Stibnite Gold Project

Wildlife and Wildlife Habitat (Including Threatened, Endangered, Proposed, Candidate, and Sensitive Species) Specialist Report

Prepared by:
USDA Forest Service
Payette National Forest

for:
Payette and Boise National Forests

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Appendix A Modeling Parameters
Appendix B Additional Information for Impacted Species and Life Histories for Special Status Species
Appendix C Canada Lynx LAU Information

List of Acronyms

AADT	Annual Average Daily Traffic
AGL	Above Ground Level
APLIC	Avian Power Line Interaction Committee
ASAOC	Administrative Settlement Agreement and Order on Consent
ATV	All-Terrain Vehicle
BG	Big Game
BGMU	Big Game Management Unit
Bighorn sheep	Rocky Mountain Bighorn Sheep
BNF	Boise National Forest
Boise Forest Plan	Boise National Forest Land and Resource Management Plan
C	ESA Candidate
CE	Categorical Exemption
CFR	Code of Federal Regulations
CR	County Road
dBA	A-weighted decibels
DBH	Diameter at Breast Height
DNA	Deoxyribonucleic Acid
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMMP	Environmental Monitoring and Management Plan
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESP	Environmental Site Potential
EVT	Existing Vegetation Type
F	Focal Species
FAA	Federal Aviation Administration
FCRNRW	Frank Church-River of No Return Wilderness
FHWA	Federal Highway Administration
Forest Service	U.S. Forest Service

FR	Forest Road
FSH	Forest Service Handbook
GMU	Game Management Unit
HRV	Historic Range and Variability
HUC	Hydrologic Unit Codes
IDEQ	Idaho Environmental Quality
IDFG	Idaho Department of Fish and Game
IRA	Inventoried Roadless Area
kV	kilovolt
LAU	Lynx Analysis Units
LCAS	Canada Lynx Conservation Assessment and Strategy
LEQ	equivalent noise level
MBTA	Migratory Bird Treaty Act
MIS	Management Indicator Species
MMP	Modified Mine Plan
ModPRO2	Perpetua's Revised Plan
NFS	National Forest System
NIDGS	Northern Idaho Ground Squirrel
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administrations
NRM	Natural Resource Manager
OHV	off-highway vehicle
OSV	over-snow vehicle
P	ESA Proposed
Payette Forest Plan	Payette National Forest Land and Resource Management Plan
Perpetua	Perpetua Resources Idaho Inc.
PIF	Partners in Flight
Plan	Plan of Operations
PM	particulate matter

PNF	Payette National Forest
PT	Proposed ESA Threatened
PTC	Permit to Construct
PVG	Potential Vegetation Groups
QEP	Qualified Eligible Participant
R4	Region 4
RAMP	Restoration and Access Management Plan
RCA	Riparian Conservation Area
RFFA	Reasonably Foreseeable Future Actions
ROW	right-of-way
S	Region 4 Sensitive
SFSR	South Fork Salmon River
SGCN	Species of Greatest Conservation Need
SGLF	Stibnite Gold Logistics Facility
SGP	Stibnite Gold Project
SPCC	Spill Prevention, Control, and Countermeasure
SOP	Standard Operating Procedure
SOPA	Schedule of Proposed Actions
T	ESA Threatened
TEPC	Threatened, endangered, proposed, or candidate
TSF	tailings storage facility
U.S.	United States
USC	United States Code
USFWS	United States Fish and Wildlife Service
VPD	vehicles per day
WCS	Wildlife Conservation Strategy
WFLHD	Western Federal Lands Highway Division

1.0 Introduction

The United States (U.S.) Department of Agriculture Forest Service (Forest Service) received the Stibnite Gold Project (SGP) Plan of Restoration and Operations, (Midas Gold Idaho, Inc. 2016) for review and approval in accordance with regulations at 36 Code of Federal Regulations (CFR) 228 Subpart A for the proposed SGP in central Idaho. A revised Plan, also known as ModPRO,[1] was submitted to the Forest Service in 2019 (Brown and Caldwell 2019). A further modified Plan, also known as ModPRO2,[2] was then submitted in October of 2021 (Perpetua 2021). Midas Gold changed their name to Perpetua Resources Idaho Inc. (Perpetua[3]) in February 2021.

The SGP would consist of mining operations, including an open pit hard rock mine and associated processing facilities, located within Valley County in central Idaho on federal, state, and private lands (**Figure 1-1**). The SGP would produce gold and silver doré, and antimony concentrate, for commercial sale by Perpetua. The SGP would have a life (construction, operation, closure, and reclamation), not including post-reclamation monitoring, of approximately 20 years, with active mining and ore processing occurring over approximately 15 years.

This specialist report describes the wildlife and wildlife habitat in the analysis area of the proposed SGP under existing (baseline) conditions. While all wildlife species are of management interest, four threatened, endangered, proposed, or candidate (TEPC) species under the Endangered Species Act (ESA) are either known to occur, or have the potential to occur, in the analysis area: Canada lynx (*Lynx canadensis*) (threatened), Northern Idaho ground squirrel (NIDGS) (*Urocitellus brunneus*) (threatened), wolverine (*Gulo gulo*) (proposed), and Monarch butterfly (*Danaus plexippus*) (candidate). Aside from species with federal status, focal species, as defined in the Boise National Forest (BNF) Wildlife Conservation Strategy were selected from habitat families to represent environmental and ecological functions that may be affected by SGP activities. Included in this analysis are Forest Service Region 4 Sensitive species which are designated by the Forest Service Regional Forester for specific regions or forests, BNF and Payette National Forest (PNF) Management Indicator Species (MIS), and Species of Greatest Conservation Need (SGCN) as identified in the BNF Wildlife Conservation Strategy (Forest Service 2010a).

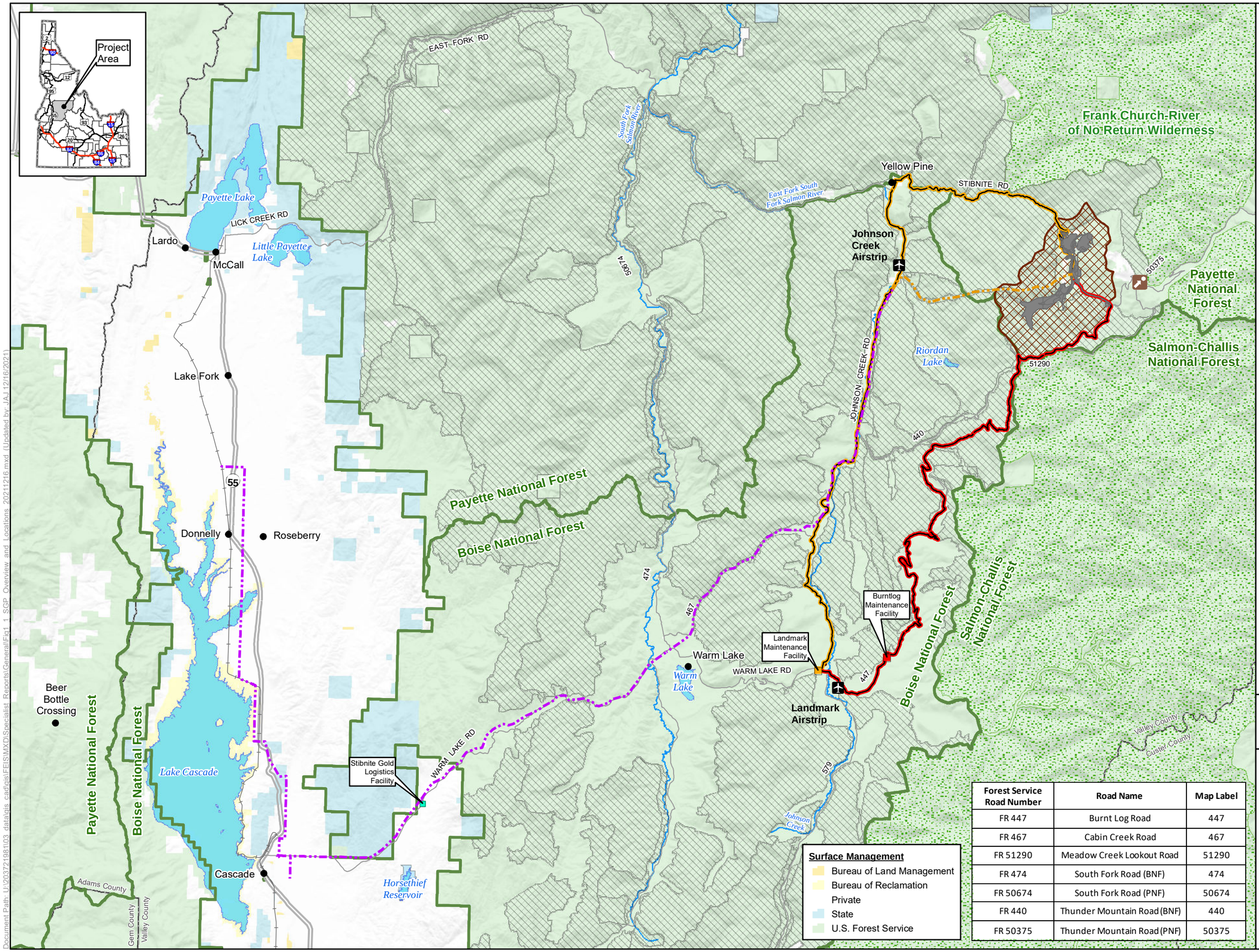
The Idaho Partners in Flight (PIF) Idaho Bird Conservation Plan (Ritter 2000) was used to identify additional migratory bird species and habitats in the wildlife analysis areas. Finally, existing conditions for several other non-special status wildlife species and big game species are included in this analysis, as they are known to occur, or have the potential to occur, in the analysis areas.

This report describes the existing (baseline) conditions (Affected Environment) relevant to wildlife species and supporting habitats that have the potential to be affected by the SGP and also evaluates the potential effects (Environmental Consequences) that the SGP could have on these species and their habitats.

[1] Associated project documents may reference the Revised Plan as the ModPRO.

[2] Associated project documents may reference the Modified Plan as the ModPRO2.

[3] Documents provided by Perpetua prior to the February 2021 name change will still be cited and referenced as Midas Gold.



LEGEND

Project Components
- SGP Features
- Operations Area Boundary

Access Roads and Trail System
- Burntlog Route *
- Johnson Creek Route

Utilities
- Upgraded Transmission Line
- New Transmission Line

Offsite Facilities
- Burntlog Maintenance Facility *
- Landmark Maintenance Facility **
- Stibnite Gold Logistics Facility

Other Features
- U.S. Forest Service
- Wilderness
- IRA and/or Forest Plan Special Area
- County
- City/Town
- Monumental Summit
- Airport/Landing Strip
- Railroad
- Highway
- Road
- Stream/River
- Lake/Reservoir

Surface Management
- Bureau of Land Management
- Bureau of Reclamation
- Private
- State
- U.S. Forest Service

Forest Service Road Number	Road Name	Map Label
FR 447	Burnt Log Road	447
FR 467	Cabin Creek Road	467
FR 51290	Meadow Creek Lookout Road	51290
FR 474	South Fork Road (BNF)	474
FR 50674	South Fork Road (PNF)	50674
FR 440	Thunder Mountain Road (BNF)	440
FR 50375	Thunder Mountain Road (PNF)	50375

* Associated with 2021 MMP only
** Associated with Johnson Creek Route Alternative only
Note:
The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road.

0 2 4 Miles
1 inch = 4 miles when printed at 11x17

Figure 1-1
SGP Overview and Location
Stibnite Gold Project
Stibnite, ID

Base Layer:
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest

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2.0 Alternatives, Including the Proposed Action

The SGP 2021 Modified Mine Plan (MMP) Alternatives Report (Forest Service 2022a) contains the details of the alternatives that are being considered and fully analyzed in this report. For reader usability, the alternatives are briefly summarized here.

2.1 No Action Alternative

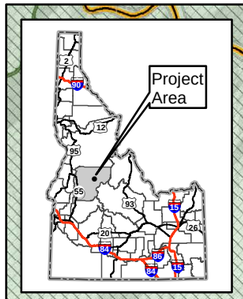
The No Action Alternative provides an environmental baseline for comparison of the action alternatives. Under the No Action Alternative, the mining, ore processing, and related activities under the 2021 MMP or the Johnson Creek Route Alternative would not take place. In addition, certain legacy and existing mining impacts would be addressed as directed in the 2021 Administrative Settlement Agreement and Order on Consent (ASAOC), including installation of stream diversion ditches designed to avoid contact of water with sources of contamination and removal of development rock and tailings currently impacting water quality. However, existing and approved activities (i.e., approved exploration activities and associated reclamation obligations) would continue and Perpetua would not be precluded from subsequently submitting another plan of operations pursuant to the General Mining Law of 1872.

2.2 2021 MMP

The 2021 MMP is based upon Perpetua's Revised Plan (ModPRO2) and is considered the Proposed Action. The description of this alternative has been updated per the Revised Plan submitted in 2021 (Perpetua 2021a). The SGP operations footprint has been modified but would still be within the previously identified Operations Area Boundary (**Figure 2-1**).

The following mine components would be common to the action alternatives:

- Mine pit locations, areal extents, and mining and backfilling methods
- Transportation management on existing and proposed roads
- Pit dewatering, surface water management, and water treatment
- Ore processing
- Lime generation
- Tailings Storage Facility (TSF) construction and operation
- TSF Buttress construction methods
- Water supply needs and uses
- Management of mine impacted water and stormwater runoff
- Electrical transmission lines
- Stibnite Gold Logistics Facility (SGLF)
- A road maintenance facility
- Surface and underground exploration
- Stibnite Gold Project worker housing facility



Surface Land Management
- Private
- U.S. Forest Service

North Security Gate
Stibnite Lake
West End Pit
Yellow Pine Pit & Backfill
Midnight Backfill
Midnight Pond
Growth Media Stockpile
Crusher ROM Stockpile Area
Scout ROM Stockpile Area
Process Plant Area
Substation
Explosives Facility
Cell Tower
Transmission Line
Water Treatment Plant
Laydown
Hangar Flats Pit Backfill, & Stockpiles
Truck Shop Area
TSF Embankment
TSF Buttress
TSF Impoundment
SODA Pond
Radio Communications Tower
Main Gate
Growth Media Stockpile
Worker Housing Facility
Radio Communications Tower

East Fork South Fork Salmon River
Sugar Creek
West End Creek
Midnight Creek
Hennessy Creek
Fiddle Creek
Garnet Creek
Robbin Creek
Blowout Creek
Meadow Creek
STIBNITE RD

T19NR09E
T18NR09E
T19NR10E
T18NR10E

Frank Church-River of No Return Wilderness
Boise National Forest
Payette National Forest
Payette National Forest
Salmon-Challis National Forest

LEGEND

Project Components *

SGP Features
- Pit Backfill
- Growth Media Stockpile
- Mining Pit
- Laydown
- Plant Site
- TSF Buttress
- TSF Liner
- Alluvial Stockpile
- Workers Housing
- Stockpile
- Explosive Facility
- Operations Area Boundary
- Patented Claim Boundary
- Tailings Pipeline
- Clean Water Diversion **
- Clean Water Diversion - Piped **
- East Fork South Fork Salmon River Tunnel ***
- Stream ****
- Pond
- Stibnite Lake
- Light Vehicle Road
- Haul Road
- Helicopter Pad

Access Roads
- Burntlog Route
- Johnson Creek Route
- Cell Tower Access Road
- Public Access Road *****

Utilities
- Transmission Line
- Substation ******
- New Cell Tower
- Existing Communication Tower

Other Features
- U.S. Forest Service
- Wilderness
- IRA and Forest Plan Special Areas
- Monumental Summit
- Road

* Project Components are associated with all Alternatives
** Some surface clean water diversions are not discernible at this figure scale (e.g., the diversions associated with the TSF/buttress north, Fiddle culvert, Midnight Outfall, Scout ROM). Please refer to Figures 2.4-14 and 2.4-15 which provide greater detail regarding the Water Management Plan and its facility/diversion locations.
*** The East Fork South Fork Salmon River Tunnel would only be utilized as a contingency to manage high flows upon completion of the restoration of the East Fork SFSR across the backfill in the Yellow Pine Pit.
**** Perennial streams are not depicted for the entire map area. Only perennial streams within the Operations Area Boundary are depicted.
***** Public Access Road associated with 2021 MMP
****** Substation locations are approximate.

0 0.35 0.7 Miles
1 inch = 0.7 miles when printed at 11x17

Figure 2-1
Mine Site Layout
Stibnite Gold Project
Stibnite, ID

Base Layer: Hillshade derived from LiDAR supplied by Midas Gold
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest

Document Path: U:\2037\216\103_data\gis_cad\gis\FEIS\MXD\Specialist Reports\General\Fig2_4-2_SGP_MineSite_Layout_20220407.mxd (Updated by JAJ 4/6/2022)

For access, the 2021 MMP would utilize Warm Lake Road, Johnson Creek Road, and Stibnite Road during construction of the proposed Burntlog Route; then once constructed, the Burntlog Route would be utilized during operations and reclamation. The actions proposed under the 2021 MMP would take place over a period of approximately 20 years, not including the long-term, post-closure environmental monitoring or potential long-term water treatment.

2.3 Johnson Creek Route Alternative

The Johnson Creek Route Alternative was developed to evaluate potential reductions in impacts to various resources. The mining portion of this alternative would be the same as under the 2021 MMP. Therefore, the primary focus of the Johnson Creek Route Alternative would be using an existing road for mine access through operations and reclamation instead of the Burntlog Route that under the 2021 MMP requires new road construction in Inventoried Roadless Areas (IRAs). The Johnson Creek Route Alternative would require extensive upgrades to both Johnson Creek Road and Stibnite Road. Construction schedule for upgrading the roads and construction of the SGP would increase from 3 years to 5 years.

The action alternatives are summarized in **Table 2-1**.

Table 2-1 Action Alternatives Summary

SGP Phase	Component/ Subcomponent	2021 MMP	Johnson Creek Route Alternative
All Phases	SGP timeline	• Construction: Approximately3 years. • Operations: Approximately 15 years. • Exploration: Approximately 17 years (during construction and operations). • Reclamation: Approximately 5 years (except for the TSF which would require an additional 9 years for tailings dewatering and consolidation). • Closure/Post-Closure Water Treatment: Approximately through Mine Year 40. • Environmental Monitoring: As long as needed.	Same as 2021 MMP except: • Construction: Approximately 5 years (upgrading the existing Johnson Creek and Stibnite Roads to provide permanent mine access).
All Phases	Access Roads	Construction/Operations: • Warm lake road from State Highway (SH) 55 to Johnson Creek Route intersection (34 miles). • Johnson Creek Route for SGP access during early construction with minor improvements within the road prism. • Burntlog Route (38 miles) for SGP access during last year of construction, mining and ore processing operations, and closure and reclamation. Includes improvements of existing segments (23 miles) and road construction for new segments (15 miles). • Up to eight borrow areas developed along Burntlog Route for materials needed for road improvements and maintenance.	• Warm lake road from SH 55 to Johnson Creek Route intersection (34 miles). • Johnson Creek Route (39 miles: Johnson Creek Road 25 miles, Stibnite Road 14 miles) upgraded and used for access throughout life of mine (LOM) instead of the Burntlog Route. • Access route around the Yellow Pine pit for public access, employee access, and deliveries of supplies and equipment to the processing, warehouse, worker housing facility, and administration areas.

SGP Phase	Component/ Subcomponent	2021 MMP	Johnson Creek Route Alternative
		• Access route around the Yellow Pine pit for public access. Closure and Reclamation: • New sections of Burntlog Route to be reclaimed after the closure and reclamation period.	• No improvements or construction of new segments for Burntlog Route. • Up to seven borrow sources developed along the Johnson Creek Route for materials needed for road improvements and maintenance. Closure and Reclamation: • Improved Johnson Creek and Stibnite roads would not be reclaimed to pre-existing conditions.
All Phases	Public Access	Construction: • Temporary groomed over-snow vehicle (OSV) trail on the west side of Johnson Creek from Trout Creek to Landmark while Burntlog Route is constructed (8 miles). • OSV trail on west side of Johnson Creek from Wapiti Meadows to Trout Creek campground closed during construction (9 miles). • OSV trail from Warm Lake to Landmark closed during construction through operations (8.5 miles). • Cabin Creek Road Groomed OSV trail (11 miles). • Public roads remain open through the SGP with temporary closures as needed to accommodate construction. Operations: • Groomed OSV trail moves from west side of Johnson Creek Road to Johnson Creek Road from Landmark to Wapiti Meadows (16.7 miles). • Stibnite Road (County Road [CR] 50-412) / Thunder Mountain Road (FR 50375) closed through the SGP. • Seasonal public access through the Operations Area Boundary provided by constructing new road through Yellow Pine pit and below mine haul road to link Stibnite Road (FR 50412) to Thunder Mountain Road (FR 50375). • Public access allowed on Burntlog Route to Thunder Mountain Road (FR 50375). Closure and Reclamation:	Construction and Operations: Same as 2021 MMP except: • OSV trail on the west side of Johnson Creek from Wapiti Meadows to Trout Creek campground would be closed from construction through mine closure (9 miles). • Groomed OSV trail on the west side of Johnson Creek from Trout Creek to Landmark lasting from construction through mine closure. Closure and Reclamation: Same as 2021 MMP.

SGP Phase	Component/ Subcomponent	2021 MMP	Johnson Creek Route Alternative
		• New road constructed over the Yellow Pine Backfill (backfilled Yellow Pine pit) connecting Stibnite Road (FR 50412) to Thunder Mountain Road (FR 50375).	
Operations	Utilities – Transmission Lines	• Upgrade approximately63 miles of the existing 12.5 kilovolt (kV) and 69 kV transmission lines. • New approximate 9-mile, 138 kV line would be constructed from the Johnson Creek substation to a new substation at the mine site. • Upgrade the substations located at Oxbow Dam, Horse Flat, McCall, Lake Fork, and Warm Lake. • Reroute approximately 5.4 miles of transmission line to avoid the Thunder Mountain Estates subdivision. • Reroute approximately 0.9 miles of transmission line between Cascade and Donnelly to use an old railroad grade on private property. • Installation of approximately 3 miles of new underground distribution line along Johnson Creek Road from the Johnson Creek substation south to Wapiti Meadows.	Same as 2021 MMP.
Operations	Utilities - Communication Towers and Repeater Sites	• One cell tower located north of the Hangar Flats pit. • Locations along Burntlog Route for very high frequency (VHF) repeater sites. • Use existing access roads to repeater site locations along Burntlog Route. • Communication site at the SGLF. • Upgrades to existing communication site.	Same as 2021 MMP except: • Cell tower sites constructed and maintained using helicopter (instead of constructing access roads) for sites within IRAs managed for Backcountry/Restoration. • Locations along Johnson Creek route for repeater sites.
Operations	Off-site Maintenance Facility	• SGLF located along Warm Lake Road. • Burntlog Maintenance Facility located at one of the borrow source locations 4.4 miles east of the junction of Johnson Creek Road and Warm Lake Road along the proposed Burntlog Route.	• SGLF same as 2021 MMP • Landmark Maintenance Facility located at junction of Warm Lake Road at Johnson Creek Road.
Closure and Reclamation	Access road segments	• Removal and reclamation of new road segments constructed for Burntlog Route. • Return of previously existing road segments to pre-construction width and condition.	• No removal or reclamation of pre-existing access routes.

Source: Perpetua 2021a

2.4 Environmental Design Features

The SGP must comply with all laws and regulations that apply to the proposed activities (Forest Service 2022a). Standards and guidelines in the Payette and Boise National Forest Land and Resource Management Plans (Forest Service 2003a, 2010b) that are designed to reduce or prevent undesirable impacts resulting from proposed management activities are incorporated into the action alternatives by reference. In addition, best management practices outlined in the Best Management Practices for Mining in Idaho (Idaho Department of Lands 1992) would be implemented where appropriate and applicable for operations to minimize site disturbance from mining and drilling activities.

In the design of the 2021 MMP, Perpetua has already considered many of the potential environmental impacts that might be caused by the SGP. This has led to an internal evaluation of project design features and operational characteristics that may have the effect of reducing and/or eliminating potential environmental impacts of the SGP. Such project-specific measures intended by a proponent to inherently reduce and/or avoid potential environmental impacts of a proposed action are referred to as environmental "design features".

Based on the application of permits and regulatory compliance requirements (Forest Service 2022a) to the project, regulatory requirements, standards and guidelines, best management practices, and likely permit conditions are listed in **Table 2-2**. The environmental design features that have been proposed and committed to by the proponent are listed in **Table 2-3**. All of these environmental design measures have been assumed to be effective in conducting the environmental analysis presented in **Section 7.0**.

Table 2-2 Prominent Regulatory and Forest Plan Requirements for Wildlife and Wildlife Habitat

Description	Type	Reference
The proponent will prepare a dust mitigation plan with appropriate schedule or triggers for control deemed adequate by IDEQ to achieve the level of control of 93 percent of dust (as submitted in the proponent's draft application for Permit to Construct from IDEQ). Alternatively, the proponent could employ particulate matter or opacity monitors deemed adequate by IDEQ and the Forest Service and immediately apply water or chemical dust control when PM or opacity monitors reach levels within 10 percent of the threshold determined by IDEQ.	IDEQ Permit	IDEQ Permit to Construct
The operator will immediately report any fuel, oil, or chemical discharges or spills greater than 25 gallons on land, or any spill directly in a stream to IDEQ, Forest Service, United States Fish and Wildlife Service (USFWS), and the National Oceanic and Atmospheric Administrations (NOAA) Fisheries as required by applicable federal and state regulations by phone and/or fax (or as soon as possible after on-site containment efforts are implemented as per the spill prevention, control, and countermeasure [SPCC] plan), and initiate emergency consultation.	Regulatory Requirement	50 CFR 402.05

Description	Type	Reference
Prohibit solid and sanitary waste facilities in RCAs. If no alternative to locating mine waste (waste rock, spent ore, tailings) facilities in RCAs exists, then: a) Analyze waste material using the best conventional methods and analytic techniques to determine its chemical and physical stability characteristics. b) Locate and design waste facilities using the best conventional geochemical and geotechnical predictive tools to ensure mass stability and prevent the release of acid or toxic materials. If the best conventional technology is not sufficient to prevent such releases and ensure stability over the long term, and such releases or instability would result in exceedance of established water quality standards or would degrade surface resources, prohibit such facilities in RCAs. c) Monitor waste and waste facilities to confirm predictions of chemical and physical stability and make adjustments to operations as needed to avoid degrading effects to beneficial uses and native and desired non-native fish and their habitats. d) Reclaim and monitor waste facilities to ensure chemical and physical stability and revegetation to avoid degrading effects to beneficial uses and native and desired non-native fish and their habitats. e) Require reclamation bonds adequate to ensure long-term chemical and physical stability and successful revegetation of mine waste facilities.	FP Component	BNF and PNF: MIST09
A Spill Prevention, Containment, and Control Plan (SPCC) shall be prepared in accordance with 49 CFR parts 171 through 180, including packaging, transportation, incident reporting, and incident response. Include the following items within the SPCC Plan: During off-loading of fuel from fuel vehicles or during refueling operations have a standard marine-type fuel containment boom (which would be of sufficient length for a worst-case discharge), spill prevention kit, and fire kit readily available on site. Store two or more spill containment/response caches along each of the fuel delivery routes. Spill response team will carry sufficient containment equipment for one full fuel tanker. Include the Forest Service as a party to be notified in the event of a hazardous materials spill. Intake pumps, engines, fuel storage, fuel containment site, and other equipment with fuel or lubricants would be inspected at each refueling and periodically between refueling for leakage or spillage. Pilot and emergency spill response vehicles would carry appropriate containment and first aid equipment. All fuel containers would be marked with contents, owner's name and contact information. Material Safety and Data Sheets for all products would be posted and available on site with the SPCC plan. Intake pumps would not be situated within the active stream/ditch channel and would be placed within containment vessels capable of holding 120 percent of the pump engine's fuel, engine oil and hydraulic fluid. The smallest practical pump and intake hose would be used. Following large storm events, the intake pumps would be inspected to determine if stream flow has encroached into the pump area and if the pump needs to be moved so it remains above flowing water.	Regulatory Requirement and Design Features	49 CFR 171

Description	Type	Reference
A spill prevention and clean-up kit would be placed at the intake pump site and would consist of absorbent pads and/or boom (which would be sufficient length for a worst-case discharge), drip pan, a shovel, and a fire extinguisher. Spare fuel for the water intake pump would be stored in approved [29 CFR 1926.152(a)(1)] fuel storage containers placed into a secondary containment vessel capable of holding at least 120 percent of the volume of the fuel in the fuel container. A copy of the SPCC plan would be kept at an appropriate on-site facility.		
All Forest Service, county and state speed limits, road restrictions and load limits will be observed by staff and contractors during travel. Personnel and contractors will be encouraged to drive at speeds appropriate for reducing the possibility of vehicle- wildlife accidents. Vehicles will be requested to slow down to speeds necessary to minimize the fugitive dust generation or the route watered if significant dust generation is produced during vehicle travel. If appropriate, during equipment mobilization and demobilization, pilot cars will be used to ensure appropriate speed and reduce potential for conflicts or incidents along the narrow access roads leading into the project area.	Design Feature	
To accommodate floods, including associated bedload and debris, new culverts, replacement culverts, and other stream crossings would be designed to accommodate a 100-year flood recurrence interval unless site-specific analysis using calculated risk tools or another method, determines a more appropriate recurrence interval.	FP Component	BNF and PNF: FRST02
Handling of road waste material (e.g., slough, rocks) would avoid or minimize delivery of waste material to streams that would result in degradation of soil, water, riparian, and aquatic resources.	Design Feature	Design Feature developed for compliance with BNF and PNF: FRST05
The proponent will coordinate with Forest biologists to consider TEPC habitat needs when designing and implementing facilities and management activities that may affect TEPC species and their habitats.	Design Feature	BNF and PNF: Developed in response to BTGU02, BTGU05, TEGU06, TEGU07, TEST09, TEST10, TEST13, BTST01,BTST02, WIST03
Impacts to known nests, denning sites, winter roosting sites, and hibernacula (bats) of TEPC and Sensitive wildlife species will be avoided during the nesting or denning period whenever possible. If impacts cannot be avoided, specific mitigation measures would be developed to minimize impacts, maintain key features of habitat, or to avoid disruption on a case-by-case basis through coordination with Forest Service wildlife biologists.	FP Component	BNF and PNF: TEST12 WIST03
Mud sumps used for drilling operations will have perimeter fencing to keep wildlife from accidently falling into the excavation.	Design Feature	

Description	Type	Reference
To prevent inadvertent entrapment of common and special-status wildlife during construction, all excavated, steep-walled holes or trenches more than two feet deep will be covered with tarp, plywood, or similar materials at the close of each working day to prevent animals from being trapped. Ramps may be constructed of earth fill or wooden planks within deep walled trenches to allow for animals to escape, if necessary. Before such holes or trenches are backfilled, they would be thoroughly inspected for trapped animals. If trapped wildlife are observed, escape ramps or structures will be installed immediately to allow escape.	Design Feature	WIST06
Potential drill pad sites adjacent to any open mine workings or natural caves will be observed for the presence of bats. If necessary to maintain key features of habitat or to avoid disruption, activities will be modified in coordination with the Forest Service.	FP Component	BNF and PNF: WIST04
To the extent possible, trees and snags found to contain nesting cavities would not be disturbed or cut. No trees with active nests would be cut. Exceptions: Mine Site and New Road Construction: Land clearing activities in areas where complete vegetation removal (greater than 0.5 acres) is necessary, these activities will not occur until after the bird breeding season (March 1 through July 30th) for migratory and resident birds. Power line construction and upgrades: Land clearing activities in areas where complete vegetation removal is necessary will not occur until after the bird breeding season (March 1 through July 30th) for migratory and resident birds.	Design Feature	BNF and PNF: Developed in response to WIST03; EO 13186
Potential water sources will be surveyed by Perpetua in coordination with the Forest Service for Columbia spotted frog egg masses and other amphibians after ice melt and avoid disturbing any water sources with identified egg masses or other species. Exceptions: If egg masses are found at a water source essential for project activities, the egg masses would be relocated in coordination with the Forest Service wildlife biologist.	Design Feature	BNF and PNF: Developed in response to WIST03
The Forest Service wildlife biologist would be notified of any sightings of TEPC or Sensitive wildlife species, including, occupied sensitive species nests or dens encountered during implementation. If necessary to maintain key features of nesting/denning habitat or to avoid disruption of nesting/denning activities, prescribed activities would be modified in accordance with the Forest Service wildlife biologist.	Design Feature	Design Feature developed for compliance with BNF and PNF: WIST03, TEST12
Where practicable, monitoring of high elevation habitats characteristic of wolverine denning habitat would be done in cooperation with State fish and game agencies.	Design Feature	Design Feature developed for compliance with BNF: WIGU17
Any adverse wildlife encounters will be reported to the Forest Service and/or appropriate State and federal wildlife managers.	Design Feature	
To minimize the risk of collisions: Install wildlife friendly culverts for rodents and small mammals. Remove road-kill carcasses regularly to prevent scavenging and bird congregations along roadways. Eliminate use of steady burning lights on tall structures (e.g., >200 ft).	Design Feature	

Description	Type	Reference
To minimize adverse effects of lighting to TEPC, MIS, or Sensitive species, where necessary and in accordance with MSHA and OSHA, the proponent could utilize actions in line with, but not limited to, the below: To the extent practicable, limit construction activities to the time between dawn and dusk. Utilize, where possible, use down shielding or directional lighting such as 'Cobra' style lights rather than an omnidirectional light system. While allowing for public and worker safety, utilize low intensity energy saving lighting (e.g., low pressure sodium lamps). If possible, minimize illumination of lighting on associated construction or operation structures by using motion sensors or heat sensors. If possible, place light shields over outside lights, confining light to the immediate area. Whisper Quiet light plants could be utilized used to mitigate visual impacts from night operations.	Design Feature	Design Feature developed for compliance with BNF and PNF: WIST03, WIST04, TEST29
Communication towers should not be sited in or near wetlands, or other known bird concentration or high use areas (e.g., riparian corridors), in known migratory or daily movement flyways. Towers should not be sited in areas with a high incidence of fog, mist, and low ceilings.	Design Feature	
For new communications towers no more than 199 feet above ground level (AGL), use construction techniques which do not require guy wires (e.g., use a lattice structure, monopole, etc.). Such towers should be unlighted if Federal Aviation Administration regulations permit. If taller (>199 feet AGL) towers requiring lights for aviation safety must be constructed, the minimum amount of pilot warning and obstruction avoidance lighting required by the Federal Aviation Administration (FAA) should be used. Unless otherwise required by the FAA, only white (preferable) or red strobe lights should be used at night, and these should be the minimum number, minimum intensity, and minimum number of flashes per minute (longest duration between flashes) allowable by the FAA. The use of solid red or pulsating red warning lights at night should be avoided.	Design Feature	
Garbage and trash will be removed from National Forest System lands regularly and disposed of in an IDEQ-approved waste disposal facility. Food and garbage will be stored either indoors, in vehicles, or if outside, in wildlife-proof containers. No garbage will be burned.	FP Component	BNF and PNF: MIGU04
To minimize adverse effects of noise to TEPC, MIS, or Sensitive species, where necessary and in accordance with MSHA and OSHA, the proponent could utilize actions in line with, but not limited to, the below: Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Temporary wooden structure could be erected around portions of the drill, pumps, and heaters, with acoustic absorbent panels. These temporary structures would not be put in place if they created safety issues related to exhaust vapor build-up. When feasible, activities such as helicopter use and blasting, could be scheduled at the same time.	Design Feature	Design Feature developed for compliance with BNF and PNF: WIST03, WIST04 TEST29

Description	Type	Reference
Design and implement projects within occupied habitats of Sensitive species to help prevent them from becoming listed. Use Forest Service-approved portions of Conservation Strategies and Agreements, as appropriate, in the management of Sensitive species habitat to keep management actions from contributing to a trend toward listing for these species.	FP Component	BNF and PNF: WIST02
Allow no net increase in groomed or designated over-the-snow routes or play areas, outside of baseline areas of consistent snow compaction, by LAU or in combination with immediately adjacent LAUs unless the Biological Assessment demonstrates the grooming or designation serves to consolidate use and improve lynx habitat. This does not apply within permitted ski area boundaries, to winter logging, and access to private inholdings. Permits, authorizations, or agreements could expand into baseline routes or areas of existing snow compaction, and grooming could expand to routes of existing snow compaction and routes that have been designated but not groomed in the past and still comply with this standard.	FP Component	BNF and PNF: TEST34
Mitigate management actions within known winter roosting sites or hibernacula (bats) of Sensitive species if those actions would measurably reduce the survival of wintering or roosting populations. Sites, periods, and mitigation measures will be determined during project planning.	FP Component	BNF and PNF: WIST04
To mitigate impacts to known nesting or denning sites of MIS or Sensitive species, land clearing activities in areas where complete vegetation removal is necessary greater than 0.5 acres would not occur, to the extent possible, until after the bird breeding season (April 1 through July 30th) for migratory and resident birds. This design feature does not apply to the mine site, road construction or maintenance, hazard tree felling, or the power line upgrades and construction.	Design Feature	Design Feature developed for compliance with BNF and PNF: WIST03

Table 2-3 Perpetua Proposed Design Features

Description
Proper dust control would be employed along transportation corridors and active mining areas using aquatic safe dust suppression chemicals and methods.
Access and mine site haul road crossings of fish bearing streams would be designed such that structures installed or constructed allow fish passage.
Perpetua would repair and rehabilitate habitats adversely affected by historical mining impacts in the SGP area.
Minor surface improvements (e.g., ditch and culvert repair, adding gravel, winter snow removal, and summer dust suppression) would occur on the Yellow Pine Route to reduce sediment runoff and dust generation.
Identifying and removing legacy hazardous materials for appropriate disposal, minimizing hazardous and non-hazardous materials generation, and properly disposing of all wastes.
Personnel transporting, handling, or using any hazardous chemicals (including sodium cyanide) would be trained to ensure the safe use of such materials. Perpetua would design, construct, and manage facilities to conform to International Cyanide Management Institute code.
Fuel and other petroleum products at the site would be stored in above ground containment structures, with appropriate secondary containment measures.
The ore processing facility building would be enclosed.
Appropriate sound dampening and muffling equipment would be utilized to minimize noise excursion from equipment and facilities. When possible, schedule high noise activities at the same time. Monitor and maintain equipment to reduce noise related impacts.

Description
When practicable, pumps, generators, and engines would be turned off when not in use to avoid unnecessary noise generation and reduce energy consumption.
Electric line power would be utilized during operations to eliminate diesel generator noise, except in emergency situations when grid power is down or temporary use in remote areas where it is not practical to run power lines.
Lighting would be managed within active mining areas to avoid unintended lighting of natural, wildlife usage areas. External lighting would be kept to the minimum required for safety and security purposes. Lights would be directed down toward the interior of the mine site and shielded, where appropriate.
Perpetua would be responsible for noxious weed control within areas disturbed by SGP activities.
During closure of mining operations, Perpetua Resources would replant where impacted by mining and/or forest fires to enhance vegetative cover and wildlife habitat. The revegetation plan includes a combination of seeding and planting to establish self-sustaining perennial and desirable plant communities.
Runoff generated from direct precipitation on the TSF would be retained in the TSF water pool for reclaim to the ore processing circuit.
During Burntlog Route and mine site haul road construction and use, Perpetua would install and maintain sediment control measures and devices, such as culverts, culvert inlet protection devices, ditching, silt fencing, straw wattles, straw bales, and sediment catch basins.
Placing sub-base material and surfacing with gravel and localized sections of road with binders to provide a stable long-term roadway and reduce sediment runoff.
During winter road maintenance, Perpetua would remove snow from the Burntlog Route and haul roads at the mine site and the temporary construction access Yellow Pine Route. Perpetua would avoid disposal of snow in riparian areas, wetlands, or areas where snowmelt might cause road damage or erosion during spring melt. Care would also be taken to dispose of collected snow, which may contain sand or gravel, in a manner that avoids impacts to nearby streams and rivers.
Perpetua would use coarse sand for winter sanding of the main access road and mine site haul roads in combination with gravel as needed.
Perpetua would maintain a recycling program at the mine site.
In order to reduce attractants, during construction and operations, trash and other miscellaneous inert (non-hazardous) garbage would be placed in the onsite landfill or contained in onsite wildlife-resistant containers and hauled to the Valley County waste transfer station for disposal. Used oils, solvents, grease, and antifreeze would be handled separately from normal trash and garbage. Good housekeeping practices would include minimizing loose trash, odors, and access for wildlife to trash storage or disposal areas and prompt removal of trash.
Implement an Avian Protection Plan at the mine site for transmission lines, including designing power lines and poles to minimize potential bird mortalities due to electrocution. Develop procedures for managing nests of protected species on utility structures (if nests are built).
Electric power structures to serve the SGP facilities would be designed and constructed to avoid raptor perching on structures for predation purposes and minimize the risk of their being electrocuted.
Construct and operate all overhead powerlines/transmission lines and related facilities in accordance with Avian Power Line Interaction Committee (APLIC) suggested practices (APLIC 2006).
Perpetua would plan routine inspections of TSF facilities for wildlife use. If needed, Perpetua would implement measures to remove wildlife and install additional BMPs to reduce wildlife exposure to these areas.
The qualified eligible participant (QEP) or qualified contractor would look for evidence of nesting, breeding, and migration of terrestrial wildlife to avoid and minimize wildlife impacts during ground disturbing construction related activities.
Calving and fawning areas would be protected from disturbance during big game calving or fawning. If calving or fawning is encountered during construction activities, activity would be modified to the extent practicable in coordination with USFS. Perpetua would consult with USFS regarding thermal cover on big game winter ranges.

Description
If critical wildlife zones or corridors are identified, require restricted or seasonal access prior to construction or expansion activities - install physical barriers and/or signage identifying these areas and develop site-specific measures to minimize impacts.
Implement seasonal and spatial restrictions during breeding seasons for raptors and other migratory birds. Based on the species known to be present in the SGP area combined with the types of activities, the following measures would be completed prior to a construction or expansion phase – Conduct pre-construction surveys for the species of concern. Inspect snags and logs before removal for maintenance, construction, and operations. Identify active nests in areas to be disturbed by construction or expansion and either maintain a minimum 500-foot distance or work during non-breeding season. These measures do not pertain to the active mining zones.
To the extent possible, trees found to contain nesting cavities would not be disturbed or removed. No trees with active nests would be removed. Activities would be modified when practicable to maintain key features of nesting/denning habitat or to avoid disruption of nesting/denning activities.
Perpetua would implement an animal trapping and relocation plan, as necessary, for nuisance species for safety of staff, visitors, and animals.
Perpetua would install wildlife exclusion fences along and around the ore processing facilities, TSF, explosive storage areas, and composting/landfill, excluding pit perimeters and high walls.
Perpetua would install signs of known wildlife crossing and usage areas along access and mine site haul road corridors and all active facility areas. Locations are yet to be determined but signs would be installed to state the road name and mile markers where these corridors are known to exist. These would also be referenced in the training materials.
Perpetua would provide tiered training for awareness, sighting, operations and maintenance, and restoration. Cross training to include noxious weeds, maintenance needs, unsafe conditions, etc., as well as reporting mechanisms. All mine personnel and visitors would receive some level of training tiered appropriately based on where they are working, type of work activities, and reason for mine visit. Forms would be developed to document training and identify how often training needs to be refreshed. Fact sheets would be developed on known wildlife in the area including pictures, warnings, and what to do if encountered.
Perpetua would design and manage the TSF and associated facilities to reduce bird attraction. These include the following – Surface area of the supernatant pond would be minimized to the extent practicable. Install an 8-foot fence around the TSF facility to exclude wildlife from the facility. Implement an avian mortality reporting system for the TSF and contact water ponds. Use skirting to enclose open spaces as necessary beneath raised structures as practical. Follow the International Cyanide Management Code to avoid features possibly attractive to wildlife, as feasible.
Erosion control techniques at the SGP would include mulching, wetland sodding; planting of vegetation to stabilize slopes; and use of silt fences, biofilters, brush mats, erosion control fabric, and/or fiber rolls along temporary swales, perimeter dikes, and stream banks. In addition, to minimize human disturbance, permanent signage would be posted around the perimeter of individual project sites to prohibit unauthorized foot traffic and the use of all-terrain vehicles and motorbikes, dumping, draining, and cutting and/or removal of plant materials.
Sumps would be constructed with at least one side having a shallow grade for wildlife egress. Sumps would be backfilled and reclaimed when no longer needed for drilling.
Mine site facilities would be monitored in accordance with the draft Environmental Monitoring and Management Plan (EMMP) for the presence and potential mortality of birds, mammals, reptiles, and amphibians. Sightings of rare or sensitive wildlife, along with any wildlife mortalities, would be recorded and provided in periodic reports to the Forest Service, USFWS, and Idaho Department of Fish and Game.
Perpetua would provide mine personnel with mobile deterrents to avoid conflicts with wildlife – sprays, air horns, etc.

Description
Perpetua would establish and post speed limits for the Burntlog Route, mine site haul roads, and light vehicle access roads on the SGP site. Slower speed limits would be posted at known wildlife crossings and along defined migratory corridors during migration season.
There would be no hunting or discharge of firearms during construction and operations within the SGP area by SGP employees and contractors. The mine site would be posted to prohibit hunting, and employees would be prohibited from carrying firearms within the Operations Area Boundary.
Perpetua would employ vegetation maintenance for safety along roads, removal of hazard trees, and riparian conservation areas, etc. – coordinate such that wildlife protection and restoration are incorporated during maintenance.

In addition to the Prominent Regulatory and Forest Plan Requirements for Wildlife and Wildlife Habitat listed in **Table 2-2** and the proposed design features listed in **Table 2-3**, Perpetua has proposed additional environmental measures for the SGP as described in the following documents:

- Stibnite Gold Mitigation Plan (Perpetua 2021b)
- Fisheries and Aquatic Resources Mitigation Plan (Brown and Caldwell, Rio Applied Science, and Engineering, and Perpetua 2021)
- Conceptual Stream and Wetland Mitigation Plan (CMP) (Tetra Tech 2021)

3.0 Relevant Laws, Regulations, and Policy

3.1 Land and Resource Management Plans

Physical, social, and biological resources on National Forest System (NFS) lands are managed to achieve a desired condition that supports a broad range of biodiversity and social and economic opportunity. National Forest Land and Resource Management Plans embody the provisions of the National Forest Management Act and guide natural resource management activities on NFS land.

- In the SGP area, the Payette National Forest Land and Resource Management Plan (Payette Forest Plan; Forest Service 2003a), and the Boise National Forest Land and Resource Management Plan (Boise Forest Plan; Forest Service 2010b) provide management prescriptions designed to realize goals for achieving desired conditions for wildlife and wildlife habitat and include various objectives, guidelines, and standards for this purpose.
- The Payette and Boise Forest Plans include management direction for wildlife and wildlife habitat, including TEPC species. The Forest Plans prescribe management direction in order to achieve the desired outcomes and conditions for wildlife and wildlife habitat. Both the Payette and Boise Forest Plans have numerous goals, objectives, guidelines, and standards related to special status and general wildlife species.

3.2 Federal Law

3.2.1 Endangered Species Act

The ESA (16 United States Code [USC] 35 1531 et seq. 1988) provides for the protection and conservation of threatened and endangered species and their critical habitats.

Section 7 of the ESA (16 USC 35.1531 et seq.) requires all federal agencies to consult or confer with the USFWS and/or the National Marine Fisheries Service (NMFS or NOAA Fisheries), collectively known as "the Services", which share regulatory authority for implementing the ESA. Federal agencies must submit a Section 7 package for proposed actions that may affect ESA-listed species, species proposed for listing, or designated critical habitat for such species. The USFWS generally manages ESA-listed terrestrial and freshwater plant and animal species. NOAA Fisheries is responsible for marine species, including anadromous fish when present in freshwater.

"Critical habitat" is defined by the ESA as specific areas within the geographical area occupied by listed species at the time of listing that contains the physical or biological features essential to conservation of the species and that may require special management considerations or protection, and specific areas outside the geographical area occupied by the species, if the agency determines that the outside area itself is essential for conservation (50 Code of Federal Regulations 424).

The first step of the overall consultation process is an "informal" consultation with one or both of the Services to determine if the proposed action is likely to affect any listed species, species proposed for listing, or designated critical habitat in the analysis area. The federal agency taking the action or the "action agency" (i.e., the Forest Service in the case of the proposed SGP) may prepare a Biological Assessment to aid in determining a project's effects on listed or proposed species or designated critical habitat. If the action agency determines that the action is likely to adversely affect ESA-listed or proposed species or designated critical habitat, then the action agency enters into "formal" consultation. The USFWS and/or NOAA Fisheries prepare(s) a Biological Opinion; jointly or separately, (if both Services are involved with the project) and determines whether the action is likely to jeopardize the continued existence of the species or adversely modify critical habitat. If there is an anticipated "incidental take" (i.e., "take"; see definition at 50 Code of Federal Regulations 402.02) of a species, one or both of the Services must issue an Incidental Take Statement that includes terms and conditions and reasonable and prudent measures that must be followed to eliminate or minimize impacts to the species or its critical habitat.

3.2.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 USC 703–712) provides protection for all migratory bird species. The MBTA specifically prohibits any action to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention for the protection of migratory birds or any part, nest, or egg of any such bird." (16 USC 703). The list of migratory bird species protected by this law is based on bird families and is periodically updated. The current list of migratory bird species can be found in 50 Code of Federal Regulations Part 10.13.

3.2.3 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC 668-668d) provides protection for bald and golden eagles, including prohibition of interference with normal foraging, nesting, and rearing activities. This protection is separate from any ESA designation for either species. Additionally, the USFWS has developed the National Bald Eagle Management Guidelines to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the provisions of the Bald and Golden Eagle Protection Act may apply to their activities.

3.2.4 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (Act of March 10, 1934) authorizes the Secretaries of Agriculture and Commerce to provide assistance to, and cooperate with, federal and state agencies to protect, rear, stock, and increase the supply of game and fur-bearing animals, as well as to study the effects of domestic sewage, trade wastes, and other polluting substances on wildlife. Amendments enacted in 1946 require consultation with the USFWS and the fish and wildlife agencies of states where the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted or otherwise controlled or modified" by any agency under a federal permit or license. Consultation is to be undertaken for the purpose of "preventing loss of and damage to wildlife resources."

The amendments also re-titled the law as the USFWS Coordination Act and expanded the instances in which diversions or modifications to waterbodies would require consultation with the USFWS. These amendments permitted lands valuable to the Migratory Bird Management Program to be made available to the state agency exercising control over wildlife resources.

3.2.5 Executive Orders

3.2.5.1 Migratory Birds, EO 13186 of January 10, 2001

Executive Order 13186 Responsibilities of Federal Agencies to Protect Migratory Birds (66 Federal Register 3853; January 2001) directs federal agencies to protect migratory birds. The U.S. Department of Agriculture, Forest Service, and the USFWS signed a memorandum of understanding in December 2018 that outlines a collaborative approach to promote the conservation of migratory bird populations. The memorandum of understanding between the Forest Service and USFWS was designed to complement Executive Order 13186.

3.2.5.2 Hunting Heritage and Wildlife Conservation, EO 13443 of August 20, 2007

Executive Order 13443 Facilitation of Hunting Heritage and Wildlife Conservation (72 Federal Register 46537, August 20, 2007) directs appropriate federal agencies to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

3.2.6 State and Local Law

Idaho Code (Title 36) establishes the Idaho Fish and Wildlife Commission and the IDFG. It establishes fish and wildlife as the property of the citizens of Idaho and gives authority to IDFG to protect, preserve, perpetuate, and manage the state's fish and wildlife resources. The Commission has approved several fish and wildlife management plans that are relevant to the SGP. These include the Idaho Mule Deer Management Plan 2008-2017, the Idaho Elk Management Plan 2014-2024, the Management Plan for the Conservation of Wolverines in Idaho 2014-2019, and the Idaho State Wildlife Action Plan.

4.0 Issues and Resource Indicators

4.1 Significant Issues

Significant issues are those which are used to formulate alternatives to the Proposed Action and to develop mitigation measures. No significant issues were identified for wildlife and wildlife habitat.

4.2 Resource Indicators and Measures

Although wildlife and wildlife habitat were not identified as a significant issue, it was identified by the public, the Forest Service, and cooperating agencies as a relevant consideration. The analysis of effects on wildlife and wildlife habitat includes the following issues and indicators:

Issue: The SGP may cause changes in wildlife habitat in the analysis area that may affect wildlife species including special-status species (threatened, endangered, proposed, MIS, and sensitive).

Indicators:

- Acres of general wildlife habitat disturbed.
- Acres of special-status wildlife habitat disturbed.
- Acres of disturbance to other high-value habitats such as crucial and or high-value big game ranges, wetlands, and seep and spring areas.
- Change in noise levels (in decibels) in, or in proximity to, wildlife habitat.
- Miles of new roads proposed for the SGP.
- Acres of disturbance for new and upgraded transmission lines.

Issue: The SGP may affect wildlife by introducing barriers to movement, including the mine site, infrastructure, new/existing maintained roads, new transmission line.

Indicators:

- Length of potential movement barriers.

Issue: The SGP may affect wildlife by potentially increasing the risk of direct injury or mortality.

Indicators:

- Amount of increased traffic along the access routes, or acres of ground disturbance for less-mobile species.
- Miles of new roads and transmission lines.
- Miles of existing roads that are not currently plowed that would be plowed.

5.0 Methodology

Appendix A of the Payette National Forest Land and Resource Management Plan (Payette Forest Plan) (Forest Service 2003a) identifies desired conditions for tree size class, canopy cover class, species composition, snags, and coarse woody debris, using the historical range and variability (HRV) as the reference condition. These same components are used to predict changes in modeled source habitat for wildlife species at a landscape scale. SGP-related and site-specific data on patterns of habitat distribution and specific habitat features are used for the wildlife analysis. For many wildlife species, the complexity of habitat structure and association with other resources requires the addition of a fine-scale analysis at the qualitative level.

Existing habitat conditions for focal wildlife species were developed using habitat models originally designed for the 2003 Payette Forest Plan revision. These wildlife habitat models were recently updated for the PNF using the best available science, including information from models developed for the BNF Wildlife Conservation Strategy (Nutt et al. 2010), recent scientific literature, and PNF and BNF wildlife research data and survey reports. A summary of modeling parameters for existing source habitat for each species analyzed is documented in **Appendix A**. The baseline data for this analysis were developed from the following data sources:

- Forest Service corporate database, Natural Resource Manager (NRM), Natural Resources Inventory System Wildlife.
- Idaho Department of Fish and Game (IDFG) database, Idaho Fish and Wildlife Information System.
- Surveys and survey reports prepared for the SGP.
- Wildlife surveys conducted in different portions of the SGP area over the last decade, including peer-reviewed research.

5.1 Analysis Area

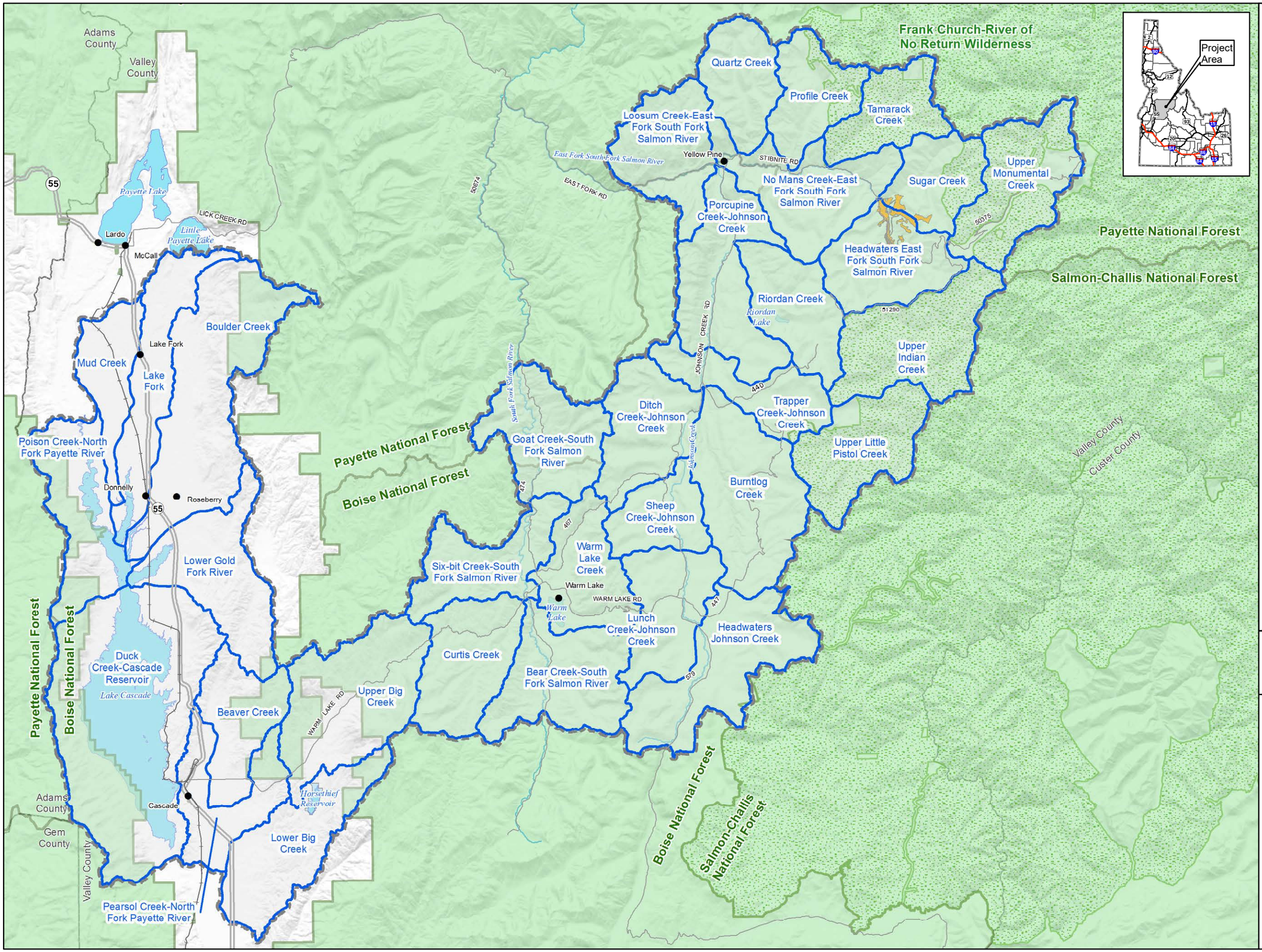
The wildlife analysis area covers approximately 613,793 acres of land, with 253,654 acres (41 percent) on the BNF, 127,487 acres (21 percent) on the PNF, 39,988 acres (7 percent) on the Salmon-Challis National Forest (acres that would be directly impacted by the SGP are administered by the PNF), and 192,664 acres (31 percent) outside Forest Service boundaries. The analysis area is shown in **Figure 5-1**.

5.1.1 Direct/Indirect Effects Boundaries

Due to the size, scale, and complexity of the proposed SGP, several methods were used to define analysis areas for wildlife species. The wildlife analysis area for upland or riparian wildlife species (including Region 4 Sensitive or MIS), utilizes 6th-level Hydrologic Unit Codes (HUC) at the 12-digit scale (HUC 12) subwatershed boundaries (**Figure 5-1** and **Table 5-1**). HUCs used in this analysis are local subwatershed levels that encompass tributary stream systems. Analysis areas also were developed for TEPC species (**Section 5.2.4**) based on peer-reviewed species-specific models.

5.1.2 Cumulative Effects Boundaries

Effects of other past, present, and reasonably foreseeable future actions may cumulatively impact a resource if these actions overlap spatially with the potential direct and indirect effects of a proposed project. As such, the cumulative effects boundaries for wildlife and wildlife habitat that could be directly or indirectly affected by the SGP consists of the same analysis areas described in **Section 5.1.1** and detailed in **Section 5.2**.



LEGEND

- Sixth-Level Hydrological Units
- Wildlife Analysis Area

Other Features

- U.S. Forest Service
- Wilderness
- Stibnite Historic Disturbance
- County
- City/Town
- Railroad
- State Highway
- Road
- Lake/Reservoir
- Stream/River

Note:
The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles
when printed at 11x17

Figure 5-1
Wildlife Analysis Area
Sixth-Level Hydrological Units
Stibnite Gold Project

Habitat model inputs are within the Payette and Boise National Forests Administrative Boundaries. Input data does not exist off-Forest or on the Salmon-Challis National Forest for the models used.
Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

Table 5-1 HUC 12 Name and Acres in Wildlife Analysis Area

HUC 12 Name	HUC 12 Acres
Bear Creek-South Fork Salmon River	20,191
Beaver Creek	13,661
Boulder Creek	34,865
Burntlog Creek	25,204
Curtis Creek	17,476
Ditch Creek-Johnson Creek	16,239
Duck Creek-Cascade Reservoir	55,596
Goat Creek-South Fork Salmon River	17,877
Headwaters East Fork South Fork Salmon River	16,007
Headwaters Johnson Creek	23,671
Lake Fork	17,419
Loosum Creek-East Fork South Fork Salmon River	16,175
Lower Big Creek	19,768
Lower Gold Fork River	20,366
Lunch Creek-Johnson Creek	15,414
Mud Creek	10,751
No Mans Creek-East Fork South Fork Salmon River	19,722
Pearsol Creek-North Fork Payette River	13,633
Poison Creek-North Fork Payette River	18,258
Porcupine Creek-Johnson Creek	21,529
Profile Creek	12,459
Quartz Creek	12,274
Riordan Creek	14,455
Sheep Creek-Johnson Creek	10,403
Six-bit Creek-South Fork Salmon River	15,087
Sugar Creek	11,497
Tamarack Creek	11,709
Trapper Creek-Johnson Creek	12,584
Upper Big Creek	26,147
Upper Indian Creek	21,811
Upper Little Pistol Creek	17,416
Upper Monumental Creek	19,035
Warm Lake Creek	15,093
Total Acres (Analysis Area)	613,793

Source: Forest Service 2020a

5.2 Analysis Area Methodology

The area of analysis for wildlife and wildlife habitat includes the area where effects (direct/indirect and cumulative) may be caused by the proposed activities (Forest Service Handbook [FSH].1909.15, 15.2a). Alternative components are the proposed mine site, all associated mine support infrastructure, all access and haul roads (proposed and existing), all utility infrastructure (proposed and upgraded), and proposed off-site facilities.

5.2.1 Habitat Families

The wildlife analysis areas are defined using forested and non-forested modeled source habitat (**Appendix A**) or habitat elements (**Appendix B**). Existing source habitat for selected terrestrial wildlife species is described by habitat family (i.e., group). These groups fit into a hierarchical system of four broad habitat suites (i.e., sub-groups): 1) Forest Only; 2) Combination of Forest and Rangeland; 3) Rangeland Only; and 4) Riverine and Non-riverine Riparian and Wetland. These four suites are further refined by categorizing similar modeled source habitats into 14 Habitat Families: Families 1 through 4 are within Suite 1; Families 5 through 9 are within Suite 2; Families 10 through 12 are within Suite 3; and Families 13 and 14 are within Suite 4. Only some of these habitat families are included in this analysis due to the existing conditions present. Habitat families are a collection of species that share similarities in modeled source habitats, which are arranged along major vegetative themes, such as ecological communities, vegetative structure, and fire regime.

5.2.2 Focal Species

Focal species include certain groups of species as described in **Section 1.0**, that may also be SGCN (IDFG 2017a), identified during the current planning period for the PNF and BNF (e.g., next 10 to 15 years). Those species were selected from habitat families to represent key environmental correlates and ecological functions that may be affected by SGP activities. Key environmental correlates are the biotic, or abiotic habitat elements that species use on the landscape to survive and reproduce. Key ecological functions are the set of ecological roles performed by a wildlife species in its ecosystem. These ecological roles are the primary ways organisms use, influence, and alter their environments.

Focal species are used in the analysis to address expected, or potential, changes to key ecosystem attributes. The focal species concept is described in more detail in the Interior Columbia Basin Ecosystem Management Project (Raphael et al. 2001; Wisdom et al. 2000). Species models and life history information were recently updated for 15 species. The following focal species were selected for analysis in this specialist report:

- Family 1 (Low Elevation, Old Forest) – white-headed woodpecker (*Picoides albolarvatus*), Lewis's woodpecker (*Melanerpes lewis*);
- Family 2 (Broad Elevation, Old Forest) – American three-toed woodpecker (*Picoides tridactylus*), black-backed woodpecker (*Picoides arcticus*), boreal owl (*Aegolius funereus*), dusky grouse (summer habitats; *Dendragapus obscurus*), fisher (*Martes pennanti*), flammulated owl (*Otus flammeolus*), great gray owl (*Strix nebulosa*), northern goshawk (summer habitats; *Accipiter gentilis*), pileated woodpecker (*Dryocopus pileatus*), silver-haired bat (*Lasionycteris noctivagans*);
- Family 3 (Forest Mosaic) – Canada lynx, mountain quail (*Oreortyx pictus*), wolverine;

- Family 5 (Forest and Range Mosaic) – gray wolf (*Canis lupus*), peregrine falcon (*Falco peregrinus*), Rocky Mountain bighorn sheep (*Ovis canadensis*), Rocky Mountain elk (*Cervus canadensis*);
- Family 7 (Forests, Woodlands, and Sagebrush) – Townsend's big-eared bat (*Corynorhinus townsendii*);
- Family 12 (Grassland and Open-canopy Sagebrush) – NIDGS; and
- Family 13 (Riverine Riparian and Wetland) – bald eagle (*Haliaeetus leucocephalus*), Columbia spotted frog (*Rana luteiventris*).
- Species modeling parameters and more detailed information is included in **Appendix A** and **B**.

5.2.3 Assumptions

The analysis incorporates the following assumptions:

- Unless there are species-specific surveys in the analysis areas to support presence or rarity of a species, the analysis assumes species presence when suitable habitat is present.
- The determination of habitat suitability is based on guidance and species habitat modeling in the Payette Forest Plan (Forest Service 2003a), the Boise National Forest Land and Resource Management Plan (Boise Forest Plan) (Forest Service 2010b), and potential vegetation groups (PVGs), which are the best available habitat data that represents potential and climax vegetation communities. Quantifying available habitat using potential vegetation groups (PVGs) rather than existing vegetation is a conservative approach that ensures temporary vegetation changes (such as those caused by wildfires) do not affect the suitability of an area for specific wildlife species.

5.2.4 Analysis Area for TEPC Species

5.2.4.1 Canada Lynx Analysis Area

The Canada lynx analysis area includes the seven Lynx Analysis Units (LAUs) located within the wildlife analysis area. A LAU is a subdivision of a national forest, usually based on watersheds, that is used for the analysis and management of habitat for Canada lynx. LAUs were delineated across the PNF and BNF using fifth-level HUC boundaries, with some using sixth-level HUC boundaries, where applicable. **Appendix C** contains more information about LAUs. **Figure 5-2** shows the Canada lynx analysis area, which includes approximately 656,493 acres as defined by the seven LAUs (i.e., Stibnite, Yellowpine, Burntlog, Landmark, Warm Lake, East Mountain, and West Mountain). **Figure 5-2** also shows the existing suitable habitat for lynx in the Canada lynx analysis area.

5.2.4.2 Northern Idaho Ground Squirrel Analysis Area

NIDGS have a very limited distribution and are only known to occur in three watersheds in Idaho: Brownlee, Little Salmon, and Weiser. This is based on the habitat mapping resulting from the Crist and Nutt (2007) NIDGS model currently used by the PNF and BNF. **Figure 5-3** shows the NIDGS analysis area, which is approximately 17,917 acres and consists of modeled suitable habitat within the HUC12 wildlife analysis area. NIDGS would only have the potential to occur in specific habitats of the wildlife analysis area, and mostly in the western half of the wildlife analysis area. NIDGS are described in greater detail in **Section 6.2.2**. **Appendix A** includes more information about the habitat modeling used for NIDGS.

5.2.4.3 Wolverine Analysis Area

Habitat for the wolverine within the wolverine analysis area was modeled based on the persistent spring snow model (**Appendix A**), updated for the PNF and BNF (2009-2015) for the Wolverine – Winter Recreation Research Project: Investigating the Interactions Between Wolverines and Winter Recreation study (Heinemeyer et al. 2017), as described in **Section 6.3.3.** In the wildlife analysis area, wolverines are most likely to use habitats with persistent spring snow cover for denning and winter range, including denning, and are expected to move through areas without snow at different times of the year. **Appendix A** includes more information about the habitat modeling used for wolverine. **Figure 5-4** shows the HUC 12 wildlife analysis area with modeled wolverine habitat (approximately 316,035 acres of persistent snow cover years 1 through 7).

5.2.4.4 Monarch Butterfly Analysis Area

The analysis area for the Monarch butterfly is the same HUC 12 wildlife analysis area as described in **Section 5.1.**

5.2.5 Additional Wildlife Analysis Areas

If not discussed in this section, all other wildlife species were analyzed using the HUC 12 wildlife analysis area described in **Section 5.1.**

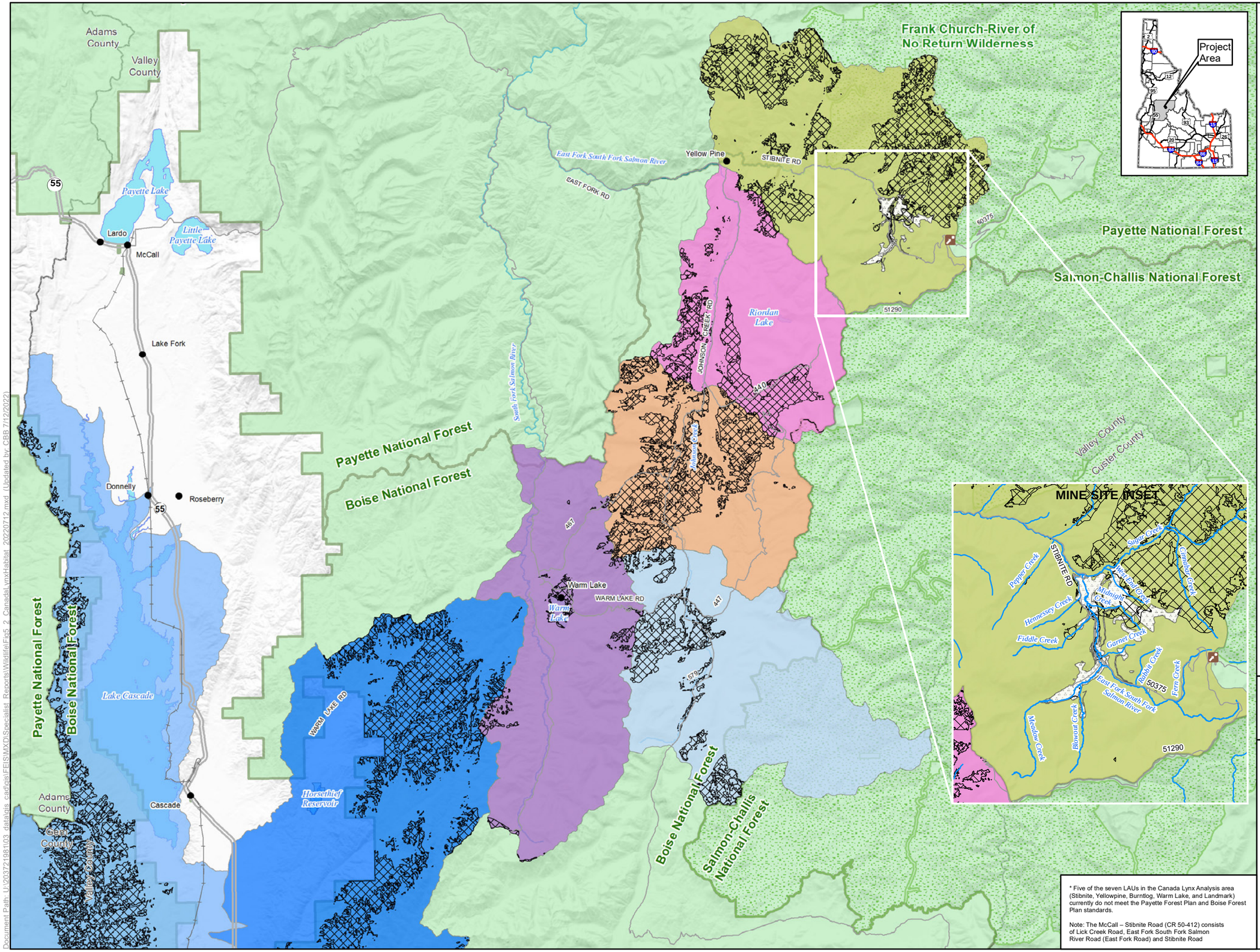
5.2.5.1 Rocky Mountain Bighorn Sheep Analysis Area

The analysis area for Rocky Mountain bighorn sheep (bighorn sheep) is based on the habitat model developed to quantify summer and winter habitat on the PNF. The source habitat model for bighorn sheep used in the PNF's Bighorn Sheep Viability Final Supplemental Environmental Impact Statement (EIS) (Forest Service 2010c) was originally designed by the Hells Canyon Initiative. **Appendix A** provides more information about the bighorn sheep source habitat model.

Based on known occupancy in the Frank Church-River of No Return Wilderness area (FCRNRW), the bighorn sheep analysis area also includes acreages in several HUC 12 watersheds on the Salmon-Challis National Forest (**Figures 5-5** and **5-6**). More information regarding the PNF bighorn sheep model is available in the PNF Bighorn Sheep Supplemental EIS Technical Report, Source Habitat Model (Forest Service 2010c) or **Appendix A**.

5.2.5.2 Riparian Analysis Area

The riparian analysis area includes any water/wetland features and forested riparian areas (forest types not categorized as PVGs) within the HUC 12 wildlife analysis area. The riparian analysis area was developed to describe existing conditions and potential impacts to the Columbia spotted frog and other associated riparian species. **Figure 5-7** shows the riparian analysis area, which is approximately 126,942 acres.



LEGEND

- Canada Lynx Existing Suitable Habitat
- Stibnite Historic Disturbance

Lynx Analysis Unit *

- Burntlog LAU
- East Mountain LAU
- Landmark LAU
- Stibnite LAU
- Warm Lake LAU
- West Mountain LAU
- Yellowpine LAU

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

0 2.5 5 Miles

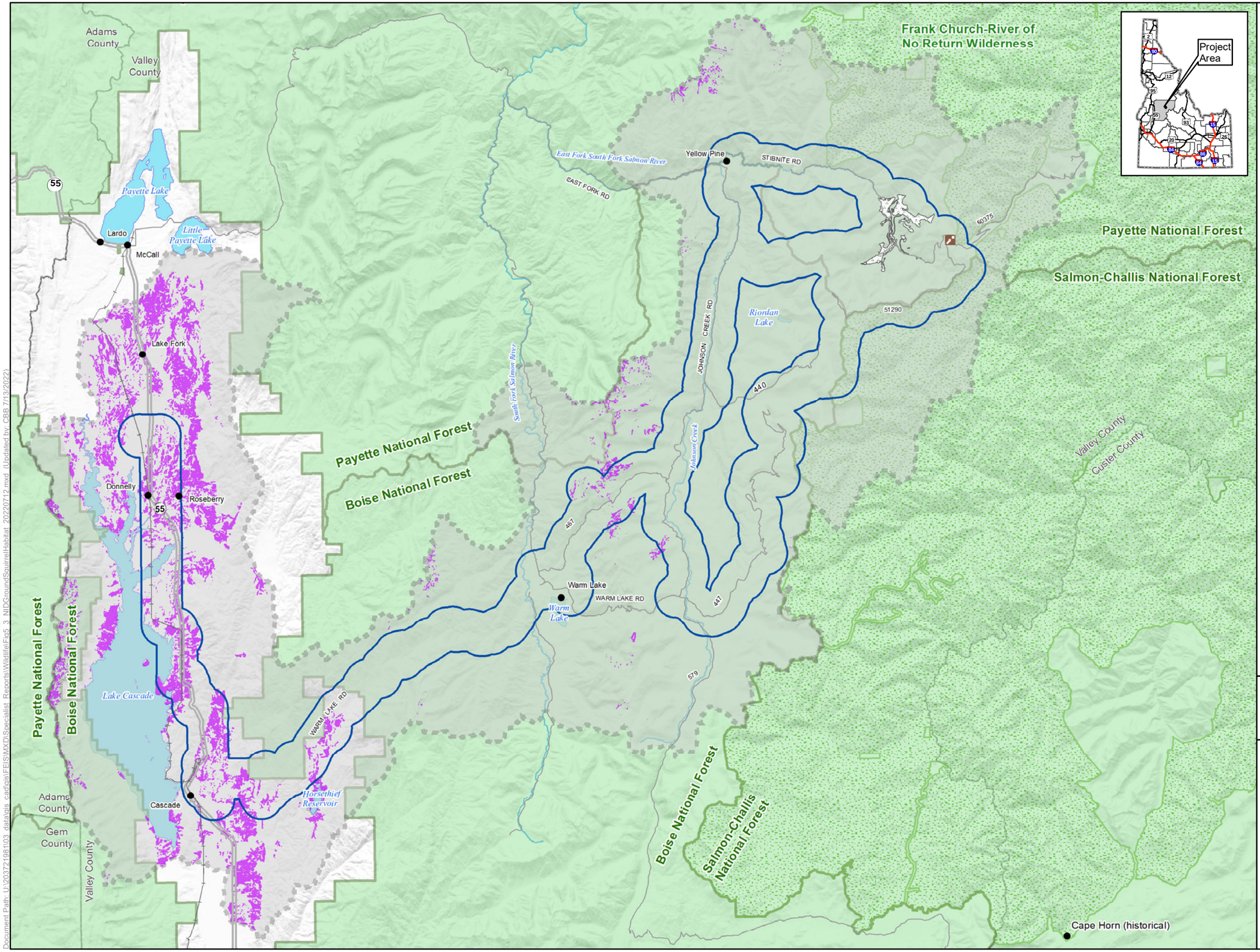
1 inch = 4.5 miles

Figure 5-2
Canada Lynx Existing Suitable Habitat in the Analysis Area Stibnite Gold Project Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

* Five of the seven LAUs in the Canada Lynx Analysis area (Stibnite, Yellowpine, Burntlog, Warm Lake, and Landmark) currently do not meet the Payette Forest Plan and Boise Forest Plan standards.

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road



LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Northern Idaho Ground Squirrel Modeled Habitat
- Stibnite Historic Disturbance

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 5-3
Northern Idaho Ground Squirrel (NIDGS) Habitat
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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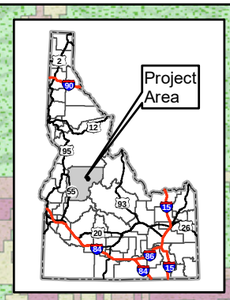
Adams County
Valley County
Payette Lake
Little Payette Lake
Lardo
McCall
55
Lake Fork
Donnelly
Roseberry
Cascade
Lake Cascade
Adams County
Gem County
Valley County
Payette National Forest
Boise National Forest
Payette National Forest
Boise National Forest
Frank Church-River of No Return Wilderness
East Fork South Fork Salmon River
Yellow Pine
STIBNITE RD
EAST FORK RD
50375
Payette National Forest
Salmon-Challis National Forest
Riordan Lake
51290
JOHNSON CREEK RD
South Fork Salmon River
Johnson Creek
440
467
Valley County
Custer County
Warm Lake
WARM LAKE RD
Warm Lake
447
579
WARM LAKE RD
Horsethief Reservoir
Boise National Forest
Salmon-Challis National Forest



LEGEND

- Wolverine Habitat Analysis Area Affected Environment
- Wildlife Analysis Area

Number of Years with Persistent Snow Cover between 2009 and 2015

Years
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- Stibnite Historic Disturbance

Other Features
- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

0 2.5 5 Miles

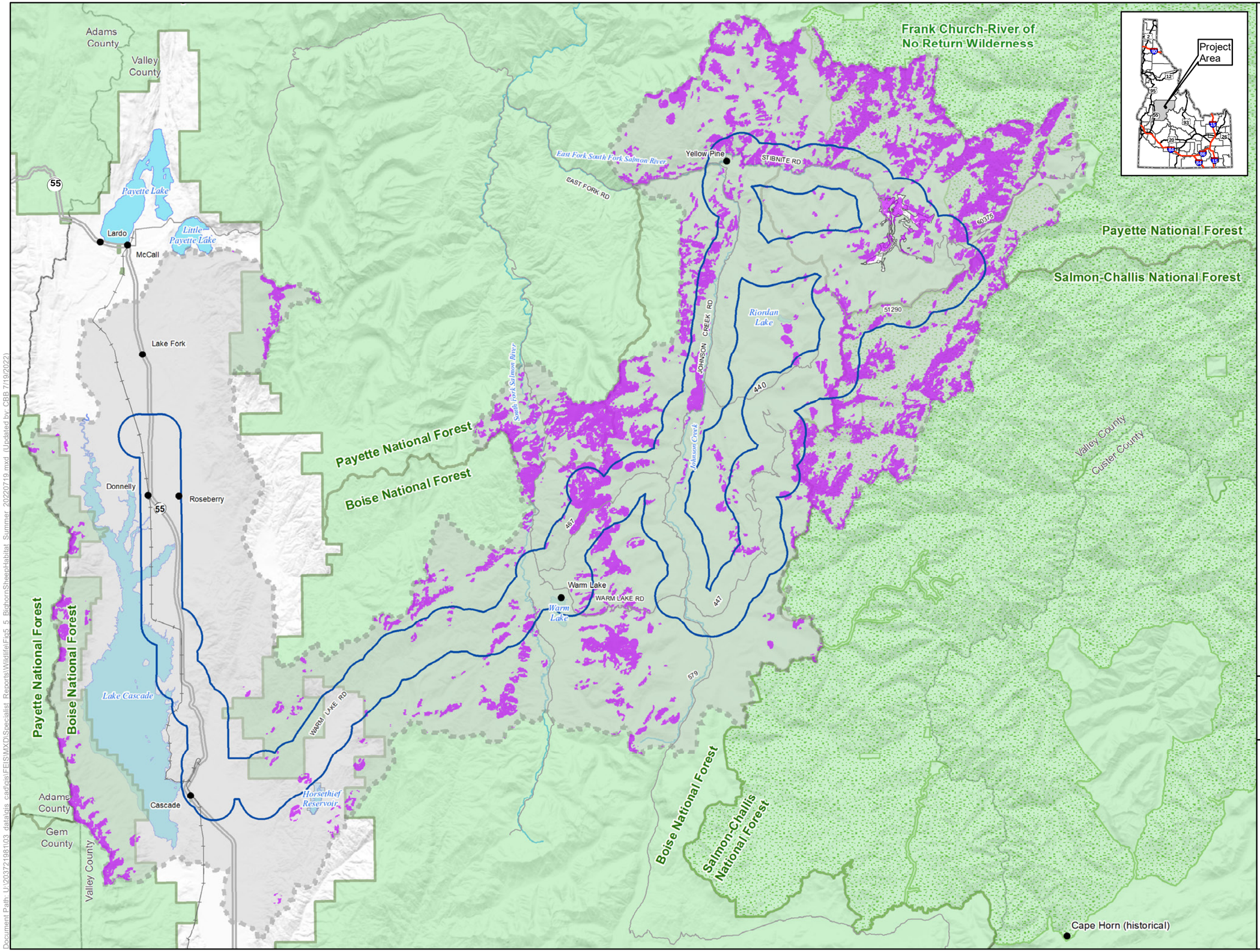
1 inch = 4.5 miles

N

Figure 5-4
Wolverine Habitat
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road



LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Bighorn Sheep Summer Modeled Habitat
- Stibnite Historic Disturbance

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figur 5-5
Bighorn Sheep (Summer) Habitat
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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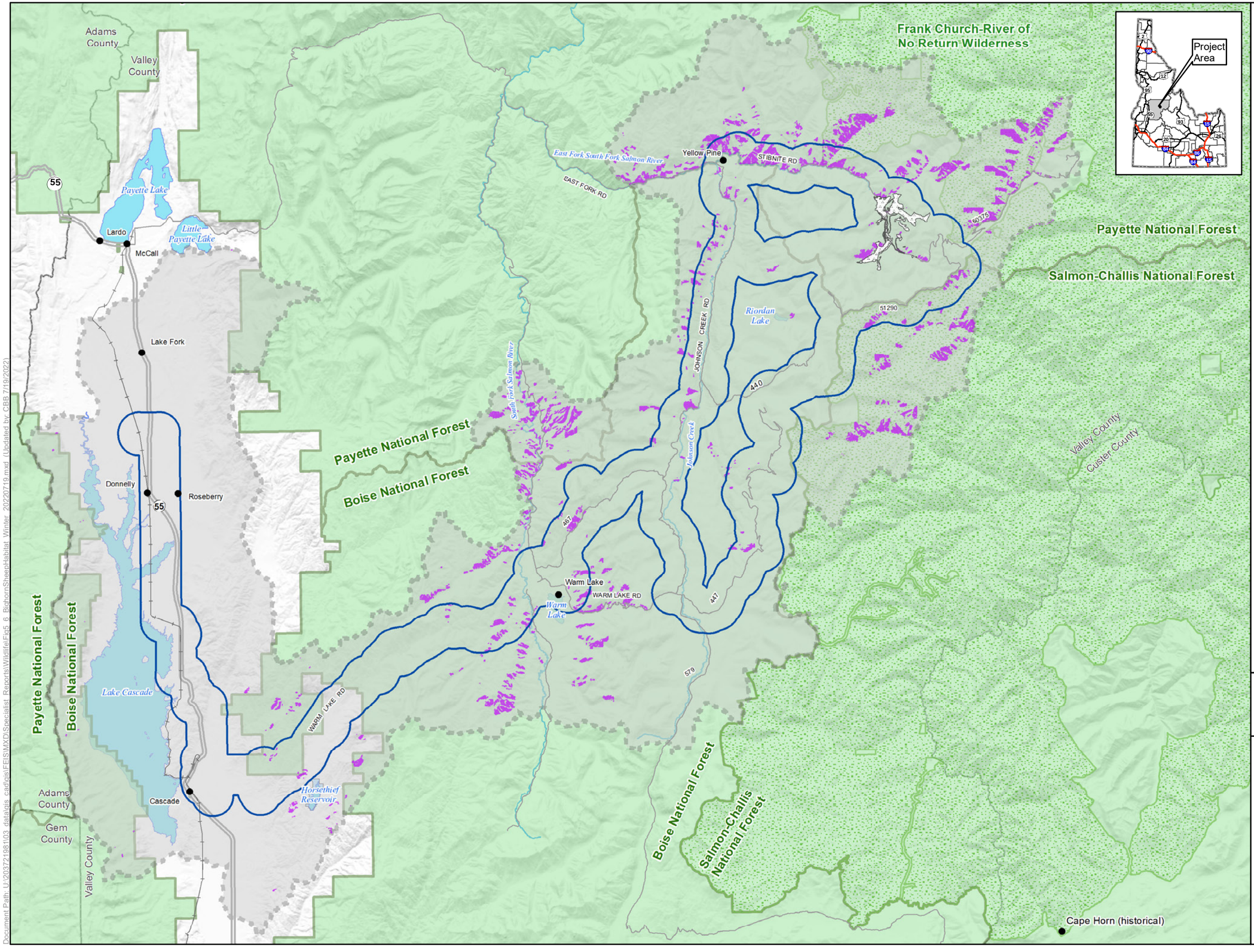

LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Bighorn Sheep Winter Modeled Habitat
- Stibnite Historic Disturbance

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 5-6
Bighorn Sheep (Winter) Habitat
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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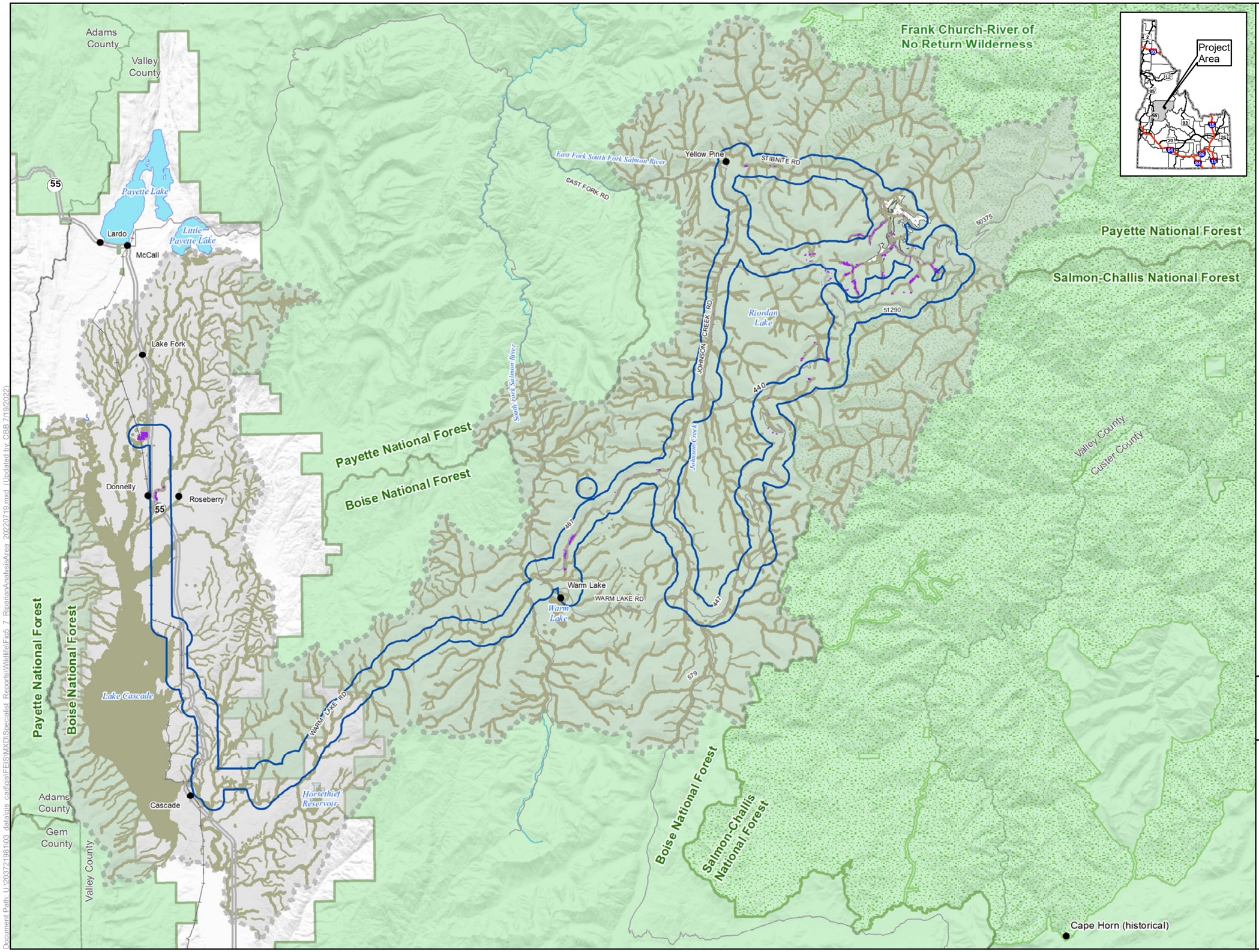

LEGEND

- Riparian Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Forested Wetland
- Riparian Conservation
- Stibnite Historic Disturbance

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 5-7
Riparian Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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6.0 Affected Environment

6.1 Existing Condition

General descriptions of vegetation (i.e., wildlife habitat) in the wildlife analysis area, including descriptions of existing vegetation metrics used for analyses, are presented in **Section 6.1.1.**

The following subsections describe the existing conditions of TEPC species; focal species (including Region 4 Sensitive Species and MIS); Idaho SGCN; big game species; and migratory birds.

6.1.1 Vegetation Conditions Related to Wildlife Habitat

The Forest Service maps PVGs and existing vegetation on the PNF and BNF. These maps are updated periodically; the existing vegetation mapping was most recently updated in 2016 for the PNF and 2017 for the BNF, and PVG mapping was most recently updated in 2005 for the PNF and 2017 for the BNF (Forest Service 2005). This mapping is available only for NFS lands.

Both existing vegetation and PVG mapping are useful to understand the vegetation community characteristics of a site, and as such, both datasets are referenced and used as the basis for describing existing conditions and analysis of impacts to wildlife habitat. Most focal species models applied in this analysis use a combination of PVG, canopy cover, and tree size class to define and model source habitat both within and outside historic range of variability (HRV) conditions.

6.1.1.1 Potential Vegetation Groups

PVGs are generally a description of the climax plant community (final stage in ecological succession) that could be supported by a site, as determined by abiotic conditions such as climate, soil types, hydrological conditions, and topographical aspect. PVG descriptions derived from Payette and Boise Forest Plans (Forest Service 2003a, 2010b) are presented in the Vegetation: General Vegetation Communities, Botanical Resources, and Non-Native Plants Specialist Report (Forest Service 2022b).

6.1.1.2 Existing Vegetation

The Vegetation Classification Mapping and Quantitative Inventory existing vegetation types (Forest Service 2016 [Note: 2021 Forest Service update didn't affect the 2016 data for the analysis area], 2017a) can be used to describe seral-stage (intermediate ecological succession) plant community composition as it was at the time of the most recent mapping. Existing vegetation mapping typically describes the current dominant vegetative cover or species occupying a site and is frequently updated to reflect vegetation changes due to disturbance such as fire, insects, and disease.

Vegetation communities in the region are generally coniferous forests typical of high mountain regions in Idaho and the inland northwestern U.S. The most common unburned existing vegetation types in the region are lodgepole pine forests, subalpine fir forests, Douglas-fir forests, ponderosa pine forests, and Engelmann spruce forests (Vegetation: General Vegetation Communities, Botanical Resources, and Non-Native Plants Specialist Report (Forest Service 2022b). Fires routinely occur in the wildlife analysis area and surrounding forests, and as such, much of the wildlife analysis area and vicinity is mapped as burned herblands (grasses and forbs), burned sparse vegetation, and burned forest shrublands (**Appendix A**).

Riparian habitats are present along numerous waterbodies, including the East Fork South Fork Salmon River, South Fork Salmon River, Rabbit Creek, Johnson Creek, Blowout Creek, Garnet Creek, Fiddle Creek, Midnight Creek, Hennessy Creek, West End Creek, Sugar Creek, and Meadow Creek. Existing

vegetation types in the vegetation analysis area are shown in Vegetation: General Vegetation Communities, Botanical Resources, and Non-Native Plants Specialist Report (Forest Service 2022b), although the wildlife analysis area is much larger.

Existing vegetation mapping includes metrics on tree canopy cover classes and tree size classes, both of which are used to determine habitat suitability.

6.1.1.3 Tree Canopy Cover Class

The Forest Service tracks the canopy cover class (i.e., how dense the tree canopy is) of the various Vegetation Classification Mapping and Quantitative Inventory existing vegetation types (Forest Service 2016, 2017a), which can be further used to assess specific habitat preferences for terrestrial wildlife species. Because of past disturbance from mining activity and large wildfires, tree canopy closure is low across many portions of the wildlife analysis area.

6.1.1.4 Tree Size Classes

The Forest Service categorizes tree size classes (i.e., how large the trees are) of the various Vegetation Classification Mapping and Quantitative Inventory existing vegetation types (Forest Service 2016, 2017a), which can be further used to assess specific habitat preferences for terrestrial wildlife species. Tree size classes (measured in diameter at breast height [dbh]) in the wildlife analysis area also have been affected by past disturbance, including fire. A small percentage of the wildlife analysis area consists of large tree size classes (greater than 20 inches dbh). Small (5 to 10 inches dbh) and medium (10 to 20 inches dbh) tree size classes are more common throughout the wildlife analysis area. Sapling (0.1 to 5 inches dbh) and non-forested tree size classes are much less prevalent.

6.2 Threatened, Endangered, Proposed, and Candidate Species

Four TEPC species are either known to occur, or have the potential to occur, in the wildlife analysis area, and all four have their own species-specific analysis area within the broader wildlife analysis area. These species include Canada lynx, NIDGS, wolverine, and Monarch butterfly (**Table 6-1**). NIDGS, which is listed as a threatened species under the ESA, are known to occur in the region. Although there is suitable habitat for the Canada lynx (federally listed threatened) in the Canada lynx analysis area, there have been no verified sightings since 1978. The Monarch butterfly, listed as a federal candidate species, may occur in the region, particularly in the lower elevations where milkweed species are more prevalent.

An additional federal threatened species, the yellow-billed cuckoo (*Coccyzus americanus*), was considered but dismissed from this analysis. There are no documented occurrences or potentially suitable habitat for this species in the SGP area and vicinity (Strobilus Environmental 2017). Additionally, results of a query of the USFWS Information, Planning, and Conservation Online Database for the SGP area did not include this species (USFWS 2019).

Table 6-1 Focal Wildlife Species, including TEPC, Region 4 Sensitive, and MIS, and Habitat Considered for Analysis

Suite	Habitat Family	Focal Species Considered in this Analysis	Scientific Name	Species Status [1]	Occurrence in the Analysis Area
Forest Only	1—Low Elevation, Old Forest	White-headed Woodpecker	*Picoides albolarvatus*	S/MIS	Limited source habitat and occurrence in analysis area.
		Lewis's Woodpecker	*Melanerpes lewis*	S	Limited source habitat and occurrence in analysis area.
	2—Broad Elevation, Old Forest	American Three-toed Woodpecker	*Picoides tridactylus*	S	Dependent mostly on disturbance events, such as fire or insect infestation. Species documented and source habitat in analysis area.
		Black-backed Woodpecker	*Picoides arcticus*	S/MIS	Species documented and source habitat in analysis area.
		Boreal Owl	*Aegolius funereus*	S	Species documented and source habitat occurs, mostly at higher elevations, in analysis area.
		Dusky Grouse (summer)	*Dendragapus obscurus*	F	Species documented and source habitat in analysis area.
		Fisher	*Martes pennanti*	S	Species documented and source habitat in analysis area.
		Flammulated Owl	*Otus flammeolus*	S	Species documented and source habitat in analysis area.
		Great Gray Owl	*Strix nebulosa*	S	Species documented and source habitat in analysis area.
		Northern Goshawk (summer)	*Accipiter gentilis*	S	Species documented and source habitat in analysis area.
		Pileated Woodpecker	*Dryocopus pileatus*	MIS	Species documented and source habitat in analysis area.
		Silver-haired bat	*Lasionycteris noctivagans*	F	Species documented and source habitat in analysis area.

Suite	Habitat Family	Focal Species Considered in this Analysis	Scientific Name	Species Status [1]	Occurrence in the Analysis Area
	3—Forest Mosaic	Canada Lynx	*Lynx canadensis*	T	Rare. Modeled source habitat in analysis area.
		Mountain Quail	*Oreortyx pictus*	S	Source habitat in analysis area, rare species occurrence.
		Wolverine	*Gulo*	PT	Species documented and high-quality habitat in analysis area. Potential denning habitat (i.e., high elevation cirques, talus slopes, and forests) present.
Combination of Forest & Rangeland	5—Forest & Range Mosaic	Gray Wolf	*Canis lupus*	S	Species (known packs) documented and habitat in analysis area.
		Peregrine Falcon	*Falco peregrinus*	S	Species documented and known habitat, including nesting sites on the BNF, within analysis area.
		Rocky Mountain Bighorn Sheep	*Ovis canadensis*	S/BG	Species documented (known herds in FCRNRWA) and winter and summer habitat in analysis area.
		Rocky Mountain Elk	*Cervus canadensis*	BG	Source habitat present throughout analysis area.
	7—Forests, Woodlands, & Sagebrush (Not addressed in the analysis)	Spotted Bat (Species not analyzed in the specialist report)	*Euderma maculatum*	S	Some suitable habitat in analysis area, but not expected to occur. Rare.
		Townsend's Big-eared Bat	*Corynorhinus townsendii*	S	Species documented and suitable habitat in analysis area.
		Northern Idaho Ground Squirrel	*Urocitellus brunneus*	T	Modeled source habitat in analysis area. Historical occurrence.
		Monarch butterfly	*Danaus plexippus*	C	Some suitable habitats in the analysis area, but not expected to occur. Rare.

Suite	Habitat Family	Focal Species Considered in this Analysis	Scientific Name	Species Status [1]	Occurrence in the Analysis Area
Riverine & Non-riverine Riparian & Wetland	13—Riverine Riparian & Wetland (Not addressed in the analysis)	Bald Eagle	*Haliaeetus leucocephalus*	S	Species documented and known habitat, including nesting sites, within analysis area.
		Columbia Spotted Frog	*Rana luteiventris*	S	Source habitat occurs in riparian & wetland areas. Species documented and source habitat in analysis area.
		Harlequin Duck (Species not analyzed in the specialist report)	*Histrionicus histrionicus*	S	Source habitat present in some low-gradient sections of analysis area. Rare. No known observations in analysis area.
		Yellow-billed Cuckoo (Species not analyzed in the specialist report)	*Coccyzus americanus*	T	Analysis area outside of USFWS modeled habitat and known occurrence.

Source: Forest Service 2020a

[1] Species Status (USFWS 2019)

BG = Big Game

C = ESA Candidate

F = Focal Species

MIS = PNF and BNF MIS

PT = Proposed ESA Threatened

R4 = Region 4

S = Region 4 Sensitive

T = ESA Threatened

6.2.1 Canada Lynx

6.2.1.1 Species Status

The Final Rule to list the Canada lynx as threatened under ESA by the USFWS was issued in March 2000 (65 Federal Register 16052). In 2000, the Canada Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al. 2000) was developed to provide a consistent and effective approach to conserve Canada lynx on federal lands. The PNF and BNF amended their existing plans in 2003 to be consistent with the LCAS.

Critical habitat for lynx was designated by the USFWS on February 25, 2009 (74 Federal Register 8616) and revised on September 12, 2014 (79 Federal Register 54781). Critical habitat for Canada lynx has been designated by the USFWS in five core units: Unit 1 in Maine, Unit 2 in Minnesota, Unit 3 in Montana and Idaho, Unit 4 in Washington, and Unit 5 in Wyoming and Montana (74 Federal Register 8616). The Idaho portion of Unit 3 is located outside the Canada lynx analysis area for the SGP in the extreme eastern border of Boundary County in the northern "panhandle" region of the state, approximately 280 miles away. No critical habitat has been designated on the PNF or BNF and core, secondary, and peripheral areas delineated for the Recovery Outline for the Contiguous U.S. Distinct Population Segment of Canada Lynx describe the forests as a secondary area (USFWS 2005). The LCAS updated in 2013 (Interagency Lynx Biology Team 2013) also describes the PNF and BNF as secondary areas. Secondary areas are those with historical records of lynx presence with no record of reproduction; or areas with historical records and no recent surveys to document the presence of lynx and/or reproduction. It has been hypothesized that secondary areas may contribute to lynx persistence by providing habitat to support lynx during dispersal movements or other periods, allowing animals to then return to core areas (USFWS 2005).

6.2.1.2 Baseline

Canada lynx are medium-sized cats (13 to 31 pounds) with noticeably large feet, long legs, and a ruffed face with ear tufts. They occur throughout Canada and Alaska, in the northern and central Rocky Mountains, and in the extreme northeastern and north-central U.S. Most lynx occurrences in the western U.S. are associated with mixed-conifer forest with the highest percentage (77 percent) occurring at the 4,921- to 6,562-foot elevation zone (McKelvey et al. 2000). Subalpine fir, Engelmann spruce, and lodgepole pine forest cover types in cold, moist PVGs provide the predominant habitat type for lynx (Aubry et al. 2000). Dry forest cover types, such as ponderosa pine forest, are not expected to provide lynx habitat. Typical prey species include snowshoe hares, squirrel species, grouse species, porcupines, beaver, small rodents, and even deer species opportunistically (Interagency Lynx Biology Team 2013). However, because snowshoe hare are the primary prey of lynx throughout their range, lynx distribution is closely associated with snowshoe hare distribution. Enhancing and protecting snowshoe hare habitat is a management priority in secondary areas (Interagency Lynx Biology Team 2013). Canada lynx typically use boreal forest landscapes with a mosaic of successional forest types that contain the following features (USFWS 2009):

- Presence of snowshoe hare and their preferred habitat conditions, which include dense understories of young trees, shrubs, or overhanging boughs that protrude above the snow, and mature multistoried stands with conifer boughs touching the snow surface.
- Winter snow conditions that are generally deep and fluffy for extended periods of time.
- Sites for denning that have abundant, coarse, woody debris, such as downed trees and root wads.

- Matrix habitat (e.g., hardwood forest, dry forest, non-forest, or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of a lynx home range) that lynx are likely to travel through while accessing patches of boreal forest in a home range.

Canada lynx habitat was mapped on the PNF and BNF and relies on specific habitat types in specific structural stages within certain PVGs, which is unlike other species models that only use PVGs with structural conditions (e.g., tree size class and canopy cover). The PNF and BNF use two classifications for lynx habitat in LAUs: "existing suitable habitat" and "source habitat capacity." "Existing suitable habitat" meets forest criteria that is currently suitable for use by lynx and is defined by parameters such as post-burn habitat (defined to better represent horizontal cover in snowshoe hare habitat), road density, and plantation age. Habitat modeling parameters are based on previously defined relationships among vegetation, snowshoe hare, and lynx. "Source habitat capacity" has the potential to develop into suitable lynx habitat in the future. The source habitat capacity model predicts the potential for overall lynx habitat capacity, including primary (breeding) and secondary habitat. It defines acreages of vegetative communities (in selected PVGs), which include preferred habitat types such as Engelmann spruce, lodgepole pine, and mixed-conifer types with Douglas fir and subalpine fir. However, the lynx habitat models are limited by inadequate data for various habitat features (e.g., tree size class, tree canopy cover, dead and downed wood, snag density, and understory cover), and overestimate existing and source habitat capacity acreages as a result. The PNF and BNF maintain the lynx habitat classes as a spatial database for analysis using Geographic Information Systems. **Table 6-2** summarizes the areas of existing and unsuitable lynx habitat in each LAU, and whether the LAU currently meets the Forest standard for suitable habitat.

Table 6-2 Lynx Habitat Acreage by Lynx Analysis Unit in the Canada Lynx Analysis Area

LAU	Total LAU Acreage (Acreage Within Analysis Area)	Existing Suitable Habitat	% of Unsuitable Habitat	Currently Meets Standard TEST15 (<30% Unsuitable)
Stibnite	81,895	23,880	39.8	No
Yellowpine	48,074	9,107	70.5	No
Burntlog	51,857	15,507	55.0	No
Warm Lake	67,282	1,887	94.1	No
Landmark	44,494	7,560	78.5	No
East Mountain	109,445	25,254	12.4	Yes
West Mountain	95,838	18,953	1.5	Yes
Total	**498,885** [1]	**102,147**	**N/A**	**N/A**

Source: Forest Service 2018a.
[1]Acreage based only on NFS lands. Canada lynx analysis area (656,493 acres) includes NFS and non-NFS lands.

There are approximately 102,147 acres of existing suitable habitat for Canada lynx in the PNF and BNF LAUs listed above (i.e., Canada lynx analysis area), and 220,260 acres of source habitat capacity (i.e., extent of PVGs or cover types capable of developing source habitat conditions at some point in time and within some defined area [Forest Service 2003a, 2010b]) for the PNF and BNF LAUs. **Figure 5-2** shows the existing suitable habitat for Canada lynx. Five of the seven LAUs are currently not meeting Forest TEPC Standard 15 (TEST15); this indicates the percentage of unsuitable habitat in the LAUs is higher than the 30 percent threshold. Wildfires account for the majority of unsuitable habitat in these LAUs (Forest Service 2018a). Current and historic status of lynx in Idaho and the latest scientific literature

predict rare occurrence of lynx in the PNF and BNF. In Idaho, the total population number is unknown, but is expected to be low based on the studies discussed below and in **Appendix C**. Surveys conducted in 2007 using the National Lynx Protocol detected lynx in the BNF but not the PNF. The National Lynx Detection Survey was conducted from 1999 to 2003 in forests with potential to have lynx, including the BNF. A survey grid was established in the Cascade Ranger District in the Burntlog and Yellowpine LAUs from 2001 to 2003. No lynx were detected during those efforts (Forest Service 2018a).

Snowshoe hare are known to occur in the Canada lynx analysis area, although data on their population size are not available. Because of disturbance and fire history, habitat in the Canada lynx analysis area is not optimum for snowshoe hare, which require high canopy cover in mature conifer forests or lodgepole pine stands with dense understories (Ellsworth and Reynolds 2006). Garcia and Associates (2013) recorded snowshoe hare tracks at "many" locations during the 2013 winter field study, but population size cannot be estimated from these random observations. It is uncertain whether the lynx analysis area contains a snowshoe hare population adequate to support a lynx home range, which generally varies from 15 square miles to 69 square miles in Washington State where habitat is similar to Idaho (Ruediger et al. 2000). Larger home ranges are generally correlated with lower prey availability.

Although there are no corridors or transition habitat in the SGP area, the Forest Service has drafted "lynx linkage areas" because of the importance of habitat connectivity for forest carnivores (Claar et al. 2004). As defined by Claar et al. (2004), lynx linkage areas are, "Habitat that provides landscape connectivity between blocks of lynx habitat. Linkage areas occur both within and between geographic areas where blocks of lynx habitat are separated by intervening areas of non-lynx habitat such as basins, valleys, agricultural lands, or where lynx habitat naturally narrows between blocks. Connectivity provided by linkage areas can be degraded or severed by human infrastructure such as high-use highways, subdivisions or other developments." Linkage areas for Canada lynx have been estimated to occur North to South across Warm Lake Road (County Road [CR] 10-579) and East to West across the South Fork Salmon River (and likely also Johnson Creek Road (CR-10-413), the Stibnite Road portion of the McCall-Stibnite Road (CR 50-412), and the Burnt Log Road (National Forest System Road [FR] 447).

The few historical observations on the BNF Cascade Ranger District indicate that Canada lynx can occur on the PNF and BNF. However, the Forest Service conducted lynx detection surveys on the BNF Cascade Ranger District between 2001 and 2003 (Forest Service 2001, 2002, 2003b), and no Canada lynx were detected during these hair snag/Deoxyribonucleic Acid (DNA) surveys. The closest confirmed lynx detection resulting from formal surveys from the National Survey Grid was on the Lowman Ranger District (BNF) in 1999, approximately 60 miles south of the Village of Yellow Pine area. The lack of lynx detections from the large body of hair snag and remote camera survey work, both in the Canada lynx analysis area and in the larger context of the surrounding ranger districts, suggests that Canada lynx is rare in the PNF and BNF, and detections would be more likely to result from a dispersing individual rather than a resident (Forest Service 2018a). Although lynx denning habitat exists on the BNF and is predicted to exist in the future across the PNF, there are no verified lynx dens or confirmed evidence of breeding. At present, occurrence of lynx in the Canada lynx analysis area is speculative.

6.2.2 Northern Idaho Ground Squirrel

6.2.2.1 Species Status

In 2012, NIDGS was identified as a distinct species (Hoisington-Lopez et al. 2012). NIDGS is now recognized as *Urocitellus brunneus*, while its former subspecies, southern Idaho ground squirrel, is recognized as *Urocitellus endemicus*. The USFWS revised the taxonomy of the species under ESA rulemaking in Federal Register (80 Federal Register 35860).

NIDGS was listed as a threatened species under the ESA, as amended (61 Federal Register 7596). The Final Rule for this listing (65 Federal Register 17779) is dated April 5, 2000. The Recovery Plan for the Northern Idaho Ground Squirrel (Recovery Plan) was completed in 2003 (USFWS 2003). The plan summarizes objectives, criteria, and strategies for recovery of the species. The goal of the Recovery Plan is to increase population size and establish a sufficient number of viable metapopulations so that the species can be delisted. The number of metapopulations considered to be sufficient for recovery is identified as 10, with each consisting of more than 500 individuals for 5 consecutive years.

Decline of NIDGS throughout the 1980s and 1990s was attributed primarily to changes and loss of habitat that resulted in isolated populations. It also was hypothesized that land conversion and fire suppression resulted in poorer quality forage (Yensen 2004). Given the extremely low population levels and the disjunct and isolated habitat that presently occurs, population viability is still a concern for this species (Wisdom et al. 2000).

A 5-year review of the current ESA classification for NIDGS was completed in 2017 (81 Federal Register 7571-7573). Although numerous conservation actions have been implemented or scheduled by the Forest Service, IDFG, and U.S. Geological Survey since the last 5-year review, the recent review determined that the threats identified in the previous status review remained the same, particularly the primary threat of loss of suitable habitat, resulting from meadow invasion by conifers. Development of private lands within their limited range also continues to be a threat. The USFWS has initiated the Recovery Planning and Implementation process for NIDGS.

6.2.2.2 Baseline

NIDGS are rare, endemic (i.e., native and restricted to a certain area), small mammals whose current known distribution is limited to a disjunct population in an approximately 2,965-acre area of Valley County and another larger, approximately 265,143-acre, area in Adams County in west-central Idaho. It has one of the smallest ranges of all North American land mammals. In this range, NIDGS occur at approximately 60 sites with an elevation range of 3,445 to 7,546 feet above mean sea level. Occupied sites are variable in size (2.5 to greater than 247 acres) and squirrel density (Wagner and Evans-Mack 2017). Typical habitat includes dry montane meadows or open scablands surrounded by ponderosa pine or Douglas-fir forest (Suronen and Newingham 2013). In March or April, squirrels emerge from their underground burrows to mate and begin their brief aboveground activity period (Yensen 1991). Hibernation starts again in July or early August (Goldberg et al. 2017).

Approximately 2,042 acres of occupied habitat and 60,450 acres of modeled NIDGS habitat occur on the PNF. The largest amount of both habitat types occurs in the Brownlee Watershed in close proximity to Bear, Idaho, which is well north and west of the NIDGS analysis area for the SGP. IDFG monitoring data from 2017 documented 308 individuals at 29 colony sites on PNF lands. Within the HUC 12 wildlife analysis area, there are approximately 17,917 acres of modeled suitable habitat (i.e., NIDGS analysis area).

The closest occupied site is located south of Cascade (Wagner and Evans-Mack 2017). In 2018, a survey was conducted in the modeled habitat in Scott Valley (June 19 to July 16) and along the Idaho Power Company transmission (IPCo) line alignment in Trout Creek (July 10 to July 12) (Yensen and Tarifa 2018), and private lands where access was obtained (between June 4 to July 17, 2019) (Yensen and Tarifa 2019). Over the entire geographic extent of 2018 and 2019 surveys, which cover almost the entire disturbance footprint for the SGP, there were no observations of NIDGS or signs of activity. However, during the surveys, areas with moderate to highly suitable habitat were identified for future surveys (Yensen and Tarifa 2018, 2019). Several of the large areas of highly suitable habitat include polygons

18136 at the Cascade Switching Station, 17378, 17379, and 17401 near the SGLF and Scott Valley Substation, 18084 and 18299 east of the Cascade Switching Station, and 17383 and 17211 north of the Cascade Switching Station (Yensen 2019). These areas are shown in more detail on **Figure 5-3**. NIDGS did occur historically in the Warm Lake area but limited surveys have been conducted (Yensen and Tarifa 2019). Although no NIDGS or signs of their activity were observed at sites during the surveys, there is a small possibility that NIDGS may occur in the future at suitable sites. Site checks and formal surveys would be conducted, as needed, prior to ground-disturbing activities in suitable habitat.

6.2.3 Wolverine

6.2.3.1 Species Status

In February 2013, the USFWS published proposed rules to list the Distinct Population Segment of the North American wolverine in the contiguous U.S. as a threatened species, citing the primary threat to the species as loss of habitat and range as a result of climate change (USFWS 2013; 78 Federal Register 7863). This decision was subsequently withdrawn. On April 4, 2016, the U.S. District Court of Montana vacated the USFWS's withdrawal of its Proposed Rule (Case 9:14-CV-00246-DLC, Document 108; 81 Federal Register 71670). At the time of the initial Draft EIS publication in August 2020 for this Project, the proposed listing was under review and pending a final decision on the status of the species by the USFWS. Therefore, the Forest Service was directed to analyze the species as "proposed-threatened." Additionally, because wolverines were a proposed species, rather than listed, there was no critical habitat designated for the species. On October 8, 2020, the USFWS determined that the best available science showed that the factors affecting wolverine populations are not as significant as believed in 2013 when the USFWS proposed to list the wolverine found in the contiguous U.S. as threatened. Therefore, this species did not meet the definition of threatened or endangered under the ESA and the USFWS withdrew its listing proposal. The Forest Service now manages this species as a Region 4 sensitive species.

6.2.3.2 Baseline

The North American wolverine is the largest terrestrial member of the family Mustelidae (e.g., weasels, badgers, otters, ferrets, martens, minks, and wolverines, among others), with adult males weighing 26 to 40 pounds and adult females weighing 17 to 26 pounds (Banci 1994). Wolverines are opportunistic feeders, consuming a variety of foods depending on availability. They primarily scavenge carrion, but also prey on small animals and birds and eat fruits, berries, and insects (Banci 1994). They have an excellent sense of smell, enabling them to find food beneath deep snow, and can eat frozen meat and crush bones of large prey including deer, elk, and moose.

Wolverines are circumboreal (i.e., generally occurring throughout the northern portion of the northern hemisphere) in distribution, occurring in Europe, Asia, and North America. In western North America, the wolverine historically occurred in Alaska, Washington, Oregon, California, Nevada, Colorado, Utah, Montana, Wyoming, Idaho, and Canada. Wolverine habitat includes alpine tundra and all subalpine and montane forests (Wisdom et al. 2000). In the PNF and BNF, wolverines appear to strongly select for forest edges and concave landscapes, such as valleys. Wolverine distribution in Idaho is strongly correlated with snow, cold temperatures, high elevation montane habitats and rugged terrain, including talus slopes (Inman 2013). Spring snow cover (April 24 to May 15) is the best overall predictor of wolverine occupancy and appropriate levels of snow cover during the denning period is essential for successful wolverine reproduction. Wolverines have an extended mating period (from May to August) and give birth to kits in February to mid-March (IDFG 2014a). Dens tend to be in areas of high structural diversity with logs and large woody debris, large boulders, and deep snow (Inman et al. 2007). Den sites are usually located amongst rocks or root wads, within hollow logs, under fallen trees, or in dense

vegetation (IDFG 2014a). Wolverine summer habitat in Idaho is associated with high-elevation whitebark pine communities with steep slopes and coarse talus (IDFG 2014a). The wolverine analysis area includes suitable habitat for the wolverine. The largest amount of high-quality wolverine habitat exists in the South Fork Salmon River watershed (approximately 231,659 acres), which includes areas adjacent to the FCRNRW.

Although new evidence suggests more social interaction, wolverines tend to be solitary and primarily nocturnal. They are active year-round and will travel during daylight hours. Wolverines have large spatial requirements, with home ranges varying in size depending on sex, age, availability of food, and differences in habitat (Banci 1994). Male and female home ranges in central Idaho are the largest reported for the species (Copeland 1996). A winter recreation study evaluated home range areas and estimated male minimum and maximum home range size at 154 and 833 square miles, respectively, with female ranges estimated from 49 to 162 square miles (Heinemeyer et al. 2017). Food availability and dispersion, spatial configurations of conspecifics (i.e., members of the same species), habitat, and topography also are suggested influences for wolverine home range selection and size (Banci 1994; Copeland 1996; Hornocker and Hash 1981). According to IDFG (2014a), wolverines also are territorial, which influences their home ranges, typically reducing its overall size depending on prey availability and the local population of wolverines. While male and female ranges can overlap, males avoid other male territories and females avoid other female territories. This is important because territoriality constraints define how wolverines can react to changes in habitat quality or displacement from occupied habitat.

Large carnivores are in global decline and have experienced effects from human-caused habitat fragmentation and loss throughout their range (Ripple et al. 2014). The Rocky Mountain region represents a carnivore “hotspot,” with species typically restricted to high elevation habitat. Wolverines in the contiguous U.S. exist as small and semi-isolated subpopulations as part of a larger metapopulation, which requires regular dispersal between habitat patches to maintain population stability. Wolverines naturally occur at low densities and have low reproductive rates. Wolverine populations in the Rocky Mountains are small (Schwartz et al. 2009). Although there are estimates for population carrying capacity in Idaho, there is currently no valid population estimate (IDFG 2014a).

The SGP area is located within two Wolverine Priority Conservation Areas, Tier 1 Game Management Units (GMUs) 25 and 26, as defined by the Management Plan for Conservation of Wolverines in Idaho, 2014-2019 (IDFG 2014a). Tier 1 are the highest scoring GMUs based on potential wolverine use, cumulative threats, and amount of unprotected habitat.

Historically, wolverines have been documented on the PNF and BNF within the wolverine analysis area (**Table 6-3**). As shown on **Table 6-3** several of the observations include the same individuals. In 2010, the PNF, BNF, and Sawtooth National Forest collaborated with the Rocky Mountain Research Station, Round River Conservation Studies, IDFG, and other governmental and non-governmental organizations to assess wolverine populations and evaluate potential impacts to the species from winter recreation. The study was titled Wolverine-Winter Recreation Research Project: Investigating the Interactions Between Wolverines and Winter Recreation, and research efforts simultaneously and intensively monitored both wolverine and winter recreation use using global positioning system monitoring. The final report was released in December 2017 (Heinemeyer et al. 2017). The study results were updated in 2019 (Heinemeyer et al. 2019). Six years of trapping efforts (2010-2015) in the McCall study area confirmed 10 individual wolverines: six females (some of which were denning) and four males. **Appendix B** contains more information about wolverine survey results and observations. The PNF and BNF contain known breeding habitat, and five den sites for four individuals (females) have been confirmed since 2010.

Table 6-3 Wolverine Documentation, including DNA Confirmation, Within or Adjacent to the Wolverine Analysis Area

Study/Observation	Dates	Animal ID	Sex/Age/Status	Trap Type/Observation
Heinemeyer et al. 2017	1/30/2010-3/31/2010	F1.2010	Female/Denning	Log trap
Heinemeyer et al. 2017	1/15/2012-3/10/2012	F1.2012	Female/Not denning	Log trap
Heinemeyer et al. 2017	1/14/2014-4/19/2014	F10.2014	Female/Denning	Log trap
Heinemeyer et al. 2017	1/30/2010-3/21/2010	F2.2010	Female/Denning	Log trap
Heinemeyer et al. 2017	1/25/2011-4/10/2011	F2.2011	Female/Not denning	Log trap
Heinemeyer et al. 2017	2/20/2010-4/3/2010	F3.2010	Female/Denning	Log trap
Heinemeyer et al. 2017	1/4/2014-3/24/2014	F3.2014	Female/Not denning	Log trap
Heinemeyer et al. 2017	1/22/2011-3/16/2011	F4.2011	Female/Not denning	Log trap
Heinemeyer et al. 2017	1/30/2011-4/2/2011	F5.2011	Female/Denning	Log trap
Heinemeyer et al. 2017	2/20/2010-3/10/2010	M1.2010	Male	Log trap
Heinemeyer et al. 2017	1/18/2011-3/15/2011	M1.2011	Male	Log trap
Heinemeyer et al. 2017	1/25/2014-4/13/2014	M1.2014	Male	Log trap
Heinemeyer et al. 2017	1/11/2014-5/27/2014	M12.2014	Male	Log trap
Heinemeyer et al. 2017	2/5/2010-4/20/2010	M2.2010	Male	Log trap
Heinemeyer et al. 2017	2/10/2011-4/3/2011	M2.2011	Male	Log trap
Heinemeyer et al. 2017	2/11/2010-4/26/2010	M3.2010	Male	Log trap
IDFG	1/12/2007	N/A	Unknown	Sample - Incidental Observation
IDFG	9/1/1983	N/A	Unknown	Seen - Incidental Observation
IDFG	6/12/1982	N/A	Unknown	Seen - Incidental Observation
IDFG	5/14/2009	N/A	Unknown	Seen - Incidental Observation
IDFG	4/12/1994	N/A	Male	Hand - Inventory/Targeted Survey
IDFG	1/15/2014	N/A	Unknown	Hand - Incidental Observation
IDFG	1/18/2013	N/A	Female	Photographed - Remote Camera Station
IDFG	3/3/2015	N/A	Female	Photographed - Remote Camera Station
IDFG	3/4/2015	N/A	Unknown	Photographed - Remote Camera Station
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	N/A	Camera Observation
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	N/A	Camera Observation

Study/Observation	Dates	Animal ID	Sex/Age/Status	Trap Type/Observation
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	N/A	Camera Observation
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	N/A	Camera Observation
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	Male	Gun Brush Hair Snag
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	Female	Gun Brush Hair Snag
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	N/A	Gun Brush Hair Snag
Garcia and Associates 2013	2/1/2013-3/1/2013	N/A	N/A	Gun Brush Hair Snag
Garcia and Associates 2014	1/19/2014-3/19/2014	N/A	Male	Camera Observation; Gun Brush Hair Snag
Garcia and Associates 2014	1/19/2014-3/19/2014	N/A	Male	Camera Observation; Gun Brush Hair Snag

Source: Forest Service 2020a.

Modeled persistent spring snow cover was utilized (**Appendix A**; Heinemeyer et al. 2017) (**Table 6-4**) to describe existing habitat for wolverines. Persistent spring snow cover modeling results largely represent female breeding habitat, and therefore may not account for movements of wolverine at different times of the year within the wolverine analysis area, or their use of varying habitat types.

Table 6-4 Persistent Snow Cover in the Wolverine Analysis Area

Snow Cover Years	Area (acres)
1	57,705
2	51,566
3	53,807
4	77,266
5	50,684
6	32,415
7	12,340

Source: Heinemeyer et al. 2017.

Figure 5-4 shows the distribution of persistent late spring (i.e., April 24 to May 15) snow cover in the wolverine analysis area as modeled for the northern hemisphere from 2009 through 2015 (Heinemeyer et al. 2017). The model uses the number of years (out of seven) in which snow cover was present in the spring in selected terrestrial pixels (very small, mapped areas).

This spring timeframe generally corresponds to the period of wolverine den abandonment. The overall wolverine analysis area includes a variety of habitats, including large areas that would typically not have persistent spring snow cover (i.e., Cascade Lake and Warm Lake Road). These are areas where wolverine are expected to travel through at different times of the year. Most dens and associated breeding habitat have been located in areas that were snow covered for 6 to 7 years. Hence, higher elevations on the

eastern side of the wolverine analysis area are more likely to have persistent snow, and therefore higher quality habitat, in more years, compared to western portions of the wolverine analysis area. This has been confirmed by regular documentation of individuals using the area and predicted winter ranges based on global positioning system locations of collared animals.

6.2.4 Monarch Butterfly

6.2.4.1 Species Status

The monarch butterfly is a candidate for listing under the ESA with a wide range across the U.S. (85 Federal Register 81813). In the west each spring, monarchs migrate to the north and east from coastal California toward the Rocky Mountains and Pacific Northwest (USFWS 2020a). This migration may span several generations of monarchs and the SGP vicinity is considered part of the species' summer breeding range. While seasonally occupying the area, monarchs often remain near water resources (particularly in arid climates) and are largely dependent on milkweed (*Asclepias spp.*) for reproduction. Western monarchs migrate back to coastal California each fall to overwinter. These populations overwinter in coastal groves of blue gum eucalyptus (*Eucalyptus globulus*), Monterey pine (*Pinus radiata*), and Monterey cypress (*Hesperocyparis macrocarpa*) (USFWS 2020a).

6.2.4.2 Baseline

Range-wide, limited monitoring of the monarch butterfly began in the 1980's, although large-scale yearly assessments did not begin until 1997. Since 1997, population counts have generally been declining every year (IDFG 2017a). The primary threats impacting monarchs are habitat loss and fragmentation, loss of milkweed, and intensified weather events that impact monarch populations. Surveys for the monarch butterfly have historically focused on locations of milkweed. Milkweed typically occurs in non-forested openings along waterways and may also occur in roadside ditches, agricultural fields, and pastures. Monarch and milkweed suitability models in Idaho show the predicted suitability for milkweed species and monarch butterflies on the PNF in the vicinity of the SGP to be low based on 36 variables such as soils, topography, climate, and distance to water (Svancara et al. 2019). Additional suitability models have also been published by the Xerces society (Xerces Society for Invertebrate Conservation 2018). Areas mapped as 'Low Suitability' are typically excluded from project analysis. Floral resources used by monarch butterflies for migration can occur in a broader range of habitats and are not restricted to non-forested vegetation along waterways.

Existing habitat for monarchs on the PNF occurs primarily on the Council and Weiser Ranger Districts, along waterways and where soils are wet, such as wet meadows and ditches. Monarchs only breed where milkweed is present, but they depend on the nectar from various floral resources during migration. It is suspected that monarch presence on the PNF is more closely associated with migration than with breeding, but more data collection and habitat assessment is needed.

While the entirety of the wildlife analysis area is within the species range, most milkweeds in Idaho are in the southern portion of the state between Boise and Twin Falls along the Snake River or in the panhandle portion of the state (Svancara et al. 2019). Surveys have not occurred in the wildlife analysis area for this species; however, according to the USFWS Monarch Conservation Database, only one acre of milkweed with 21 individual plants has been mapped in Valley County, Idaho where the SGP occurs (USFWS 2020b). Therefore, while monarchs may occur in the wildlife analysis area, the probability is low.

6.3 Focal Species, Including Region 4 Sensitive Species and Management Indicator Species

Many of the focal species selected for analysis for the SGP also are Region 4 Sensitive species. Those species are designated by Forest Service Regional Foresters for specific regions or forests. There are 16 Regional Forester Sensitive Species (sensitive mammals, birds, and reptiles/amphibians) from the Intermountain Region (Region 4 of the Forest Service) included in this analysis (**Table 6-1**).

The following species (R4 Sensitive, MIS, focal species, or big game species) (**Table 6-1**) have suitable habitat and documented occurrence or are assumed to occur in the wildlife analysis area: white-headed woodpecker, Lewis's woodpecker, American three-toed woodpecker, black-backed woodpecker, boreal owl, dusky grouse (summer), fisher, flammulated owl, great gray owl, northern goshawk, pileated woodpecker, silver-haired bat, mountain quail, gray wolf, peregrine falcon, Rocky Mountain bighorn sheep, Rocky Mountain elk, Townsend's big-eared bat, bald eagle, and Columbia spotted frog.

Additional species considered but excluded from this analysis due to the wildlife analysis area being outside of the species range or lack of modeled habitat include Lazuli bunting, spotted bat, Harlequin duck, and yellow-billed cuckoo (federal candidate species).

6.3.1 Habitat Family 1 – Low-Elevation, Old Forest

Family 1 includes wildlife species associated with low elevation, old forest vegetation types and has been identified as a habitat family of greatest conservation concern, due to widespread and substantial declines in habitat quantity across their range (**Appendix A**; Wisdom et al. 2000).

Family 1 wildlife species depend on single-story, and to a lesser extent, multi-story, lower elevation old forest stands as source habitats. Family 1 source habitat occurs in large tree, low canopy cover conditions in PVGs 1, 2, 3, and 5, and in those habitat types of PVG 6 where ponderosa pine is a major seral component (see the Vegetation: General Vegetation Communities, Botanical Resources, and Non-Native Plants Specialist Report (Forest Service 2022b). Special features of this source habitat are large-diameter live trees and snags (Wisdom et al. 2000). Historically, these habitat types were maintained in a relatively open condition by frequent, nonlethal fire.

White-headed woodpecker. The white-headed woodpecker is a Region 4 Sensitive species, a PNF and BNF MIS, and Idaho SGCN. The white-headed woodpecker is a regional endemic species of the Interior Northwest and may be particularly vulnerable to environmental change because it occurs in limited distribution, with narrow habitat requirements in dry conifer forests. The white-headed woodpecker is closely tied to mature ponderosa pine forests, with live and dead ponderosa pine trees greater than (>) 20 inches dbh in open canopy conditions (**Appendix A**). To meet their various ecological needs, white-headed woodpeckers also require heterogeneous (i.e., mixed or varied) landscapes characterized by a mosaic of open- and closed-canopied ponderosa pine forest (**Appendix A**). Although white-headed woodpeckers have not been documented in the analysis area, they may pass through. They are expected to be uncommon and due to specific breeding habitat requirements, are not expected to breed and nest in the wildlife analysis area. The closest recorded observations are approximately 6 miles north and 16 miles west of the SGP (Forest Service 2017b).

On the PNF and BNF, vegetative communities that may provide source habitat conditions include PVGs 1, 2, 3, 5, and 6 (Nutt et al. 2010). While the drier habitat types in PVGs 3 and 6 can develop cover types with ponderosa pine in the larger size classes and open canopies, these conditions are not found as commonly as in PVGs 1, 2, and 5 across the PNF and BNF. Large diameter snags are an essential habitat

feature for white-headed woodpecker. Current breeding habitat on the PNF is concentrated on the west side of the Forest, on the Council and New Meadows Ranger Districts.

Approximately 5,070 acres of white-headed woodpecker modeled source habitat occurs in the wildlife analysis area (**Table 6-5**; **Figure 6-1**). The highest acreages of modeled habitat are concentrated in the following subwatersheds: Loosum Creek – East Fork South Fork Salmon River, No Mans Creek – East Fork South Fork Salmon River, Quartz Creek, Porcupine Creek – Johnson Creek, and Goat Creek – South Fork Salmon River.

Table 6-5 White-headed Woodpecker Modeled Source Habitat in the Wildlife Analysis Area

Subwatershed Name	Acres of Modeled Source Habitat
Bear Creek-South Fork Salmon River	76
Beaver Creek	104
Burntlog Creek	7
Curtis Creek	167
Ditch Creek-Johnson Creek	3
Duck Creek-Cascade Reservoir	112
Goat Creek-South Fork Salmon River	305
Loosum Creek-East Fork South Fork Salmon River	1,318
Lower Big Creek	3
Lower Gold Fork River	0.4
No Mans Creek-East Fork South Fork Salmon River	1,096
Pearsol Creek-North Fork Payette River	125
Poison Creek-North Fork Payette River	96
Porcupine Creek-Johnson Creek	376
Profile Creek	133
Quartz Creek	564
Riordan Creek	23
Sheep Creek-Johnson Creek	5
Six-bit Creek-South Fork Salmon River	253
Trapper Creek-Johnson Creek	10
Upper Big Creek	213
Warm Lake Creek	81
Total	**5,070**

Source: Forest Service 2020a.

Lewis's Woodpecker. The Lewis's woodpecker is an Idaho SGCN (Tier 2 – Vulnerable in Idaho). This woodpecker is closely associated with recent burns and responds favorably to stand-replacing fires (Tobalske 1997), whereas habitat for other Family 1 species is usually maintained by frequent, low-intensity burns that retain large and old-forest habitat. The Lewis's woodpecker is characterized as a 'burn specialist' due to its preference for nesting within burned pine forests (**Appendix A**). Distribution is closely associated with open ponderosa pine forest in the western U.S. and fire-maintained old-growth ponderosa pine (**Appendix A**). Suitable habitat conditions include an open canopy, abundant arthropod

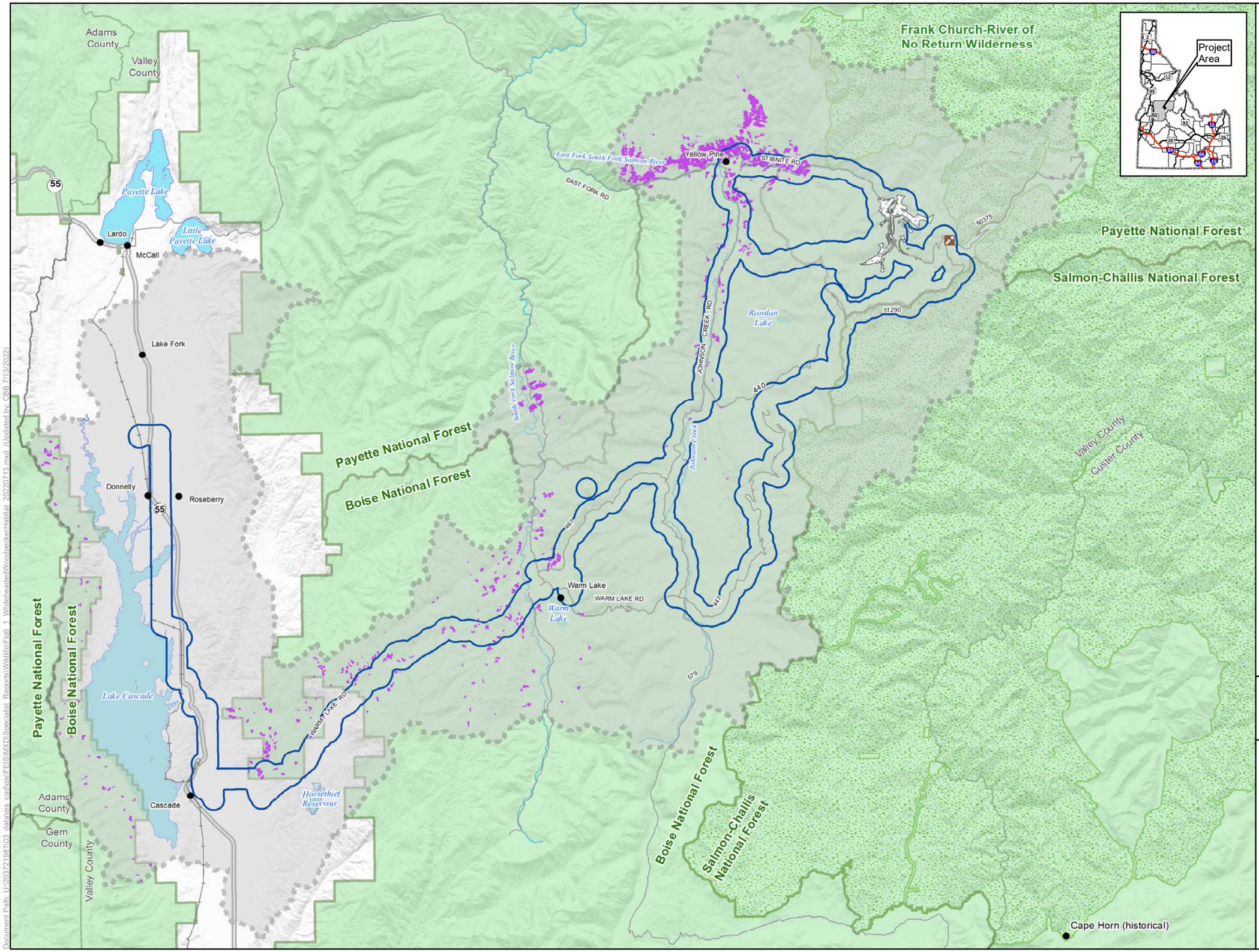
(e.g., insects and spiders) prey, shrubby understory, and availability of nest cavities and perches (**Appendix A**).

Approximately 4,141 acres of Lewis's woodpecker modeled source habitat occurs in the wildlife analysis area (**Table 6-6**; **Figure 6-2**). A large portion of the modeled source habitat is in the following subwatersheds: No Man's Creek – East Fork South Fork Salmon River, Loosum Creek – East Fork South Fork Salmon River, Quartz Creek, Goat Creek – South Fork Salmon River, and Porcupine Creek – Johnson Creek.

Table 6-6 Lewis's Woodpecker Modeled Source Habitat in the Wildlife Analysis Area

Subwatershed Name	Acres of Modeled Source Habitat
Bear Creek-South Fork Salmon River	39
Beaver Creek	26
Burntlog Creek	6
Curtis Creek	71
Ditch Creek-Johnson Creek	3
Duck Creek-Cascade Reservoir	30
Goat Creek-South Fork Salmon River	252
Loosum Creek-East Fork South Fork Salmon River	1,000
Lower Big Creek	3
Lower Gold Fork River	0.03
No Mans Creek-East Fork South Fork Salmon River	1,225
Pearsol Creek-North Fork Payette River	23
Poison Creek-North Fork Payette River	24
Porcupine Creek-Johnson Creek	236
Profile Creek	98
Quartz Creek	419
Riordan Creek	10
Sheep Creek-Johnson Creek	5
Six-bit Creek-South Fork Salmon River	151
Sugar Creek	57
Tamarack Creek	150
Trapper Creek-Johnson Creek	6
Upper Big Creek	58
Upper Monumental Creek	179
Warm Lake Creek	70
Total	**4,141**

Source: Forest Service 2020a.



LEGEND

- Woodpecker Habitat Analysis Area - Affected Environment
- Existing Condition Analysis Area
- White-headed Woodpecker Modeled Habitat
- Stibnite Historic Disturbance

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 6-1
White-headed Woodpecker Habitat
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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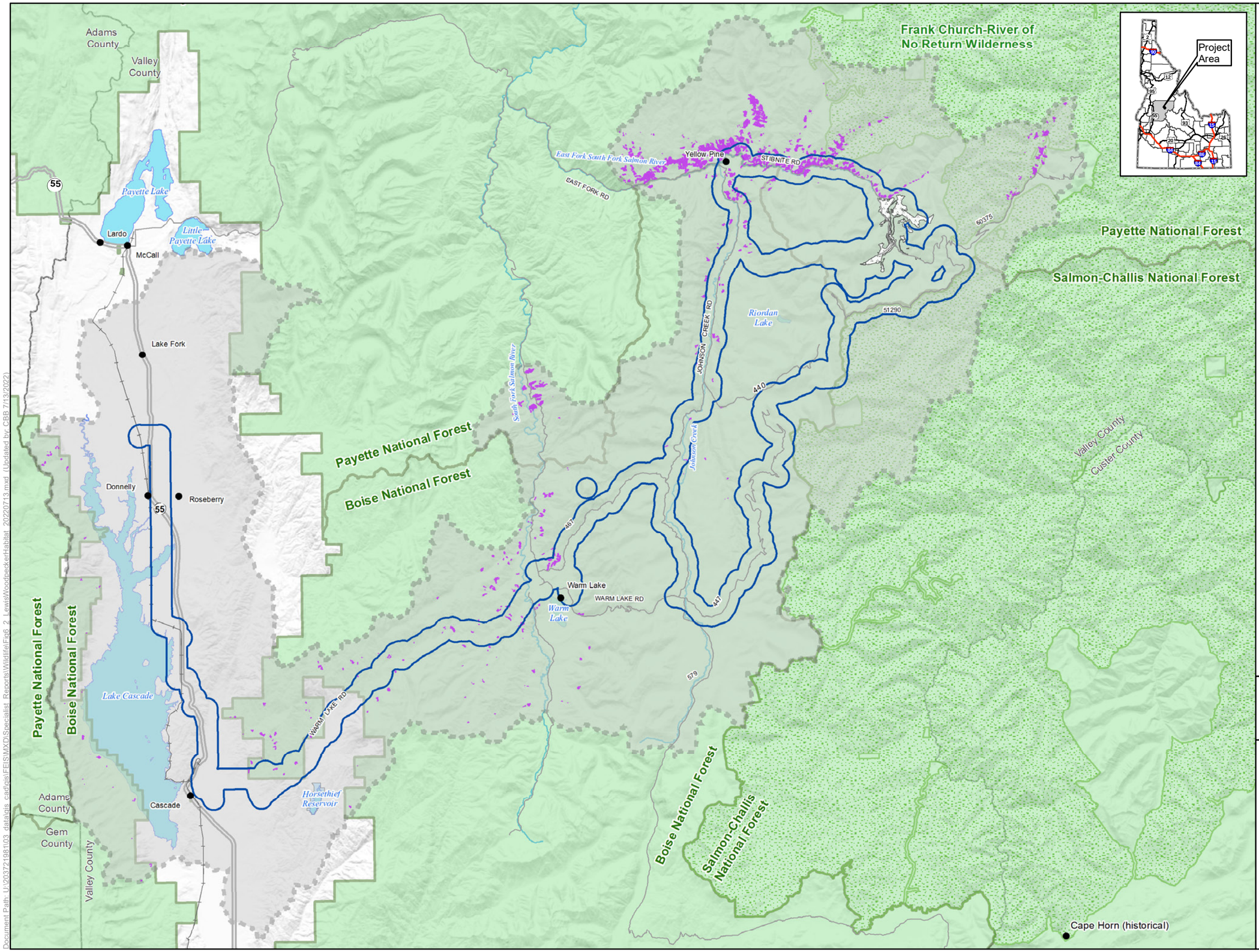

LEGEND

- Woodpecker Habitat Analysis Area - Affected Environment
- Existing Condition Analysis Area
- Lewis's Woodpecker Modeled Habitat
- Stibnite Historic Disturbance

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route
** Substation locations are approximate
*** Associated with Burntlog Route only
**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 6-2
Lewis's Woodpecker Habitat
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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6.3.2 Habitat Family 2 – Broad Elevation Old Forest

Species in Family 2 use late-seral, multi-, and single-layered stages of the montane community as source habitats (Wisdom et al. 2000). Source habitats for some species also include late-seral stages of the subalpine community or the lower montane community, or both. Source habitat for Family 2 overlaps Family 1; however, it encompasses a broader array of cover types and elevations (Wisdom et al. 2000). Family 2 source habitat occurs primarily in PVGs 3 through 11 (Forest Service 2003a, Appendix E), although some species use lower elevation types. Historical fire regimes in Family 2 vary by PVG but are dominated by mixed severity and lethal regimes (Forest Service 2003a, Appendix A).

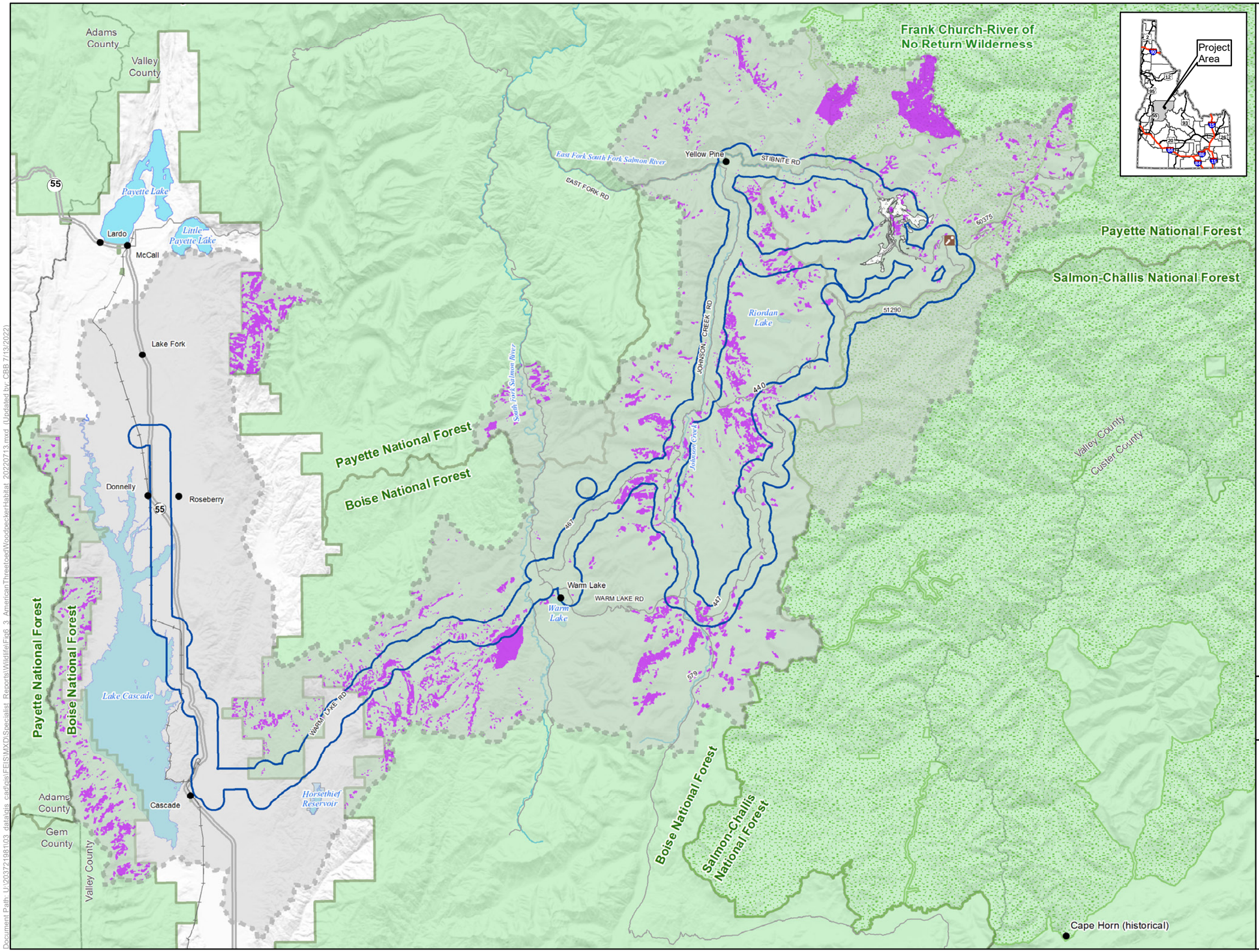
Species that comprise Family 2 tend to be habitat generalists that use a wide range of conditions. Many are associated with both the large and medium tree size class forests in moderate- to high-stand canopy conditions. Some Family 2 species can take advantage of PVGs that exhibit uncharacteristically high tree densities and amounts of shade-tolerant tree species that have resulted from fire suppression and/or past management activities. As forest conditions increase in density and shade-tolerant species become more common throughout the landscape (either from suppression of fire or past vegetation management), the quantity and interconnectedness of Family 2 habitat increases.

American (Northern) three-toed woodpecker. The American three-toed woodpecker is a Region 4 Sensitive species that uses mature to old-growth, recently burned forests, and areas affected by pine bark beetles (Wiggins 2004). Saab et al. (2018) observed that the American three-toed woodpecker diet can consist almost entirely of spruce beetles, and they feed under the bark of freshly killed Engelmann spruce. The three-toed woodpecker is associated with disturbance events such as mountain pine beetle infestations and wildfire events that create areas with high densities of snags and insect prey (**Appendix A**; Wisdom et al. 2000). Three-toed woodpecker populations typically peak during the first 3 to 5 years after a fire.

Three-toed woodpeckers can utilize some forested conditions that are not within the historical range of variability under PVGs 5 and 11. These conditions generally consist of higher tree densities and more complex vegetative structure than what would have developed when stands in these PVGs were experiencing historical disturbance processes. These dense conditions also would make stands more susceptible to insect infestations or stand-replacing wildfire important for disturbance-related species. For PVG 5, when functioning outside HRV, the Medium-High and High tree canopy cover class are included when in the Medium, Large, and Very Large tree size classes. For PVG 11, when functioning outside HRV, the High tree canopy cover class is included when in the Medium, Large, and Very Large tree size classes.

Therefore, Medium (10 to 19.9 inches dbh), Large (20 to 29.9 inches dbh), and Very Large (>30 inches dbh) tree size classes are recommended for use in the source habitat model for American three-toed woodpecker, for both within and outside of the HRV. Selecting forested stands in the Medium-High (45 to 59 percent) and High (>60 percent) tree canopy cover classes also are recommended for modeling American three-toed woodpecker source habitat.

Although three-toed woodpeckers have not been recorded in the wildlife analysis area, and the closest observation in the Forest Service database is approximately 12 miles north of the wildlife analysis area (Forest Service 2017b), the habitat profile and burn history of the area could be attractive to the species, and it is likely they could occur. Approximately 21,675 acres of American three-toed woodpecker modeled source habitat occurs in the wildlife analysis area (**Table 6-7**; **Figure 6-3**). The highest acreages of modeled habitat, similar to black-backed woodpecker, occur in the following subwatersheds: Tamarack Creek, Curtis Creek, Boulder Creek, Duck Creek – Cascade Reservoir, and Lunch Creek – Johnson Creek.



LEGEND

- Woodpecker Habitat Analysis Area - Affected Environment
- Existing Condition Analysis Area
- American Three-Toed Woodpecker Modeled Habitat
- Stibnite Historic Disturbance

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 6-3
American Three-toed Woodpecker Habitat
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Table 6-7 American Three-toed Woodpecker Modeled Source Habitat in the Wildlife Analysis Area

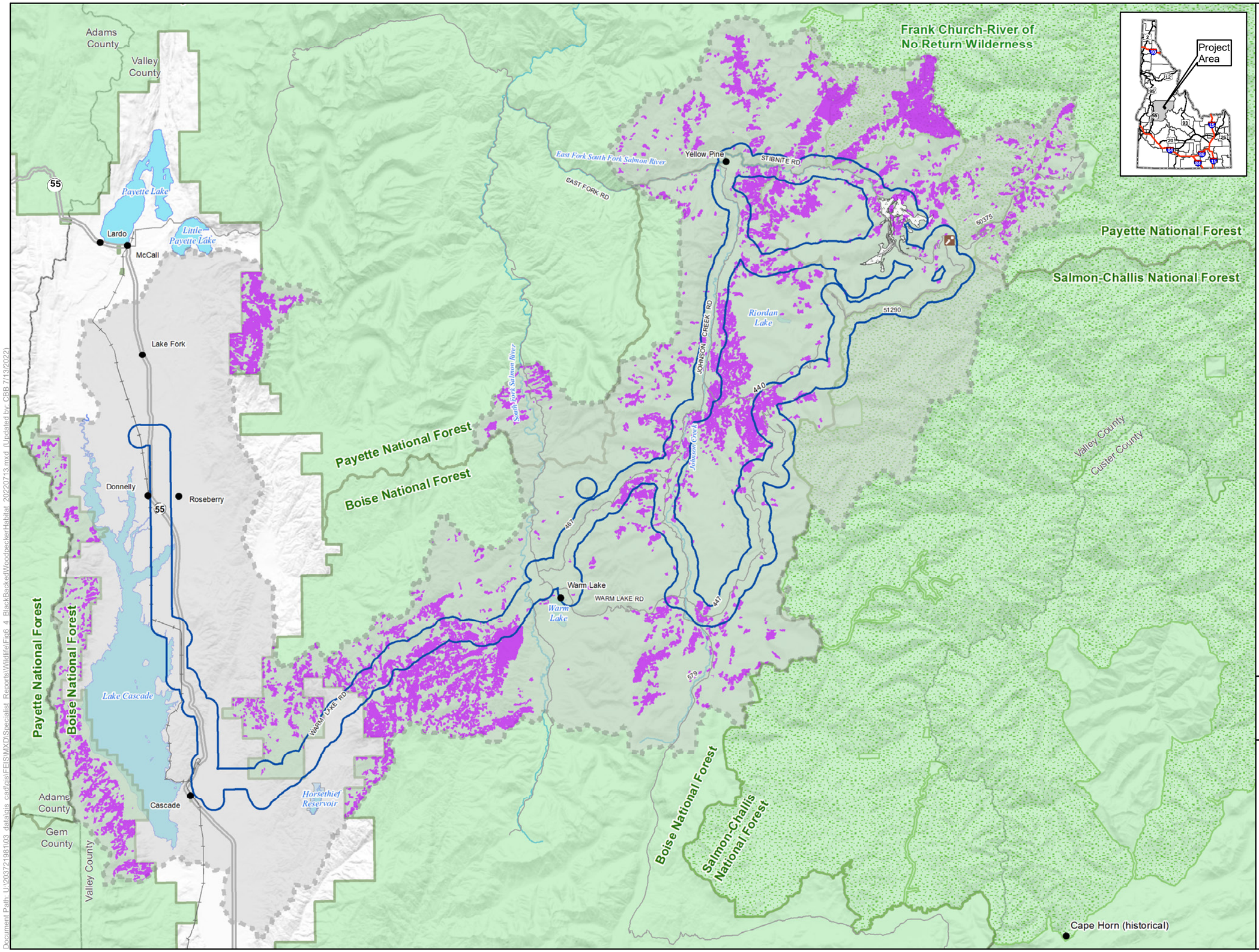
Subwatershed Name	Acres of Modeled Source Habitat
Bear Creek-South Fork Salmon River	60
Beaver Creek	233
Boulder Creek	1,674
Burntlog Creek	972
Curtis Creek	2,098
Ditch Creek-Johnson Creek	1,283
Duck Creek-Cascade Reservoir	1,567
Goat Creek-South Fork Salmon River	426
Headwaters East Fork South Fork Salmon River	234
Headwaters Johnson Creek	989
Loosum Creek-East Fork South Fork Salmon River	202
Lower Big Creek	110
Lower Gold Fork River	2
Lunch Creek-Johnson Creek	1,309
No Mans Creek-East Fork South Fork Salmon River	463
Pearsol Creek-North Fork Payette River	12
Poison Creek-North Fork Payette River	321
Porcupine Creek-Johnson Creek	781
Profile Creek	1,268
Quartz Creek	433
Riordan Creek	517
Sheep Creek-Johnson Creek	635
Six-bit Creek-South Fork Salmon River	180
Sugar Creek	233
Tamarack Creek	3,199
Trapper Creek-Johnson Creek	498
Upper Big Creek	1,183
Upper Monumental Creek	735
Warm Lake Creek	58
Total	**21,675**

Source: Forest Service 2020a.

Black-backed woodpecker. The black-backed woodpecker is a BNF MIS and focal species that uses montane and boreal coniferous forests with standing snags. This species is associated with disturbance events such as mountain pine beetle infestations and wildfire that create areas with high densities of snags and insect prey (**Appendix A**; Wisdom et al. 2000). They are strongly associated with recently burned forests (often colonizing them within one year after a fire) and excavate nests in snags (Saab et al. 2009).

On the PNF and BNF, vegetative communities that may provide source habitat conditions for black-backed woodpecker include PVGs 8, 9, 10, and 11 in the Medium and Large tree size classes and with moderate or high canopy cover (Nutt et al. 2010). PVG 5 also can provide source habitat when outside of the HRV. It is recommended that Medium (10 to 19.9 inches dbh), Large (20 to 29.9 inches dbh), and Very Large (>30 inches dbh) tree size classes be used to model source habitat for the black-backed woodpecker, both for within and outside the HRV. Mountain pine beetle infestations and/or high intensity fire events are primary recycling agents in these PVGs; both are disturbances associated with woodpecker habitat and population irruptions. Snags are a special habitat feature for woodpeckers and provide nesting and foraging opportunities. Studies indicate that black-backed woodpeckers can utilize a wide range of canopy covers that fall within the Low-Medium, Medium, Medium-High, and High canopy cover classifications.

Approximately 49,424 acres of black-backed woodpecker modeled source habitat occurs in the analysis area (**Table 6-8**; **Figure 6-4**). A large portion of the modeled source habitat is in the following subwatersheds, similar to areas modeled for other fire-associated woodpeckers: Curtis Creek, Tamarack Creek, Upper Big Creek, Duck Creek – Cascade Reservoir, and Boulder Creek.



LEGEND

- Woodpecker Habitat Analysis Area - Affected Environment
- Existing Condition Analysis Area
- Black-backed Woodpecker Modeled Habitat
- Stibnite Historic Disturbance

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 6-4 Black-backed Woodpecker Habitat Stibnite Gold Project Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Table 6-8 Black-backed Woodpecker Modeled Source Habitat in the Wildlife Analysis Area

Subwatershed Name	Acres of Modeled Source Habitat
Bear Creek-South Fork Salmon River	623
Beaver Creek	566
Boulder Creek	2,793
Burntlog Creek	2,696
Curtis Creek	5,704
Ditch Creek-Johnson Creek	1,850
Duck Creek-Cascade Reservoir	3,011
Goat Creek-South Fork Salmon River	1,029
Headwaters East Fork South Fork Salmon River	451
Headwaters Johnson Creek	1,256
Loosum Creek-East Fork South Fork Salmon River	981
Lower Big Creek	492
Lower Gold Fork River	79
Lunch Creek-Johnson Creek	1,590
No Mans Creek-East Fork South Fork Salmon River	2,594
Pearsol Creek-North Fork Payette River	32
Poison Creek-North Fork Payette River	751
Porcupine Creek-Johnson Creek	2,232
Profile Creek	2,418
Quartz Creek	1,711
Riordan Creek	1,086
Sheep Creek-Johnson Creek	882
Six-bit Creek-South Fork Salmon River	562
Sugar Creek	1,402
Tamarack Creek	4,106
Trapper Creek-Johnson Creek	2,226
Upper Big Creek	4,676
Upper Monumental Creek	1,508
Warm Lake Creek	116
Total	**49,424**

Source: Forest Service 2020a

Dusky grouse (summer). Dusky grouse is a focal species for the PNF and BNF. This species is closely related to sooty grouse and the two species were, until recently, considered a single species, blue grouse. Dusky grouse is a large grouse associated with mountain forest which contain ponderosa and lodgepole pine, aspen, and fir. This species is a forest dwelling grouse native to the Rocky Mountains, a permanent resident on the PNF and BNF, which moves to higher elevations in winter.

While herblands, grasslands, and shrublands (e.g., mountain mahogany, chokecherry, serviceberry, rose, bitterbrush, sagebrush) are commonly described as summer habitat, use of these habitats primarily occurs when they are within or adjacent to forested stands, typically within open ponderosa pine or Douglas fir habitat types (**Appendix A**; Wisdom et al. 2000). Wisdom et al. (2000) described dusky grouse summer source habitat as contrast habitat that occurs on the interface between forest and openings and generally at lower elevations than in winter. These openings, whether natural or created by harvest or fire, can develop an inter-mix of herb, shrub, and/or seedling vegetation that provides cover and forage for dusky grouse, and yet are still within the larger matrix of a later seral forest. This kind of mosaic commonly occurs in the lower range of tree canopy covers.

Modeled source habitat for dusky grouse includes Seedling (4.5 feet tall), Sapling (0.1 to 4.9 inches dbh), Small (5 to 9.9 inches dbh), Medium (10 to 19.9 inches dbh), Large (20 to 29.9 inches dbh), and Very Large (>30 inches dbh) tree size classes. Forested stands in the Low (10 to 19 percent) and Low-Medium (20 to 29 percent) tree canopy cover classes also were selected.

Approximately 20,509 acres of dusky grouse modeled source habitat occurs in the analysis area (**Table 6-9**; **Figure 6-5**). The highest acreages of modeled habitat are concentrated in the following subwatersheds: Upper Big Creek, Six-bit Creek – South Fork Salmon River, Goat Creek – South Fork Salmon River, Porcupine Creek – Johnson Creek, and Loosum Creek – East Fork South Fork Salmon River.

Table 6-9 Dusky Grouse Modeled Source Habitat in the Wildlife Analysis Area

Subwatershed Name	Acres of Modeled Source Habitat
Bear Creek-South Fork Salmon River	712
Beaver Creek	649
Boulder Creek	220
Burntlog Creek	36
Curtis Creek	1,516
Ditch Creek-Johnson Creek	73
Duck Creek-Cascade Reservoir	1,162
Goat Creek-South Fork Salmon River	1,948
Headwaters East Fork South Fork Salmon River	0
Loosum Creek-East Fork South Fork Salmon River	1,591
Lower Big Creek	298
Lower Gold Fork River	49
No Mans Creek-East Fork South Fork Salmon River	1,539
Pearsol Creek-North Fork Payette River	972
Poison Creek-North Fork Payette River	1,076
Porcupine Creek-Johnson Creek	1,946
Profile Creek	115

Subwatershed Name	Acres of Modeled Source Habitat
Quartz Creek	457
Riordan Creek	77
Sheep Creek-Johnson Creek	40
Six-bit Creek-South Fork Salmon River	2,088
Sugar Creek	78
Tamarack Creek	197
Trapper Creek-Johnson Creek	261
Upper Big Creek	2,349
Upper Monumental Creek	376
Warm Lake Creek	683
Total	**20,509**

Source: Forest Service 2020a

Boreal owl. The boreal owl is a Region 4 Sensitive species. The boreal owl requires mature conifer forests with moderate to high canopy cover and snags. This species is strongly associated with higher elevation subalpine fir / spruce-fir habitats (>5,000 feet elevation), where their dominant prey food, red-backed vole, is available. Boreal owls, as secondary cavity nesters, also are highly dependent on pileated woodpeckers and northern flickers for nest cavities (**Appendix A**). Association of foraging and nesting habitat, snags, and downed wood for nest sites and prey habitat, are special habitat features not represented by the model.

This species has been documented in the wildlife analysis area at higher elevations. The nesting/fledging period is April through July (IDFG 2012). The species has been documented, particularly in the mine site, village of Yellow Pine, and Landmark areas, and most likely breeds in the wildlife analysis area. Approximately 28,602 acres of modeled source habitat is present (**Table 6-10**; **Figure 6-6**). The highest acreages of modeled habitat occur in the following subwatersheds: Upper Big Creek, Curtis Creek, No Man's Creek – East Fork South Fork Salmon River, Boulder Creek, Burntlog Creek, and Trapper Creek – Johnson Creek.

Frank Church-River of No Return Wilderness

Payette National Forest

Salmon-Challis National Forest

Boise National Forest

Adams County

Valley County

Gem County

Custer County

Payette Lake

Little Payette Lake

Lake Cascade

Riordan Lake

Warm Lake

Horsethief Reservoir

Lardo

McCall

Lake Fork

Donnelly

Roseberry

Cascade

Yellow Pine

Cape Horn (historical)

East Fork South Fork Salmon River

South Fork Salmon River

Johnson Creek

STIBNITE RD

EAST FORK RD

JOHNSON CREEK RD

WARM LAKE RD

50375

51290

440

467

447

579

55

Project Area

LEGEND

Wildlife Habitat Analysis Area Affected Environment

Existing Condition Analysis Area

Dusky Grouse Summer Modeled Habitat

Stibnite Historic Disturbance

Other Features

U.S. Forest Service

Wilderness

County

City/Town

Railroad

State Highway

Road

Stream/River

Lake/Reservoir

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

N

Figure 6-5
Dusky Grouse (Summer) Habitat
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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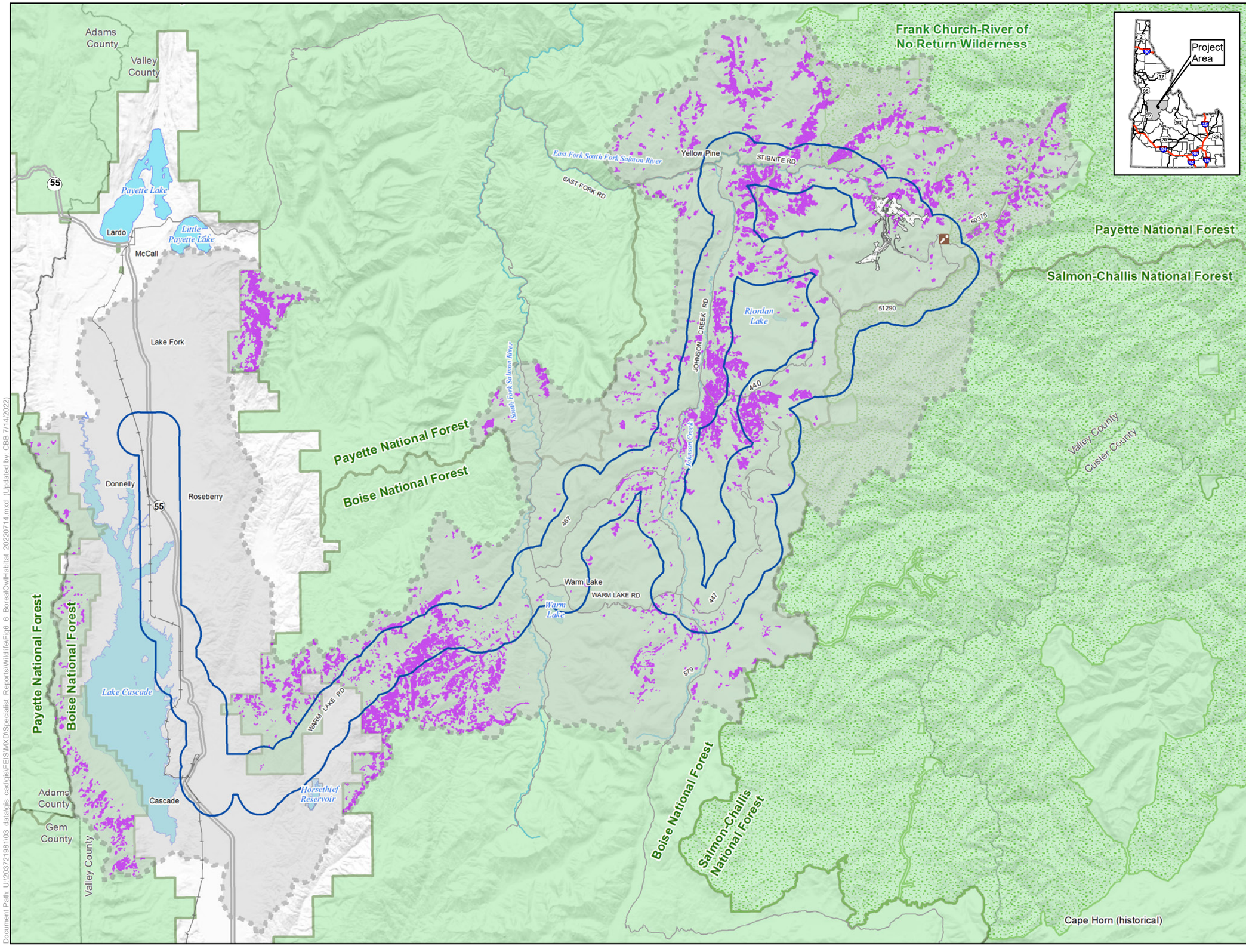

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Table 6-10 Boreal Owl Modeled Source Habitat in the Wildlife Analysis Area

Subwatershed Name	Acres of Modeled Source Habitat
Bear Creek-South Fork Salmon River	244
Beaver Creek	368
Boulder Creek	1,950
Burntlog Creek	1,761
Curtis Creek	2,916
Ditch Creek-Johnson Creek	705
Duck Creek-Cascade Reservoir	1,119
Goat Creek-South Fork Salmon River	390
Headwaters East Fork South Fork Salmon River	219
Headwaters Johnson Creek	386
Loosum Creek-East Fork South Fork Salmon River	811
Lower Big Creek	356
Lower Gold Fork River	54
Lunch Creek-Johnson Creek	402
No Mans Creek-East Fork South Fork Salmon River	2,150
Pearsol Creek-North Fork Payette River	8
Poison Creek-North Fork Payette River	187
Porcupine Creek-Johnson Creek	1,459
Profile Creek	1,373
Quartz Creek	1,326
Riordan Creek	750
Sheep Creek-Johnson Creek	293
Six-bit Creek-South Fork Salmon River	358
Sugar Creek	1,197
Tamarack Creek	1,217
Trapper Creek-Johnson Creek	1,759
Upper Big Creek	3,194
Upper Monumental Creek	1,591
Warm Lake Creek	59
Total	**28,602**

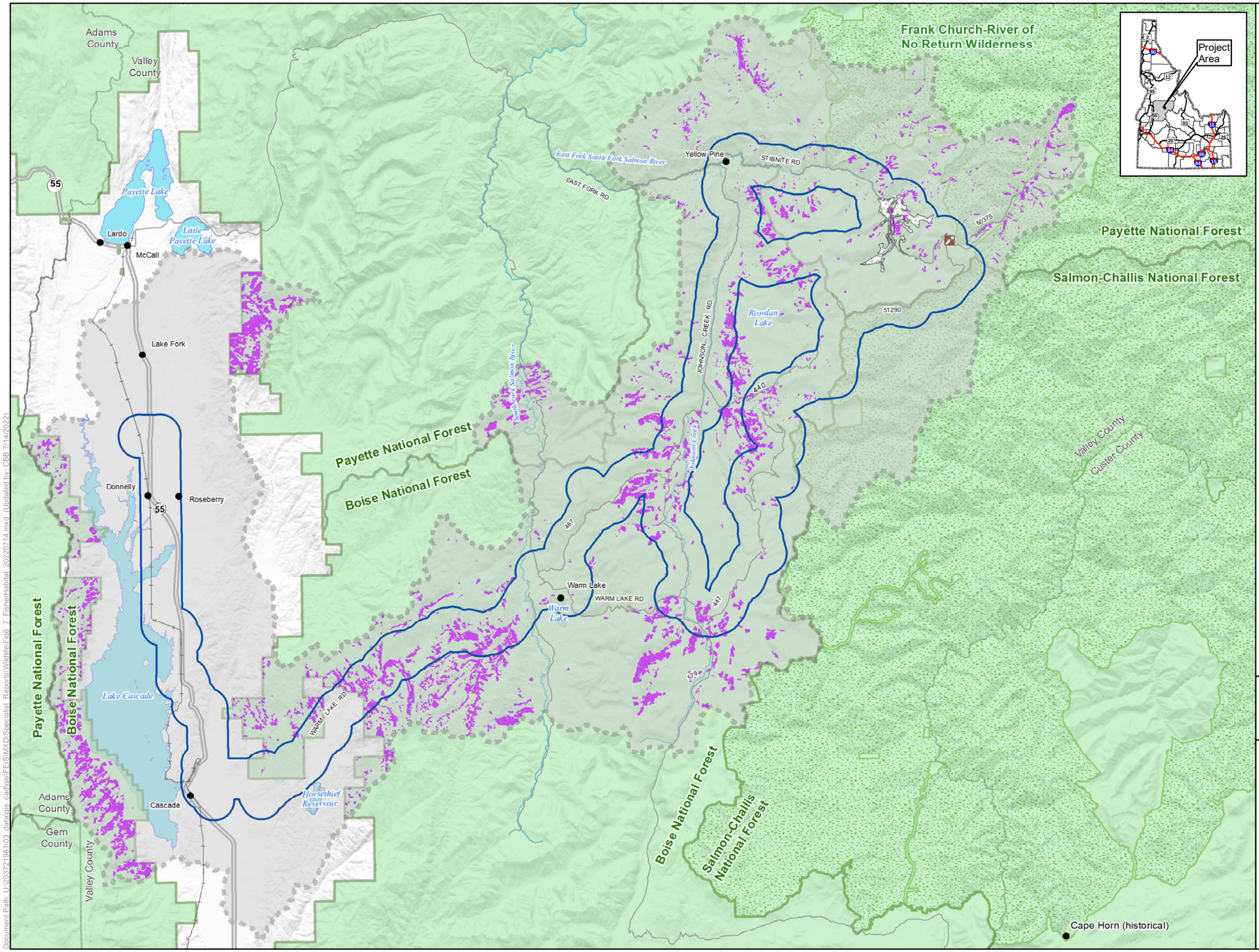
Source: Forest Service 2020a

Fisher. The fisher, a large member of the weasel family, is a Region 4 Sensitive species and a SGCN. The species was previously granted candidate species status by the USFWS for the West Coast Distinct Population Segment (68 Federal Register 41169; July 10, 2003), but listing was determined to be "not warranted" for the Rocky Mountain Region Distinct Population Segment (76 Federal Register 38504; June 30, 2011). The Forest Service has fisher survey units located across the PNF and BNF and the most recent state monitoring was conducted in 2018-2019 (IDFG 2019). Although commercial harvest of fishers in Idaho has been closed for more than 60 years, fisher populations have not recovered in western portions of their range (Lofroth et al. 2010; USFWS 2010). On the PNF, incidental trapping continues to be a mortality issue for fisher.

In the western U.S., fishers use coniferous and mixed mature forests, often in riparian corridors and drainages (Meyer 2007; Raley et al. 2012). Sauder and Rachlow (2014; 2015) found that fisher core use areas were often composed of moderate amounts of high canopy cover forest and moderate landscape edge density, and that forest heterogeneity was an important factor in habitat selection. Olson et al. (2014) also found that the probability of fisher occurrence was highest in mesic (i.e., containing a moderate amount of moisture) forest types with tall trees (i.e., between 25 and 50 meters), high annual precipitation, and mid-range winter temperatures. This is supported by Schwartz et al. (2013), who found that fishers disproportionately used late successional forests with large diameter trees in their study in the Northern Rocky Mountain region. They den in cavities of dead snags, living trees, or in downed trees greater than 20 inches dbh (Meyer 2007). Coarse woody debris on the forest floor also is an important habitat feature. In conifer forests of Idaho, fishers have very large home ranges. Average home range size estimates are approximately 2,400 to 10,000 acres for females and 7,400 to 20,000 acres for males (Jones 1991; Olson et al. 2014).

Vegetative communities that may provide source habitat conditions include PVGs 3, 6, 8, 9, and 10 in medium and large tree size classes and moderate or high canopy cover classes (Nutt et al. 2010). These PVGs have the capability to develop mesic, old forest, multi-layer conditions with moderate and high canopy closures that would provide for the structural diversity that is characteristic of fisher source habitat. Special habitat features include riparian corridors (travel, prey patches), down logs (resting and den sites), and snags (resting and den sites).

Approximately 19,711 acres of modeled source habitat occurs in the wildlife analysis area (**Table 6-11**; **Figure 6-7**). The highest acreages of modeled source habitat occur in the following subwatersheds: Duck Creek – Cascade Reservoir, Curtis Creek, Boulder Creek, Upper Big Creek, and Lunch Creek – Johnson Creek.



LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Fisher Modeled Habitat
- Stibnite Historic Disturbance

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 6-7
Fisher Habitat
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Table 6-11 Fisher Modeled Source Habitat in the Wildlife Analysis Area

Subwatershed Name	Acres of Modeled Source Habitat
Bear Creek-South Fork Salmon River	369
Beaver Creek	213
Boulder Creek	1,895
Burntlog Creek	972
Curtis Creek	2,011
Ditch Creek-Johnson Creek	1,246
Duck Creek-Cascade Reservoir	2,641
Goat Creek-South Fork Salmon River	763
Headwaters East Fork South Fork Salmon River	233
Headwaters Johnson Creek	989
Loosum Creek-East Fork South Fork Salmon River	188
Lower Big Creek	137
Lower Gold Fork River	24
Lunch Creek-Johnson Creek	1,303
No Mans Creek-East Fork South Fork Salmon River	457
Pearsol Creek-North Fork Payette River	24
Poison Creek-North Fork Payette River	658
Porcupine Creek-Johnson Creek	781
Profile Creek	19
Quartz Creek	410
Riordan Creek	429
Sheep Creek-Johnson Creek	634
Six-bit Creek-South Fork Salmon River	217
Sugar Creek	153
Tamarack Creek	124
Trapper Creek-Johnson Creek	498
Upper Big Creek	1,673
Upper Monumental Creek	578
Warm Lake Creek	70
Total	**19,711**

Source: Forest Service 2020a

Flammulated owl. Flammulated owl, a Region 4 Sensitive species, is a cavity nester that prefers stands of medium to large trees (ponderosa pine, Douglas-fir, and aspen) with moderate canopy closure (Forest Service 2012a). Occupied habitat is strongly associated with upper slopes (upper third) or ridges (**Appendix A**). This species is highly migratory and, as an insectivore, would only occur in the SGP area during warmer time periods when insects, particularly moths, are available. Breeding home ranges average approximately 35 acres. Nesting occurs in April and May, with fledging typically complete by the end of July (IDFG 2012). At higher elevations, this may fluctuate with prey availability.

Vegetative communities that provide source habitat conditions include PVGs 2, 3, 5, and 6 in the medium and large tree size classes and moderate canopy cover class (Nutt et al. 2010). These PVGs are most likely to have the habitat types that develop late seral stages of open forest with stands dominated by ponderosa pine or Douglas-fir or co-dominated by both. Historical fire regimes in these PVGs include nonlethal and mixed (Forest Service 2003a, Appendix A). Snags are a special habitat feature for flammulated owls and provide nesting sites.

Flammulated owl monitoring transects exist in the SGP area and the species has been documented and breeds in the wildlife analysis area. Approximately 18,321 acres of modeled source habitat is present (**Table 6-12**; **Figure 6-8**). The highest acreages of modeled habitat occur in the following subwatersheds: Upper Big Creek, Duck Creek – Cascade Reservoir, Curtis Creek, Goat Creek – South Fork Salmon River, and Poison Creek – North Fork Payette River.

Table 6-12 Flammulated Owl Modeled Source Habitat in the Wildlife Analysis Area

Subwatershed Name	Acres of Modeled Source Habitat
Bear Creek-South Fork Salmon River	251
Beaver Creek	1,249
Boulder Creek	903
Burntlog Creek	34
Curtis Creek	2,311
Ditch Creek-Johnson Creek	59
Duck Creek-Cascade Reservoir	2,585
Goat Creek-South Fork Salmon River	1,490
Headwaters East Fork South Fork Salmon River	1
Loosum Creek-East Fork South Fork Salmon River	1,051
Lower Big Creek	79
Lower Gold Fork River	55
No Mans Creek-East Fork South Fork Salmon River	835
Pearsol Creek-North Fork Payette River	373
Poison Creek-North Fork Payette River	1,324
Porcupine Creek-Johnson Creek	1,198
Profile Creek	200
Quartz Creek	262
Riordan Creek	109
Sheep Creek-Johnson Creek	15
Six-bit Creek-South Fork Salmon River	809
Sugar Creek	14
Tamarack Creek	51
Trapper Creek-Johnson Creek	187
Upper Big Creek	2,605
Upper Monumental Creek	157
Warm Lake Creek	111
Total	**18,321**

Source: Forest Service 2020a

Adams County
Valley County
Payette Lake
Little Payette Lake
Lardo
McCall
Lake Fork
Donnelly
Roseberry
55
Lake Cascade
Cascade
Adams County
Gem County
Valley County
Payette National Forest
Boise National Forest
Horsethief Reservoir
WARM LAKE RD
Warm Lake
Warm Lake
WARM LAKE RD
467
447
579
Boise National Forest
Salmon-Challis National Forest
Cape Horn (historical)
East Fork South Fork Salmon River
EAST FORK RD
Yellow Pine
STIBNITE RD
South Fork Salmon River
JOHNSON CREEK RD
Riordan Lake
440
Johnson Creek
Frank Church-River of No Return Wilderness
50375
51290
Payette National Forest
Salmon-Challis National Forest
Valley County
Custer County
Project Area

LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Flammulated Owl Modeled Habitat
- Stibnite Historic Disturbance

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

N

Figure 6-8
Flammulated Owl Habitat
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

PAYETTE NATIONAL FOREST

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

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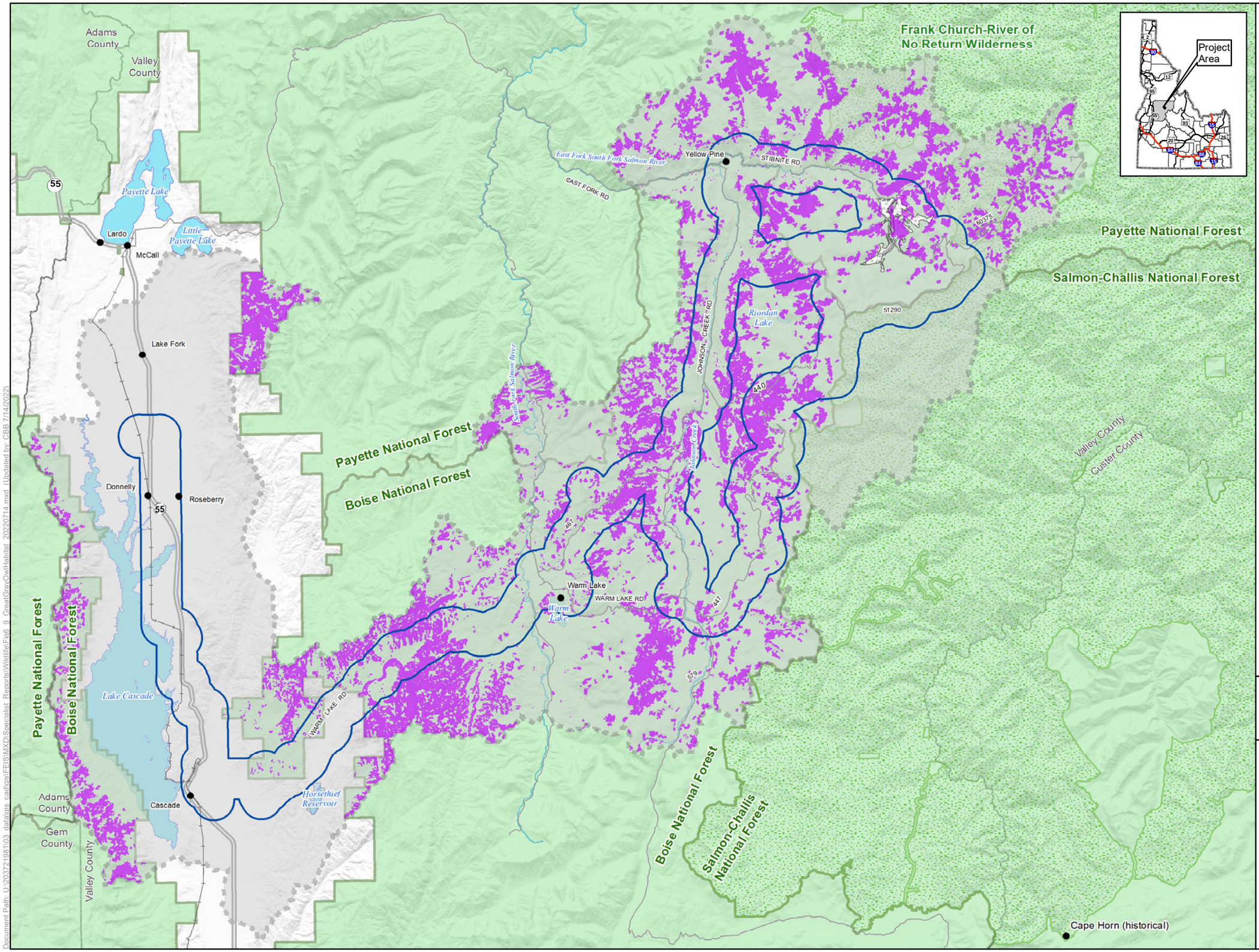
Great gray owl. Great gray owl is a Region 4 Sensitive species and Idaho SGCN. Great gray owl source habitat includes old forests (multi- and single-story); unharvested, young, multi-story forests; and stand-initiation stages of subalpine and montane forests, including Engelmann spruce, spruce-subalpine fir, and riparian woodlands (Wisdom et al. 2000). The habitat components considered most important for great gray owl are suitable nesting sites in mature or older forest, with adjacent suitable foraging areas in non-stocked and seedling forests, meadows, and open riparian habitats adjacent to extensive meadows. Large diameter trees or snags are special habitat features for the great gray owl. Great gray owls often use the nests of other raptor species in large, broken-topped trees and are known to nest within northern goshawk nest stands. Though associated with mature to old-growth conifer forests, they forage in open areas within 2 miles of nests, including meadows, bogs, and peatlands (Ulev 2007). Due to their close association with snow cover, breeding season typically lasts from late February to late May on the PNF and BNF.

Vegetative communities on the PNF and BNF capable of providing great gray owl source habitat conditions include PVGs 3, 6, 7, 8, 9, 10, and 11. Many of these PVGs historically had mixed and lethal fire regimes, which can create both open and forested habitats being used by the owls. The model likely greatly overestimates the amount of source habitat because it does not account for forest stands proximate to open meadows or other foraging habitats. Due to their specific habitat requirements, including this habitat mix, great gray owls are expected to be uncommon within the analysis area.

Great grays have limited Forest Service documentation in the wildlife analysis area. Strobilus Environmental (2017) indicates that great gray owls have been documented in the Warm Lake and Landmark LAUs. HDR Inc. (HDR) conducted broadcast surveys at two sites within the wildlife analysis area and no individual owls were detected (HDR 2017a and 2017b). Approximately 75,932 acres of modeled source habitat is present (**Table 6-13**; **Figure 6-9**). The highest acreages of modeled source habitat occur in the following subwatersheds: Upper Big Creek, Curtis Creek, Ditch Creek – Johnson Creek, Burntlog Creek, and Trapper Creek – Johnson Creek.



LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Great Gray Owl Modeled Habitat
- Stibnite Historic Disturbance

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 6-9
Great Gray Owl Habitat
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Table 6-13 Great Gray Owl Modeled Source Habitat in the Wildlife Analysis Area

Subwatershed Name	Acres of Modeled Source Habitat
Bear Creek-South Fork Salmon River	1,010
Beaver Creek	391
Boulder Creek	3,762
Burntlog Creek	4,140
Curtis Creek	4,829
Ditch Creek-Johnson Creek	4,714
Duck Creek-Cascade Reservoir	2,866
Goat Creek-South Fork Salmon River	2,148
Headwaters East Fork South Fork Salmon River	1,781
Headwaters Johnson Creek	2,858
Loosum Creek-East Fork South Fork Salmon River	2,188
Lower Big Creek	519
Lower Gold Fork River	168
Lunch Creek-Johnson Creek	3,093
No Mans Creek-East Fork South Fork Salmon River	3,729
Pearsol Creek-North Fork Payette River	42
Poison Creek-North Fork Payette River	873
Porcupine Creek-Johnson Creek	3,826
Profile Creek	2,291
Quartz Creek	3,114
Riordan Creek	3,171
Sheep Creek-Johnson Creek	2,022
Six-bit Creek-South Fork Salmon River	1,976
Sugar Creek	3,274
Tamarack Creek	2,338
Trapper Creek-Johnson Creek	3,906
Upper Big Creek	5,998
Upper Little Pistol Creek	0.001
Upper Monumental Creek	3,633
Warm Lake Creek	1,272
Total	**75,932**

Source: Forest Service 2020a

Northern goshawk. The northern goshawk is a Region 4 Sensitive species that occupies northern conifer forests. Northern goshawks use a variety of forest ages, structural conditions, and successional stages (Griffith 1993), and are associated with shrubland and grassland habitats. The home range for a goshawk pair is up to 6,000 acres (Griffith 1993). Nesting is typically from April through June and fledging is generally complete by the end of August.

Goshawks have been documented at low levels in the wildlife analysis area, specifically in the Burntlog and Stibnite LAUs (Forest Service 2018a; Strobilus Environmental 2017); although there appears to be sufficient habitat for breeding, goshawks are expected to be uncommon. HDR conducted goshawk surveys in 2015 and 2017 in the proposed mine site area at the request of the Forest Service. No adult or juvenile goshawks were observed during broadcast acoustical surveys, and no evidence of nests, whitewash (i.e., urine and feces), prey remains, or molted feathers were observed (HDR 2015, 2017b).

On both the PNF and BNF, source habitat for northern goshawks occurs in all PVGs except 1 and 11 in the medium and large tree size classes and moderate and high canopy cover class (Nutt et al. 2010). PVGs 2 through 9 are capable of developing multi-layered, mature, and late seral stands with a dense canopy. For some PVGs, such as PVG 6, these conditions occur under historical fire regimes, while other PVGs, such as PVGs 2 and 5, develop these conditions from fire suppression and altered fire regimes.

Approximately 45,758 acres of modeled source habitat is present in the wildlife analysis area (**Table 6-14**; **Figure 6-10**). The highest acreages of modeled source habitat occur in the following subwatersheds: Curtis Creek, Upper Big Creek, Duck Creek – Cascade Reservoir, Boulder Creek, and No Mans Creek – East Fork South Fork Salmon River.

Adams County
Valley County
Payette Lake
Little Payette Lake
Lardo
McCall
Lake Fork
Donnelly
Roseberry
Cascade
Lake Cascade
Horsethief Reservoir
Adams County
Gem County
Valley County
Payette National Forest
Boise National Forest
Payette National Forest
Boise National Forest
Frank Church-River of No Return Wilderness
East Fork South Fork Salmon River
EAST FORK RD
Yellow Pine
STIBNITE RD
Riordan Lake
JOHNSON CREEK RD
South Fork Salmon River
Johnson Creek
60375
51290
440
467
447
579
Warm Lake
WARM LAKE RD
Warm Lake
WARM LAKE RD
Payette National Forest
Salmon-Challis National Forest
Valley County
Custer County
Boise National Forest
Salmon-Challis National Forest
Cape Horn (historical)

Project Area

LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Northern Goshawk Modeled Habitat
- Stibnite Historic Disturbance

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 6-10
Northern Goshawk Habitat
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Table 6-14 Northern Goshawk Modeled Source Habitat in the Wildlife Analysis Area

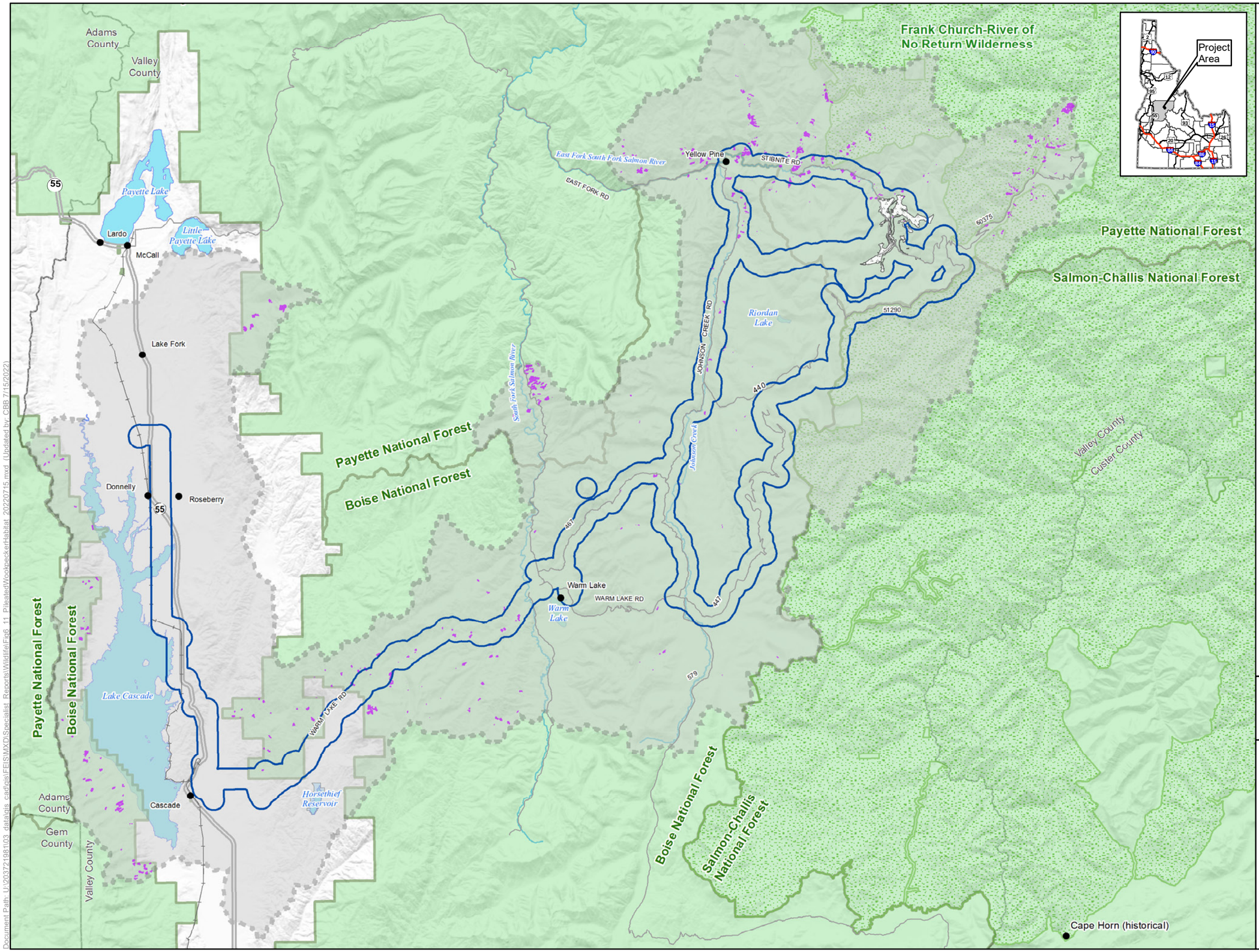
Subwatershed Name	Acres of Modeled Source Habitat
Bear Creek-South Fork Salmon River	620
Beaver Creek	580
Boulder Creek	2,803
Burntlog Creek	2,699
Curtis Creek	4,875
Ditch Creek-Johnson Creek	1,850
Duck Creek-Cascade Reservoir	3,073
Goat Creek-South Fork Salmon River	1,166
Headwaters East Fork South Fork Salmon River	451
Headwaters Johnson Creek	1,256
Loosum Creek-East Fork South Fork Salmon River	1,113
Lower Big Creek	492
Lower Gold Fork River	79
Lunch Creek-Johnson Creek	1,590
No Mans Creek-East Fork South Fork Salmon River	2,754
Pearsol Creek-North Fork Payette River	36
Poison Creek-North Fork Payette River	771
Porcupine Creek-Johnson Creek	2,289
Profile Creek	1,560
Quartz Creek	1,821
Riordan Creek	1,086
Sheep Creek-Johnson Creek	883
Six-bit Creek-South Fork Salmon River	562
Sugar Creek	1,339
Tamarack Creek	1,364
Trapper Creek-Johnson Creek	2,232
Upper Big Creek	4,744
Upper Monumental Creek	1,553
Warm Lake Creek	116
Total	**45,758**

Source: Forest Service 2020a

Pileated woodpecker. The pileated woodpecker is a PNF/BNF MIS and focal species. Pileated woodpeckers serve a variety of functional roles within the community and are associated with habitat elements used by other species in this family. Pileated woodpeckers occupy dense deciduous, coniferous, or mixed forests; open woodlands; second growth forests; and parks and wooded residential areas of towns (**Appendix A**). The species prefers habitats with tall, closed canopies and high basal areas. General characteristics of habitat provide opportunities for nesting, roosting, and foraging and include the presence of large diameter trees and snags, multiple canopy layers, decaying wood on the forest floor, and a somewhat moist environment that promotes fungal decay, and ant, termite, and beetle populations to forage upon (**Appendix A**). Source habitats for pileated woodpeckers are typically late-seral stages of subalpine and montane community types. Home ranges average 1,006 acres (**Appendix A**).

On the PNF and BNF, vegetative communities that may provide source habitat conditions include PVGs 2, 3, 5, 6, 8, and 9 in the large tree size classes and moderate and high canopy cover class (Nutt et al. 2010). Some PVGs are capable of providing source habitat conditions under historical fire regimes while others do so because of altered fire regimes (i.e., PVGs 2 and 5). Special habitat features for pileated woodpecker include large diameter (>21 inches dbh) snags and hollow live trees for nesting and roosting, and large standing dead and downed trees for foraging. Some of these special habitat features are not well represented by the model. The very large tree size class is very limited in the analysis area.

Approximately 1,722 acres of modeled source habitat is present in the wildlife analysis area (**Table 6-15**; **Figure 6-11**). The highest acreages of modeled source habitat occur in the following subwatersheds: Upper Monumental Creek, Duck Creek – Cascade Reservoir, Goat Creek – South Fork Salmon River, Profile Creek, and No Man's Creek – East Fork South Fork Salmon River.



Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 6-11
Pileated Woodpecker Habitat
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Table 6-15 Pileated Woodpecker Modeled Source Habitat in the Wildlife Analysis Area

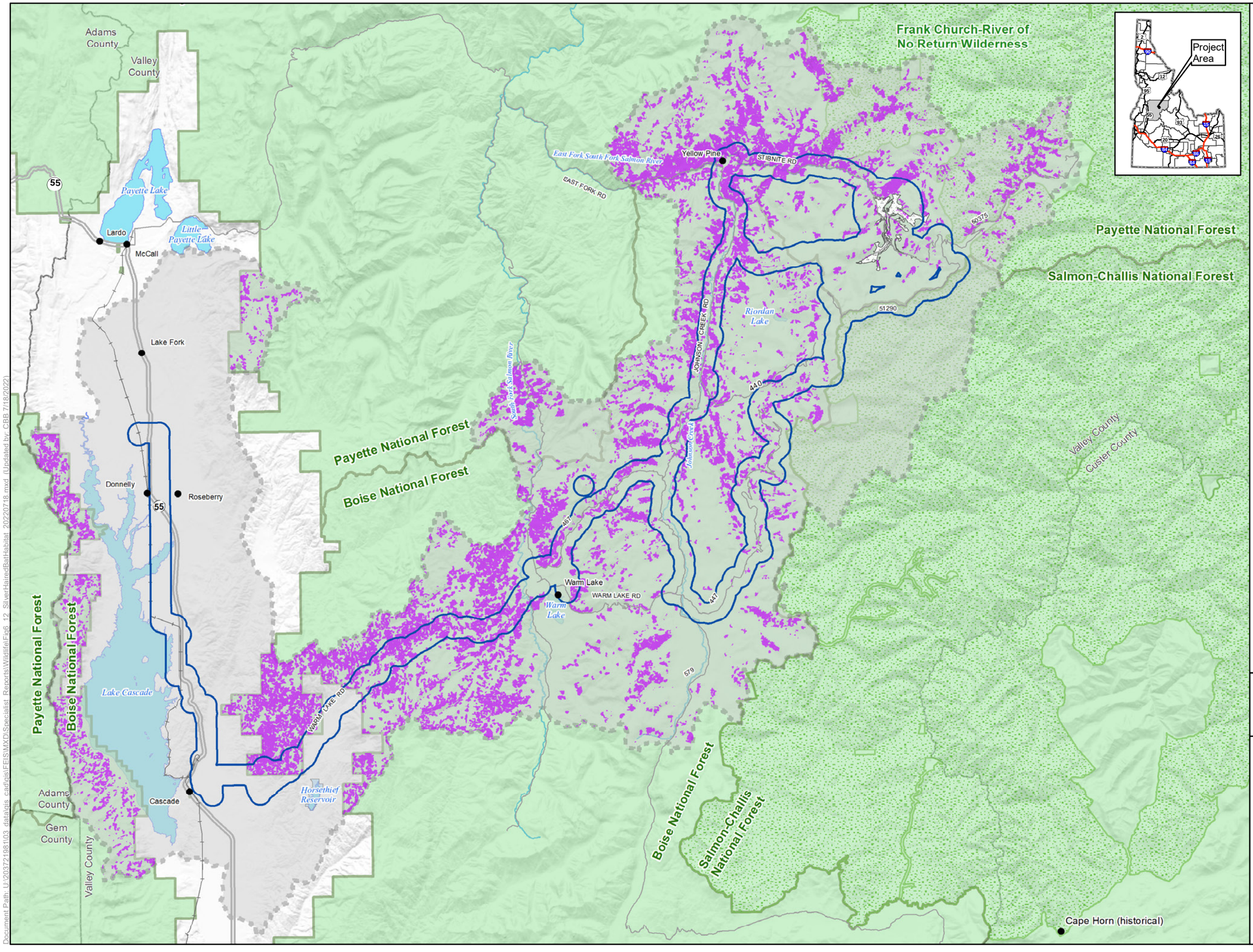
Subwatershed Name	Acres of Modeled Source Habitat
Bear Creek-South Fork Salmon River	20
Beaver Creek	21
Boulder Creek	86
Burntlog Creek	4
Curtis Creek	70
Ditch Creek-Johnson Creek	10
Duck Creek-Cascade Reservoir	211
Goat Creek-South Fork Salmon River	186
Headwaters East Fork South Fork Salmon River	1
Headwaters Johnson Creek	1
Loosum Creek-East Fork South Fork Salmon River	132
Lunch Creek-Johnson Creek	7
No Mans Creek-East Fork South Fork Salmon River	161
Pearsol Creek-North Fork Payette River	10
Poison Creek-North Fork Payette River	38
Porcupine Creek-Johnson Creek	57
Profile Creek	173
Quartz Creek	110
Sheep Creek-Johnson Creek	2
Six-bit Creek-South Fork Salmon River	7
Sugar Creek	8
Tamarack Creek	31
Trapper Creek-Johnson Creek	7
Upper Big Creek	142
Upper Monumental Creek	227
Total	**1,722**

Source: Forest Service 2020a

Silver-haired bat. Silver-haired bat is a Region 4 Sensitive species and Idaho SGCN (Tier 2) associated with primarily forested areas adjacent to lakes, ponds, and streams, including areas with human disturbance. They are generally migrant over the major part of their range. Summer roosts are in conifer / deciduous tree foliage, cavities, loose bark, and sometimes in buildings. Day roost trees are usually characterized as large (>21 inches dbh), dead or live with some defect, with loose bark and cracks. Winter habitat includes mines, caves, rock crevices, under tree bark and hollow trees / snags (**Appendix A**).

Source habitat for resident silver-haired bats is in forested and woodland areas, generally late seral stages of subalpine, montane, lower montane, and riparian woodland community groups. Modeling of source habitat for this species, which consists of both foraging and roosting habitat, utilizes Seedling (<4.5 feet tall), Medium (10 to 19.9 inches dbh), Large (20 to 29.9 inches dbh), and Very Large (>30 inches dbh) tree size classes. Literature also supports use of forested stands in the Low (10 to 19 percent), Low-Medium (20 to 29 percent), and Medium (30 to 44 percent) tree canopy cover classes for preferred PVGs within their HRV.

Silver-haired bats have been documented on Forest Service lands in the wildlife analysis area and in the FCRNRW (IDFG 2017a; 2013). Approximately 57,719 acres of modeled source habitat is present in the wildlife analysis area (**Table 6-16**; **Figure 6-12**). The highest acreages of modeled source habitat occur in the following subwatersheds: Upper Big Creek, Curtis Creek, Six-bit Creek – South Fork Salmon River, Loosum Creek – East Fork South Fork Salmon River, and Porcupine Creek – Johnson Creek.



LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Silver-Haired Bat Modeled Habitat
- Stibnite Historic Disturbance

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 6-12
Silver-haired Bat Habitat
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Table 6-16 Silver-haired Bat Modeled Source Habitat in the Wildlife Analysis Area

Subwatershed Name	Acres of Modeled Source Habitat
Bear Creek-South Fork Salmon River	1,514
Beaver Creek	1,691
Boulder Creek	484
Burntlog Creek	2,367
Curtis Creek	4,347
Ditch Creek-Johnson Creek	2,535
Duck Creek-Cascade Reservoir	1,854
Goat Creek-South Fork Salmon River	2,298
Headwaters East Fork South Fork Salmon River	513
Headwaters Johnson Creek	1,227
Loosum Creek-East Fork South Fork Salmon River	3,998
Lower Big Creek	556
Lower Gold Fork River	299
Lunch Creek-Johnson Creek	843
No Mans Creek-East Fork South Fork Salmon River	3,535
Pearsol Creek-North Fork Payette River	1,054
Poison Creek-North Fork Payette River	1,736
Porcupine Creek-Johnson Creek	3,973
Profile Creek	1,664
Quartz Creek	1,949
Riordan Creek	1,120
Sheep Creek-Johnson Creek	947
Six-bit Creek-South Fork Salmon River	4,070
Sugar Creek	1,364
Tamarack Creek	1,374
Trapper Creek-Johnson Creek	1,469
Upper Big Creek	5,874
Upper Monumental Creek	1,690
Warm Lake Creek	1,374
Total	**57,719**

Source: Forest Service 2020a

6.3.3 Habitat Family 3 – Forest Mosaic

Species within this family tend to be habitat generalists in montane forests. Most species also use subalpine forests, lower montane forests, or riparian woodlands as source habitats. A few species use upland shrub and upland herb communities. Source habitat occurs across all PVGs and structural stages. Three TEPC or Sensitive wildlife species are within Family 3: Canada lynx (discussed in TEPC section), wolverine (discussed in TEPC section), and mountain quail.

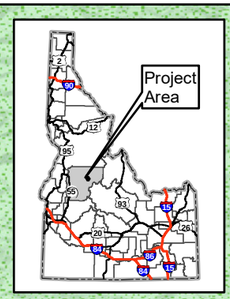
Mountain quail. Mountain quail is a Region 4 sensitive species and an Idaho SGCN that is closely associated with riparian habitats (Forest Service 2012a). Wisdom et al. (2000) describes forest habitat associations for this species as all forested vegetation stages, except stem exclusion (i.e., forest stage where young trees are rapidly competing and growing densely) in Interior Douglas-fir, Interior ponderosa pine, and Western larch cover types. **Appendix A** describes use of conifer shrub or riparian shrub communities that have a forested component.

On the BNF and PNF, vegetative communities that may provide source habitat conditions for mountain quail include PVGs 1, 2, 4, 5, 7, and 11 (Nutt et al. 2010). Historical fire regimes are nonlethal in low elevation types (PVGs 1, 2, and 5) and "mixed1" or "mixed2" in other PVGs. Riparian shrubland is a special habitat feature. In the Interior Columbia Basin, mountain quail are usually found within 100 to 200 meters (328 to 656 feet) of a water source (**Appendix A**). The source habitat model utilizes Seedling (4.5 feet tall), Sapling (0.1 to 4.9 inches dbh), Small (5 to 9.9 inches dbh, Medium (10 to 19.9 inches dbh), Large (20 to 29.9 inches dbh), and Very Large (>30 inches dbh) tree size classes and selected forested stands in the Low (11 to 19 percent) and Low-Medium (20 to 29 percent) tree canopy cover classes.

Mountain quail are most often found in areas with high abundance of shrubs and the model also includes Very Low (10 to 20 percent) and Low (20 to 30 percent) canopy cover classes for the SHRUB existing vegetation type (EVT) and Very Low (10 to 20 percent), Low (20 to 30 percent), and Moderate (30 to 40 percent) for the FOREST EVT to model non-forest source habitat.

Although approximately 72,681 acres of mountain quail modeled source habitat occurs in the wildlife analysis area (**Table 6-17**; **Figure 6-13**), the nearest recorded observation is approximately 8 miles west of the northern portion of the analysis area (Forest Service 2017b) and species occurrence is expected to be rare. The highest acreages of modeled habitat are concentrated in the following subwatersheds: Upper Monumental Creek, Upper Big Creek, Loosum Creek – East Fork South Fork Salmon River, Ditch Creek – Johnson Creek, and Porcupine Creek – Johnson Creek.

Adams County
Valley County
Payette Lake
Little Payette Lake
Lardo
McCall
Lake Fork
Donnelly
Roseberry
55
Payette National Forest
Boise National Forest
Lake Cascade
Cascade
Horsethief Reservoir
Adams County
Gem County
Valley County
WARM LAKE RD
Frank Church-River of No Return Wilderness
East Fork South Fork Salmon River
EAST FORK RD
Yellow Pine
STIBNITE RD
60375
Payette National Forest
Salmon-Challis National Forest
Riordan Lake
51290
JOHNSON CREEK RD
South Fork Salmon River
Fallsmont Creek
440
467
447
579
Warm Lake
WARM LAKE RD
Boise National Forest
Salmon-Challis National Forest
Valley County
Custer County
Cape Horn (historical)



LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Mountain Quail Modeled Habitat
- Stibnite Historic Disturbance

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

N

Figure 6-13
Mountain Quail Habitat
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Table 6-17 Mountain Quail Modeled Source Habitat in the Wildlife Analysis Area

Subwatershed Name	Acres of Modeled Source Habitat
Bear Creek-South Fork Salmon River	1,601
Beaver Creek	1,276
Boulder Creek	887
Burntlog Creek	3,040
Curtis Creek	3,590
Ditch Creek-Johnson Creek	4,219
Duck Creek-Cascade Reservoir	1,825
Goat Creek-South Fork Salmon River	3,811
Headwaters East Fork South Fork Salmon River	2,459
Headwaters Johnson Creek	2,383
Loosum Creek-East Fork South Fork Salmon River	4,475
Lower Big Creek	655
Lower Gold Fork River	260
Lunch Creek-Johnson Creek	1,662
No Mans Creek-East Fork South Fork Salmon River	3,166
Pearsol Creek-North Fork Payette River	1,076
Poison Creek-North Fork Payette River	777
Porcupine Creek-Johnson Creek	4,020
Profile Creek	3,027
Quartz Creek	3,089
Riordan Creek	1,288
Sheep Creek-Johnson Creek	1,962
Six-bit Creek-South Fork Salmon River	3,491
Sugar Creek	3,159
Tamarack Creek	3,132
Trapper Creek-Johnson Creek	1,319
Upper Big Creek	4,531
Upper Indian Creek	1
Upper Little Pistol Creek	1
Upper Monumental Creek	4,598
Warm Lake Creek	1,899
Total	**72,681**

Source: Forest Service 2020a.

6.3.4 Habitat Family 5 – Forest and Range Mosaic

Family 5 species use a broad range of forest, woodlands, and rangelands as source habitat (Wisdom et al. 2000). Source habitats occur in all PVGs and structural types, as well as woodland and non-forested types. Human disturbance and altered fire regimes are primary factors affecting some species (Wisdom et al. 2000). Species associated with Family 5 potentially in the wildlife analysis are: gray wolf, peregrine falcon, Rocky Mountain bighorn sheep, and Rocky Mountain elk. Of the four species, current habitat modeling is only available for Rocky Mountain bighorn sheep. Remaining species are addressed qualitatively.

Gray wolf. Gray wolves are a Region 4 Sensitive species and are federally listed in several western states, excluding Idaho. Gray wolves in the northern Rocky Mountain states (i.e., Idaho, Montana, and parts of Oregon, Washington, and Utah) were delisted by the USFWS in May 2011. They are habitat generalists with large pack territories of up to 150 square miles (Snyder 1991). Their range is related to availability of prey species, including deer, elk, and, less commonly, moose, bighorn sheep, and domestic stock. Gray wolves are well documented in the wildlife analysis area. NRM WILDLIFE records verify occupancy in and around the wildlife analysis area and several packs are known to occur in the FCRNRWA. Garcia and Associates observed tracks during a 2013 winter field study (Forest Service 2017b; Garcia and Associates 2013; Strobilus Environmental 2017). Gray wolves have been observed in the mine site, specifically at the proposed tailings storage facility (in June 1998), main ore processing area (May 2000), and Yellow Pine pit (June 1997) locations. Perpetua staff and consultants have observed gray wolves multiple times during exploration activities in the analysis area (Strobilus Environmental 2017).

Peregrine falcon. Peregrine falcons are a Region 4 Sensitive species. Peregrines are cliff nesters, utilizing cliffs from 30 to 400 meters (98 to 1,312 feet) high. Habitat surrounding the cliffs may be variable, ranging from old forests to second growth and sagebrush steppe environments. Common features of nesting habitat include close proximity (1,312 to 2,953 feet) to water, abundant avian prey, and lack of human disturbance during the breeding season (Pagel 1995). Although greater distances may be traveled, peregrines usually hunt within 10 miles of their nests with 80 percent of foraging occurring within 1 mile.

Peregrines were once listed as endangered under the ESA but were removed from the list in 1999. Pagel (1995) reviewed the status of peregrines in the Columbia River Basin. Major and minor potential threats to peregrines were identified. Major threats were described as continuing concerns to the short- and long-term viability of the population. These included pesticide contamination and anthropogenic (i.e., human) disturbance near nest sites. Weather, predation, competition, disease, accidents, falconry, shooting, and prey population declines were identified as minor threats.

On the PNF and BNF, vegetative communities that could provide source habitat conditions include all forest and non-forest vegetation types. Source habitat is typically located within 10 miles of suitable nesting cliffs.

Peregrine falcons have been documented within the wildlife analysis area and nesting has been verified along Johnson Creek and East Fork South Fork Salmon River since 2000 (Forest Service 2018a). Breeding territories also are documented in the FCRNRW area.

Rocky Mountain bighorn sheep. Rocky Mountain bighorn sheep are a Region 4 Sensitive species and Idaho SGCN (Tier 2). Human settlement of Idaho in the mid-1800s increased harvest of bighorn sheep and introduced domestic sheep, resulting in a major loss of the species. Disease transmission from domestic sheep to bighorn sheep has resulted in substantial die-offs dating back to the 1870s in the Salmon River Mountains (Smith 1954). Current estimates place bighorn sheep numbers at 10 percent or less of the historic population levels.

Bighorn sheep occupy rugged canyons, foothills, and mountainous terrain at elevations ranging from 1,450 to 10,500 feet and slopes of 45 percent or greater. Key habitat features include steep, rugged escape terrain, such as cliffs and rockslides; grasses and forbs for forage; and a limited amount of tall vegetation. Wisdom et al. (2000) describes source habitats for bighorn sheep in alpine, subalpine, upland shrubland, and upland herbland community groups. Alpine and subalpine community groups are primarily summer range and upland herbland and shrubland are used in both seasons, depending on elevation (Wisdom et al. 2000).

NRM WILDLIFE has a record of one bighorn sheep on the eastern border of the Stibnite LAU (Forest Service 2017b). They are known to occur in the FCRNRW area, which includes lambing areas for the Big Creek herd and collaring data from the Forest Service. The IDFG (2017b) estimated the bighorn sheep population in the Middle Fork Salmon River Population Management Unit to be about 477 individuals in 2017, which was a decrease from survey estimates in 2004, 2006, and 2009. In addition, one bighorn sheep was observed approximately 6 miles northeast of the mine site (Strobilus Environmental 2017).

Bighorn sheep occurrence on the PNF and BNF is concentrated in areas with preferred habitat features such as Hell's Canyon National Recreation Area and the FCRNRW. Bighorn sheep have been documented in the wildlife analysis area. IDFG collaring data (2017b) verified several existing herds (Pinnacles, Big Creek, Monumental herds) and lambing areas within proximity to the SGP area. Approximately 59,405 acres of summer habitat and 10,306 acres of winter habitat is modeled within the wildlife analysis area, including some habitat on the Salmon-Challis National Forest.

On the PNF and BNF, PVGs 1, 2, 4, 5, 7, 9, 10, and 11 in all tree size classes and with a low canopy cover provide summer source habitat when this habitat is within 2 miles of rock, cliff, or talus slopes with greater than 27 percent gradient. Winter source habitat is composed of numerous sagebrush-dominated cover types when the canopy cover class is low and these cover types are within 2 miles of rock, cliff, or talus slopes with greater than 27 percent gradient. More information on the PNF bighorn sheep model is available in the PNF Bighorn Sheep Supplemental EIS Technical Report, Source Habitat Model (Forest Service 2010c).

Table 6-18 and **Figures 5-5** and **5-6** display modeled summer and winter bighorn sheep habitat occurring in the analysis area.

Table 6-18 Rocky Mountain Bighorn Sheep Modeled Summer and Winter Source Habitat in the Wildlife Analysis Area

Subwatershed Name	Acres of Modeled Summer Source Habitat	Acres of Modeled Winter Source Habitat
Bear Creek-South Fork Salmon River	2,681	767
Beaver Creek	102	70
Boulder Creek	773	-
Burntlog Creek	1,055	119
Curtis Creek	611	221
Ditch Creek-Johnson Creek	3,583	258
Duck Creek-Cascade Reservoir	1,749	8
Goat Creek-South Fork Salmon River	5,544	1,092
Headwaters East Fork South Fork Salmon River	1,371	285
Headwaters Johnson Creek	630	-

Subwatershed Name	Acres of Modeled Summer Source Habitat	Acres of Modeled Winter Source Habitat
Lake Fork	1	1
Loosum Creek-East Fork South Fork Salmon River	1,426	469
Lower Big Creek	322	124
Lunch Creek-Johnson Creek	385	14
No Mans Creek-East Fork South Fork Salmon River	1,941	1,067
Pearsol Creek-North Fork Payette River	46	24
Poison Creek-North Fork Payette River	520	5
Porcupine Creek-Johnson Creek	2,173	324
Profile Creek	2,812	61
Quartz Creek	2,729	214
Riordan Creek	810	39
Sheep Creek-Johnson Creek	482	13
Six-bit Creek-South Fork Salmon River	985	356
Sugar Creek	3,411	506
Tamarack Creek	3,801	697
Trapper Creek-Johnson Creek	945	65
Upper Big Creek	386	78
Upper Indian Creek	4,833	844
Upper Little Pistol Creek	4,747	551
Upper Monumental Creek	5,926	1,465
Warm Lake Creek	2,624	567
Total	**59,405**	**10,306**

Source: Forest Service 2020a.

6.3.5 Habitat Family 7 – Forests, Woodlands, and Sagebrush

Species in Family 7 use a complex pattern of forest, woodlands, and sagebrush cover types (Wisdom et al. 2000). A distinguishing feature of the family is that most species have specialized requirements for nesting and roosting, which often limits population size and distribution. Two Region 4 Sensitive wildlife species are members of Family 7: spotted bat and Townsend's big-eared bat. Due to the rarity of spotted bat, only Townsend's is addressed qualitatively in this analysis. Another Sensitive species, silver-haired bat (Family 2), which is believed to occur and has suitable habitat in the analysis area, is utilized as a proxy for other bat species.

Townsend's big-eared bat. Townsend's big-eared bat is a Region 4 Sensitive species and Idaho SGCN (Tier 3), with suitable habitat within the wildlife analysis area. Ponderosa pine, Douglas fir, and grand fir stands are abundant in the analysis area and may be used as summer maternity roost sites. Townsend's big-eared bats also will readily use underground mine workings and adits for daytime roosting (Gruver and Keinath 2006). There are no documented occurrences or records of Townsend's big-eared bat in the wildlife analysis area. The nearest observation is approximately 20 miles north near the Snowshoe Mine on Crooked Creek in Idaho County (in the company of multiple other bat species) according to the NRM WILDLIFE database (Forest Service 2017b). No Townsend's big-eared bat colonies have been recorded in Valley County as of 1999 (Idaho Conservation Effort 1999). They also have been documented using

openings in cliff walls along the Snake River Canyon (Hells Canyon), about 65 miles west of the analysis area (Strobilus Environmental 2017).

6.3.6 Habitat Family 13 - Riverine Riparian and Wetland

Source habitat for species in Family 13 occurs in conjunction with riverine riparian and wetland areas. Some species within the family also use non-riverine riparian and wetland habitats. Adjacent forests and woodlands provide nesting sites for some species. Three TEPC or Sensitive wildlife species are members of Family 13: bald eagle, Columbia spotted frog, and yellow-billed cuckoo. Yellow-billed cuckoo is not analyzed in this specialist report as described earlier in this section.

Bald eagle. The bald eagle is a Region 4 Sensitive species known to occur along riparian areas and in the vicinity of large waterbodies. The removal of the bald eagle from the Federal List of Endangered and Threatened Wildlife and Plants became effective August 9, 2007. However, the bald eagle is afforded some protections under the Bald and Golden Eagle Protection Act and the MBTA.

Two key habitats have been identified for bald eagles: nesting territory and wintering habitat. Nesting territories are typically associated with large rivers, lakes, reservoirs, or ponds that produce fish (Buehler 2000). Territories are used in successive years and may include more than one nest site. Bald eagles nest relatively close to water (1.25 miles) with suitable foraging opportunities (Buehler 2000). The majority of nest sites are located within one-half mile of a major stream or water body (USFWS 1986).

Wintering habitat also is typically associated with aquatic habitats with some open water for foraging (Buehler 2000). Winter habitat suitability is defined by food availability, the presence of roost sites that provide protection from inclement weather, and the absence of human disturbance (Buehler 2000). Winter food sources (e.g., fish, waterfowl, and ungulate carrion) and their availability varies across bald eagle winter range. Bald eagles scavenging on carcasses off highways are susceptible to motor-vehicle impact injuries. Bald eagles will tolerate some level of human activity in areas of high prey availability.

Key features of source habitat for the bald eagle include available food resources and suitable sites for nesting and roosting. These features can be correlated with watershed pathways used to assess the conditions of the watershed. The pathways that have relevance to the bald eagle include watershed condition, water quality, channel conditions and dynamics, and flow/hydrology.

In the wildlife analysis area, bald eagles have nested at Warm Lake since the early 2000s and they also forage in the lake, as well as in the South Fork Salmon River (nest site last documented in 2008), and in the Johnson Creek area.

Columbia spotted frog. Columbia spotted frogs are aquatic and typically occur in or near permanent bodies of water, such as lakes, ponds, slow-moving streams, and marshes (Gomez 1994). The frogs generally occur along the marshy edges of such sites where emergent vegetation (e.g., grasses, sedges, cattails) is fairly thick and where an ample amount of dead and decaying vegetation exists. Some occupied sites also may have a layer of algae or small vegetation (e.g., duckweed) on the surface of the water. During summer, they may travel away from breeding sites but are still typically associated with aquatic sites with vegetated margins (Gomez 1994). Given the elevation range of the species, occupied aquatic sites may be surrounded by a wide variety of terrestrial vegetation, including mixed coniferous and subalpine forests, grasslands, and shrub-steppe communities.

Patla and Keinath (2005) describe three seasonally occupied habitats: breeding, foraging, and over-wintering. Breeding sites are used for egg deposition and larval development. These sites consist of stagnant or slow-moving water with some shallow (3.9 to 7.9 inches deep) water available. Emergent

vegetation (sedges) is usually present. Foraging habitat is used by all post-larval stages of frogs for prey acquisition. These sites can occur as ephemeral pools in forests and meadows; intermittent and perennial streams; edges of rivers, riparian zones, and lake margins; and marshes. Over-wintering sites provide wet, well-oxygenated habitat that is protected from freezing temperatures. While some sites may be suitable for all three habitats, in many areas, these sites are spatially separated, requiring frogs to migrate between sites within the course of a year.

Key features of source habitat for the Columbia spotted frog include the aquatic site itself, its banks and bank-side vegetation, and the conditions of the surrounding uplands. These features can be correlated with watershed pathways used to assess the conditions of the watershed. The pathways that have relevance to the Columbia spotted frog include watershed condition, water quality, channel conditions and dynamics, and flow/hydrology. No special habitat features have been identified for the Columbia spotted frog.

Individuals have been observed by the Forest Service in the riparian analysis area (Forest Service 2017b), and they were incidentally noted along the East Fork South Fork Salmon River near the mine site during raptor surveys in spring and summer of 2017 (HDR 2017b). They also may occur in other potentially suitable habitat in the riparian analysis area, such as forested areas adjacent to wetlands which may be used as winter hibernacula.

6.4 Idaho Species of Greatest Conservation Need

In addition to the PNF and BNF sensitive species, SGCN identified for the State of Idaho that may occur in the SGP area also are considered. The SGCN in the Idaho Batholith Ecoregion are discussed in this section (IDFG 2017a, 2017c). Several species have already been assessed as TEPC species and focal species (including Forest Service Region 4 Sensitive and MIS) or are described in the migratory bird species sections (**Section 6.6**). The species not described elsewhere are listed in **Table 6-19** and include: western toad (*Anaxyrus boreas*), western grebe (*Aechmophorus occidentalis*), Clark's grebe (*Aechmophorus clarkii*), sandhill crane (*Grus Canadensis/Antigone canadensis*), common nighthawk (*Chordeiles minor*), hoary bat (*Lasiurus cinereus*), little brown myotis (*Myotis lucifugus*), and hoary marmot (*Marmota caligata*).

Table 6-19 Species of Greatest Conservation Need

Common Name	Scientific Name	IDFG Identified Habitats	Species Occurs in Analysis Areas?
Western Toad	*Anaxyrus boreas*	Springs and Groundwater-Dependent Wetlands; Lakes, Ponds, and Reservoirs	Potentially in wildlife analysis area based on presence of suitable habitat.
Western Grebe	*Aechmophorus occidentalis*	Lakes, Ponds, and Reservoirs	Potentially in wildlife analysis area based on presence of suitable habitat.
Clark's Grebe	*Aechmophorus clarkii*	Lakes, Ponds, and Reservoirs	Potentially in wildlife analysis area based on presence of suitable habitat.
Sandhill Crane	*Grus canadensis*	Riverine–Riparian Forest and Shrubland; Springs and Groundwater-Dependent Wetlands; Lakes, Ponds and Reservoirs	Potentially in wildlife analysis area based on presence of suitable habitat.
Common Nighthawk	*Chordeiles minor*	Dry Lower Montane–Foothill Forest; Lower Montane–Foothill Grassland and Shrubland; Riverine–Riparian Forest and Shrubland	Potentially in wildlife analysis area based on presence of suitable habitat.
Hoary Bat	*Lasiurus cinereus*	Dry Lower Montane–Foothill Forest; Subalpine–High Montane Conifer Forest; Lower Montane–Foothill Grassland and Shrubland; Riverine–Riparian Forest and Shrubland; Springs and Groundwater- Dependent Wetlands; Lakes, Ponds, and Reservoirs	Present in wildlife analysis area based on Forest Service surveys.
Little Brown Myotis	*Myotis lucifugus*	Dry Lower Montane–Foothill Forest; Lower Montane–Foothill Grassland and Shrubland; Riverine–Riparian Forest and Shrubland; Springs and Groundwater-Dependent Wetlands; Lakes, Ponds, and Reservoirs	Present in wildlife analysis area based on Forest Service surveys.
Hoary Marmot	*Marmota caligata*	Alpine and High Montane Scrub, Grassland and Barrens	Potentially in wildlife analysis area based on presence of suitable habitat.

Source: IDFG 2017a; PNF/BNF Monitoring Data (Galloway 2019).

These SGCN were analyzed in different groups depending on the habitats they generally occupy.

General Habitats – SGCN analyzed in this group include common nighthawk, hoary bat, and little brown myotis. The general wildlife analysis area was used for these species given their occupancy across several different habitats.

Riparian Species – SGCN analyzed in this group include western toad, western grebe, Clark's grebe, and sandhill crane. The riparian analysis area was used for these species due to their habitat requirements.

Alpine Species – The only SGCN analyzed in this group is the hoary marmot. This species uses subalpine and alpine areas, which overlap much of the wolverine analysis area. While the marmot has a much smaller home range compared to the wolverine, the wolverine analysis area is used for this species because of the overlap in habitat types.

6.5 Big Game Species

Big game species (as defined by the PNF and BNF Forest Plans) that are expected to be present and have habitat in the wildlife analysis area include Rocky Mountain elk and mule deer (*Odocoileus hemionus*) (Forest Service 2003a, 2010b). These big game species have been recorded in the PNF and/or BNF and also in the wildlife analysis area (Strobilus Environmental 2017). The Atlas of Idaho's Wildlife shows habitat present in the wildlife analysis area for these two species (IDFG 1997).

Roadless areas, which are usually more prevalent on national forests and wilderness areas, are often used for wildlife migration corridors (Forest Service 2007). Big game species also may use these remote places for calving, escape cover, summer/winter ranges, or migrations between summer and winter ranges. While there are no corridors or transition habitat in the wildlife analysis area (Forest Service 2017c), big game migration routes and transition habitat might occur in the wildlife analysis area, but studies have not been conducted yet to map these big game habitats. Big game species can be legally hunted and are managed by the IDFG. The wildlife analysis area occurs in IDFG Big Game Management Units (BGMUs) 24, 25, 26, and 27. Additional information regarding Rocky Mountain elk and mule deer is provided below. **Appendix B** includes more information about big game species life histories and observations.

Rocky Mountain elk. Rocky Mountain elk are a priority species/big game species of special interest in the PNF and BNF and are found in a variety of habitats. They are habitat generalists and have been repeatedly observed in and near the wildlife analysis area. The wildlife analysis area near the mine site includes elk winter habitat and predicted elk summer habitat, which could include calving areas.

Habitat use and distribution changes seasonally for this species and can be generalized by seasonal movements. During the winter, snow forces elk to move to lower elevation winter ranges. Winter ranges are often of mixed land ownership and include portions of the PNF and BNF, as well as other public and private lands. As snow recedes, elk follow the spring green-up back to mid- and high-elevation summer ranges located in the PNF (Forest Service 2017c).

IDFG monitors and manages elk at the zone level (i.e., aggregations of several BGMUs). The wildlife analysis area is located in BGMUs that are currently meeting the IDFG bull and cow elk population objectives (IDFG 2017d). BGMUs 24 and 25 are both located in the McCall Elk Zone (the portion of Valley County in the drainage of the South Fork Salmon River south of the Hall Creek drainage on the east side of the river, and south of the Bear Creek drainage on the west side of the river, except that portion of the Secesh River drainage upstream from and including Paradise Creek drainage). BGMUs 26 and 27 are in the Middle Fork Elk Zone, and are northeast and southeast of the mine site, respectively. In

surrounding elk zones that are below objectives, the IDFG is attempting to "increase the populations by reducing or eliminating cow harvest, adjusting bull harvest, and intensively managing predators to reduce the impacts of predation on those herds" (IDFG 2014b, 2017d). In a 2014 survey, IDFG (2018a) estimated a population of 816 individuals in BGMU 25, which was a 41 percent increase from the 2010 survey. No survey data were available for BGMU 24. As of the 2014 survey, the population was estimated to be 5,800 individuals in the McCall Elk Zone (Forest Service 2019).

Mule deer. Mule deer are a priority species/big game species of special interest in the PNF and BNF. Mule deer are habitat generalists and have been observed frequently in and near the wildlife analysis area. There is no designated mule deer winter range in the wildlife analysis area. Mule deer are best adapted to seral, transitional habitat types.

IDFG manages and monitors mule deer at the BGMU level. Portions of the wildlife analysis area are in legal mule deer hunting units, including BGMUs 24, 25, 26, and 27. The IDFG (2018b) estimated the mule deer population in the Weiser-McCall Population Management Unit 2 (which includes BGMU 24) to be 35,269 individuals in 2010. The population estimate for the Middle Fork Population Management Unit 3 (includes BGMU 25, 26, and 27) was 10,248 individuals in 2010 (IDFG 2018b). In 2017, the estimated abundance of mule deer was 1,279 individuals in BGMU 25, 1,319 individuals in BGMU 26, and 6,007 individuals in BGMU 27 (Forest Service 2019).

6.6 Migratory Bird Species, Bald and Golden Eagles

Migratory birds are protected under the MBTA, and bald and golden eagles also are protected under the Bald and Golden Eagle Protection Act. Most of the bird species discussed in the sections above are protected by the MBTA, with the exception of the mountain quail and dusky (blue) grouse. The Idaho PIF Idaho Bird Conservation Plan (Ritter 2000) was used to identify migratory bird species and habitats in the wildlife analysis area. The Idaho Bird Conservation Plan takes a habitat-based approach to conserving bird populations in Idaho and correlated priority bird species with four habitats of highest priority (Ritter 2000). Idaho PIF priority migratory bird species are shown in **Table 6-20**, including the high priority habitats they represent. Two of the four high priority habitats occur in the wildlife analysis area and are shown in **Table 6-20**.

Table 6-20 Migratory Bird Species and Priority Habitats in Wildlife Analysis Area

Idaho PIF Highest Priority Habitats	Idaho PIF Priority Migratory Bird Species	Idaho PIF Priority Migratory Bird Species in Wildlife Analysis Area
Dry Ponderosa Pine / Douglas-fir / Grand Fir Forests (Aspen can occur)	White-headed Woodpecker; Flammulated Owl	White-headed Woodpecker; Flammulated Owl
Riparian	Barrow's Goldeneye; Hooded Merganser; Blue Grouse; Mountain Quail; Black-chinned hummingbird; Calliope Hummingbird; Rufous Hummingbird; Willow Flycatcher; Dusky Flycatcher; Black-billed Magpie; American Dipper; Yellow Warbler; MacGillivray's Warbler	Blue Grouse; Mountain Quail; Calliope Hummingbird; Willow Flycatcher; American Dipper

Source: Ritter 2000

Migratory bird species known to occur in the wildlife analysis area through sightings or sign (e.g., nests, calls) include the golden eagle, Steller's jay, gray jay, Clark's nutcracker, common raven, and American

dipper. Migratory bird species not documented, but assumed to occur due to suitable habitat, include the American robin, hermit thrush, Swainson's thrush, varied thrush, and red-tailed hawk.

The USFWS lists bird species of conservation concern for bird conservation regions across the U.S. (2008). These are species that have reduced populations or loss of essential habitat.

Table 6-21 lists these species for Region 10 of the USFWS (i.e., the Northern Rockies, including central and northern Idaho); all also are protected under the MBTA. The species in this section include species of conservation concern other than the special status species previously described (**Section 6.3**, Focal Species, including Region 4 Sensitive Species and MIS).

Six of the 17 bird species of conservation concern listed in **Table 6-21** have a reasonable possibility of occurrence in the general wildlife analysis area: the calliope hummingbird, Lewis's woodpecker (discussed in **Section 6.3**, Focal Species, including Region 4 Sensitive Species and MIS), olive-sided flycatcher, willow flycatcher, Cassin's finch, and Brewer's sparrow.

Table 6-21 Bird Species of Conservation Concern in Bird Conservation Region 10

Common Name	Scientific Name	Likelihood of Occurrence in the Wildlife Analysis Area
Brewer's sparrow	*Spizella breweri*	Potential – breeding suspected[1]
Calliope hummingbird	*Stellula calliope*	Potential – breeding has occurred[1]
Cassin's finch	*Carpodacus cassinii*	Potential – habitat present, not recorded in Valley County[1]
Lewis's woodpecker	*Melanerpes lewis*	Potential – habitat present, limited documentation
Olive-sided flycatcher	*Contopus cooperi*	Potential – habitat present, not recorded[1]
Willow flycatcher	*Empidonax traillii*	Potential – habitat present (wetlands)
Black rosy-finch	*Leucosticte atrata*	Low – not recorded in Valley County[1]
Ferruginous hawk	*Buteo regalis*	Low – habitat is grasslands, not recorded[1]
Loggerhead shrike	*Lanius ludovicianus*	Low – not recorded in Valley County[1], no habitat
McCown's longspur	*Calcarius mccownii*	Low – not recorded in Valley County[1]
Swainson's hawk	*Buteo swainsoni*	Low – not recorded in Valley County[1]
Williamson's sapsucker	*Sphyrapicus thyroideus*	Low – not recorded[1], habitat present
Black swift	*Cypseloides niger*	Negligible – no habitat (high waterfalls), not reported[1]
Long-billed curlew	*Numenius americanus*	Negligible – no habitat, no record[1]
Sage sparrow	*Amphispiza belli*	Negligible – no habitat, not reported[1]
Sage thrasher	*Oreoscoptes montanus*	Negligible – no habitat, not recorded[1]
Upland sandpiper	*Bartramia longicauda*	Negligible – no habitat, no record[1]

Source: USFWS 2021.
[1] Idaho Bird Records database (2018); other species listed in Atlas of Idaho's Wildlife (IDFG 1997)

6.7 Ambient Noise Levels

The Noise Specialist Report (Forest Service 2022c) summarizes the various baseline ambient noise levels in the SGP area. Ambient levels range from 34 to 64 decibels on the A-weighted scale across the 9 sites measured. It is important to note that these measurements are based on audibility to human hearing, and different groups of wildlife have different hearing level ranges. However, the East Fork South Fork Salmon River valley and areas near the proposed Burntlog Route had the lowest ambient sound levels

while sites along existing roadways or near Cascade had the highest ambient sound levels. Overall, these sound levels indicate the area is generally quiet in most places, although wildlife do have exposure to louder existing roadways currently. Trucks/cars, off-highway vehicles, and snowmobiles currently utilize portions of the wildlife analysis area and exploration drilling and some limited activities currently occur near the mine site; wildlife are likely acclimated to this level of use and the noise associated with them. In more remote areas (e.g., FCRNRW near the proposed Burntlog Route), wildlife are likely not acclimated to such noise disturbances.

6.8 Baseline Air Quality

The Air Quality Specialist Report (Forest Service 2022d) describes the baseline conditions of the SGP area for air quality indicators.

The air quality in a given location is characterized by a number of properties that can be physically monitored and evaluated. The existing conditions that may be affected by the SGP include ambient air quality in comparison to the National Ambient Air Quality Standards, visibility as impacted by regional haze and visible plumes emitted from mine activities, and current rates of atmospheric deposition of mercury, nitrogen, and sulfur compounds. The description of the affected environment addresses these issues and several other parameters that pertain to regional air quality.

Within the Air Quality Specialist Report (Forest Service 2022d), Table 6-1 indicates that monitored background levels used for air quality permitting were significantly below the ambient air standards. There are currently no permitted sources hazardous air pollutant emissions in the SGP area, and so the wildlife analysis area is likely not currently affected by them. Monitoring stations nearest to the SGP area indicate that both wet and dry nitrogen deposition show no clear trend or are trending higher, while sulfur deposition at sites nearby is variable. Atmospheric deposition of mercury is of particular concern where the potential exists for transfer to riparian areas and/or surface waters through precipitation and runoff. The Air Quality Specialist Report (Forest Service 2022d) discusses that national mercury emissions from domestic anthropogenic sources have steadily declined due primarily to reductions in mercury emissions from fossil-fueled electric generation plants.

6.9 Analysis Area Disturbance

Existing disturbance within the analysis area includes historical mining-related disturbance and existing roads and trails. Historical mining-related disturbance is primarily within the SGP mine site area with an estimated 1,593 acres of existing disturbance within areas that would be encompassed by the SGP under all alternatives.

Existing roads within the analysis area which would be used for access to the SGP are discussed in the Access and Transportation Specialist Report (Forest Service 2022e). These roads include approximately 23 miles of NFS roads and 75 miles of county roads. Only a portion of the 34-mile Warm Lake Road (CR 10-579) from Highway 55 to Warm Lake (23 miles) and the Stibnite Road portion of McCall-Stibnite Road (CR 10-412) (14 miles) are currently plowed for winter use. Currently 6 miles of Burnt Log Road (Forest Road 447) are frequently groomed for over-snow vehicle use in the winter with another 3.8 miles infrequently groomed. A groomed over-snow vehicle route also runs along Warm Lake Road (CR 10-579) from Warm Lake to Landmark (11 miles). Another groomed over-snow vehicle route runs within the Johnson Creek Road (CR 10-413) travel way from Landmark to Wapiti Meadow Ranch for approximately 17 miles. Existing roads and over-snow routes are consistent with Forest Service Standard TEST34.

7.0 Environmental Consequences

7.1 Impact Definitions

The impacts definitions for intensity, duration (FSH 1909.15, 152b), and context are provided in **Table 7-1**.

Table 7-1 Impact Definitions

Attribute	Term	Description
Intensity	Negligible	Impacts would result in a change in current conditions that would be too small to be physically measured using normal methods or would not be perceptible. There is no noticeable effect on the natural or baseline setting. There are no required changes in management or utilization of the resource.
Intensity	Minor	Impacts would result in a change in current conditions that would be just measurable with normal methods or barely perceptible. The change may affect individuals of a population or a small portion of a resource, but it would not result in a modification in the overall population, or the value or productivity of the resource. There are no required changes in management or utilization of the resource.
Intensity	Moderate	Impacts would result in an easily measurable change in current conditions that is readily noticeable. The change affects a large percentage of a population, or portion of a resource which may lead to modification or loss in viability, value, or productivity in the overall population or resource. There are some required changes in management or utilization of the resource.
Intensity	Major	Impacts are considered significant. Impacts would result in a large, measurable change in current conditions that is easily recognized. The change affects a majority of a resource or individuals of a population, which leads to significant modification in the overall population, or the value or productivity of the resource. This impact may not be in compliance with applicable regulatory standards or impact thresholds, requiring large changes in management or utilization of the resource.
Duration	Temporary	Impacts that are anticipated to last no longer than 1 year.
Duration	Short-Term	Impacts that are anticipated to begin and end within the first 3 years during the construction phase.
Duration	Long-Term	Impacts lasting beyond 3 years to the end of mine operations and through reclamation, approximately 20 years.
Duration	Permanent	Impacts that would remain after reclamation is completed.
Context	Localized	Impacts would occur within the analysis area or the general vicinity of the Operations Area Boundary.
Context	Regional	Impacts would extend beyond the Operations Area Boundary and local area boundaries.

Intensity is the severity or levels of magnitude of an impact.
Duration is the length of time an effect would occur.
Context is the effect(s) of an action that must be analyzed within a framework, or within physical or conceptual limits

7.2 Direct and Indirect Effects

The following analysis of effects associated with wildlife and wildlife habitat is considered in the overall context of the affected environment presented in **Section 6.0**. The discussion for each of the alternatives is

organized in terms of effects on species and/or habitats, by alternative and SGP phasing (e.g., construction, operations, closure, and reclamation) wherever possible, to more clearly define the potential impacts to a given species from the SGP. Effects to wildlife and wildlife habitat were analyzed using species-specific models developed for the PNF and BNF and Forest Service Region 4, geographic information system spatial analyses, scientific literature reviews, and information and analysis documented in reports prepared for the SGP. Survey reports and geographic information system data were obtained for vegetation groups and habitat types, forest stand information, listed species occurrences, and other wildlife species. Geographic information system analysis was used to quantify direct and indirect effects on species, where possible, by overlaying the action alternatives with the species-specific modeled habitat and other selected analysis areas.

Additional factors considered in this analysis include:

- While there is significant historical mining activity in the Stibnite area, much of the analysis area is on remote NFS lands and in close proximity to the FCRNRW, with little prior anthropogenic (i.e., human) influence.
- Human activity during the winter near the mine site and on many of the SGP area roadways is currently low. All phases of the SGP and all alternatives would increase miles of road plowed during the winter, including new routes in previously undisturbed areas.
- Noise levels are measured in decibels on the A-weighted scale (dBA), which is meant for human perception. Wildlife species are likely more sensitive to these noise levels. Continuous (ongoing) noises would attenuate to ambient levels in 1 to 2 miles of construction/operation activities, depending on the time of year, topography, and specific SGP components, while temporary disturbances (e.g., blasting, winter maintenance) would be short-term, but potentially carry a farther distance from the source and be louder in nature.
- Based on known responses to varying levels of anthropogenic disturbance (i.e., displacement from primary and secondary habitat from noise, light and human presence) and based on professional judgement and existing literature, buffers were developed to more accurately address potential indirect and cumulative effects from the SGP components.

Effects on wildlife or habitat associated with the 2021 MMP would likely be largest near the mine site and the access roads (specifically, the Burntlog Route during operations under the 2021 MMP and the Johnson Creek Road during construction and operations under the Johnson Creek Route Alternative). During construction, mine traffic under both action alternatives (2021 MMP and Johnson Creek Route Alternative) would generate an estimated annual average daily traffic (AADT) level of 65 vehicles (45 heavy vehicles and 20 light vehicles). During operations under the 2021 MMP and Johnson Creek Route Alternative, there would be an AADT level of 50 vehicles (33 heavy vehicles and 17 light vehicles) resulting in approximately five mine-related vehicles traveling outside the mine site per hour between 5:00 am and 7:00 pm. Under all action alternatives, closure and reclamation would generate a total estimated AADT of 25 vehicles (13 heavy vehicles and 12 light vehicles).

Noise levels would vary among SGP phases and depending on distances to activities, but impacts would generally be greater and more intense during the construction phase and closer they are to activities, especially during construction of the new portions of the Burntlog Route since this area has not been previously disturbed. This would especially be true because wildlife are more sensitive to noises than the measurements used for human perception. For example, noise from the SGP would attenuate to the threshold of 55 dBA approximately 0.8 mile from the source of activity based on distance alone.

Accounting for ground absorption and atmospheric absorption, noise from the SGP would attenuate to 55 dBA approximately 0.38 miles from the source of activity. Overall, it can be expected that permanent displacement of individuals would occur as a result of noise-related impacts, especially along the new portions of the Burntlog Route.

Under the 2021 MMP, the approximately 36-mile Johnson Creek Route consisting of Johnson Creek Road (County Road [CR] 10-413) and the Stibnite Road portion of McCall-Stibnite Road (CR 50-412) would be used for construction purposes while the primary mine access, the Burntlog Route is constructed. The Burntlog Route would include the 20-mile existing Burnt Log Road (National Forest System Road [Forest Road] 447), two new road segments totaling approximately 15 miles and crossing a 1-mile portion of Meadow Creek Lookout Road (Forest Road 51290). The existing 11-mile groomed over-snow vehicle (OSV) trail from Warm Lake to Landmark would be closed under the 2021 MMP, and a new 10.4-mile groomed trail would be constructed using the existing Cabin Creek Road (Forest Road 467). There would also be a 2-acre parking area west of Forest Road 467 and a new 1.5-mile groomed access trail from the Forest Service Warm Lake Project Camp on Paradise Valley Road (Forest Road 488). An approximately 7-mile temporary groomed OSV trail, on NFS lands adjacent to the west side of Johnson Creek Road (CR 10-413) from Landmark to Trout Creek, would also be maintained during construction of the Burntlog Route to replace the current OSV route that runs within the Johnson Creek Road travelway, but after Johnson Creek Road is no longer in use for construction traffic, the OSV route would return to the travelway.

The Johnson Creek Route Alternative includes the following changes to the SGP that would affect wildlife differently from noise impacts than the 2021 MMP. Under this alternative, the mine site and utilities would operate similarly to the 2021 MMP. However, very high frequency radio repeater and cell tower sites would be constructed and maintained using helicopters (instead of constructing access roads) in Inventoried Roadless Areas. This would reduce direct habitat impacts but would increase the disturbance of wildlife due to noise. For example, during construction, transmission line construction utilizing helicopters would temporarily increase average hourly noise levels up to 100 dBA LEQ for short periods of time. Noise from transmission line construction with helicopter use would attenuate to the threshold of 55 dBA approximately 1.7 miles from the source of activity based on distance alone. Accounting for ground absorption and atmospheric absorption, noise from transmission line construction with helicopter use would attenuate to 55 dBA approximately 0.66 mile from the source of activity. In addition, the Burntlog Route would not be constructed under this alternative, and the existing Johnson Creek Route would be used for access during mine construction, operations, and closure and reclamation. Traffic noise levels would be similar to those predicted for the 2021 MMP; however, all the noise would be along Johnson Creek Route. The Cabin Creek OSV trail would not be constructed under this alternative. Additionally, the temporary OSV trail along the west side of Johnson Creek Road would be maintained through operations.

Impacts from SGP activities related to wildlife species, discussed in detail below, could include:

- Direct removal or disturbance of general or special-status species habitat;
- Disturbance and avoidance of habitat due to noise and light or increased human activity;
- Blockage or fragmentation of wildlife movement corridors;
- Mortality or injury from construction of new structures or vehicle traffic; or
- Loss of forage (e.g., vegetation) or prey species (e.g., insects, small mammals, etc.).

7.2.1 Threatened, Endangered, Proposed, and Candidate Species

The analysis of direct effects includes the potential take of ESA listed species. Pursuant to the ESA, take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." (16 United States Code 35.1531 et seq.). Take of an individual or population could occur for various reasons such as traffic collisions, change in an individual or population's habitat use due to noise, other disturbance, or contamination of food or water sources. Direct effects also would include loss of habitat or the encroachments into wildlife migration or travel areas, although no defined corridors have been identified. For all species, habitat loss could be temporary (0 to 3 years); short-term (3 to 15 years); long-term (>15 years); or permanent for land use changes (i.e., pit lakes, TSF, TSF Buttress, transmission line upgrades).The analysis of potential indirect effects on threatened, endangered, proposed, and candidate species includes fragmentation of habitat; increased competition for resources or habitat due to displacement of individuals from the affected area into the territory of other animals; or other effects, such as increased human presence in the species-specific analysis areas (e.g., hunters, trappers, and recreationists) that can cause mortality (i.e., illegal hunting or trapping) or reduced breeding and recruitment in the future population.

7.2.1.1 Canada Lynx

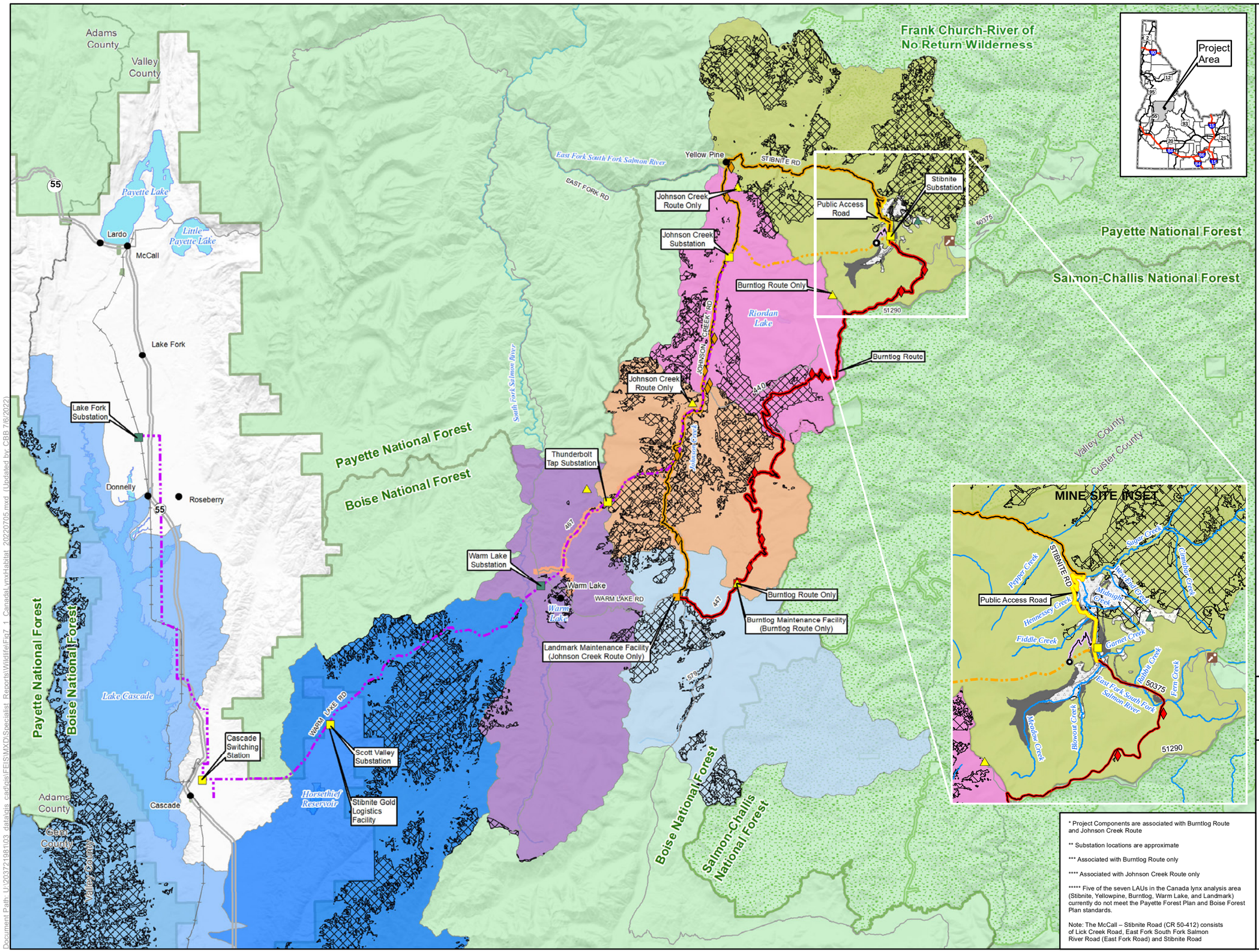
Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figure 7-1 displays the SGP components of the 2021 MMP and Johnson Creek Route Alternative compared to modeled habitat within each LAU. Direct and indirect effects to Canada lynx are analyzed within a 5-mile buffer of both alternative components within the LAUs, to assess all potential impacts, including noise disturbance. This buffer distance was developed using best professional judgment, in coordination with the USFWS, to address potential indirect impacts from anthropogenic influences and to account for potential impacts to transient Canada lynx potentially moving through the general SGP area. However, based on noise information presented in the Noise Specialist Report (Forest Service 2022c), most indirect impacts would occur within 1 to 2 miles from SGP components.

<u>Mine Site</u>

Although there is potentially suitable habitat for Canada lynx in the Canada lynx analysis area, there is no designated critical habitat on the PNF or BNF. The mine site and associated infrastructure may displace transient Canada lynx around the perimeter of these disturbances. This would be a large area, because the mine site area would measure approximately 6 miles long by 1 mile wide. Ruediger et al. (2000) found that Canada lynx often avoid large developments (e.g., ski resorts, facilities, etc.); therefore, it is likely that the mine site area would be a barrier to lynx movement, which would be a direct effect.

Direct mortality on lynx (e.g., vehicle collisions, destruction of dens, etc.) is not likely because lynx have not been documented in the Canada lynx analysis area; the analysis area does not contain prime denning habitat; and their movements are often nocturnal (Forest Service 2008) when limited vehicle traffic would occur. Although some denning habitat may exist, the PNF and BNF are considered secondary lynx habitat (Interagency Lynx Biology Team 2013). The lack of denning habitats, on-going activity in the vicinity of the mine site, and absence of known resident individuals, make it unlikely that Canada lynx would be displaced by the 2021 MMP or Johnson Creek Route Alternative.



LEGEND

- Canada Lynx Existing Suitable Habitat
- Stibnite Historic Disturbance

Lynx Analysis Unit ***

- Burntlog LAU
- East Mountain LAU
- Landmark LAU
- Stibnite LAU
- Warm Lake LAU
- West Mountain LAU
- Yellowpine LAU

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Cell Tower Access
- Public Access Road
- Burntlog Route Borrow Source ***
- Johnson Creek Borrow Source ****

Utilities

- New Transmission Line
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site
- Existing Communication Tower
- New Cell Tower

Offsite Facilities

- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

0 2.5 5 Miles

1 inch = 4.5 miles

* Project Components are associated with Burntlog Route and Johnson Creek Route

** Substation locations are approximate

*** Associated with Burntlog Route only

**** Associated with Johnson Creek Route only

***** Five of the seven LAUs in the Canada lynx analysis area (Stibnite, Yellowpine, Burntlog, Warm Lake, and Landmark) currently do not meet the Payette Forest Plan and Boise Forest Plan standards.

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

Figure 7-1
Canada Lynx Existing Suitable Habitat and Project Components in the Analysis Area Stibnite Gold Project Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

Document Path: U:\2023\21981\03_data\gis_cad\gis\FEIS\MXD\Specialist_Reports\Wildlife\Fig7_4_CanadaLynxHabitat_20220706.mxd (Updated by: CBB 7/6/2022)

Indirect disturbance impacts to Canada lynx due to an increase in noise and light (e.g., blasting, vehicle traffic, operations, etc.) would be long-term (i.e., through the life the SGP; approximately 20 years). Construction, operation, and closure and reclamation activities at the mine site are likely to disturb any transient Canada lynx in the vicinity. Noise-reduction strategies (e.g., enclosure of ore processing facility, use of electricity instead of diesel generators, muffling equipment, etc.; **Section 2.4**) would be used to reduce indirect effects on sensitive wildlife species. Buildings, equipment, and drill rigs would have limited external lighting, and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Additionally, light and noise impacts are reduced by vegetation, topography, and distance from the impact sources. The noise and light reduction strategies employed in the SGP area are expected to reduce impacts on transient Canada lynx by minimizing the intensity and duration.

Access Roads

Direct mortality on lynx (e.g., vehicle collisions) is not likely because lynx have not been documented in the Canada lynx analysis area and their movements are often nocturnal (Forest Service 2008) when limited vehicle traffic would occur. However, the 2021 MMP would include construction of 15 miles of new road between the existing Burnt Log Road (Forest Road 447) to the Thunder Mountain Road (Forest Road 50375) at the mine site, and several smaller segments of realignment and upgrades. Construction and the year-round operation (and plowing in winter), of the Burntlog Route could be a potential source of mortality for transient Canada lynx. During construction (when traffic levels would be highest), the AADT level would be 65. The slow speed limits on the Burntlog Route would likely limit potential mortality or injury for individual Canada lynx by giving drivers more time to react to wildlife occurrences.

Roadways under the 2021 MMP may displace or alter the movement of transient Canada lynx. Linkage areas for Canada lynx have been estimated to occur north to south across Warm Lake Road (CR 10-579) and east to west across the South Fork of the Salmon River (Claar et al. 2004). Construction and use of the new 15-mile-long portion of the Burntlog Route would fragment habitat and could act as a barrier to movement (Interagency Lynx Biology Team 2013). Increased traffic on Warm Lake Road (CR 10-579), Johnson Creek Road (CR 10-413), and Stibnite Road portion of the McCall-Stibnite Road (CR 50-412) also would discourage lynx from crossing these roads. Ruediger et al. (2000) found that Canada lynx often avoid roadways more as they scale from gravel roads to highways; therefore, it is possible that the access roads could act as a barrier to transient lynx movement, which would be a direct effect.

Additionally, the existing 11-mile groomed OSV trail from Warm Lake to Landmark would be closed under the 2021 MMP, and an approximately 10.4-mile groomed trail would utilize the existing Cabin Creek Road (Forest Road 467). Depending on the area of modeled habitat crossed, this would result in a net gain of 0.6 mile of groomed OSV trail. However, there would also be a 2-acre parking area west of Forest Road 467, and a new 1.5-mile groomed access trail from the Forest Service Warm Lake Project Camp on Paradise Valley Road (Forest Road 488). This trail would cross modeled habitat for Canada lynx, which would cause additional indirect impacts during the winter due to noise from OSVs. During construction, the current OSV trail associated with Johnson Creek Road would be moved to the side of the road, but there would be no expected changes as it is an existing route.

Disturbance impacts to Canada lynx along roadways due to noise and light would be long-term (i.e., through the life of the SGP; approximately 20 years). The noise and light reduction strategies employed along access roads during the SGP may be sufficient to reduce impacts on transient Canada lynx (see Mine Site section above for these measures). **Section 2.4** presented measures required by the Forest

Service and proposed by Perpetua to reduce impacts on wildlife. For example, construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible; pumps, generators, and engines would be turned off when not in use; and light shields would be placed over outside lights, confining light to the immediate area in order to further limit visual impacts.

Indirect impacts could occur in the form of increased competition for resources, including the competition created by plowing the Burntlog Route, which is currently not plowed for winter use. Currently, access in this area during the winter is limited to predators suited for over-snow travel (i.e., lynx and wolverine). Construction and operation of the Burntlog Route would open new corridors for predators and recreational activities. This could increase the predation on snowshoe hares by other predators (e.g., coyotes) or become a source of mortality for prey species (e.g., snowshoe hare, squirrels, etc.), which could affect food availability for transient Canada lynx. The increased human access and potential increase in hunting and trapping pressure for lynx and prey species in previously undisturbed areas also would be indirect effects.

Upon closure, the new segments of the Burntlog Route would be decommissioned, recontoured, and reclaimed, which would remove impacts associated with traffic or human access in the long-term.

Under the Johnson Creek Route Alternative, the Johnson Creek Route would be used instead of the Burntlog Route, which would eliminate the disturbance of 15 miles of habitat adjacent to the FCRNRW. This would avoid the impacts of noise, light, and traffic on Canada lynx in the FCRNRW area where suitable current habitat is mapped. However, it is expected that transient Canada lynx would still cross SGP area roadways, including the Johnson Creek Route. Traffic levels on Stibnite Road and Johnson Creek Road (both part of the Johnson Creek Route) would increase by about 167 percent and 71 percent, respectively, during operations. Therefore, there would still be a chance of wildlife mortality under the Johnson Creek Route Alternative.

Utilities

Direct impacts on Canada lynx due to construction and operation of the utility corridors, substations, and communication towers are not likely because lynx have not been documented in the Canada lynx analysis area and the construction activities would be temporary (e.g., 3 years). However, transient Canada lynx may occur sporadically. There would be new utility access roads, as well as new transmission lines and upgraded transmission lines. Habitats along utility corridors would be maintained in low structure (e.g., low vegetation) condition, which would widen the right-of-way (ROW) effect for Canada lynx (Interagency Lynx Biology Team 2013). The new transmission line between the mine site and Johnson Creek substation would not intersect any modeled habitat. Upon closure, this new segment would be decommissioned and reclaimed. Decommissioning of the transmission line under the 2021 MMP would remove any potential effects in the long term.

Potential disturbance impacts due to noise and light near the substations would be long-term (approximately 20 years) and likely of low impact. However, the impacts from constructing the utility corridors, substations, and communication towers would be temporary (i.e., up to 3 years) but of higher intensity. The noise and light reduction strategies employed along utility corridors and near communication towers would reduce impacts on transient Canada lynx during construction (**Section 2.4**).

There would be no differences to the utilities under the Johnson Creek Route Alternative, so effects would be the same as the 2021 MMP.

Off-site Facilities

Direct impacts on Canada lynx from construction of the off-site facilities are unlikely because lynx have not been documented in the Canada lynx analysis area. However, the off-site facilities would impact approximately 4 acres of habitat in the Canada lynx analysis area. Transient Canada lynx individuals would likely avoid the off-site facility locations, but traffic associated with the off-site facilities may increase the potential for vehicle-wildlife collisions. The slow speed limits imposed would likely limit potential mortality or injury for individual Canada lynx.

Disturbance impacts to Canada lynx at the off-site facility locations due to noise and light would mostly occur during construction, but some effects would persist long-term (i.e., through the life of the 2021 MMP; approximately 20 years). The noise and light reduction strategies employed at the off-site facilities would likely be sufficient to reduce impacts on transient Canada lynx.

Under the Johnson Creek Route Alternative, the Landmark Maintenance Facility would be relocated to the southern side of Warm Lake Road, which would shift the footprint slightly versus the 2021 MMP. However, effects to transient Canada lynx are expected to be the same.

Habitat Impacts

As discussed in **Section 6.2.1.2**, Forest Plan Standard TEST15 indicates the percentage of unsuitable habitat in the LAUs is higher than the 30 percent threshold. In several LAUs that are currently not meeting the Forest Plan Standard TEST15 for suitable habitat (Stibnite, Yellowpine, Burntlog, Warm Lake, and Landmark; **Table 6-2**), there would be an additional loss of suitable habitat, and these LAUs would continue to not meet the Standard. For the LAUs currently meeting the Standard (East Mountain and West Mountain), the direct impacts from the SGP would not cause the Standard to be exceeded.

Table 7-2 shows the acres of suitable habitat that would be directly impacted by each alternative in each LAU. Direct impacts to Canada lynx habitat across all LAUs would vary between 194 (2021 MMP) or 175 acres (Johnson Creek Route Alternative). Using a 5-mile buffer on the SGP components within each LAU, the area of indirect impacts on Canada lynx habitat could total approximately 70,745 acres under the 2021 MMP or 70,652 acres under the Johnson Creek Route Alternative.

Table 7-2 Direct and Indirect Impacts on Canada Lynx Habitat

LAU	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP		
Stibnite	80	20,634
Yellowpine	39	9,107
Burntlog	61	15,507
Warm Lake	2	1,652
Landmark	3	5,736
East Mountain	9	15,969
West Mountain	0	2,140
Total	**194**	**70,745**

LAU	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
Johnson Creek Route Alternative		
Stibnite	80	20,649
Yellowpine	9	9,101
Burntlog	69	15,494
Warm Lake	2	1,652
Landmark	6	5,647
East Mountain	9	15,969
West Mountain	0	2,140
Total	**175**	**70,650**

Source: Forest Service 2020a.

Direct and Indirect Effects from the No Action Alternative

Mine Site

There have been no recent observations of Canada lynx in the Operations Area Boundary, existing Utilities Area, and off-site facilities; although, if there are transient Canada lynx in the region, they could potentially use these areas as they have in the past.

Access Roads

Because some of the existing roadways in the Canada lynx analysis area bisect potential linkage areas, they also would likely continue to affect transient Canada lynx through habitat fragmentation and vehicle-wildlife collisions.

Utilities

Transient Canada lynx would likely continue to use the Canada lynx analysis area much as they currently do.

Off-site Facilities

Depending on the future use of existing off-site facilities, Canada lynx would likely continue to avoid them as they currently do.

Determination

The Forest Service has preliminarily determined that the mine site, access roads, and utilities would affect, but not adversely affect, Canada lynx utilizing the area or their habitat. Direct impacts would be highest for the 2021 MMP. The off-site facilities would likely not affect transient Canada lynx under any action alternative. Under all action alternatives, the Stibnite LAU and Burntlog LAU would have the highest direct impacts to lynx habitat. Informal Section 7 ESA consultation is ongoing with the USFWS. Therefore, based on the impact analysis above for the Canada lynx and its habitat, the action alternatives would result primarily in localized, long-term, and permanent, minor impacts to the Canada lynx.

7.2.1.2 Northern Idaho Ground Squirrel

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figure 7-2 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the NIDGS analysis area compared to modeled habitat. Direct and indirect effects to NIDGS are analyzed within a 1-mile buffer of alternative components. This buffer distance was developed using best professional judgment, in coordination with the USFWS, to encompass the area of potential indirect impacts from anthropogenic influences (e.g., noise, light, human presence) at the mine site and along access roads.

Mine Site

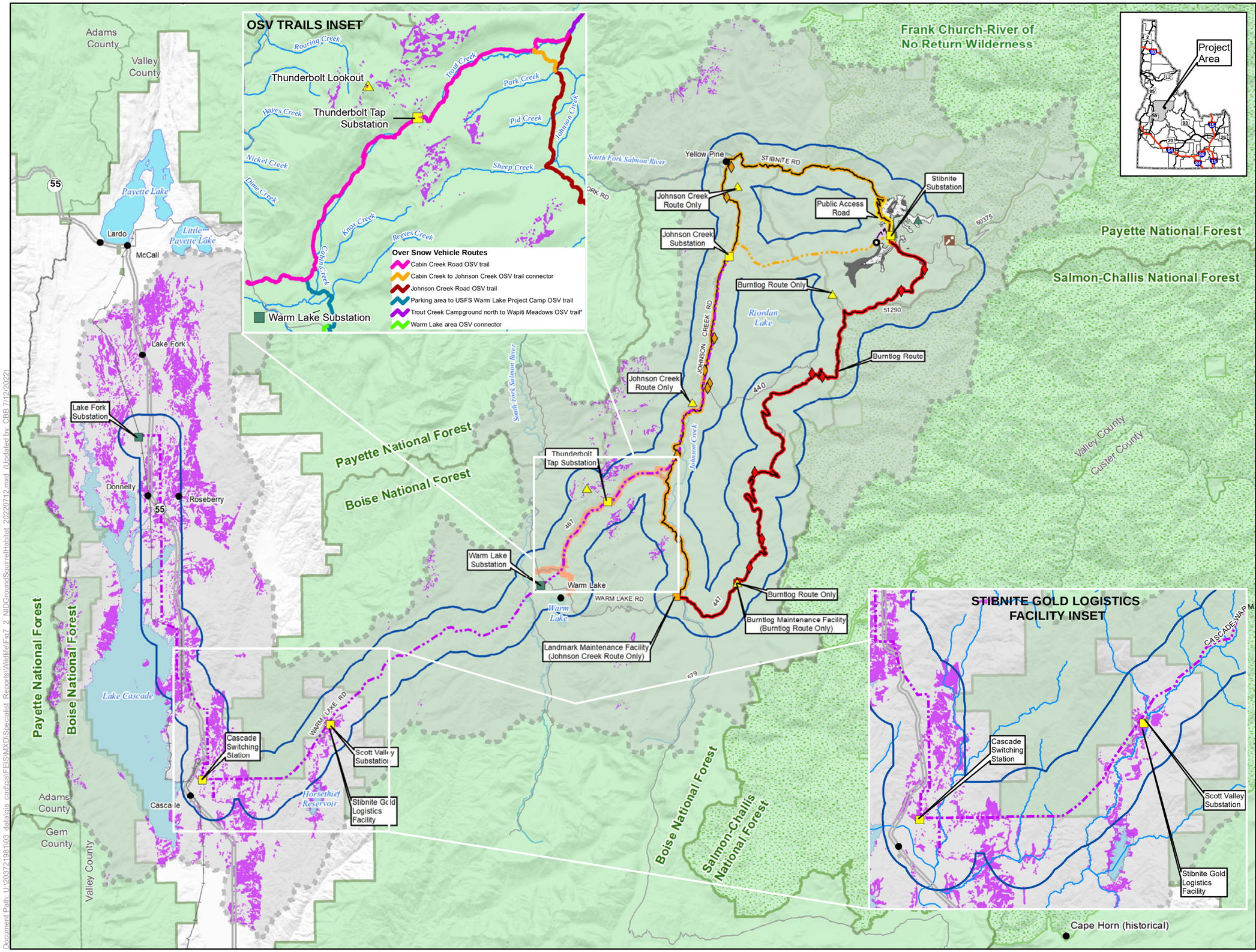
While modeled habitat for the NIDGS occurs in the region, no known observations of NIDGS or modeled habitat occur in the mine site area. Therefore, mine site activities under all alternatives would not affect NIDGS.

Access Roads

Road maintenance and vehicle traffic could directly impact individual NIDGS, if sites become occupied in the future, where the 2021 MMP components cross modeled habitat. The Burntlog Route would not cross modeled suitable habitat, and construction would therefore not impact NIDGS habitat. However, Warm Lake Road (CR 10-579) does cross modeled habitat, and the increased traffic could pose a direct risk of mortality due to collisions, particularly during the warmer months when the species is active. Additionally, the 10.4-mile groomed OSV trail along the existing Cabin Creek Road (Forest Road 467) and the new 7-mile temporary groomed OSV trail along Johnson Creek Road would occur in and near close proximity to modeled habitat for NIDGS but would be unlikely to affect NIDGS due to its seasons (i.e., late fall and winter) of use.

The existing (23 miles of NFS roads and 75 miles of county roads) and new roads (43 miles of Burntlog Route and utility access roads) may act as a barrier to squirrel movement and dispersal, which would be an indirect effect. Increased habitat fragmentation between colonies could indirectly impact dispersal between populations, which could lead to genetic and demographic consequences. However, Yensen and Tarifa (2019, 2018) observed no evidence of NIDGS or their sign at the proposed SGLF, Trout Creek, or at various private land parcels along the SGP but there is a possibility that NIDGS may occur in the future at suitable sites. Site buffers and monitoring would be used to avoid or mitigate direct impacts on squirrel populations. If sites are determined to be occupied in the future, mitigation measures, such as seasonal restrictions, site buffers, and monitoring would be used to avoid or mitigate direct impacts on squirrel populations.

Under the Johnson Creek Route Alternative, the Johnson Creek Route does not cross modeled suitable habitat, although it is in closer proximity to modeled suitable habitat than the Burntlog Route. Construction and operations would not likely impact NIDGS habitat.



LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Northern Idaho Ground Squirrel Modeled Habitat
- Stibnite Historic Disturbance

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Cell Tower Access Road
- Public Access Road
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities

- New Transmission Line
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site
- Existing Communication Tower
- New Cell Tower

Offsite Facilities

- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route
** Substation locations are approximate
*** Associated with Burntlog Route only
**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

N

Figure 7-2
Northern Idaho Ground Squirrel (NIDGS) Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Utilities

Construction of the utility corridors, substations, and communication towers, as well as maintenance activities in the ROWs, may impact individual NIDGS where the 2021 MMP components overlap modeled habitat known to support populations. However, Yensen and Tarifa (2019, 2018) observed no evidence of NIDGS, or their sign associated with the utility components (e.g., within modeled habitat near the upgraded transmission line and Scott Valley Substation); but there is a possibility that NIDGS may occur in the future at suitable sites. If sites are determined to be occupied in the future, mitigation measures, such as seasonal restrictions, site buffers, and monitoring would be used to avoid or mitigate direct impacts on squirrel populations. Reclamation during closure would reclaim the new transmission line segment, but this area does not overlap modeled habitat and would not likely provide additional modeled habitat.

The Johnson Creek Route Alternative would have similar effects on NIDGS and modeled habitat as the 2021 MMP.

Off-site Facilities

Construction of new off-site facilities (i.e., Stibnite Gold Logistics Facility) is unlikely to impact individual NIDGS, because the 2021 MMP components do not overlap modeled habitat known to support populations. Yensen and Tarifa (2019, 2018) observed no evidence of NIDGS or their sign at the logistics facility; however, there is a possibility that NIDGS may occur in the future at suitable sites. Site checks and formal surveys would be conducted, as needed, prior to ground-disturbing activities in suitable habitat.

Vehicle traffic associated with the proposed off-site facilities could impact individual NIDGS where the 2021 MMP components cross modeled habitat known to support populations. Surveys of modeled habitat would be required before construction activities occur. All staff and contractors would be trained to reduce wildlife collisions.

There would be no changes to the off-site facilities under the Johnson Creek Route Alternative, so effects would be the same as the 2021 MMP.

Habitat Impacts

Direct impacts to NIDGS modeled habitat across the wildlife analysis area would be approximately 63 acres for the 2021 MMP and Johnson Creek Route Alternative. Using a 1-mile buffer on SGP components, the indirect area of impacts on modeled NIDGS suitable habitat is approximately 5,248 acres (**Table 7-3**).

Table 7-3 Direct and Indirect Impacts on NIDGS Habitat

Alternative	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP	63	5,248
Johnson Creek Route Alternative	63	5,248

Source: Forest Service 2020a.

Direct and Indirect Effects from the No Action Alternative

Mine Site

While modeled habitat for the NIDGS occurs in the region, no NIDGS are known or estimated to occur in the mine site area, thus no current impacts are occurring or would occur under the No Action Alternative.

Access Roads

Existing roads would likely continue to be used in a similar manner with similar traffic levels. Habitat fragmentation and vehicle-wildlife collisions would still be present for NIDGS, if they occur in suitable habitats in the future, due to existing roadways under the No Action Alternative.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat or habitat fragmentation. As depicted by modeled habitat, there is a possibility that NIDGS may occur in the future at suitable sites.

Off-site Facilities

Because the existing off-site facilities occupy a small area and there would be no new facilities built, there would be no effects on NIDGS under the No Action Alternative.

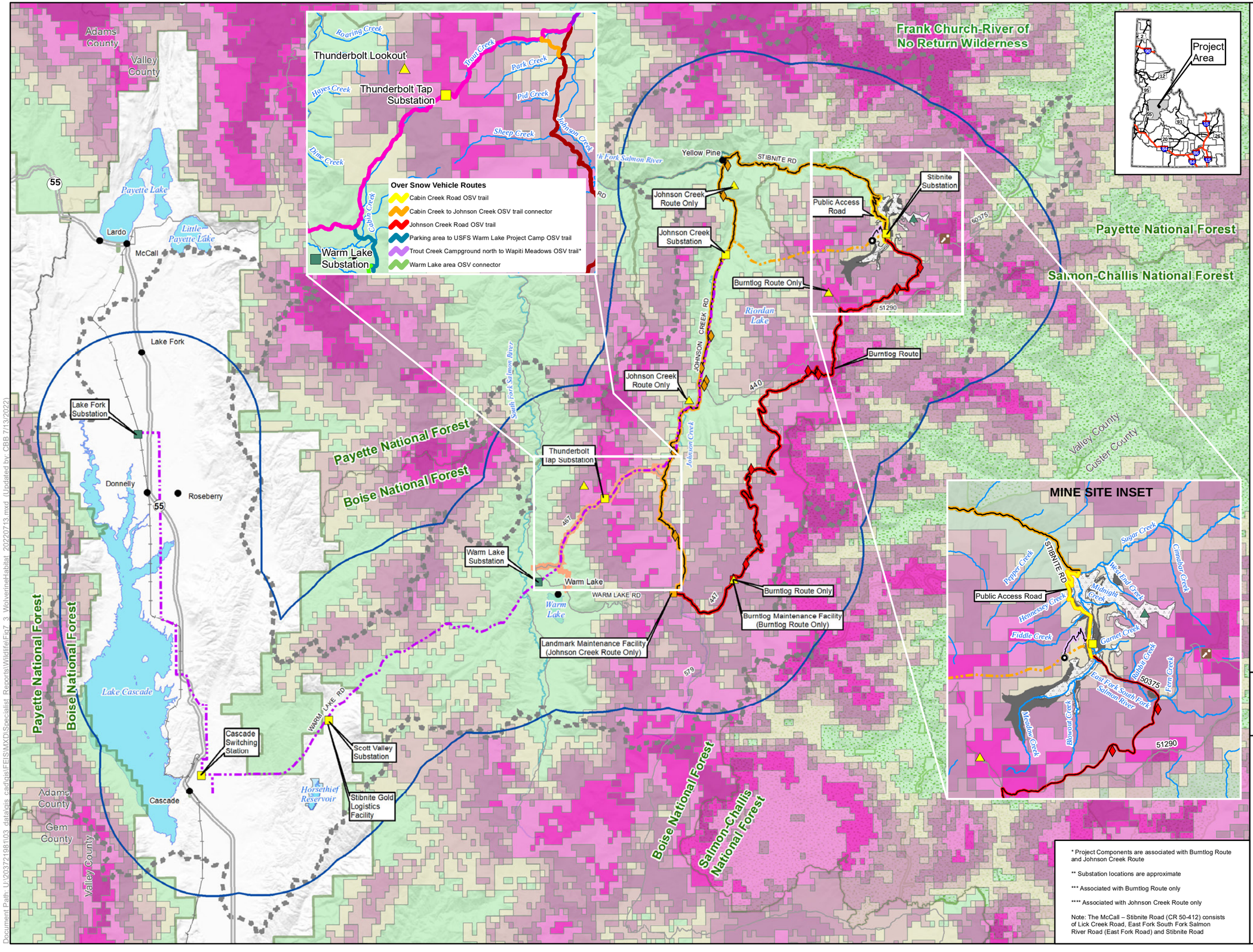
Determination

The Forest Service has preliminarily determined that the access roads and utilities would affect, a small amount of NIDGS suitable habitat under the action alternatives and direct and indirect impacts would be the same. The mine site and off-site facilities would not affect NIDGS habitat under either action alternative. Overall impacts from the SGP would affect, but not adversely affect, NIDGS. Informal Section 7 ESA consultation is ongoing with the USFWS. Therefore, based on the impact analysis above for the NIDGS and its habitat, the action alternatives would result primarily in localized, temporary, and short-term, minor impacts to the NIDGS.

7.2.1.3 Wolverine

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figure 7-3 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the wolverine analysis area compared to modeled habitat. Direct and indirect effects to wolverine are analyzed within a 5-mile buffer of both action alternative components, to assess all potential impacts, including noise disturbance. This buffer distance was developed using best professional judgment, in coordination with the USFWS, to address potential indirect impacts from anthropogenic influences (e.g., noise, light, human presence) and to account for potential impacts to wolverines moving through the general SGP area.



LEGEND

Wolverine Habitat Analysis Area Affected Environment

Wildlife Analysis Area

Number of Years with Persistent Snow Cover between 2009 and 2015

Years

1
2
3
4
5
6
7

Stibnite Historic Disturbance

Project Components *

SGP Features

Access Roads & Trail System

Burntlog Route ***
Johnson Creek Route
Groomed OSV Route
Cell Tower Access Road
Public Access Road
Burntlog Route Borrow Source ***
Johnson Creek Route Source ****

Utilities

New Transmission Line
Upgraded Transmission Line
New Substation **
Existing Substation **
New Repeater Site
Existing Communication Tower
New Cell Tower

Offsite Facilities

Burntlog Maintenance Facility ***
Landmark Maintenance Facility ****

Other Features

U.S. Forest Service
Wilderness
County
City/Town
Monumental Summit
Railroad
State Highway
Road
Stream/River
Lake/Reservoir

0 2.5 5 Miles

1 inch = 4.5 miles

* Project Components are associated with Burntlog Route and Johnson Creek Route

** Substation locations are approximate

*** Associated with Burntlog Route only

**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

Figure 7-3
Wolverine Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Mine Site

Direct impacts on wolverines are likely in the mine site area due to habitat loss and associated habitat fragmentation; year-round vehicle traffic causing disturbance and potential avoidance behavior; and risk of vehicle collisions causing injury or mortality. However, the mine site also contains open water areas and disturbed ground, which would not provide habitat for wolverines. The mine site would measure approximately 6 miles long by 1 mile wide during operations. The mine site and associated infrastructure would reduce habitat quality or displace resident and transient wolverines around the perimeter of the mine site, because wolverines typically avoid crossing large openings, such as clear-cuts, roadways, and developed areas (Banci 1994; Luensmann 2008; Scrafford et al. 2018). Because wolverines have been observed in the wolverine analysis area, and several individual wolverines have been captured, collared, and tracked via global positioning systems in the PNF and BNF adjacent to the wolverine analysis area (Forest Service 2012b, 2015a; Heinemeyer et al. 2017), it is likely that wolverines would be directly affected through loss of quality habitat or displacement around the mine site.

Noise and light also could directly disturb potential wolverine foraging or denning behavior throughout the life of the SGP (i.e., 20 years). Sustained levels of human disturbances, especially noise due to operations and helicopter flights to assist with exploratory drilling, is expected to contribute to increased levels of displacement of individual wolverines in the wildlife analysis area. Noise levels would be above ambient levels within 1 to 2 miles of the mine site but would attenuate below ambient levels beyond 2 miles. The noise and light reduction strategies employed in the SGP area would reduce impacts on wolverines by minimizing the intensity and duration but would not completely eliminate them (**Section 2.4**).

Increased human presence in the wolverine analysis area also could lead to additional recreational (e.g., snowmobiling, skiing, etc.) and other human activity in the area, which could indirectly affect wolverine populations by displacing them. Heinemeyer et al. (2017) observed that both motorized and non-motorized recreation has a larger negative effect on wolverines the further away they occurred from roadways and trails. Heinemeyer et al. (2019) also noted that female wolverines showed a stronger avoidance of off-road motorized recreation than males, indicating that indirect impacts would be higher for denning females.

Although there would be some differences under the Johnson Creek Route Alternative, this alternative would directly and indirectly impact the least amount of habitat (persistent spring snow cover), but effects would largely be the same as the 2021 MMP.

Access Roads

Direct impacts on wolverines are likely along the access roads due to habitat loss by access road construction, year-round vehicle traffic causing disturbance and potential avoidance behavior, over-snow recreation in the winter and new construction and plowing of the Burntlog Route through potential suitable habitat. Wolverines typically use remote areas that are not fragmented by roadways or other linear disturbances (Scrafford et al. 2018), and they have shown an aversion to crossing roadways with ROWs over 328 feet (100 meters) in width (Luensmann 2008). The Burnt Log (Forest Road 447) and Thunder Mountain (Forest Road 50375) roads would be widened to 26 feet wide, including shoulders, which is significantly narrower than 328 feet. Austin (1998) found that wolverines avoided areas within 100 meters of the Trans-Canada Highway and showed low use of areas within 1,000 meters (i.e., approximately 0.6 mile) of it. Scrafford and Boyce (2014) found that wolverines in northern Alberta tended to avoid areas within 300 meters (i.e., approximately 1,000 feet) of roadways, but regularly crossed paved roads with more than 100 vehicles per day (vpd). Traffic levels on the Burntlog Route would be highest during construction at about 65 vpd. Perpetua would limit their vehicle traffic outside

the mine site to between 5:00 am and 7:00 pm resulting in approximately five mine-related vehicles traveling on Burntlog Route per hour during operations. Additionally, Squires et al. (2006) observed that wolverines in southwestern Montana crossed major roadways in areas with the narrowest distance between forest cover on each side. Construction of 15 miles of new road for the Burntlog Route would fragment habitat but may not act as a barrier to movement due to its width and adjacent tree cover. Upon closure, the new segment of Burntlog Route would be recontoured and reclaimed, which would reduce direct and indirect impacts in the long-term.

An increase in big or small game collision mortality along roadways would be likely as the Burntlog Route segment would be new to the area and would be plowed throughout the winter. Because wolverines are largely scavengers in the winter (particularly on ungulate carrion), this could attract wolverines to roadways. Vehicle-wildlife collisions and habitat fragmentation would likely be the largest impact on the wolverine related to the 2021 MMP. Appropriate speed limits (i.e., generally 30 miles per hour or less) would be established for the Burntlog Route, mine site haul roads, and light vehicle access roads for the 2021 MMP to reduce the possibility of vehicle-wildlife collisions. All staff and contractors would be trained to reduce wildlife collisions. However, wildlife-vehicle collisions would still be possible. Removing wildlife collision mortality from roadways also could reduce some impacts.

Additionally, Heinemeyer et al. (2017) observed that wolverines responded negatively to increasing intensity of winter recreation in Idaho, Montana, and Wyoming; and that off-road or dispersed recreation triggered a stronger response than recreation concentrated on access roads. Female wolverines showed a stronger avoidance effect to motorized off-road recreation than males, and therefore experienced higher habitat loss (Heinemeyer et al. 2019). Kortello et al. (2019) also documented the negative association of forestry roads and winter recreation on wolverine distribution in the southern Columbia Mountains of Canada. During construction, the current OSV trail associated with Johnson Creek Road would be moved to the side of the road, but there would be no increase in snowmobile use as it is an existing route for OSVs. The new 10.4-mile groomed OSV trail along the existing Cabin Creek Road (Forest Road 467) would cross modeled habitat for wolverines, and associated increased recreational activity (e.g., snowmobiling, skiing, etc.) would likely cause indirect impacts to wolverines due to noise from OSVs as this would be a new winter route. Wolverines affected physically (i.e., habitat disturbance due to construction of the Burntlog Route) or behaviorally (i.e., displacement) would likely avoid the areas by moving away from the activities, which could have an impact on denning females. Public use of some roadways would likely also encourage additional backcountry recreational activities and hunting (e.g., big game, small game), which could cause direct mortality (i.e., vehicle collisions or illegal hunting [wolverines do not have a hunting season in Idaho]) or avoidance behavior.

Noise and increased lighting also could disturb potential wolverine foraging or denning habitat throughout the life of the SGP (i.e., 20 years), but the area disturbed would be small relative to equivalent habitat in the contiguous forest area, and relative to the extremely large home range of wolverines (from 49 to 833 square miles; Heinemeyer et al. 2017). However, construction of the access roads would likely produce noise effects at farther distances. For example, noise from access road construction would attenuate to the threshold of 55 dBA approximately 0.57 miles from the source of activity based on distance alone; accounting for ground and atmospheric absorption, noise would attenuate to 55 dBA approximately 0.28 mile from the source. Estimated average hourly traffic noise levels would be approximately 48 dBA at 50 feet from the roadway and would attenuate to below ambient noise levels of 40 dBA within 500 feet from the roadway (Forest Service 2022c). Therefore, traffic noise could affect wolverines in the FCRNRW within 500 feet of the roadway during operations. The noise and light reduction strategies (e.g., noise mufflers, light shields and type) employed along access roads would

likely reduce impacts on wolverines by minimizing the intensity and duration but may not eliminate them entirely (**Section 2.4**).

The year-round maintenance and winter plowing of the Burntlog Route could potentially open new and more remote areas for other predators, such as wolves or coyotes, which could indirectly increase the competition for food resources with wolverines.

Under the Johnson Creek Route Alternative, the Johnson Creek Route would be used instead of the Burntlog Route, which would eliminate the disturbance of 15 miles of wolverine habitat adjacent to the FCRNRW. This would avoid the impacts of noise, light, and traffic impacts on wolverines in the FCRNRW area. Additionally, the Johnson Creek Route would mostly avoid areas mapped as persistent spring snow cover, which are areas expected to be used most by wolverines. However, it is expected that wolverines would still cross SGP area roadways, including the Johnson Creek Route. Traffic levels on Stibnite Road and Johnson Creek Road (both part of the Johnson Creek Route) would increase by about 167 percent and 71 percent, respectively, during operations. Therefore, there would still be a chance of wildlife mortality under the Johnson Creek Route Alternative.

Utilities

Direct impacts on wolverines due to the utility corridors, substations, and communication towers are possible, and construction activities may cause wolverines to avoid these areas in the short-term. Some habitat would be removed for these areas along roadways, but they are not considered good habitat for wolverines due to their roadside location. The addition of new utility access roads, as well as new transmission lines and upgraded transmission lines would likely be a threat to individual wolverines. Upon closure, the new transmission line between the mine site and Johnson Creek substation would be decommissioned, removed, and reclaimed, which would reduce long-term impacts under the 2021 MMP.

Noise and light due to construction of utility corridors, substations, and communication towers could temporarily (up to 3 years) disturb potential wolverine foraging habitat, but the area disturbed would be small relative to equivalent habitat in the contiguous forest area, and relative to the extremely large home range of wolverines (from 49 to 833 square miles; Heinemeyer et al. 2017). For example, noise would attenuate to the threshold of 55 dBA approximately 0.28 mile from the source of activity based on distance alone. Accounting for ground absorption and atmospheric absorption, noise from transmission line construction would attenuate to 55 dBA approximately 0.15 mile from the source of activity (Forest Service 2022c). The noise and light reduction strategies employed along utility corridors and near communication towers would reduce impacts on wolverines but may not entirely eliminate them.

Under the Johnson Creek Route Alternative, utilities would be constructed and installed using helicopters in Inventoried Roadless Areas rather than by constructing access roads. This would introduce more noise impacts to wolverines in their vicinity during construction. For example, noise from transmission line construction with helicopter use would attenuate to the threshold of 55 dBA approximately 1.70 miles from the source of activity based on distance alone. Accounting for ground absorption and atmospheric absorption, noise from transmission line construction with helicopter use would attenuate to 55 dBA approximately 0.66 mile from the source of activity (Forest Service 2022c). During operations, the utilities would produce the same noise levels as the 2021 MMP.

Off-site Facilities

Direct impacts on wolverines due to off-site facilities are possible, as there are known breeding territories in the wolverine analysis area, and they would likely travel throughout the area. Because wolverines typically use remote areas that are not fragmented by roadways or buildings, it is likely that resident or

transient wolverine individuals would naturally avoid the off-site facility areas. There could be some displacement and avoidance of more remote facilities (e.g., Landmark Maintenance Facility).

Noise and increased lighting near the off-site facilities may disturb potential wolverine foraging or denning habitat although the area disturbed would be small relative to equivalent habitat in the contiguous forest area, and relative to the extremely large home range of wolverines. It is likely that resident or transient wolverine individuals would avoid the off-site facilities.

Traffic associated with the facilities may increase the potential for vehicle-wildlife collisions. All employees and contractors would be trained to reduce wildlife collisions. Any adverse wildlife encounters would be reported to appropriate state and federal wildlife managers, and in accordance with state and federal laws.

The Johnson Creek Route Alternative would have similar effects on wolverines and modeled habitat as the 2021 MMP.

Habitat Impacts

Persistent snow cover is used to assess impacts to wolverine habitat (**Section 6.3.3**), particularly denning habitat. **Table 7-4** summarizes the areas (in acres) with persistent snow cover in numbers of years (from 1 through 7) impacted by the 2021 MMP and Johnson Creek Route Alternative. This model depicts the number of years, out of seven, in which snow cover was present in the spring in selected pixels (April 24 – May 15). This time frame generally corresponds to the period of wolverine den abandonment. Most dens were located in areas that were snow covered for 6 to 7 years out of the total 7 years studied, indicating that wolverines select den sites in areas with the highest consistent snow coverage. Thus, the direct impacts on these areas would be a direct effect to wolverines and denning activities.

To be conservative, areas with persistent snow cover for years 5 through 7 indicate higher quality habitat (particularly denning habitat) than years 1 through 4. Indirect impacts were calculated by including all modeled habitat (years 1 through 7) within 5 miles of action alternative components. Of the two alternatives, the Johnson Creek Route Alternative would directly and indirectly impact the least amount of higher quality habitat and persistent spring snow cover overall.

Table 7-4 Direct and Indirect Impacts on Wolverine Habitat

Persistent Spring Snow Cover Years	Directly Impacted Habitat (acres)	Indirectly Impacted Habitat (acres)
2021 MMP		
1-4	2,149	245,018
5-7	193	97,922
Johnson Creek Route Alternative		
1-4	1,915	228,945
5-7	90	74,171

Source: Forest Service 2020a.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Wolverines would likely continue to use the mine site area much as they currently do.

Access Roads

Existing roads also would continue to affect wolverines through habitat fragmentation and vehicle-wildlife collisions.

Utilities

There would be no new loss of habitat or source of noise and light for wolverines due to utility construction.

Off-site Facilities

Depending on the future use of current off-site facilities, wolverines would likely continue to avoid them as they currently do.

Determination

Wolverines have been well documented in the wolverine analysis area and several individual wolverines have been captured in and adjacent to the wolverine analysis area (Forest Service 2012b, 2015b; Heinemeyer et al. 2017). The Forest Service has preliminarily determined that the 2021 MMP and Johnson Creek Route Alternative may directly and indirectly impact wolverine individuals and habitat resulting in adverse impacts but would not jeopardize the continued existence of the species. Informal Section 7 ESA consultation is ongoing with the USFWS. The Johnson Creek Route Alternative would impact the least habitat overall, but still reduce habitat connectivity, and potentially cause displacement (primarily from increased noise), based on direct and indirect impacts. Therefore, based on the impact analysis for the wolverine and its habitat, the 2021 MMP and Johnson Creek Route Alternative would result in localized and long-term impacts to the wolverine, particularly the local population (part of larger Central Idaho sub-populations).

7.2.1.4 Monarch Butterfly

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Direct impacts on the Monarch butterfly could include direct mortality (i.e., wildlife-vehicle collisions) or loss of habitat due to land clearing activities and land use changes. Indirect impacts could include reduced use of foraging habitat or reduced pollinator resources in the analysis area.

Mine Site

Direct effects on Monarch butterflies would primarily be due to loss and fragmentation of habitat; direct mortality through vehicle-wildlife collisions; and disturbance from light, noise, fugitive dust, and increased human activity under the 2021 MMP. Displaced individuals would likely only be lost to the population if the adjacent environment were at maximum carrying capacity, to the extent that there were not enough available habitats to support them. In such a case, individuals would have to travel further, exposing them to predation, vehicle-wildlife collisions, and energetic loss.

Monarch butterflies would likely be displaced around the perimeter of the mine site. Additional roadways in the mine site would expose individuals to direct vehicle collisions or increased predation in the wildlife analysis area.

Light, noise, and fugitive dust impacts associated with mine site activities are likely to disturb or displace Monarch butterflies. The estimated total average hourly noise levels from the mine site during the operations phase would be 102 dBA with blasting (Forest Service 2022c). Under the blasting scenario, SGP-related noise levels from the mine site during operations would attenuate to well below average ambient sound levels, because the impacts are reduced by vegetation, topography, and distance from the impact sources. Noise-reduction strategies (e.g., enclosure of ore processing facility, use of electricity instead of diesel generators, muffling equipment, etc.) would be used to reduce indirect effects on wildlife. Several terrestrial wildlife species have shown responses to anthropogenic noise levels beginning at 40 dBA (Shannon et al. 2016). However, because the existing (ambient) sound levels vary between 20 and 40 dBA, it is likely that SGP area wildlife, including the Monarch butterfly, would have a higher tolerance for noise. Equipment would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. As part of the SGP, buildings, equipment, and drill rigs would have limited external lighting when feasible. The result would generally be a reduction in the area of habitat disturbed at most sites.

Hazardous materials and chemicals would be transported to the mine site in U.S. Department of Transportation-certified containers by trained personnel and would be stored in designated areas employing secondary containment measures. A Hazardous Materials Handling and Emergency Response Plan would address procedures for responding to accidental spills or releases of hazardous materials to minimize environmental effects. Used products would be stored on site in approved containers that would be separate from other trash and garbage products. Therefore, there is little chance of Monarch butterflies being exposed to hazardous materials.

The Johnson Creek Route Alternative would have similar effects on the Monarch butterfly as the 2021 MMP.

Access Roads

Direct effects on the Monarch butterfly would primarily be due to loss and fragmentation of habitat; direct mortality through vehicle-wildlife collisions; and disturbance from light, noise, fugitive dust, and increased human activity under the 2021 MMP. Construction of 15 miles of new road for the Burntlog Route would likely fragment habitat for the Monarch butterfly. The new 15-mile-long section of Burntlog Route would be constructed and maintained year-round and have an annual average daily traffic level of 68 vehicles, which would likely directly disrupt Monarch butterfly movements The intensity of this impact could range from minor displacement to mortality. The duration ranges from temporary road construction (up to 3 years) to short-term (during 12 to 15 years of mining and ore processing operations). It is not expected that the increased risk of injury or mortality would become permanent, because the new segment of the Burntlog Route would be reclaimed, and traffic levels on the existing roads would return to current levels. The geographic extent of these impacts would be limited to the vicinity of the access road.

Light, noise, and fugitive dust (potentially high levels depending on phase of the Project) impacts associated with road construction, maintenance, and vehicle traffic are likely to disturb or displace the Monarch butterfly. SGP design features would help reduce these impacts, but not eliminate them. The

estimated noise levels from SGP-related traffic on the Burntlog Route during the operations phase would be 49 dBA. The estimated SGP-related noise level from road maintenance activity on the mine access road would range up to 88 dBA during the summer months (Forest Service 2022c).

Under the Johnson Creek Route Alternative, the Burntlog Route would not be built. This would avoid effects of noise disturbance, fugitive dust, habitat loss, and habitat fragmentation to the Monarch butterfly in the vicinity of Burnt Log Road (Forest Road 447). However, Monarch butterflies that currently utilize habitats along the Johnson Creek Route would likely be more impacted due to increased fugitive dust and noise disturbance from increased traffic.

Utilities

Direct impacts on Monarch butterflies could include loss or fragmentation of habitat along utility corridors, substations, and communication towers due to land clearing activities and land use changes under the 2021 MMP. The addition of new utility access roads, as well as new transmission lines and upgraded transmission lines, could impact individual Monarch butterflies. Construction impacts would likely displace wildlife but would be temporary (up to 3 years). Vegetation would be cleared only in those areas necessary for 2021 MMP activities to preserve natural habitat to the greatest extent practicable.

Noise-reduction strategies would be used to reduce indirect effects. Equipment would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

The Johnson Creek Route Alternative would have similar effects on Monarch butterflies as the 2021 MMP.

Off-site Facilities

Construction and operation of the off-site facilities under the 2021 MMP are unlikely to disturb Monarch butterflies, because construction activities are not planned to occur in suitable habitat used by them. Noise and lighting reduction strategies would be used to reduce indirect effects on species in the vicinity. Buildings would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

Although construction and operation of the off-site facilities themselves would likely not cause direct mortality to Monarch butterflies, vehicle traffic associated with the facilities could result in mortality.

The Johnson Creek Route Alternative would have similar effects on Monarch butterflies as the 2021 MMP.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Monarch butterflies would likely continue to use the mine site area as they currently do.

Access Roads

Existing roads also would continue to affect wildlife through habitat fragmentation and vehicle-wildlife collisions and noise, light, and fugitive dust impacts from traffic.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat or source of noise and light impacts.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

Determination

The action alternatives may directly and indirectly impact Monarch butterflies and habitat. However, due to the low potential for this species to occur in the wildlife analysis area, primarily due to a lack of suitable habitat, the action alternatives would not likely contribute to a trend towards ESA listing or loss of viability of the species within the planning area. Therefore, based on the impact analysis above for the Monarch butterfly and its habitat, the action alternatives would result in negligible impacts to the Monarch butterfly.

7.2.2 Focal Species, including Region 4 Sensitive Species and Management Indicator Species

7.2.2.1 Habitat Family 1 – Low Elevation, Old Forest

White-headed Woodpecker

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figure 7-4 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the wildlife analysis area compared to modeled habitat.

Mine Site

The white-headed woodpecker is expected to be uncommon in the wildlife analysis area. Modeled habitat for white-headed woodpecker does not occur in the mine site area and direct impacts are unlikely.

The 2021 MMP would cause an increase in noise and light in the vicinity of the mine site, which could cause indirect effects to white-headed woodpecker within 0.5 mile of the mine site. Wildlife behaviors that may change as a result of increased noise include nesting (loss of a nest would constitute “take”) or foraging changes. Noise-reduction strategies would be used to lower potential indirect effects on woodpeckers. For example, buildings, equipment, and drill rigs would have limited external lighting, and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

The Johnson Creek Route Alternative would have similar effects on white-headed woodpecker as the 2021 MMP.

Adams County
Valley County
Payette Lake
Little Payette Lake
Lardo
McCall
55
Lake Fork
Lake Fork Substation
Donnelly
Roseberry
Payette National Forest
Boise National Forest
Lake Cascade
Cascade
Cascade Switching Station
Adams County
Gem County
Valley County
Horsethief Reservoir
Scott Valley Substation
Stibnite Gold Logistics Facility
WARM LAKE RD
Warm Lake Substation
Warm Lake
Thunderbolt Tap Substation
East Fork South Fork Salmon River
EAST FORK RD
Yellow Pine
STIBNITE RD
Johnson Creek Route Only
Johnson Creek Substation
Burntlog Route Only
Riordan Lake
JOHNSON CREEK RD
South Fork Salmon River
Johnson Creek
Johnson Creek Route Only
Landmark Maintenance Facility (Johnson Creek Route Only)
Burntlog Route Only
Burntlog Maintenance Facility (Burntlog Route Only)
Burntlog Route
Stibnite Substation
Public Access Road
Frank Church-River of No Return Wilderness
Payette National Forest
Salmon-Challis National Forest
Valley County
Custer County
Boise National Forest
Salmon-Challis National Forest
Cape Horn (historical)
Project Area

MINE SITE INSET
Public Access Road
STIBNITE RD
Pepper Creek
Sugar Creek
Glamdar Creek
Hennessey Creek
Fiddle Creek
Garnet Creek
Rubble Creek
Fern Creek
Meadow Creek
Blowout Creek
East Fork South Fork Salmon River
50375
51290

LEGEND

Woodpecker Habitat Analysis Area - Affected Environment
Existing Condition Analysis Area
White-headed Woodpecker Modeled Habitat
Stibnite Historic Disturbance

Project Components *
SGP Features

Access Roads & Trail System
Burntlog Route ***
Johnson Creek Route
Groomed OSV Route
Cell Tower Access
Public Access Road
Burntlog Route Borrow Source ***

Utilities
New Transmission Line
Upgraded Transmission Line
New Substation **
Existing Substation **
New Repeater Site
Existing Communication Tower
New Cell Tower

Offsite Facilities
Burntlog Maintenance Facility ***
Landmark Maintenance Facility ****

Other Features
U.S. Forest Service
Wilderness
County
City/Town
Monumental Summit
Railroad
State Highway
Road
Stream/River
Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route

** Substation locations are approximate

*** Associated with Burntlog Route only

**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles
1 inch = 4.5 miles

Figure 7-4
White-headed Woodpecker Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

Document Path: U:\2023\21981\03_data\gis_cad\gis\FEIS\MXD\Specialist_Reports\Wildlife\Fig7_4_WhiteheadedWoodpeckerHabitat_20220713.mxd (Updated by CBB 7/13/2022)

Access Roads

There is very limited modeled habitat for white-headed woodpecker near the proposed Burntlog Route, so there would be only low direct impacts for the access roads (4 acres; **Table 7-5**). The 2021 MMP would cause an increase in noise, light, and fugitive dust in the wildlife analysis area due to road construction, vehicle traffic, and maintenance. However, most modeled habitat is adjacent to existing roadways (e.g., Warm Lake Road). Wildlife behaviors that may change as a result of increased noise, light, and fugitive dust due to increased traffic include nesting (loss of a nest equals "take") and/or foraging changes. Noise-reduction strategies would be used to lower indirect effects on woodpeckers (**Section 2.4**).

Under the Johnson Creek Route Alternative, the Burntlog Route would not be constructed. There is modeled habitat for white-headed woodpecker along the Johnson Creek Route. Because the Stibnite Road and Johnson Creek Road are existing roadways that would be upgraded, there would be approximately 8 acres of direct impacts on white-headed woodpecker habitat, and there would be more indirect impacts due to noise, light, and fugitive dust disturbance from increased traffic levels.

Utilities

There is very limited modeled habitat for white-headed woodpecker along the utility areas, so there would be very little direct impacts (approximately 12 acres; **Table 7-5**). Direct take of adult birds, nests, eggs, or young due to construction or operational activities is unlikely, because white-headed woodpeckers are expected to be uncommon.

The 2021 MMP would cause an increase in noise and light in the wildlife analysis area, due to construction, operation, and maintenance of the utilities, particularly along the new transmission line between the mine site and Johnson Creek substation (where some modeled habitat occurs). Wildlife behaviors that may change as a result of increased noise include nesting (loss of a nest equals "take") and/or foraging changes. Noise-reduction strategies would be used to lower indirect effects on woodpeckers. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

The Johnson Creek Route Alternative would have similar effects on white-headed woodpecker as the 2021 MMP.

Off-site Facilities

The 2021 MMP is unlikely to disturb individual white-headed woodpeckers due to clearing and construction activities for off-site facilities, because none are expected to impact modeled habitat. However, indirect effects on woodpeckers could include reduced use of foraging or nesting habitat.

The Johnson Creek Route Alternative would have similar effects on white-headed woodpecker as the 2021 MMP.

Habitat Impacts

Table 7-5 White-headed Woodpecker Direct and Indirect Impacts

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP		
Mine Site	0	N/A
Access Roads	4	N/A
Utilities	12	N/A
Off-site Facilities	0	N/A
Total	**16**	**1,473**
Johnson Creek Route Alternative		
Mine Site	0	N/A
Access Roads	17	N/A
Utilities	12	N/A
Off-site Facilities	0	N/A
Total	**29**	**1,485**

Source: Forest Service 2020a.
N/A = indirect impacts are calculated by buffer distances (0.5 mile for woodpeckers) from the action alternatives and occur outside of the SGP components.
0 acres indicates that SGP components would not cross or overlap modeled habitat.

Direct and Indirect Effects from the No Action Alternative

Mine Site

There is no modeled habitat near the mine site for white-headed woodpeckers, and they are not expected to occur.

Access Roads

Existing roads (e.g., Stibnite Road, Johnson Creek Road, Warm Lake Road) in close proximity to modeled habitat would continue to affect white-headed woodpeckers through habitat fragmentation and noise, light, and fugitive dust impacts from traffic.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat, source of noise and light, or increased risk of collision for woodpeckers.

Off-site Facilities

There would be no loss of habitat or new sources of noise and light due to off-site facilities.

Determination

Based on the impact analysis above for the white-headed woodpecker and its habitat, the action alternatives would result primarily in negligible impacts to the white-headed woodpecker and would not contribute to a trend towards ESA listing or loss of viability of the species within the planning area.

Lewis's Woodpecker

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figure 7-5 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the wildlife analysis area compared to modeled habitat.

Mine Site

Effects to the Lewis's woodpecker at the mine site under both action alternatives would be similar to the white-headed woodpecker analysis. No modeled habitat would be impacted in the mine site area under either action alternative (**Table 7-6**).

Access Roads

Effects to the Lewis's woodpecker along the access roads under the action alternatives would be similar to the white-headed woodpecker analysis. Approximately 5 acres and 19 acres, respectively, of modeled habitat would be impacted along the access roads for each of the action alternatives.

Utilities

Effects to the Lewis's woodpecker associated with the utilities under the action alternatives would be similar to the white-headed woodpecker analysis. Approximately 6 acres of modeled habitat would be impacted along the access roads for each of the action alternatives.

Off-site Facilities

There would be no effects to the Lewis's woodpecker due the off-site facilities under the action alternatives.

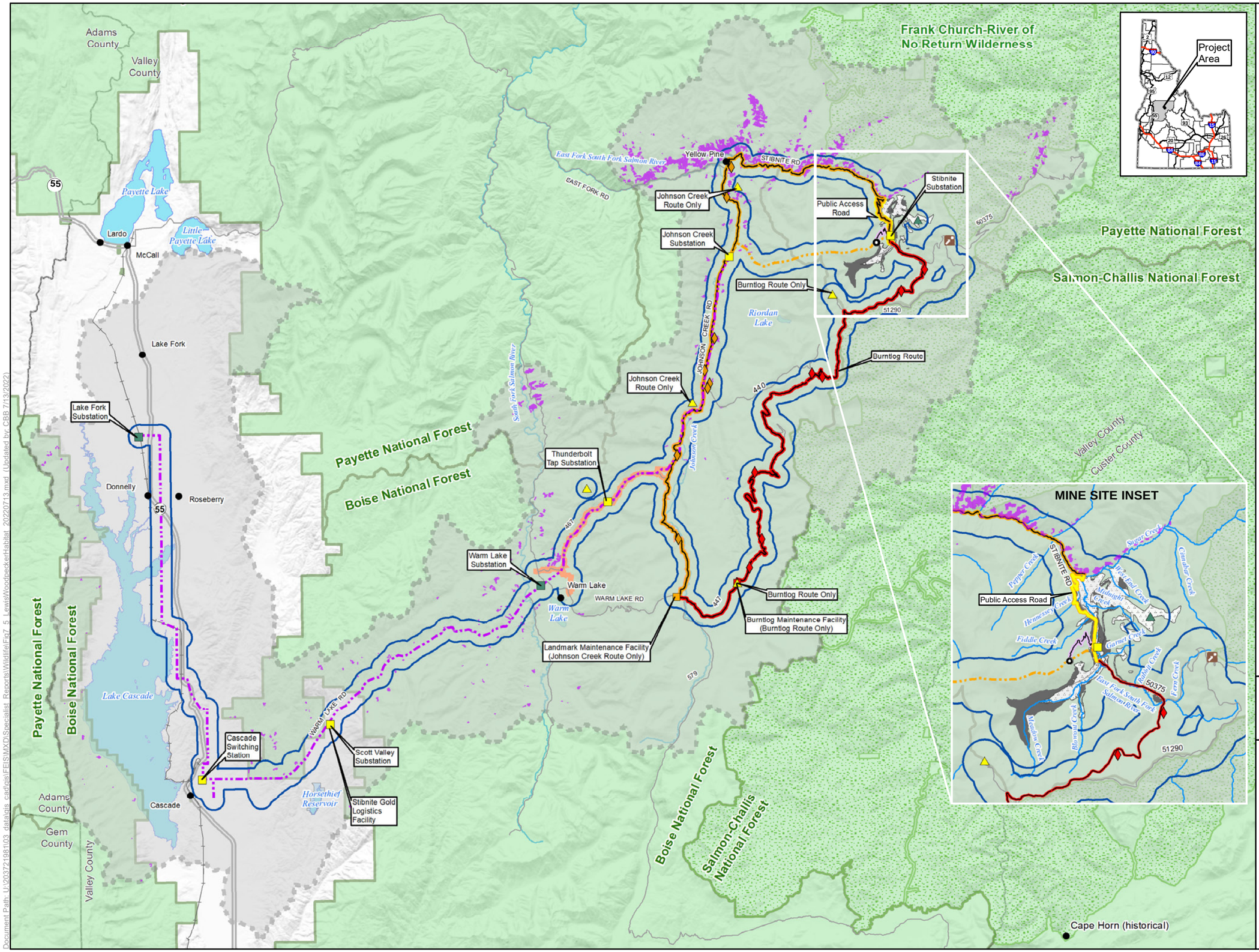
Habitat Impacts

Table 7-6 Lewis's Woodpecker Direct and Indirect Impacts

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP		
Mine Site	0	N/A
Access Roads	5	N/A
Utilities	6	N/A
Off-site Facilities	0	N/A
Total	**11**	**1,340**
Johnson Creek Route Alternative		
Mine Site	0	N/A
Access Roads	19	N/A
Utilities	6	N/A
Off-site Facilities	0	N/A
Total	**25**	**1,345**

Source: Forest Service 2020a

N/A = indirect impacts are calculated by buffer distances (0.5 mile for woodpeckers) from the action alternatives and occur outside of the SGP components. 0 acres indicates that SGP components would not cross or overlap modeled habitat.



LEGEND

- Woodpecker Habitat Analysis Area - Affected Environment
- Existing Condition Analysis Area
- Lewis's Woodpecker Modeled Habitat
- Stibnite Historic Disturbance

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Cell Tower Access
- Public Access Road
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities

- New Transmission Line
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site
- Existing Communication Tower
- New Cell Tower

Offsite Facilities

- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route
** Substation locations are approximate
*** Associated with Burntlog Route only
**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 7-5
Lewis's Woodpecker Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Direct and Indirect Effects from the No Action Alternative

Effects to the Lewis's woodpecker would be the same as described for the white-headed woodpecker under the No Action Alternative.

Determination

Based on the impact analysis above for the Lewis's woodpecker and its habitat, the action alternatives would result primarily in negligible impacts to the Lewis's woodpecker and would not contribute to a trend towards ESA listing or loss of viability of the species within the planning area.

7.2.2.2 Habitat Family 2 – Broad Elevation, Old Forest

American Three-toed Woodpecker

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

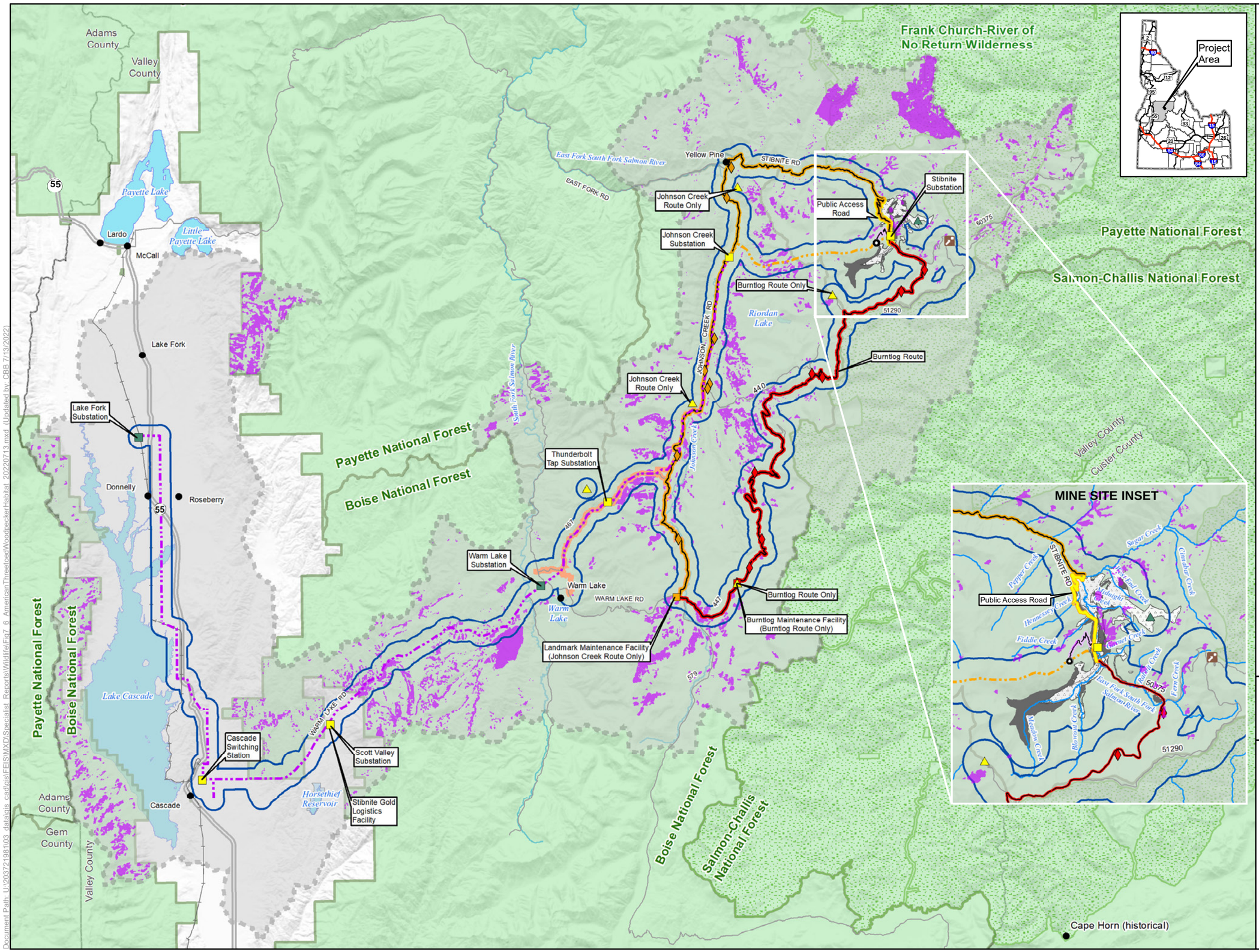
Figure 7-6 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the wildlife analysis area compared to modeled habitat.

Mine Site

While there is modeled habitat for American three-toed woodpeckers in the mine site area, there are no documented occurrences, and they are expected to be rare. However, there would be a direct impact of 30 acres of modeled habitat in the mine site area for American three-toed woodpeckers under the 2021 MMP (**Table 7-7**). Removal of snag trees would cause a loss of suitable habitat for this species, which would likely displace resident birds. Adjacent areas contain similar habitat types, but individual birds may face more competition for these areas, which would be an indirect effect. Direct take of adult birds due to construction or operational activities is possible, but unlikely, because most individuals are expected to avoid areas of activity and they are rare in the mine site area. However, it is possible that nests, eggs, and young could be directly disturbed by vegetation removal (including cutting of trees) during construction if it occurs during the nesting season. To the extent practicable, trees found to contain nests would not be disturbed or cut. A Forest Service wildlife biologist would be notified of any occupied sensitive species nests encountered. Although design features would reduce impacts, there would still be a decrease in modeled habitat.

The 2021 MMP would cause an increase in noise and light in the woodpecker analysis area, mostly in the vicinity of the mine site. Construction and operations, vehicle traffic, and helicopter use are likely to directly disturb or displace individuals. Wildlife behaviors that may change as a result of increased noise and light include nesting (loss of a nest equals "take") and/or foraging changes. Noise-reduction strategies would be used to reduce indirect effects on woodpeckers (**Section 2.4**). For example, buildings, equipment, and drill rigs would have limited external lighting, and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

The Johnson Creek Route Alternative would have similar effects on American three-toed woodpecker as the 2021 MMP.



LEGEND

- Woodpecker Habitat Analysis Area - Affected Environment
- Existing Condition Analysis Area
- American Three-Toed Woodpecker Modeled Habitat
- Stibnite Historic Disturbance

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Cell Tower Access
- Public Access Road
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities

- New Transmission Line
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site
- Existing Communication Tower
- New Cell Tower

Offsite Facilities

- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route
** Substation locations are approximate
*** Associated with Burntlog Route only
**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 7-6
American Three-toed Woodpecker Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Access Roads

There would be a direct impact of 10 acres to modeled habitat along the Burntlog Route for American three-toed woodpeckers under the 2021 MMP (**Table 7-7**). Removal of snag trees along this roadway would cause a loss of suitable habitat for this species. Direct take of adult birds due to construction or operational activities is unlikely because they are expected to be uncommon. However, it is possible that nests, eggs, and young could be directly disturbed by vegetation removal (including cutting of trees) during construction if it occurs during the nesting season. To the extent practicable, trees found to contain nests would not be disturbed or cut. A Forest Service wildlife biologist would be notified of any occupied sensitive species nests encountered. Although design features would reduce impacts, there would still be a decrease in habitat.

The 2021 MMP would cause an increase in noise, light, and fugitive dust in the woodpecker analysis area, due to road construction, vehicle traffic, and maintenance. Wildlife behaviors that may change as a result of increased noise include nesting (loss of a nest equals “take”) and/or foraging changes. Noise-reduction strategies would be used to lower indirect effects on woodpeckers. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Additionally, the 10.4-mile groomed OSV trail along the existing Cabin Creek Road (Forest Road 467) would cross modeled habitat, which may disrupt American three-toed woodpeckers due to OSV noise.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be constructed. However, there would be a direct impact of 1 acre of modeled habitat associated with upgrades to the Johnson Creek Route. Additionally, the increased traffic along Stibnite Road, Johnson Creek Road, and Warm Lake Road would cause indirect impacts to woodpeckers using the modeled habitat within 0.5 mile of the roadways due to noise, light, and fugitive dust.

Utilities

There would be a direct impact of 17 acres of modeled habitat along the utilities for American three-toed woodpeckers under the 2021 MMP (**Table 7-7**). Removal of snag trees near utility corridors, substations, and communication towers would cause a loss of suitable habitat for this species, which would likely displace any resident birds. Adjacent areas contain similar habitat types, but individual birds may face more competition for these areas, which would be an indirect effect. Direct take of adult birds due to construction or operational activities is unlikely because they are expected to be uncommon. However, it is possible that nests, eggs, and young (loss of a nest, eggs, or young equals “take”) could be directly disturbed by vegetation removal (including cutting of trees) during construction if it occurs during the nesting season. This could occur along the new transmission line segment between the mine site and Johnson Creek substation or along the upgraded transmission line segments along Johnson Creek Road and Warm Lake Road. To the extent practicable, trees found to contain nests would not be disturbed or cut. A Forest Service wildlife biologist would be notified of any occupied sensitive species nests encountered. Although design features would reduce impacts, there would still be a decrease in habitat.

The Johnson Creek Route Alternative would have similar effects on the American three-toed woodpecker as the 2021 MMP.

Off-site Facilities

The 2021 MMP is unlikely to disturb individual American three-toed woodpeckers due to clearing and construction activities for off-site facilities, because none of the facilities are expected to overlap modeled

habitat. However, indirect effects on woodpeckers could include reduced use of foraging or nesting habitat within 0.5 mile of the off-site facilities due to noise and light.

Under the Johnson Creek Route Alternative, the Landmark Maintenance Facility would be relocated to the southern side of Warm Lake Road, which would shift the footprint slightly versus the 2021 MMP and cause a direct impact of about 1 acre. It is not expected that this change would cause effects different from the 2021 MMP.

Habitat Impacts

Table 7-7 American Three-toed Woodpecker Direct and Indirect impacts

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP		
Mine Site	30	N/A
Access Roads	10	N/A
Utilities	17	N/A
Off-site Facilities	0	N/A
Total	**57**	**2,724**
Johnson Creek Route Alternative		
Mine Site	29	N/A
Access Roads	1	N/A
Utilities	17	N/A
Off-site Facilities	1	N/A
Total	**48**	**2,224**

Source: Forest Service 2020a
N/A = indirect impacts are calculated by buffer distances (0.5 mile for woodpeckers) from the action alternatives and occur outside of the SGP components.
0 acres indicates that SGP components would not cross or overlap modeled habitat.

The 2021 MMP would cause an increase in noise and light in the woodpecker analysis area, due to construction, operation, and maintenance of the utilities. Wildlife behaviors that may change as a result of increased noise include nesting or foraging changes. Noise-reduction strategies would be used to reduce indirect effects on woodpeckers. Buildings and equipment would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

The Johnson Creek Route Alternative would have similar effects on American three-toed woodpecker as the 2021 MMP.

Direct and Indirect Effects from the No Action Alternative

Effects to the American three-toed woodpecker would be the same as described for the white-headed woodpecker under the No Action Alternative.

Determination

The action alternatives may directly and indirectly impact American three-toed woodpecker individuals and habitat but would not likely contribute to a trend towards ESA listing or loss of viability of the species within the planning area. The action alternatives would have similar direct and indirect impacts, but the Johnson Creek Route Alternative would directly impact the least amount of habitat. Therefore, based on the impact analysis above for the American three-toed woodpecker and its habitat, the action alternatives would result primarily in localized, long-term, and permanent, minor impacts to the American three-toed woodpecker.

Black-backed Woodpecker

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figure 7-7 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the wildlife analysis area compared to modeled habitat.

Mine Site

Effects to the black-backed woodpecker at the mine site would be similar to the American three-toed woodpecker analysis. However, there would be a direct impact of 49 acres of modeled habitat under the 2021 MMP and 45 acres under the Johnson Creek Route Alternative (**Table 7-8**).

Access Roads

Effects to the black-backed woodpecker along the access roads would be similar to the American three-toed woodpecker analysis. The 2021 MMP would have a direct impact of 20 acres (**Table 7-8**). This would primarily occur due to construction of the Burntlog Route through modeled habitat. Indirect impacts (due to noise, light, and fugitive dust from construction and increased traffic) would occur within 0.5 mile of the Burntlog Route as well.

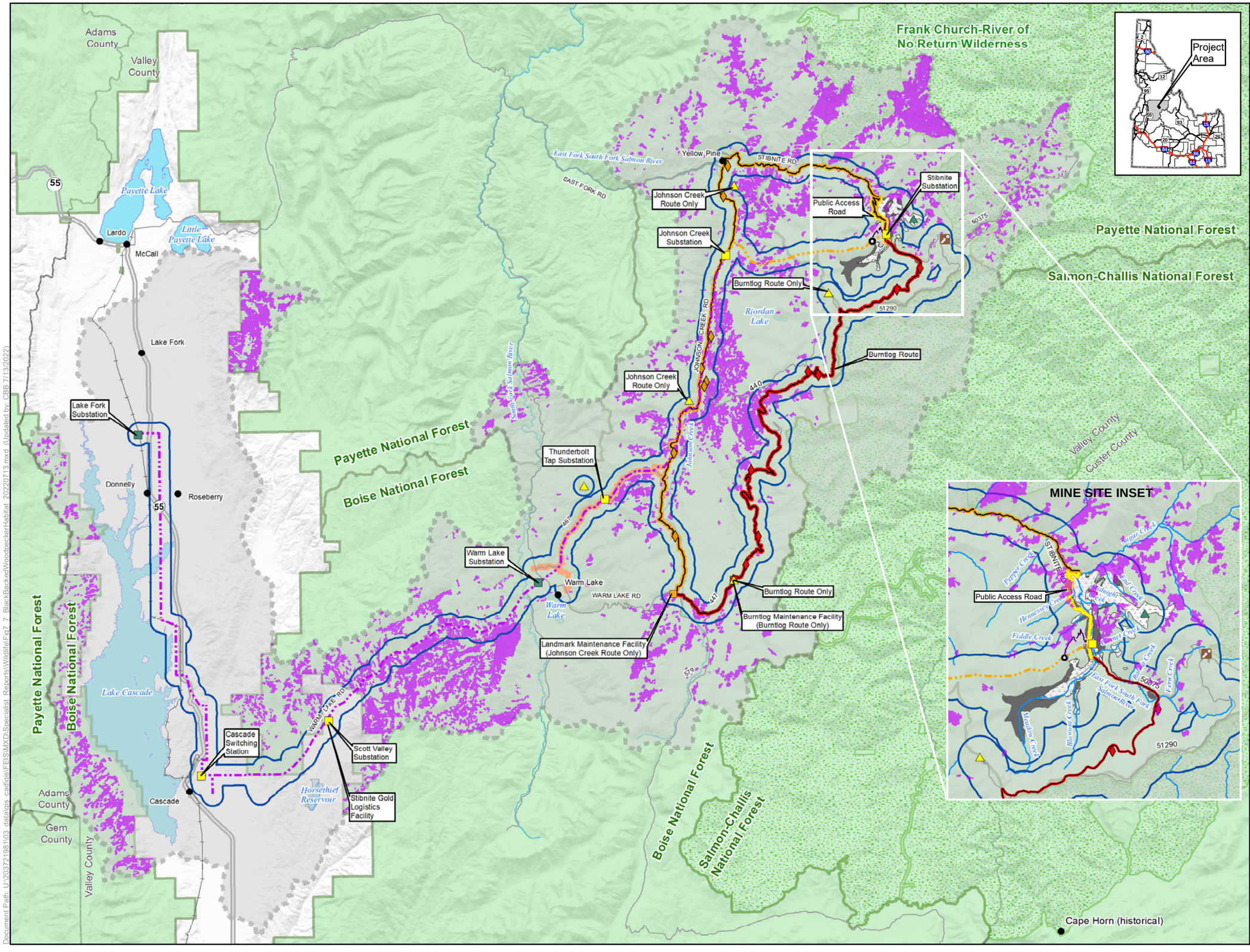
The Johnson Creek Route Alternative would directly impact 14 acres of modeled habitat, due to shifting the primary access route to the Johnson Creek Route. There would also be indirect impacts along this route due to an abundance of modeled habitat along Stibnite Road, Johnson Creek Road, and Warm Lake Road.

Utilities

Effects to the black-backed woodpecker associated with the utilities would be similar to the American three-toed woodpecker analysis. Direct impacts on modeled habitat for black-backed woodpecker would be similar across the action alternatives.

Off-site Facilities

Effects to the black-backed woodpecker at the off-site facilities under the action alternatives would be similar to the American three-toed woodpecker analysis.



LEGEND

- Woodpecker Habitat Analysis Area - Affected Environment
- Existing Condition Analysis Area
- Black-backed Woodpecker Modeled Habitat
- Stibnite Historic Disturbance

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Cell Tower Access
- Public Access Road
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities

- New Transmission Line
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site
- Existing Communication Tower
- New Cell Tower

Offsite Facilities

- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route
** Substation locations are approximate
*** Associated with Burntlog Route only
**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 7-7
Black-backed Woodpecker Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Habitat Impacts

Table 7-8 Black-backed Woodpecker Direct and Indirect Impacts

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP		
Mine Site	49	N/A
Access Roads	20	N/A
Utilities	20	N/A
Off-site Facilities	0	N/A
Total	**89**	**7,420**
Johnson Creek Route Alternative		
Mine Site	45	N/A
Access Roads	14	N/A
Utilities	20	N/A
Off-site Facilities	1	N/A
Total	**80**	**6,244**

Source: Forest Service 2020a.
N/A = indirect impacts are calculated by buffer distances (0.5 mile for woodpeckers) from the action alternatives and occur outside of the SGP components.
0 acres indicates that SGP components would not cross or overlap modeled habitat.

Direct and Indirect Effects from the No Action Alternative

Effects to the black-backed woodpecker would be the same as described for the white-headed woodpecker under the No Action Alternative.

Determination

The action alternatives may directly and indirectly impact black-backed woodpecker individuals and habitat but would not likely contribute to a trend towards ESA listing or loss of viability of the species within the planning area. The action alternatives would all have similar direct and indirect impacts, but the Johnson Creek Route Alternative would directly impact the least habitat. Therefore, based on the impact analysis above for the black-backed woodpecker and its habitat, the action alternatives would result primarily in localized, long-term and permanent, minor impacts to the black-backed woodpecker.

Dusky Grouse (Summer)

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figure 7-8 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the wildlife analysis area compared to modeled habitat.

Adams County
Valley County
Frank Church-River of No Return Wilderness
Payette National Forest
Salmon-Challis National Forest
Boise National Forest
Payette Lake
Little Payette Lake
Lardo
McCall
Lake Fork
Donnelly
Roseberry
Cascade
Lake Cascade
Gem County
Yellow Pine
East Fork South Fork Salmon River
EAST FORK RD
STIBNITE RD
Johnson Creek Route Only
Johnson Creek Substation
Public Access Road
Stibnite Substation
Burntlog Route Only
Burntlog Route
Riordan Lake
JOHNSON CREEK RD
South Fork Salmon River
Johnson Creek
Thunderbolt Tap Substation
Warm Lake Substation
Warm Lake
WARM LAKE RD
Landmark Maintenance Facility (Johnson Creek Route Only)
Burntlog Maintenance Facility (Burntlog Route Only)
Lake Fork Substation
Cascade Switching Station
Scott Valley Substation
Stibnite Gold Logistics Facility
Horsethief Reservoir
Cape Horn (historical)
50375
51290
440
447
467
579

Project Area

MINE SITE INSET
Public Access Road
Sugar Creek
Pepper Creek
West Fork Creek
Midnight Creek
Clearwater Creek
Hennessey Creek
Fiddle Creek
Garnet Creek
Robbat Creek
Fern Creek
Meadow Creek
Blowout Creek
East Fork South Fork Salmon River

LEGEND

Wildlife Habitat Analysis Area Affected Environment
Existing Condition Analysis Area
Dusky Grouse Summer Modeled Habitat
Stibnite Historic Disturbance

Project Components *
SGP Features

Access Roads & Trail System
Burntlog Route ***
Johnson Creek Route
Groomed OSV Route
Cell Tower Access Road
Public Access Road
Burntlog Route Borrow Source ***
Johnson Creek Route Source ****

Utilities
New Transmission Line
Upgraded Transmission Line
New Substation **
Existing Substation **
New Repeater Site
Existing Communication Tower
New Cell Tower

Offsite Facilities
Burntlog Maintenance Facility ***
Landmark Maintenance Facility ****

Other Features
U.S. Forest Service
Wilderness
County
City/Town
Monumental Summit
Railroad
State Highway
Road
Stream/River
Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route
** Substation locations are approximate
*** Associated with Burntlog Route only
**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles
1 inch = 4.5 miles

Figure 7-8
Dusky Grouse (Summer) Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Mine Site

Modeled summer habitat for dusky grouse is limited and occurs only in the northern portion of the mine site area. However, no modeled habitat would be directly impacted by the action alternatives in the mine site.

The 2021 MMP would cause an increase in noise and light in the wildlife analysis area, mostly in the vicinity of the mine site. Dusky grouse behaviors that may change as a result of increased noise and light include changes in nesting (loss of a nest equals "take") and/or foraging patterns that could lead to fragmentation of habitat. Noise-reduction strategies (e.g., enclosure of ore processing facility, use of electricity instead of diesel generators, muffling equipment, etc.) would be used to reduce indirect effects on sensitive wildlife species. Buildings, equipment, and drill rigs would have limited external lighting, and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Additionally, light and noise impacts are reduced by vegetation, topography, and distance from the impact sources. Therefore, indirect impacts on dusky grouse would differ depending on the specific conditions at each individual 2021 MMP component location based on the density of vegetation and proximity to adjoining hillsides and valleys.

Direct and indirect effects for dusky grouse would likely be exposure to emissions and a reduction in insects due to emissions, which could affect dusky grouse during the brood-rearing season (summer).

Insects and insectivorous birds may be exposed to metals (e.g., mercury) and other elements from atmospheric emissions and tailings piles associated with gold and silver mining activities (Custer et al. 2009; Eagles-Smith et al. 2018; Jones and Miller 2005). Emissions of metals from mine operations and ore processing, in the form of particulate matter and dust, may be deposited directly on local soils and waterways. In addition, rainwater and snow melt may provide a pathway for these elements to leach from tailings piles or be physically transported as solid particles into adjacent waterbodies. These elements may enter the food web through plants and insects and then be consumed by insectivorous wildlife, potentially causing injury if exposure is sufficient. The Forest Service would require an adaptive management plan to address dust and emissions (**Section 2.4**).

Although this mitigation measure would reduce impacts, there would still likely be direct and indirect impacts to insectivorous birds like the dusky grouse.

The Johnson Creek Route Alternative would have similar effects on dusky grouse as the 2021 MMP.

Access Roads

The 2021 MMP could directly disturb dusky grouse in the wildlife analysis area through habitat removal and disturbance. The new segment of the Burntlog Route would be decommissioned and reclaimed during mine closure, but the effects would still be considered permanent due to the long time period. The Burntlog Route does not cross much modeled suitable habitat, but there would still be approximately 20 acres of direct impacts (**Table 7-9**). The construction traffic (AADT of 65) and operation traffic (AADT of 50) associated with the workforce, supplies, haulage, and other miscellaneous traffic, including road maintenance on the access roads, could expose individual dusky grouse to vehicle-wildlife collisions.

Also, noise, light, and fugitive dust disturbance from road construction, road maintenance, and routine vehicle traffic may disturb or displace individual grouse where they occur. Dusky grouse behaviors that may change as a result of increased noise, light, and fugitive dust include changes in nesting (loss of a nest equals "take") and/or foraging patterns that could lead to fragmentation of habitat.

Another indirect impact to dusky grouse along access roads could include fugitive dust. Dust associated with construction of facilities and roads, road maintenance, and vehicle travel may have indirect impacts on wildlife forage (e.g., plants and insects) (see Section 7.0, in the Vegetation: General Vegetation Communities, Botanical Resources, and Non-Native Plants Specialist Report [Forest Service 2022b]). Increased dust deposition could result in negative impacts on wildlife foods ranging from plant metabolic process inhibition, plant mortality, inhibition of pollination, or injury to pollinating insects. For SGP, the potential for dust deposition is likely to be higher in the immediate area of roads and other surface-disturbing actions but would diminish with distance from these actions. Dust impacts on wildlife forage plants and insects would start during construction and continue through closure and reclamation. Some dust deposition also may occur in the post-closure period where monitoring-related travel on dirt roads would occur; however, this would be negligible. Effects of dust on plants and insects would occur immediately at the time of dust propagating activities and is likely to continue throughout the lifetime of SGP.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be built. Most of the modeled dusky grouse habitat is located in proximity to the Johnson Creek Route. As such, dusky grouse could be impacted by the Johnson Creek Route Alternative along the access roads due to direct impacts of 68 acres. Indirect impacts for the Johnson Creek Route Alternative would be the same as for the 2021 MMP.

Utilities

The 2021 MMP would directly disturb dusky grouse in the wildlife analysis area through habitat loss due to clearing and construction activities for utility corridors, substations, and communication towers. Direct impacts would include 140 acres of modeled habitat along the utility features (**Table 7-9**). During operations, the utility ROWs would be maintained in a low vegetation growth stage, which could provide summer nesting or brood-rearing habitat for dusky grouse.

Noise and light disturbance from construction of the utility corridors, substations, and communication towers may temporarily disturb or displace individuals. These indirect effects would be considered temporary during construction (up to 3 years). Once the construction is complete, it is expected that dusky grouse would resume use of the area.

Existing substations, structures, and upgraded transmission lines would exist in perpetuity. The new transmission line segment between the mine site and Johnson Creek substation (as well as the substation itself) would be removed and the area recontoured and reclaimed upon closure, which would reduce impacts after the life of the mine.

The Johnson Creek Route Alternative would have similar effects on dusky grouse as the 2021 MMP.

Off-site Facilities

There would be no direct impacts to modeled habitat due to the off-site facilities under the action alternatives. Construction and operation of the off-site facilities is also unlikely to have indirect effects on dusky grouse, as modeled habitat is limited within 1 mile of the off-site facilities.

Habitat Impacts

Table 7-9 Dusky Grouse (Summer) Direct and Indirect Impacts

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP		
Mine Site	0	N/A
Access Roads	20	N/A
Utilities	140	N/A
Off-site Facilities	0	N/A
Total	**160**	**9,045**
Johnson Creek Route Alternative		
Mine Site	0	N/A
Access Roads	68	N/A
Utilities	140	N/A
Off-site Facilities	0	N/A
Total	**208**	**9,042**

Source: Forest Service 2020a.
N/A = indirect impacts are calculated by buffer distances (0.5 mile for woodpeckers) from the action alternatives and occur outside of the SGP components.
0 acres indicates that SGP components would not cross or overlap modeled habitat.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Modeled habitat is limited for dusky grouse in the mine site area, and they are assumed to occur sporadically. Individuals would likely continue to use the mine site as they currently do.

Access Roads

Existing roads (e.g., Stibnite Road, Johnson Creek Road, and Warm Lake Road) would continue to affect dusky grouse through habitat fragmentation, direct mortality through vehicle strikes, and noise, light, or fugitive dust impacts from traffic.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no loss of habitat, sources of noise and light impacts, or increased risk of collision for dusky grouse.

Off-site Facilities

There would be no loss of habitat or sources of noise and light impacts due to off-site facilities.

Determination

The action alternatives may directly and indirectly impact dusky grouse individuals and habitat. The action alternatives would have similar impacts and impact nearly the same amount of habitat (e.g., herblands, grasslands, and shrublands adjacent to ponderosa pine, lodgepole pine, aspen, and fir forests).

Therefore, based on the impact analysis above for the dusky grouse and its habitat, the action alternatives would result primarily in localized, short-term, long-term, and permanent, minor impacts.

Boreal Owl

Direct and Indirect Effects of the 2021 MMP and Johnson Creek Route Alternative

Figure 7-9 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the wildlife analysis area compared to modeled habitat.

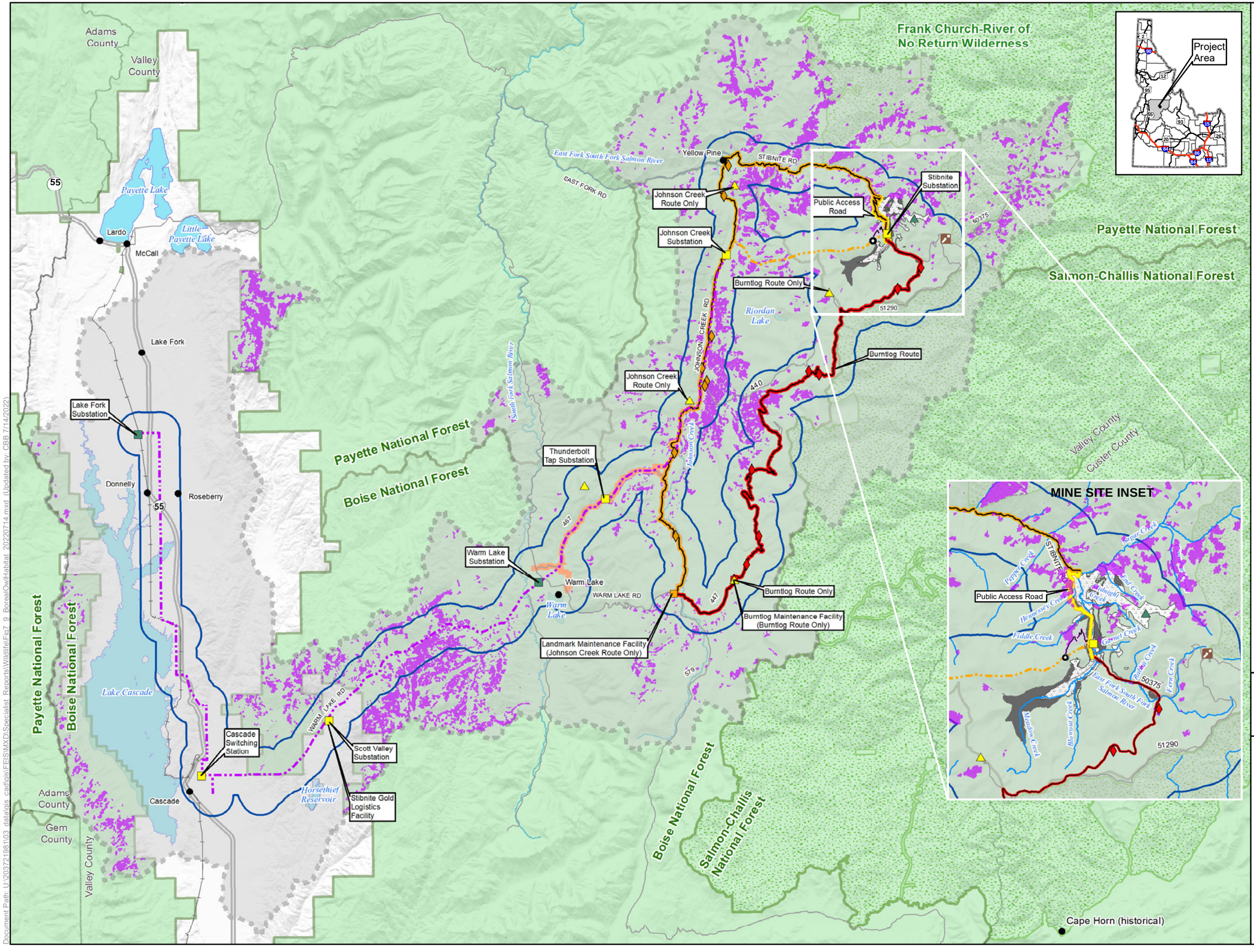
Mine Site

Boreal owls are known to occur and breed in the mine site area, and modeled habitat occurs as well. The 2021 MMP may directly disturb boreal owls in the wildlife analysis area through habitat loss, disturbance from increased human activity, and helicopter use associated with some exploratory drilling support.

Approximately 20 acres of modeled habitat would be directly impacted or removed at the mine site under the 2021 MMP (**Table 7-10**). Direct take of adult birds due to construction or operational activities is possible, but unlikely, because most individuals are expected to avoid areas of activity. However, it is possible that nests, eggs, and young could be directly disturbed by vegetation removal (including cutting of trees) during construction if it occurs during the nesting season. To the extent practicable, trees found to contain nests or cavities (often used by boreal owls) would not be disturbed or cut. A Forest Service wildlife biologist would be notified of any occupied sensitive species nests encountered. Timing restrictions would restrict some activities within a certain radius of active nest trees for raptor species, which would help reduce habitat impacts. For example, the Forest Service would require restricting activities between March 1 and July 30 which occur up to 1,500 feet from active boreal owl nest sites, and a 350-foot ground disturbance buffer would be maintained around active nests, with some exceptions (**Section 2.4**). Although design features would reduce impacts, there would still be a decrease in modeled habitat.

The boreal owl also could be impacted by direct collision risks with structures at the mine site. Electric transmission line structures to serve 2021 MMP facilities would be designed and constructed to avoid raptor perching (to minimize the risk of being electrocuted).

The 2021 MMP would cause an increase in noise, light, and emissions in the wildlife analysis area, mostly in the vicinity of the mine site. Construction and operations, vehicle traffic, and helicopter use are likely to directly disturb or displace individuals. Wildlife behaviors that may change as a result of increased noise include nesting (loss of a nest equals “take”) and/or foraging changes. Bright lighting can disrupt feeding activities for many owl species. Noise-reduction strategies (e.g., enclosure of ore processing facility, use of electricity instead of diesel generators, muffling equipment, etc.) would be used to reduce indirect effects on sensitive wildlife species. Buildings, equipment, and drill rigs would have limited external lighting, and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Additionally, light and noise impacts are reduced by vegetation, topography, and distance from the impact sources. Therefore, indirect impacts on wildlife would differ depending on the specific conditions at each individual 2021 MMP component location based on the density of vegetation and proximity to adjoining hillsides and valleys.



LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Boreal Owl Modeled Habitat
- Stibnite Historic Disturbance

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Cell Tower Access Road
- Public Access Road
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities

- New Transmission Line
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site
- Existing Communication Tower
- New Cell Tower

Offsite Facilities

- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route
** Substation locations are approximate
*** Associated with Burntlog Route only
**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 7-9
Boreal Owl Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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A possible indirect effect is that there could be a reduction in insects as prey species near the mine site activities. Any actions resulting in a decrease to insects could impact the boreal owl, including direct removal of foraging habitat (e.g., understory vegetation) or effects from fugitive dust and emissions.

Insects and insectivorous birds may be exposed to metals (e.g., mercury) and other elements from atmospheric emissions and tailings piles associated with gold and silver mining activities (Custer et al. 2009; Eagles-Smith et al. 2018; Jones and Miller 2005). Emissions of metals from mine operations and ore processing, in the form of particulate matter and dust, may be deposited directly on local soils and waterways. In addition, rainwater and snow melt may provide a pathway for these elements to leach from tailings piles or be physically transported as solid particles into adjacent waterbodies. These elements may enter the food web through plants and insects and then be consumed by insectivorous wildlife, potentially causing injury if exposure is sufficient. The Forest Service would require an adaptive management plan to address dust and emissions (**Section 2.4**). Although this mitigation measure would reduce impacts, there would still likely be indirect impacts to insectivorous birds like the boreal owl.

The Johnson Creek Route Alternative would have similar effects on boreal owl as the 2021 MMP.

Access Roads

The 2021 MMP could disturb individual boreal owls in the wildlife analysis area through direct habitat loss (9 acres) due to tree clearing, road construction, and increased human activity along the access roads (**Table 7-10**). Direct take of adult birds due to these activities is possible, but unlikely, because most individuals are expected to avoid areas of activity. However, it is possible that nests, eggs, and young could be directly disturbed by vegetation removal, including cutting of trees if it occurs during the nesting season. Timing restrictions described for the mine site would be used to reduce impacts.

Additionally, increased vehicle traffic is likely to disturb or displace individuals from roadside habitats. Plowing of the Burntlog Route over the winter would introduce additional noise and disturbance, which could affect wintertime use by boreal owls. Noise-reduction strategies would be used to reduce indirect effects on owls. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Additionally, the 10.4-mile groomed OSV trail along the existing Cabin Creek Road (Forest Road 467) would cross modeled habitat, which may disrupt boreal owls due to OSV noise.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be constructed or used. While 13 acres of modeled habitat would be directly impacted under this alternative, there is modeled suitable habitat located along the Johnson Creek Route that could be indirectly affected by noise and light from increased traffic levels.

Utilities

The 2021 MMP could disturb individual boreal owls in the wildlife analysis area through direct habitat loss (8 acres) due to clearing and construction activities for utility corridors, substations, and communication towers. Direct take of adult birds due to these activities is unlikely because most individuals are expected to avoid areas of activity. However, it is possible that nests, eggs, and young could be disturbed by vegetation removal, including cutting of trees if it occurs during the nesting season. Timing restrictions described for the mine site would be used to reduce impacts.

The cell tower, communication tower, repeater sites, and new or upgraded 138-kilovolt (kV) transmission line would be a potential source of mortality for boreal owls (APLIC 2012). In the long term, the

transmission line design would meet APLIC raptor-protection criteria and include insulating or covered apparatus for perch accommodation to reduce risks to raptor species. Transmission line structures to serve 2021 MMP facilities would be designed and constructed to avoid raptor perching (to minimize the risk of being electrocuted). However, the long-term presence of structures and communication towers would pose a risk of collision and direct mortality. Upon closure, the new segment of transmission line between the mine site and Johnson Creek substation would be reclaimed.

Noise and light from construction of the utility corridors, substations, and cell tower, and repeater sites is likely to disturb or displace individuals. However, construction of these areas would be temporary (approximately 3 years), and it is not expected to become a barrier to long-term movement or to fragment habitat. Once the construction is complete, it is expected that owls would resume use of the area.

The Johnson Creek Route Alternative would have similar effects on boreal owl as the 2021 MMP.

Off-site Facilities

The 2021 MMP would not have any direct impacts on modeled habitat due to clearing and construction activities for off-site facilities. Modeled habitat within 1 mile of the off-site facilities is limited, but the 2021 MMP could disturb individual boreal owls in the wildlife analysis area through noise increases due to construction or operation of the off-site facilities. Noise-reduction strategies would be used to lower indirect effects on the boreal owl. Lighting best management practices (e.g., downturned/shielded lights, reduced number used, directional lighting, etc.) would be used to reduce indirect effects on sensitive wildlife species (**Section 2.4**). Buildings would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

Under the Johnson Creek Route Alternative, the Landmark Maintenance Facility would be relocated to the southern side of Warm Lake Road, which would shift the footprint slightly versus the 2021 MMP. While the facility would be closer to modeled habitat, it is not expected that this change would cause different effects from the 2021 MMP.

Habitat Impacts

Table 7-10 Boreal Owl Direct and Indirect Impacts

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP		
Mine Site	20	N/A
Access Roads	9	N/A
Utilities	8	N/A
Off-site Facilities	0	N/A
Total	**37**	**9,175**

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
Johnson Creek Route Alternative		
Mine Site	15	N/A
Access Roads	13	N/A
Utilities	8	N/A
Off-site Facilities	0	N/A
Total	**36**	**7,755**

Source: Forest Service 2020a.
N/A = indirect impacts are calculated by buffer distances (0.5 mile for woodpeckers) from the action alternatives and occur outside of the SGP components.
0 acres indicates that SGP components would not cross or overlap modeled habitat.

Direct and Indirect Effects of the No Action Alternative

Mine Site

Overall, boreal owls would likely continue to use the mine site as they currently do.

Access Roads

Existing roads also would continue to affect wildlife through habitat fragmentation and the risk of vehicle-wildlife collisions.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no loss of habitat, sources of noise and light, or increased risk of collision for boreal owls.

Off-site Facilities

There would be no loss of habitat or sources of noise and light impacts due to off-site facilities.

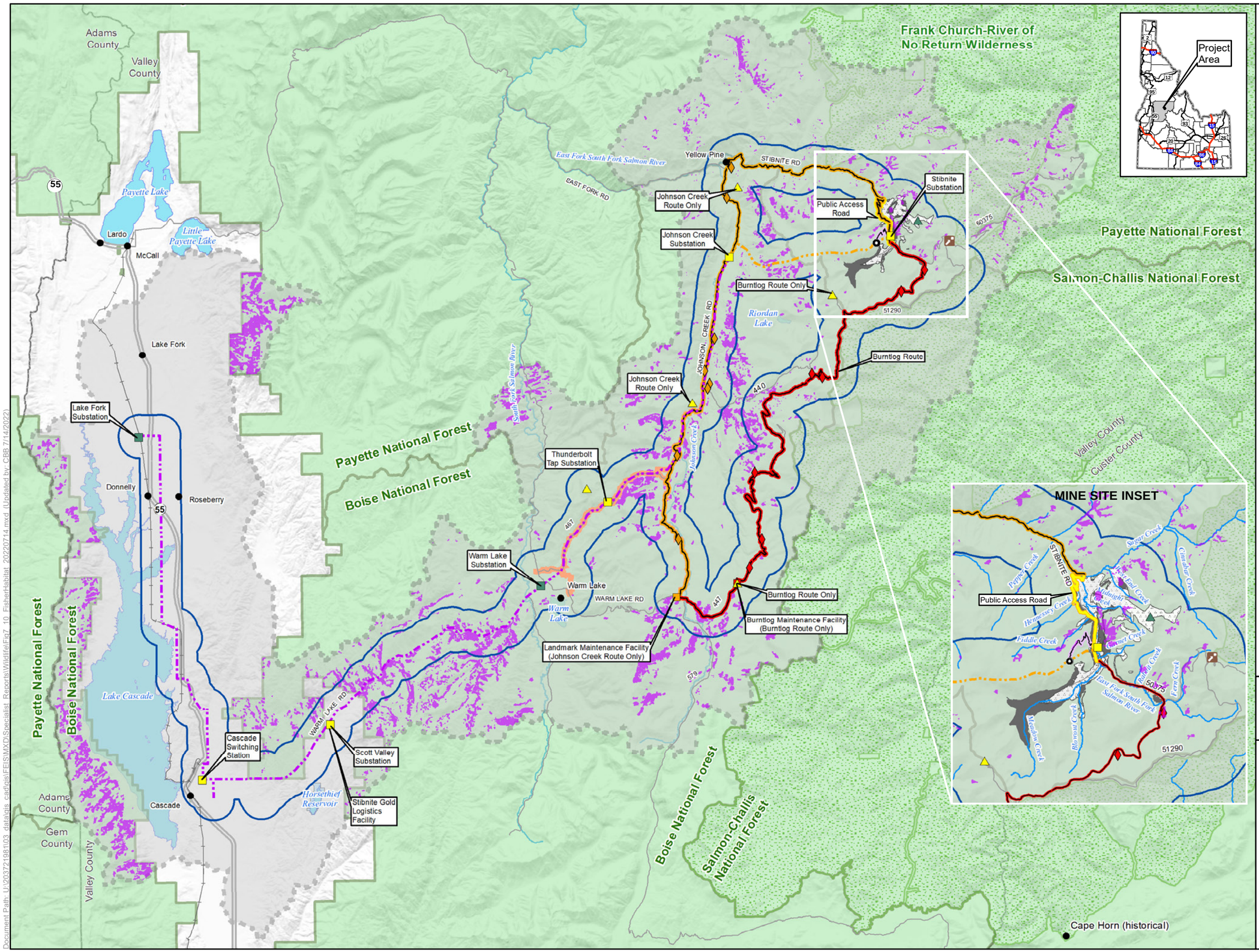
Determination

The action alternatives may directly and indirectly impact boreal owl individuals and habitat but would not likely contribute to a trend towards ESA listing or loss of viability of the species within the planning area. The action alternatives would all have similar direct and indirect impacts, but the Johnson Creek Route Alternative would directly impact the least habitat. Therefore, based on the impact analysis above for the boreal owl and its habitat, the action alternatives would result primarily in localized, long-term and permanent, minor impacts to the boreal owl.

Fisher

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figure 7-10 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the wildlife analysis area compared to modeled habitat.



LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Fisher Modeled Habitat
- Stibnite Historic Disturbance

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Cell Tower Access Road
- Public Access Road
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities

- New Transmission Line
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site
- Existing Communication Tower
- New Cell Tower

Offsite Facilities

- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route
** Substation locations are approximate
*** Associated with Burntlog Route only
**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 7-10
Fisher Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Mine Site

Approximately 30 acres of direct impacts to modeled habitat would occur in the mine site under the 2021 MMP (**Table 7-11**). Olson et al. (2014) observed that although fishers are capable of long-distance dispersal movements (e.g., 6.2 miles), large expanses of non-favorable habitat may prevent them from doing so and become a barrier to movement. As the mine site would be approximately 6 miles long by 1 mile wide, it could fragment habitat.

These same effects also could reduce prey availability or redistribute their populations in the wildlife analysis area, causing them to travel further for foraging opportunities, which would indirectly affect the fisher. Noise and light at the mine site could also indirectly impact fishers.

The Johnson Creek Route Alternative would have similar effects on fisher as Alternative the 2021 MMP.

Access Roads

Approximately 10 acres of direct impacts to modeled habitat would occur along the access roads under the 2021 MMP (**Table 7-11**). The new 15-mile-long section of Burntlog Route would be used and plowed year-round; and along with all other access roads and other roads used for the SGP, would likely represent an increased potential for vehicle collisions as this species has been documented at wolverine monitoring stations along the existing Burnt Log Road. All employees and contractors would be trained to reduce wildlife collisions. The AADT for the 2021 MMP would be approximately 65 during construction and 50 during operations. There also is the potential for an increase in trapping, resulting from increased access in remote areas. Restricting public access on the Burntlog Route and removing roadkill from roadways would likely reduce the chance of mortality (**Section 2.4**). These same effects also could reduce prey availability in the SGP area, which would indirectly affect the fisher. Upon reclamation, the new section of the Burntlog Route would be decommissioned, re-contoured, and seeded to resemble pre-mining conditions, although the vegetation would likely continue to be dominated by grasses and forbs for many years. Additionally, the 10.4-mile groomed OSV trail along the existing Cabin Creek Road (Forest Road 467) would cross modeled habitat, which may disrupt fishers due to OSV noise.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be constructed and there would be approximately 1 acre of direct impacts on modeled habitat associated with the Johnson Creek Route. Indirect effects would also be likely within 1 mile of the Johnson Creek Route, as modeled habitat occurs along Stibnite Road, Johnson Creek Road, and Warm Lake Road.

Utilities

Approximately 14 acres of direct impacts to modeled habitat would occur along the utilities under the 2021 MMP (**Table 7-11**). Direct impacts on the fisher would include disturbance or fragmentation of habitat along utility corridors, substations, and communication towers due to land clearing activities and land use changes. Direct impacts would occur along new transmission lines (between the mine site and Johnson Creek substation) and along upgraded transmission lines (between Johnson Creek Road and the Thunderbolt Tap substation, and along Warm Lake Road). Construction impacts would likely displace individual fishers farther distances but displacement would be temporary (up to 3 years). Vegetation would be cleared only in those areas necessary for the 2021 MMP activities to preserve natural habitat to the greatest extent practicable. During operations, vegetation would be maintained in a low vegetation growth stage, and fishers would likely use the area again.

After mine closure is complete, the 8.5-mile new transmission line between the mine site and Johnson Creek substation would be removed, and fishers could continue to use modeled habitat in the area.

The Johnson Creek Route Alternative would have similar effects on fisher as the 2021 MMP.

Off-site Facilities

Construction and operation of the off-site facilities for the 2021 MMP are unlikely to disturb the fisher, because construction activities are not planned to occur in modeled habitat. However, noise and light reduction strategies would be used to reduce indirect effects on them, as modeled habitat does occur adjacent to the Landmark Maintenance Facility. Buildings would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

Under the Johnson Creek Route Alternative, the Landmark Maintenance Facility would be relocated to the southern side of Warm Lake Road, which would shift the footprint slightly versus the 2021 MMP. This would cause less than 1 acre of direct impacts to fisher; however, it is not expected that this change would cause effects different from the 2021 MMP.

Habitat Impacts

Table 7-11 Fisher Direct and Indirect Impacts

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP		
Mine Site	30	N/A
Access Roads	10	N/A
Utilities	14	N/A
Off-site Facilities	0	N/A
Total	**54**	**5,866**
Johnson Creek Route Alternative		
Mine Site	30	N/A
Access Roads	1	N/A
Utilities	14	N/A
Off-site Facilities	<1	N/A
Total	**45**	**4,767**

Source: Forest Service 2020a.
N/A = indirect impacts are calculated by buffer distances (0.5 mile for woodpeckers) from the action alternatives and occur outside of the SGP components.
0 acres indicates that SGP components would not cross or overlap modeled habitat.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Fishers may use the mine site area as they have in limited areas in the past.

Access Roads

Existing roads also would continue to affect wildlife through habitat fragmentation and vehicle-wildlife collisions.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat or source of noise and light impacts.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

Determination

The action alternatives may directly and indirectly impact fisher individuals and habitat but would not likely contribute to a trend towards ESA listing or loss of viability of the species within the planning area. The action alternatives would all have similar effects, but the Johnson Creek Route Alternative would directly and indirectly impact the least habitat. Therefore, based on the impact analysis above for the fisher and its habitat, the action alternatives would result primarily in localized, long-term and permanent, minor impacts to the fisher.

Flammulated Owl

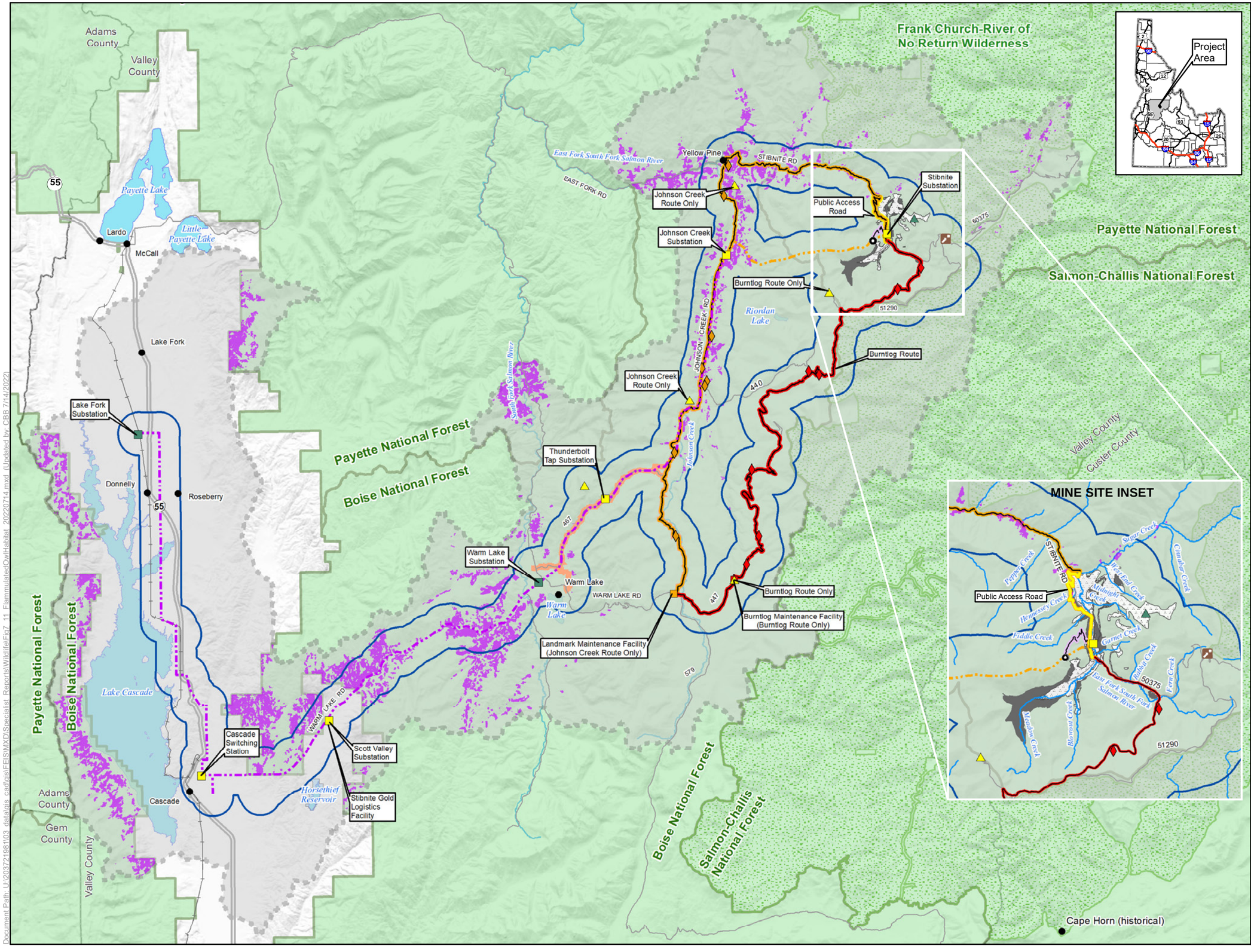
Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figure 7-11 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the wildlife analysis area compared to modeled habitat.

Mine Site

The 2021 MMP could directly disturb 1 acre of modeled habitat in the mine site area (**Table 7-12**), as modeled habitat is limited in this area. However, flammulated owls are known to occur in the wildlife analysis area. Direct take of adult birds due to construction or operational activities is unlikely because most individuals are expected to avoid areas of activity. However, it is possible that nests, eggs, and young could be directly disturbed by vegetation removal (including cutting of trees) during construction if it occurs during the nesting season. To the extent practicable, trees found to contain nests or cavities (often used by flammulated owls) would not be disturbed or cut. A Forest Service wildlife biologist would be notified of any occupied sensitive species nests encountered.

The 2021 MMP would cause an increase in noise and light in the wildlife analysis area, mostly in the vicinity of the mine site. Construction and operations, vehicle traffic, and helicopter use are likely to directly disturb or displace individuals. Wildlife behaviors that may change as a result of increased noise include nesting (loss of a nest equals “take”) and/or foraging changes. Bright lighting can disrupt feeding activities for many owl species. Because flammulated owls are primarily nocturnal, they also could be impacted by direct collision risks with structures at the mine site due to lighting. Transmission line structures to serve facilities under the 2021 MMP would be designed and constructed to avoid raptor perching (to minimize the risk of being electrocuted).



LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Flammulated Owl Modeled Habitat
- Stibnite Historic Disturbance

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Cell Tower Access Road
- Public Access Road
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities

- New Transmission Line
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site
- Existing Communication Tower
- New Cell Tower

Offsite Facilities

- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route
** Substation locations are approximate
*** Associated with Burntlog Route only
**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 7-11 Flammulated Owl Habitat and Project Components in the Analysis Area Stibnite Gold Project Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

Document Path: U:\20372\186103_data\gis_ea\gis\FEIS\MXD\Specialist_Reports\Wildlife\Fig7_11_FlammulatedOwlHabitat_20220714.mxd (Updated by CBB 7/14/2022)

A likely indirect effect is that there could be a reduction in prey species near the mine site activities and along access routes. Any actions resulting in a decrease to insects could impact the flammulated owl, including direct removal of foraging habitat (e.g., understory vegetation) or effects from fugitive dust and emissions. Flammulated owls are highly migratory and would primarily be impacted during the breeding season (mid-May to mid-August).

Insects and insectivorous birds, such as the flammulated owl, may be exposed to metals (e.g., mercury) and other elements from atmospheric emissions and tailings piles associated with gold and silver mining activities (Custer et al. 2009; Eagles-Smith et al. 2018; Jones and Miller 2005). Emissions of metals from mine operations and ore processing, in the form of particulate matter and dust, may be deposited directly on local soils and waterways. In addition, rainwater and snow melt may provide a pathway for these elements to leach from tailings piles or be physically transported as solid particles into adjacent waterbodies. These elements may enter the food web through plants and insects and then be consumed by insectivorous wildlife, potentially causing injury if exposure is sufficient. The Forest Service would require an adaptive management plan to address dust and emissions (**Section 2.4**). Although design features would reduce impacts, there would still likely be indirect impacts to insectivorous birds like the flammulated owl.

The Johnson Creek Route Alternative would have similar effects on flammulated owl as the 2021 MMP.

Access Roads

The 2021 MMP could disturb individual flammulated owls in the wildlife analysis area through direct habitat loss (3 acres; **Table 7-12**) due to tree clearing, road construction, and increased human activity in the access roads. Direct take of adult birds due to these activities is possible, but unlikely, because most individuals are expected to avoid areas of activity. However, it is likely that nests, eggs, and young would be directly disturbed by vegetation removal, including cutting of trees if it occurs during the nesting season. Additionally, increased vehicle traffic is likely to directly disturb or displace individuals from roadside habitats.

Noise-reduction strategies would be used to reduce indirect effects on owls. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Cutting of trees for 2021 MMP activities would avoid avian tree nests, where feasible; and a Forest Service wildlife biologist would be notified of any occupied sensitive species nests encountered. Although design features would reduce direct impacts, there would still be a decrease in habitat due to construction of the Burntlog Route.

Another indirect impact to flammulated owls along access roads could include fugitive dust. Dust associated with construction of facilities and roads, road maintenance, and vehicle travel may have indirect impacts on owl prey (e.g., insects, small mammals due to plant forage changes, etc.) (see Section 7.0, in the Vegetation: General Vegetation Communities, Botanical Resources, and Non-Native Plants Specialist Report (Forest Service 2022b). Increased dust deposition could result in negative impacts on wildlife foods ranging from plant metabolic process inhibition, plant mortality, inhibition of pollination, or injury to pollinating insects. For SGP, the potential for dust deposition is likely to be higher in the immediate area of roads and other surface-disturbing actions but would diminish with distance from these actions. Dust impacts on wildlife forage plants and insects would start during construction and continue through closure and reclamation. Some dust deposition also may occur in the post-closure period where monitoring-related travel on dirt roads would occur; however, this would be negligible. Effects of dust on

plants and insects would occur immediately at the time of dust propagating activities and is likely to continue throughout the lifetime of the SGP.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be built. Most of the modeled suitable flammulated owl habitat is located in proximity to the Johnson Creek Route Alternative. As such, there would be 22 acres of direct impacts to modeled habitat associated with the Johnson Creek Route. Indirect effects (e.g., noise, light, fugitive dust, emissions) would also be likely due to modeled habitat occurring along the Stibnite Road, Johnson Creek Road, and Warm Lake Road.

Utilities

The 2021 MMP could disturb individual flammulated owls in the wildlife analysis area through direct impacts of 41 acres to modeled habitat due to clearing and construction activities for utility corridors, substations, and communication towers. Direct take of adult birds due to these activities is unlikely because most individuals are expected to avoid areas of activity. However, it is possible that nests, eggs, and young would be disturbed by vegetation removal, including cutting of trees if it occurs during the nesting season. To the extent practicable, trees found to contain nesting cavities would not be disturbed or cut. No trees with active nests would be cut.

The cell tower, communication tower, repeater sites, and new 138-kV transmission line would be a potential source of mortality for flammulated owls (APLIC 2012). The utility line design would meet APLIC raptor-protection criteria and include insulating or covered apparatus for perch accommodation to reduce risks to raptor species. Electric transmission line structures to serve facilities under the 2021 MMP would be designed and constructed to avoid raptor perching (to minimize the risk of being electrocuted). However, the long-term (i.e., 20 years) presence of structures and communication towers would pose a risk of collision and direct mortality. Upon closure and reclamation, the new transmission line between the mine site and Johnson Creek substation would be removed, which would eliminate these impacts.

Noise and light from construction of the utility corridors, substations, and communication towers is likely to disturb or displace individuals. However, construction of these areas would be temporary (up to 3 years) and is not expected to become a barrier to long-term movement or to fragment habitat. Once the construction is complete, it is expected that owls would resume use of the area. The noise-reduction strategies described for the mine site and access roads would be employed along utility corridors and near communication towers, which would reduce noise impacts on flammulated owls.

The Johnson Creek Route Alternative would have similar effects on flammulated owl as the 2021 MMP.

Off-site Facilities

The action alternatives are unlikely to impact flammulated owls as there would be no direct impacts to modeled habitat. Additionally, indirect impacts would be unlikely as modeled habitat is very limited within 1 mile of the off-site facilities.

Habitat Impacts

Table 7-12 Flammulated Owl Direct and Indirect Impacts

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP		
Mine Site	1	N/A
Access Roads	3	N/A
Utilities	41	N/A
Off-site Facilities	0	N/A
Total	**45**	**6,507**
Johnson Creek Route Alternative		
Mine Site	1	N/A
Access Roads	22	N/A
Utilities	41	N/A
Off-site Facilities	0	N/A
Total	**64**	**6,507**

Source: Forest Service 2020a.
N/A = indirect impacts are calculated by buffer distances (0.5 mile for woodpeckers) from the action alternatives and occur outside of the SGP components.
0 acres indicates that SGP components would not cross or overlap modeled habitat.

Direct and Indirect Effects from the No Action Alternative

See the boreal owl analysis for effects under the No Action Alternative that also would apply to the flammulated owl.

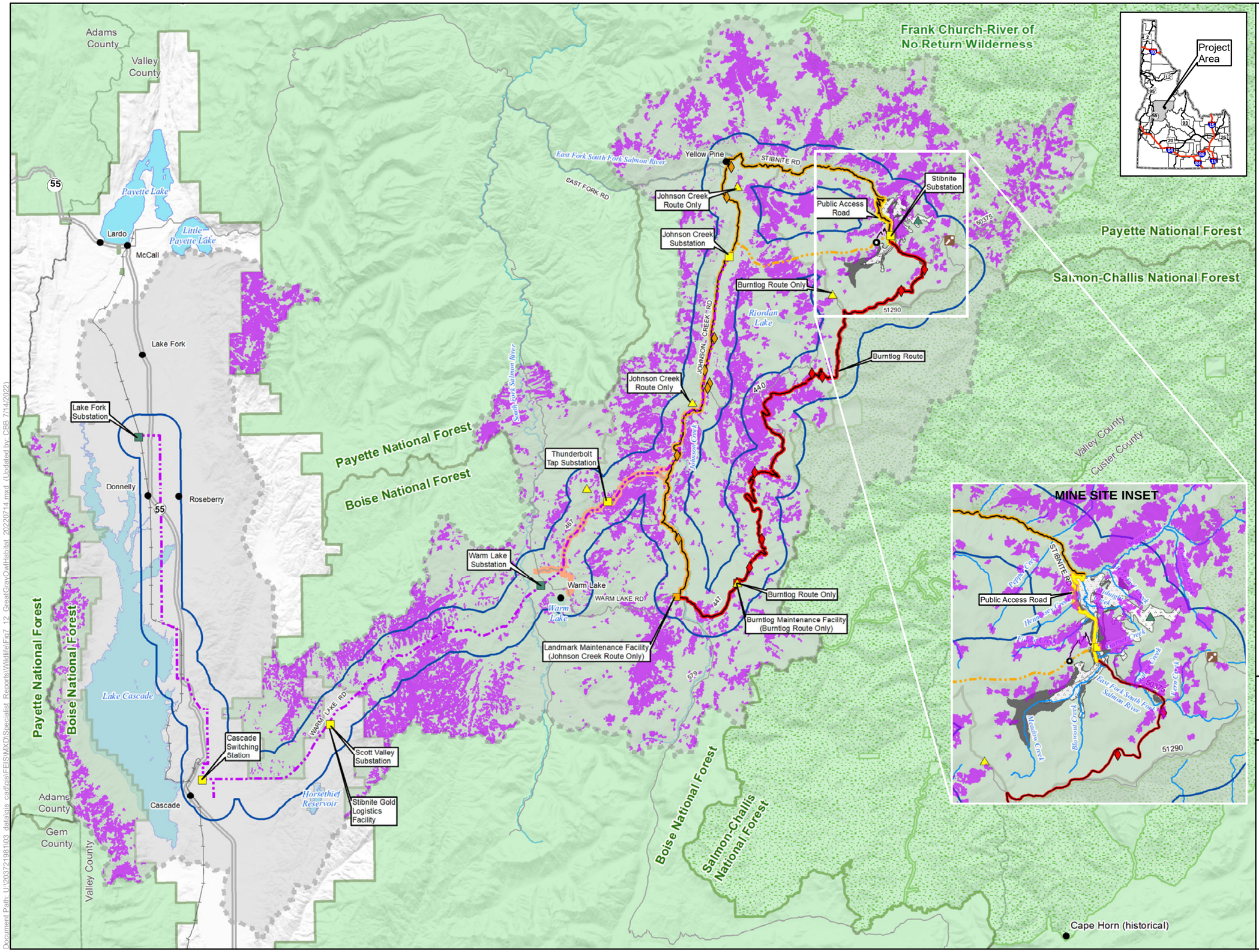
Determination

The action alternatives may directly and indirectly impact flammulated owl individuals and habitat but would not likely contribute to a trend towards ESA listing or loss of viability of the species within the planning area. The action alternatives would all have very similar direct and indirect impacts on modeled habitat (e.g., medium to large ponderosa pine, Douglas-fir, and aspen stands). Therefore, based on the impact analysis above for the flammulated owl and its habitat, the action alternatives would result primarily in localized, long-term and permanent, minor impacts to the flammulated owl.

Great Gray Owl

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figure 7-12 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the wildlife analysis area compared to modeled habitat.



LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Great Gray Owl Modeled Habitat
- Stibnite Historic Disturbance

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Cell Tower Access Road
- Public Access Road
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities

- New Transmission Line
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site
- Existing Communication Tower
- New Cell Tower

Offsite Facilities

- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route
** Substation locations are approximate
*** Associated with Burntlog Route only
**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 7-12
Great Gray Owl Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Mine Site

Great gray owls are documented in the area and modeled habitat occurs throughout the wildlife analysis area. The 2021 MMP would result in 164 acres of direct impacts to modeled habitat for great gray owl in the mine site area (**Table 7-13**). Direct take of adult birds due to construction or operational activities is possible, but unlikely, because most individuals are expected to avoid areas of activity. However, it is possible that nests, eggs, and young could be directly disturbed by vegetation removal (including cutting of trees) during construction if it occurs during the nesting season. This resident species occasionally nests early in the season (in the snow). To the extent practicable, trees found to contain nests would not be disturbed or cut. A Forest Service wildlife biologist would be notified of any occupied sensitive species nests encountered. Timing restrictions would restrict some activities within a certain radius of active nest trees for raptor species, which would help reduce habitat impacts. For example, the Forest Service would require restricting activities between March 1 and July 30 which occur up to 1,500 feet from active great gray owl nest sites, and a 150-foot ground disturbance buffer would be maintained around active nests, with some exceptions (**Section 2.4**).

Although design features would reduce impacts, there would still be a decrease in modeled habitat.

The great gray owl also could be impacted by direct collision risks with structures at the mine site. Electric transmission line structures to serve 2021 MMP facilities would be designed and constructed to avoid raptor perching (to minimize the risk of being electrocuted).

The 2021 MMP would cause an increase in noise and light in the wildlife analysis area, mostly in the vicinity of the mine site. Construction and operations, vehicle traffic, and helicopter use are likely to directly disturb or displace individuals. Wildlife behaviors that may change as a result of increased noise include nesting (loss of a nest equals “take”) and/or foraging changes. Bright lighting can disrupt feeding activities for many owl species. Noise-reduction strategies (e.g., enclosure of ore processing facility, use of electricity instead of diesel generators, muffling equipment, etc.) would be used to reduce indirect effects on sensitive wildlife species. Buildings, equipment, and drill rigs would have limited external lighting, and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Additionally, light and noise impacts are reduced by vegetation, topography, and distance from the impact sources. Therefore, indirect impacts on wildlife would differ depending on the specific conditions at each individual 2021 MMP component location based on the density of vegetation and proximity to adjoining hillsides and valleys.

Access Roads

The 2021 MMP would result in 56 acres of direct impacts to modeled habitat for great gray owl associated with the Burntlog Route (**Table 7-13**). Direct take of adult birds due to these activities is possible, but unlikely, because most individuals are expected to avoid areas of activity. However, it is possible that nests, eggs, and young could be directly disturbed by vegetation removal, including cutting of trees if it occurs during the nesting season. Timing restrictions described for the mine site would be used to reduce impacts.

Additionally, increased vehicle traffic is likely to disturb or displace individuals from roadside habitats. Noise-reduction strategies would be used to reduce indirect effects on owls. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Also, the 10.4-

mile groomed OSV trail along the existing Cabin Creek Road (Forest Road 467) would cross modeled habitat, which may disrupt great gray owls due to OSV noise.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be constructed or used. Direct impacts on modeled habitat would total approximately 13 acres and would be associated with upgrades along the Johnson Creek Route. Additionally, there is modeled suitable habitat located along the Johnson Creek Route that could be indirectly affected by noise and light from increased traffic levels.

Utilities

There would be 50 acres of direct impacts to modeled habitat due to construction of the new substations and new transmission line between the mine site and Johnson Creek substation, in addition to the upgrades to transmission lines and substations between Johnson Creek Road and the Warm Lake substation, and along Warm Lake Road and Johnson Creek Road.

Direct take of adult birds due to these activities is unlikely because most individuals are expected to avoid areas of activity. However, it is possible that nests, eggs, and young could be disturbed by vegetation removal, including cutting of trees if it occurs during the nesting season. Timing restrictions described for the mine site would be used to reduce impacts.

The cell tower, communication tower, repeater sites, and new or upgraded transmission lines would be a potential source of mortality for great gray owls (APLIC 2012). In the long-term, the transmission line design would meet APLIC raptor-protection criteria and include insulating or covered apparatus for perch accommodation to reduce risks to raptor species. Transmission line structures to serve 2021 MMP facilities would be designed and constructed to avoid raptor perching (to minimize the risk of being electrocuted). However, the long-term (e.g., 20 years) presence of structures and communication towers would pose a risk of collision and direct mortality. Upon closure and reclamation, the new transmission line between the mine site and Johnson Creek substation would be removed, which would eliminate some of these impacts.

Noise and light from construction of the utility corridors, substations, and communication towers is likely to disturb or displace individuals within 1 mile of the SGP components. However, construction of these areas would be temporary (approximately 3 years), and it is not expected to become a barrier to long-term movement or to fragment habitat. Once the construction is complete, it is expected that owls would resume use of the area.

The Johnson Creek Route Alternative would have similar effects on great gray owl as the 2021 MMP.

Off-site Facilities

The 2021 MMP would not have any direct impacts on modeled habitat due to clearing and construction activities for off-site facilities. However, the 2021 MMP could disturb individual great gray owls in the wildlife analysis area through noise pollution due to construction or operation of the off-site facilities. Noise-reduction strategies would be used to reduce indirect effects on the owls. Lighting best management practices (e.g., downturned/shielded lights, reduced number used, directional lighting, etc.) would be used to reduce indirect effects on sensitive wildlife species (**Section 2.4**). Buildings would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

Under the Johnson Creek Route Alternative, the Landmark Maintenance Facility would be relocated to the southern side of Warm Lake Road, which would shift the footprint slightly versus the 2021 MMP.

While this would result in 2 acres of direct impacts to modeled habitat, it is not expected that this change would cause effects different from the 2021 MMP.

Habitat Impacts

Table 7-13 Great Gray Owl Direct and Indirect Impacts

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP		
Mine Site	164	N/A
Access Roads	56	N/A
Utilities	50	N/A
Off-site Facilities	0	N/A
Total	**270**	**21,437**
Johnson Creek Route Alternative		
Mine Site	160	N/A
Access Roads	13	N/A
Utilities	50	N/A
Off-site Facilities	2	N/A
Total	**225**	**16,305**

Source: Forest Service 2020a.
N/A = indirect impacts are calculated by buffer distances (0.5 mile for woodpeckers) from the action alternatives and occur outside of the SGP components.
0 acres indicates that SGP components would not cross or overlap modeled habitat.

Direct and Indirect Effects from the No Action Alternative

See the boreal owl analysis for effects under the No Action Alternative that also would apply to the great gray owl.

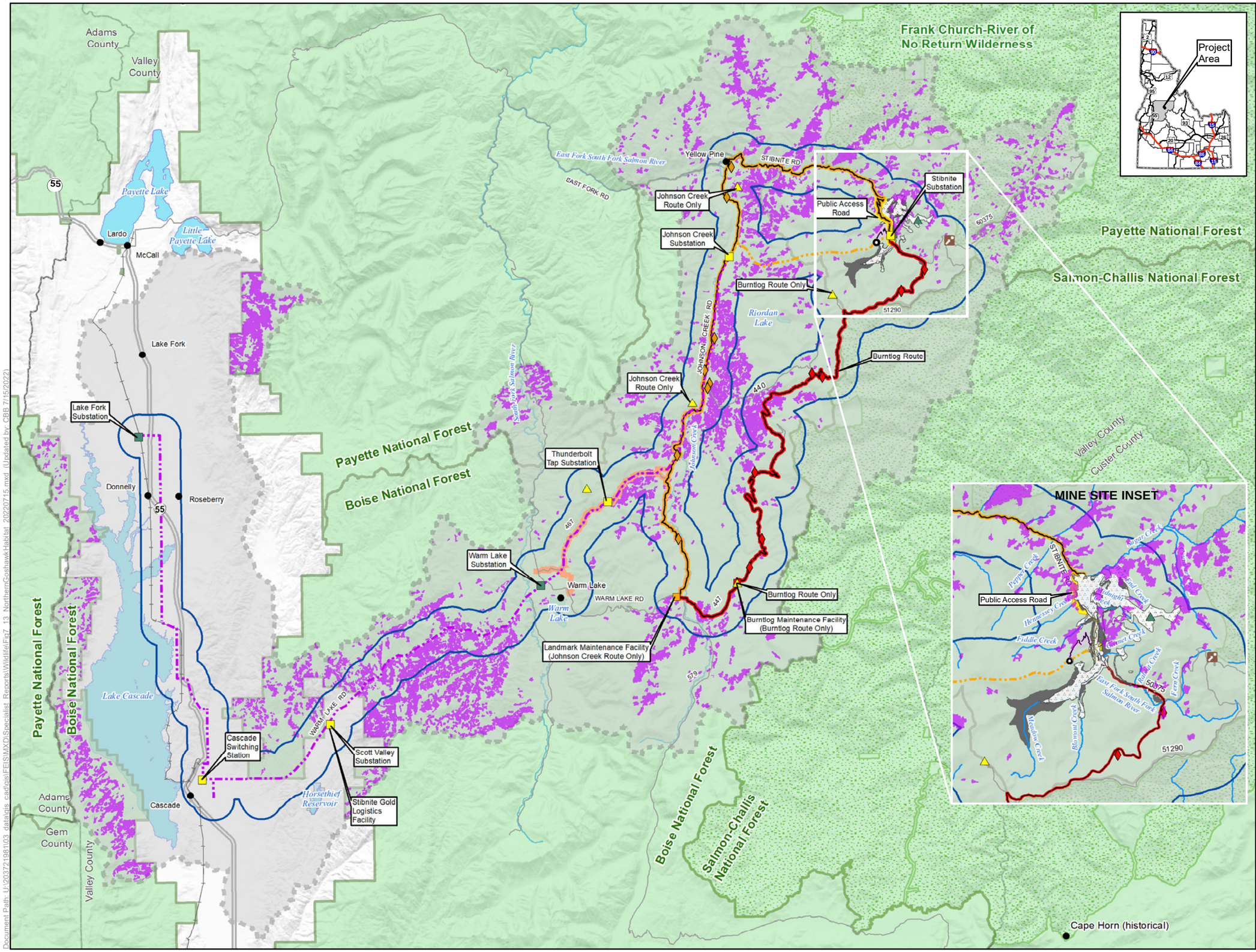
Determination

The action alternatives may directly and indirectly impact great gray owl individuals and habitat but would not likely contribute to a trend towards ESA listing or loss of viability of the species within the planning area. The Johnson Creek Route Alternative would directly impact the least amount of habitat due to the elimination of the Burntlog Route (where much modeled habitat occurs). Therefore, based on the impact analysis above for the great gray owl and its habitat, the action alternatives would result primarily in localized, long-term and permanent, minor impacts to the great gray owl.

Northern Goshawk

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figure 7-13 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the wildlife analysis area compared to modeled habitat.



LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Northern Goshawk Modeled Habitat
- Stibnite Historic Disturbance

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Cell Tower Access Road
- Public Access Road
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities

- New Transmission Line
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site
- Existing Communication Tower
- New Cell Tower

Offsite Facilities

- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route
** Substation locations are approximate
*** Associated with Burntlog Route only
**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

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1 inch = 4.5 miles

N

Figure 7-13
Northern Goshawk Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Mine Site

Northern goshawks have been documented but are expected to be uncommon and there are no known nests in the wildlife analysis area. There would be 49 acres of direct impacts to modeled habitat in the mine site area under the 2021 MMP. Direct take of adult birds or nests, eggs, or young due to construction or operational activities is unlikely, as they are thought to be uncommon. However, to the extent practicable, trees found to contain nests would not be disturbed or cut. A Forest Service wildlife biologist would be notified of any occupied sensitive species nests encountered. Timing restrictions would restrict some activities within a certain radius of active nest trees for raptor species, which would help reduce habitat impacts. For example, the Forest Service would restrict activities within a 30-acre (650-foot radius) area surrounding active nests, with some exceptions (**Section 2.4**). Additionally, drilling operations, roadwork, and helicopter flights would be restricted within a 1,500-foot buffer of active goshawk nests from April 1 to August 15. Although design features would reduce impacts, there would still be a decrease in modeled habitat.

The northern goshawk could also be impacted by direct collision risks with structures at the mine site. Electric transmission line structures to serve 2021 MMP facilities would be designed and constructed to avoid raptor perching (to minimize the risk of being electrocuted).

The 2021 MMP would cause an increase in noise and light in the wildlife analysis area, mostly in the vicinity of the mine site. Construction and operations, vehicle traffic, and helicopter use are likely to directly disturb or displace individuals. Wildlife behaviors that may change as a result of increased noise include foraging changes.

The Johnson Creek Route Alternative would have similar effects on the northern goshawk as the 2021 MMP.

Access Roads

The 2021 MMP would result in 20 acres of direct impacts to modeled habitat for northern goshawk associated with the Burntlog Route (**Table 7-14**). Direct take of adult birds or nests, eggs, or young due to these activities is unlikely, because most individuals are expected to avoid areas of activity and there are no known nests in the area. However, timing restrictions described for the mine site would be used to reduce potential impacts.

Additionally, increased vehicle traffic is likely to disturb or displace individuals from roadside habitats and would cause indirect impacts on northern goshawk. Noise-reduction strategies would be used to reduce indirect effects on raptor species. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. The 10.4-mile groomed OSV trail along the existing Cabin Creek Road (Forest Road 467) would cross modeled habitat, which may disrupt northern goshawks due to OSV noise.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be constructed or used. Direct impacts on modeled habitat would total approximately 15 acres and would be associated with upgrades along the Johnson Creek Route. Additionally, there is modeled habitat located along the Johnson Creek Route that could be indirectly affected by noise and light from increased traffic levels.

Utilities

There would be 20 acres of direct impacts to modeled habitat due to construction of the new substations and new transmission line between the mine site and Johnson Creek substation, in addition to the upgrades to transmission lines and substations between Johnson Creek Road and the Warm Lake substation, and along Warm Lake Road and Johnson Creek Road. Direct take of adult birds or nests, eggs, or young due to these activities is unlikely because most individuals are expected to avoid areas of activity and they are not known to nest in the area.

The communication towers and new or upgraded transmission lines would be a potential source of mortality for northern goshawk. However, the transmission line design would meet APLIC raptor-protection criteria and include insulating or covered apparatus for perch accommodation to reduce risks to raptor species. Upon closure and reclamation, the new transmission line between the mine site and Johnson Creek substation would be removed, which would eliminate some of these collision impacts.

Noise and light from construction of the utility corridors, substations, and communication towers could disturb or displace individuals within 1 mile of the SGP components. However, construction of these areas would be temporary (approximately 3 years), and it is not expected to become a barrier to long-term movement or to fragment habitat. Once the construction is complete, it is expected that northern goshawks would resume use of the area.

The Johnson Creek Route Alternative would have similar effects on northern goshawk as the 2021 MMP.

Off-site Facilities

The 2021 MMP would not have any direct impacts on modeled habitat due to clearing and construction activities for off-site facilities. Indirect impacts would also be unlikely as modeled habitat is limited within 1 mile of the off-site facilities.

Under the Johnson Creek Route Alternative, the Landmark Maintenance Facility would be relocated to the southern side of Warm Lake Road, which would shift the footprint slightly versus the 2021 MMP. While this would result in 1 acre of direct impacts to modeled habitat, it is not expected that this change would cause effects different from the 2021 MMP.

Habitat Impacts

Table 7-14 Northern Goshawk Direct and Indirect Impacts

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP		
Mine Site	49	N/A
Access Roads	20	N/A
Utilities	20	N/A
Off-site Facilities	0	N/A
Total	**89**	**15,113**

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
Johnson Creek Route Alternative		
Mine Site	45	N/A
Access Roads	15	N/A
Utilities	20	N/A
Off-site Facilities	1	N/A
Total	**81**	**12,702**

Source: Forest Service 2020a.
N/A = indirect impacts are calculated by buffer distances (0.5 mile for woodpeckers) from the action alternatives and occur outside of the SGP components.
0 acres indicates that SGP components would not cross or overlap modeled habitat.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Overall, northern goshawks would likely continue to use the mine site as they currently do.

Access Roads

Existing roads also would continue to affect wildlife through habitat fragmentation and vehicle-wildlife collisions.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat, source of noise and light impacts, or increased risk of collision for northern goshawks.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

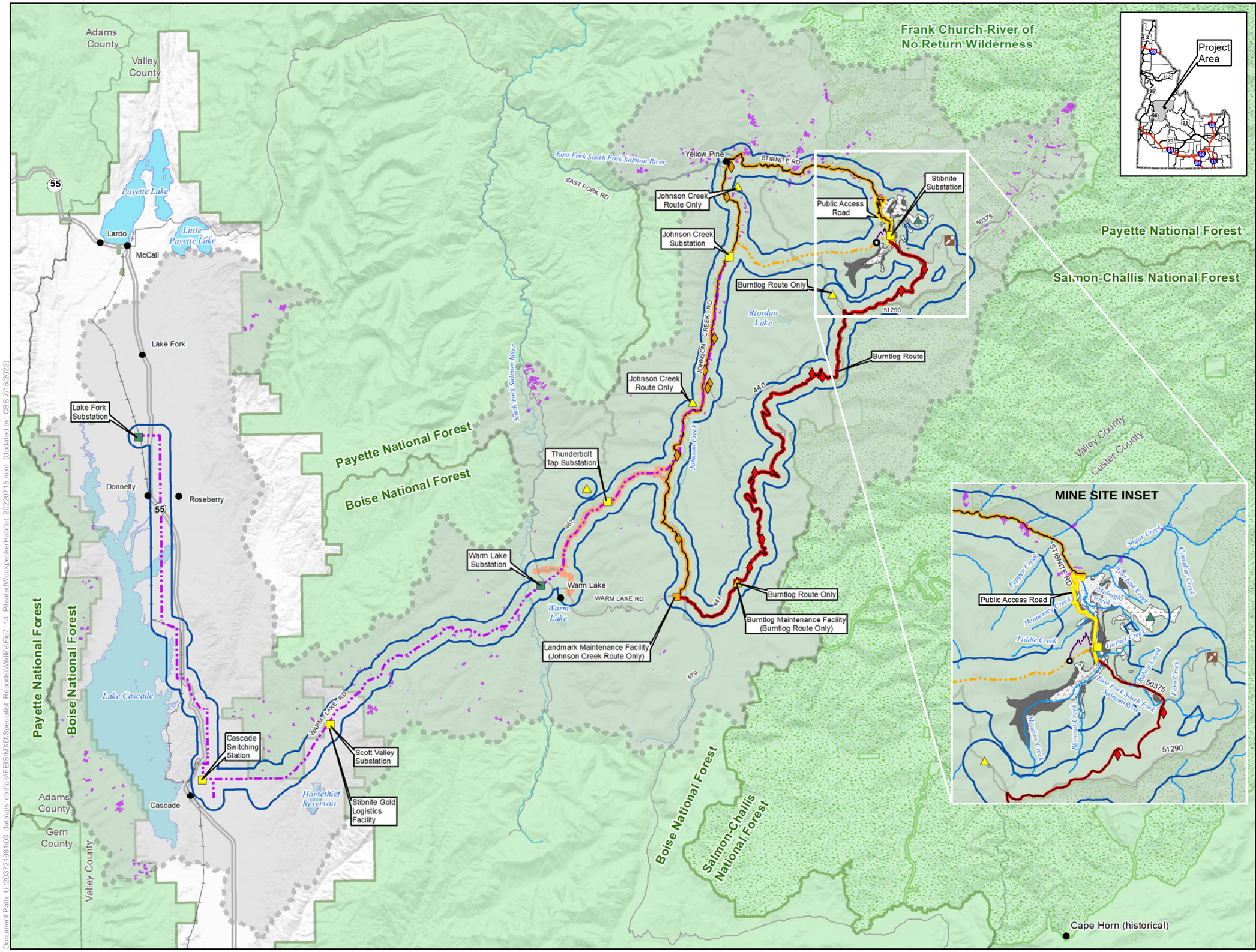
Determination

The action alternatives may directly and indirectly impact northern goshawk individuals and habitat but would not likely contribute to a trend towards ESA listing or loss of viability of the species within the planning area. The Johnson Creek Route Alternative would directly and indirectly impact the least amount of habitat. Therefore, based on the impact analysis above for the northern goshawk and its habitat, the action alternatives would result primarily in localized, long-term and permanent, minor impacts to the northern goshawk.

Pileated Woodpecker

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figure 7-14 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the wildlife analysis area compared to modeled habitat.



LEGEND

- Woodpecker Habitat Analysis Area - Affected Environment
- Existing Condition Analysis Area
- Pileated Woodpecker Modeled Habitat
- Stibnite Historic Disturbance

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Cell Tower Access Road
- Public Access Road
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities

- New Transmission Line
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site
- Existing Communication Tower
- New Cell Tower

Offsite Facilities

- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route
** Substation locations are approximate
*** Associated with Burntlog Route only
**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 7-14
Pileated Woodpecker Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Mine Site

Effects to the pileated woodpecker at the mine site under all action alternatives would be similar to the white-headed woodpecker analysis, as pileated woodpeckers and modeled habitat are uncommon in the mine site area. There are some documented occurrences in the Big Creek and Chamberlain areas, and it is possible they may utilize the wildlife analysis area.

There would be no direct impacts to pileated woodpecker modeled habitat on the mine site under any of the action alternatives. Indirect impacts could include displacement due to noise or light, and design features described for the white-headed woodpecker would likely reduce those impacts.

Access Roads

Effects to the pileated woodpecker along the access roads under all action alternatives would be similar to the white-headed woodpecker analysis, as pileated woodpeckers and modeled habitat are rare along the access roads.

There would be 0.5 acre of direct impacts to modeled habitat along the access roads for each of the action alternatives (**Table 7-15**). Indirect impacts could include displacement due to noise, light, or fugitive dust and design features described for the white-headed woodpecker would likely reduce those impacts.

Utilities

Effects to the pileated woodpecker associated with the utilities under all action alternatives would be similar to the white-headed woodpecker analysis, as pileated woodpeckers and modeled habitat are rare in the utility areas.

There would be 0.5 acres of direct impacts to pileated woodpecker modeled habitat along the utilities under the action alternatives. Indirect impacts could include displacement due to noise or light, and design features described for the white-headed woodpecker would likely reduce those impacts.

Off-site Facilities

Effects to the pileated woodpecker at the off-site facilities under all action alternatives would be similar to the white-headed woodpecker analysis, as pileated woodpeckers and habitat are rare near the off-site facilities.

There would be no direct impacts to pileated woodpecker modeled habitat for the off-site facilities under any of the action alternatives. Indirect impacts could include displacement due to noise or light, and design features described for the white-headed woodpecker would likely reduce those impacts.

Habitat Impacts

Table 7-15 Pileated Woodpecker Direct and Indirect Impacts

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP		
Mine Site	0	N/A
Access Roads	0.5	N/A
Utilities	0.5	N/A
Off-site Facilities	0	N/A
Total	**1**	**373**

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
Johnson Creek Route Alternative		
Mine Site	0	N/A
Access Roads	0.5	N/A
Utilities	0.5	N/A
Off-site Facilities	0	N/A
Total	**1**	**374**

Source: Forest Service 2020a.
N/A = indirect impacts are calculated by buffer distances (0.5 mile for woodpeckers) from the action alternatives and occur outside of the SGP components.
0 acres indicates that SGP components would not cross or overlap modeled habitat.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Pileated woodpeckers would likely continue to use the mine site as they currently do, which is believed to be rarely.

Access Roads

Existing roads would continue to affect wildlife through habitat fragmentation and vehicle-wildlife collisions and noise, light, and fugitive dust impacts from traffic.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat, source of noise and light impacts, or increased risk of collision for woodpeckers.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

Determination

Although modeled habitat is limited in the wildlife analysis area, individuals are present during the breeding season. The action alternatives would likely have no direct impacts on pileated woodpecker modeled habitat (e.g., large and very large tree size classes in several different forest stands) but may affect individuals and there would be similar indirect impacts across all the action alternatives. Therefore, based on the impact analysis above for the pileated woodpecker and its habitat, the action alternatives would result primarily in localized, long-term and permanent, minor impacts to the pileated woodpecker.

Silver-haired Bat

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figure 7-15 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the wildlife analysis area compared to modeled habitat.

Mine Site

Silver-haired bats are documented in the wildlife analysis area and FCRNRW. There would be approximately 44 acres of direct impacts to modeled habitat at the mine site under the 2021 MMP (**Table 7-15**). Removal of large trees could reduce roosting habitat, while removal of open riparian habitats or small natural openings could reduce foraging habitat.

The 2021 MMP would cause an increase in noise and light in the wildlife analysis area, mostly in the vicinity of the mine site. Silver-haired bat behaviors that may change as a result of increased noise and light include changes in roosting and foraging patterns that could lead to fragmentation of habitat. Noise-reduction strategies (e.g., enclosure of ore processing facility, use of electricity instead of diesel generators, muffling equipment, etc.) would be used to reduce indirect effects on sensitive wildlife species. Buildings, equipment, and drill rigs would have limited external lighting, and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Additionally, light and noise impacts are reduced by vegetation, topography, and distance from the impact sources. Therefore, indirect impacts on silver-haired bats would differ depending on the specific conditions at each individual 2021 MMP component location based on the density of vegetation and proximity to adjoining hillsides and valleys.

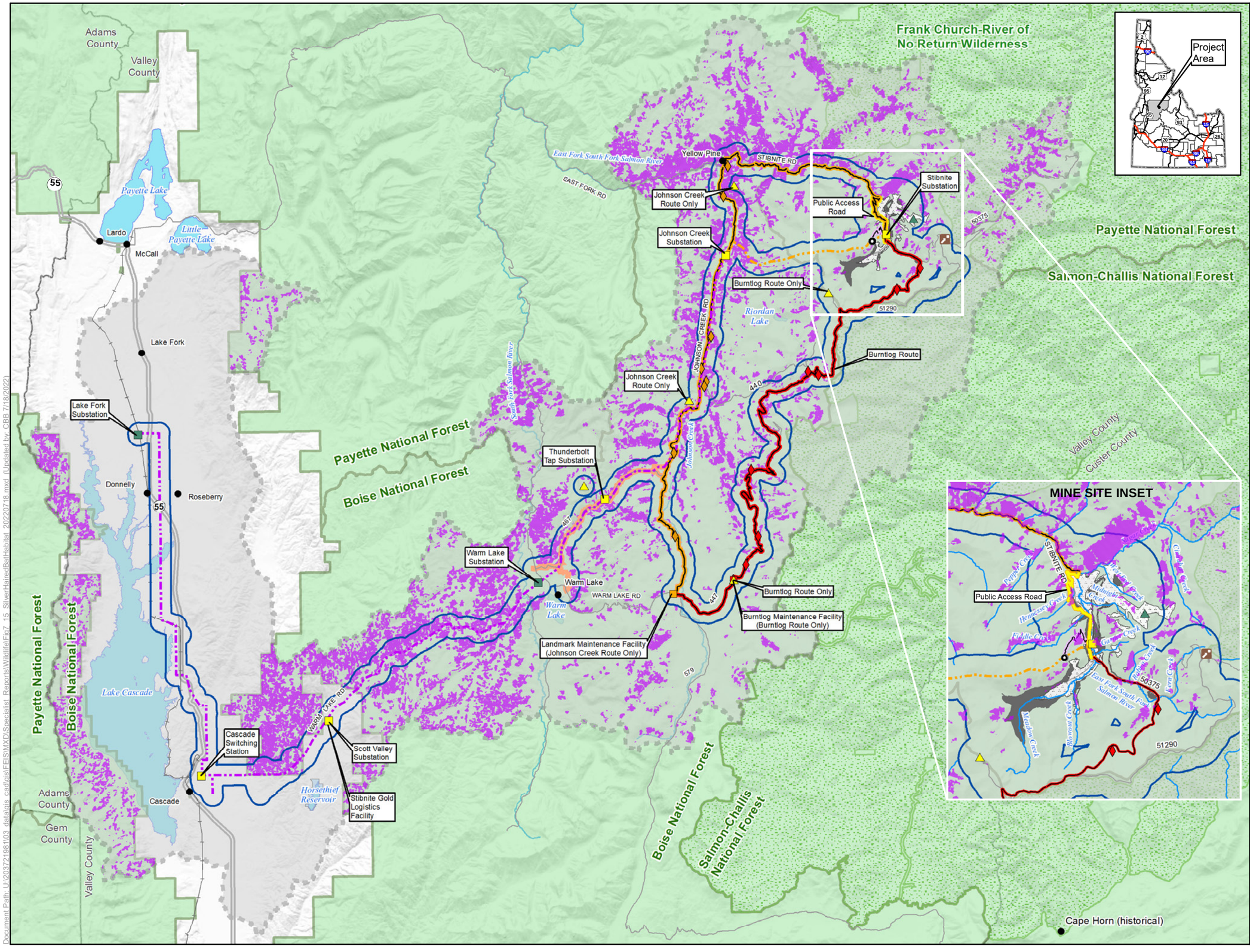
Direct and indirect impacts for bat species would likely be emission exposure and a reduction in insects due to emissions.

Insects and insectivorous wildlife including bats may be exposed to metals (e.g., mercury) and other elements from atmospheric emissions and tailings piles associated with gold and silver mining activities (Custer et al. 2009; Eagles-Smith et al. 2018; Jones and Miller 2005). Emissions of metals from mining operations and ore processing, in the form of particulate matter and dust, may be deposited directly on local soils and waterways. In addition, rainwater and snow melt may provide a pathway for these elements to leach from tailings piles or be physically transported as solid particles into adjacent waterbodies. These elements may enter the food web through plants and insects and then be consumed by insectivorous wildlife, potentially causing injury if exposure is sufficient. The Forest Service would require an adaptive management plan to address dust and emissions (**Section 2.4**). Although this mitigation measure would reduce impacts, there would still likely be indirect impacts to the silver-haired bat.

The Johnson Creek Route Alternative would have effects similar to the 2021 MMP.

Access Roads

There would be approximately 30 acres of direct impacts to modeled habitat along the access roads under the 2021 MMP, due to construction of the Burntlog Route (**Table 7-16**). Removal of large trees in this area could reduce roosting habitat. The new segment of the Burntlog Route would be decommissioned and reclaimed during mine closure, which would reduce impacts to silver-haired bats and potentially create foraging habitat in the long-term (e.g., 20 years).



LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Silver-Haired Bat Modeled Habitat
- Stibnite Historic Disturbance

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Cell Tower Access Road
- Public Access Road
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities

- New Transmission Line
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site
- Existing Communication Tower
- New Cell Tower

Offsite Facilities

- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route
** Substation locations are approximate
*** Associated with Burntlog Route only
**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 7-15
Silver-haired Bat Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

Document Path: U:\2023\21961\03_data\gis_cad\gis\FEIS\MXD\Specialist_Reports\Wildlife\Fig7_15_SilverHairedBatHabitat_20220718.mxd (Updated by CBB 7/18/2022)

The operational traffic associated with the workforce, supplies, haulage, and other miscellaneous traffic, including road maintenance on the access roads, could expose individual bats to indirect impacts due to noise, light, and fugitive dust. Bat behaviors that may change as a result of increased noise, light, and fugitive dust include changes in roosting and foraging patterns that could lead to fragmentation of habitat.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be built. While more of the modeled silver-haired bat habitat is located in proximity to the Johnson Creek Route, direct impacts would total approximately 87 acres. Due to the modeled habitat along the Johnson Creek Route, there would be indirect impacts due to increased traffic levels (e.g., noise, light, and fugitive dust) and emissions.

Utilities

There would be approximately 145 acres of direct impacts to modeled habitat along the utilities under the 2021 MMP, due to clearing and construction activities for utility corridors, substations, and communication towers (**Table 7-16**). Removal of large trees during construction could reduce roosting habitat. The Forest Service would require that known roost sites and hibernacula be avoided during the roosting period whenever possible (**Section 2.4**). During operations, the utility ROWs would be maintained in a low vegetation growth stage, which could provide summer foraging habitat for silver-haired bats. Upon closure and reclamation, the new transmission line between the mine site and Johnson Creek substation would be removed and reclaimed, which would reduce habitat impacts.

Noise and light disturbance from construction of the utility corridors, substations, and communication towers may temporarily (up to 3 years) disturb or displace individual bats. Once the construction is complete, it is expected that silver-haired bats would resume use of the area.

The Johnson Creek Route Alternative would have similar effects on silver-haired bats as the 2021 MMP.

Off-site Facilities

There would be no direct impacts to modeled habitat for silver-haired bat at any of the off-site facilities under the action alternatives. Indirect impacts would be unlikely as well, due to modeled habitat being limited around these facilities.

Habitat Impacts

Table 7-16 Silver-haired Bat Direct and Indirect Impacts

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP		
Mine Site	44	N/A
Access Roads	30	N/A
Utilities	145	N/A
Off-site Facilities	0	N/A
Total	**219**	**11,446**

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
Johnson Creek Route Alternative		
Mine Site	43	N/A
Access Roads	87	N/A
Utilities	144	N/A
Off-site Facilities	1	N/A
Total	**275**	**10,773**

Source: Forest Service 2020a.
N/A = indirect impacts are calculated by buffer distances (0.5 mile for woodpeckers) from the action alternatives and occur outside of the SGP components.
0 acres indicates that SGP components would not cross or overlap modeled habitat.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Because there is suitable habitat nearby for silver-haired bat and they are assumed to occur in the mine site area (especially the northern portion), individuals would likely continue to use the mine site as they currently do.

Access Roads

Existing roads (e.g., Johnson Creek Road, Stibnite Road, and Warm Lake Road) would continue to affect silver-haired bats through habitat fragmentation and disturbance from noise, light, and fugitive dust impacts due to traffic.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat, source of noise and light impacts, or increased risk of collision for bats. Individual bats would likely continue to use existing utility corridors for foraging.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

Determination

The action alternatives may directly and indirectly impact silver-haired bat individuals and habitat and the Johnson Creek Route Alternative would have the fewest direct and indirect impacts. Therefore, based on the impact analysis above for the silver-haired bat and its habitat, the action alternatives would result primarily in localized, long-term and permanent, minor impacts to the silver-haired bat.

7.2.2.3 Habitat Family 3 – Forest Mosaic

Mountain Quail

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figure 7-16 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the wildlife analysis area compared to modeled habitat.

Mine Site

Mountain quail are believed to be rare in the wildlife analysis area, although modeled habitat is abundant and would be impacted. The 2021 MMP could directly disturb 102 acres of modeled habitat in the mine site area. Mountain quail are ground nesters in shrub-dominated riparian areas and could be at risk of direct nest damage associated with the vegetation clearing and ground disturbance. However, the likelihood of mountain quail nesting in the wildlife analysis area is low because suitable shrub-dominated riparian habitat is sparse in the 2021 MMP disturbance footprint, and the nearest observation of the species is approximately 8 miles west of the mine site (Strobilus Environmental 2017).

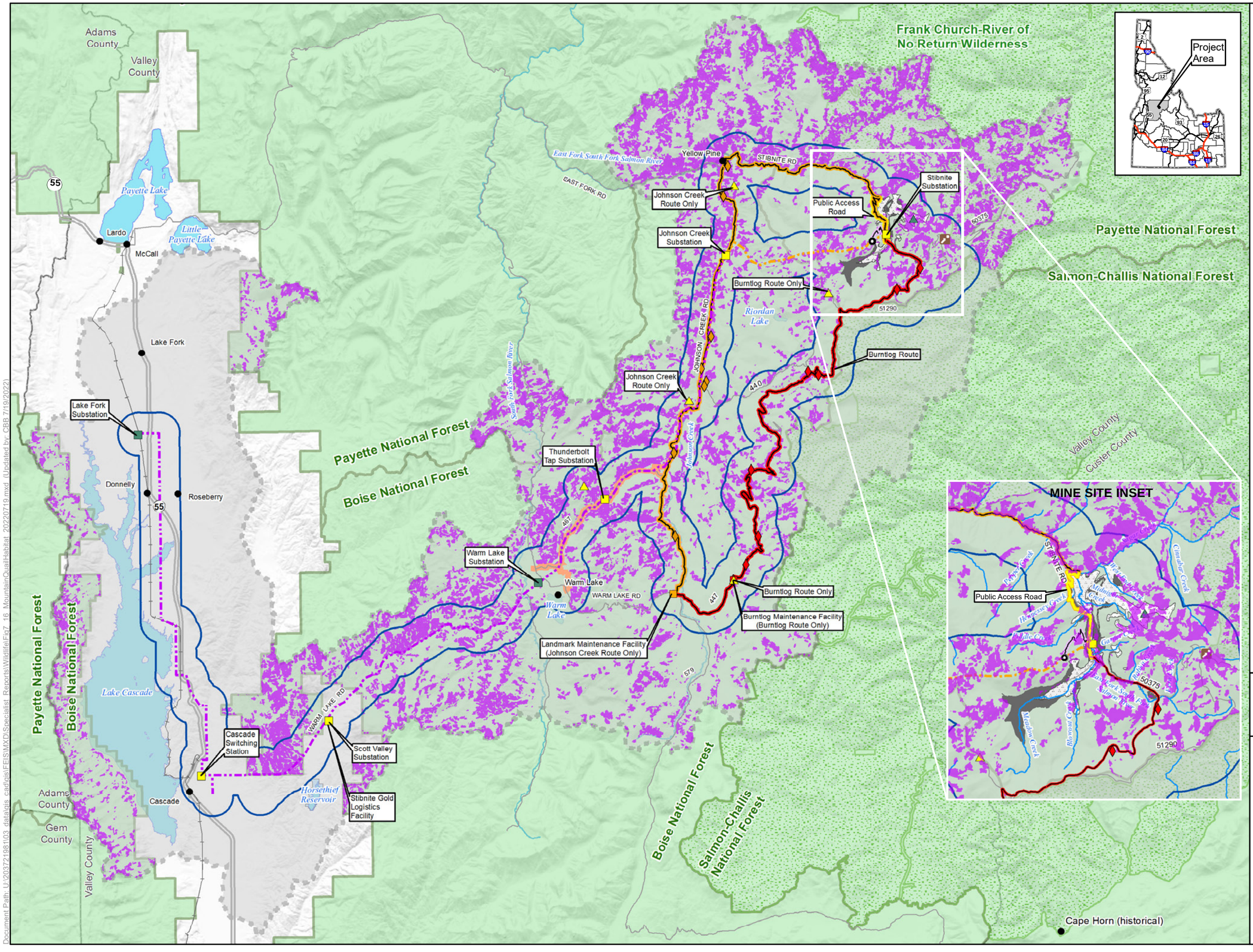
Implementation of the 2021 MMP would require removal of vegetation from several habitat types during the life of the mine, some of which would be reclaimed during closure and reclamation. The 2021 MMP would permanently impact a variety of wetlands and perennial and non-perennial streams (Forest Service 2022f), which could directly reduce habitat for mountain quail depending on specific riparian areas. Although riparian habitats would be directly disturbed in the short term, portions of the area would be reclaimed in the long term, including impacted wetlands, stream channels, and associated riparian habitat (Forest Service 2022f).

The 2021 MMP would cause an increase in noise and light in the wildlife analysis area, mostly in the vicinity of the mine site. Mountain quail behaviors that may change as a result of increased noise and light include modifications in nesting (loss of a nest equals “take”) and/or foraging patterns that could lead to fragmentation of habitat. Noise-reduction strategies (e.g., enclosure of ore processing facility, use of electricity instead of diesel generators, muffling equipment, etc.) would be used to reduce indirect effects on sensitive wildlife species. Buildings, equipment, and drill rigs would have limited external lighting, and would employ noise-minimizing practices. Indirect impacts during the brood-rearing season due to loss of insects from emissions and fugitive dust is discussed in the Dusky Grouse section.

Access Roads

The 2021 MMP could directly disturb 69 acres (**Table 7-17**) of modeled habitat along the access roads. The 2021 MMP would also impact a variety of wetlands and perennial and non-perennial streams (Forest Service 2022f) along access roads, which could directly reduce habitat for mountain quail depending on riparian areas. The operational traffic associated with the workforce, supplies, haulage, and other miscellaneous traffic, including road maintenance on the access roads, could expose individual mountain quail to vehicle-wildlife collisions. The new segment of the Burntlog Route would be decommissioned and reclaimed during mine closure, but the effects would be considered long-term (e.g., 20 years).

Noise, light, and fugitive dust disturbance from road construction, road maintenance, and routine vehicle traffic could potentially disturb or displace individual quail. Mountain quail behaviors that may change as a result of increased noise, light, and fugitive dust include modifications in nesting (loss of a nest equals “take”) and/or foraging patterns that could lead to fragmentation of habitat. Additionally, the 10.4-mile groomed OSV trail along the existing Cabin Creek Road (Forest Road 467) would cross modeled habitat, which may disrupt mountain quail due to OSV noise. See the Dusky Grouse section for indirect impacts related to fugitive dust along access roads that could also impact mountain quail.



LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Mountain Quail Modeled Habitat
- Stibnite Historic Disturbance

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Cell Tower Access Road
- Public Access Road
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities

- New Transmission Line
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site
- Existing Communication Tower
- New Cell Tower

Offsite Facilities

- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route
** Substation locations are approximate
*** Associated with Burntlog Route only
**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 7-16
Mountain Quail Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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Under the Johnson Creek Route Alternative, the Burntlog Route would not be built. There would be 115 acres of direct impacts to modeled habitat, which would be associated with upgrades to the existing Johnson Creek Route roadways. Indirect effects due to traffic noise, light, and fugitive dust would be expected within 1 mile of the Johnson Creek Route.

Utilities

The 2021 MMP could directly disturb 233 acres (**Table 7-17**) of modeled habitat due to clearing and construction activities for utility corridors, substations, and communication towers. Utility components under the 2021 MMP would impact a variety of wetlands and perennial and non-perennial streams (Forest Service 2022f). Direct impacts to forested wetlands would likely be permanent as ROW management practices generally do not allow the establishment of woody vegetation. Utility corridors would be maintained in a low vegetation stage during operations, which could disturb modeled habitat as well.

Noise and light disturbance from construction of the utility corridors, substations, and communication towers may temporarily disturb or displace individuals. These indirect impacts would be considered temporary during construction (up to 3 years). Once the construction is complete, it is expected that mountain quail would resume use of the area.

The Johnson Creek Route Alternative would have similar effects on mountain quail as the 2021 MMP.

Off-site Facilities

The 2021 MMP would directly disturb 1 acre of modeled habitat for the off-site facilities and up to 1 acre of wetlands and associated riparian habitat would be impacted. However, it is expected that most individuals would avoid these areas, and any habitat effects would be minor.

Indirect impacts would be unlikely as modeled habitat is limited near these facilities. However, noise-reduction strategies would be used to reduce any potential indirect impacts on mountain quail. Buildings would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

The Johnson Creek Route Alternative would have similar impacts as the 2021 MMP.

Habitat Impacts

Table 7-17 Mountain Quail Direct and Indirect Impacts

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP		
Mine Site	102	N/A
Access Roads	69	N/A
Utilities	233	N/A
Off-site Facilities	1	N/A
Total	**405**	**23,491**

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
Johnson Creek Route Alternative		
Mine Site	101	N/A
Access Roads	115	N/A
Utilities	232	N/A
Off-site Facilities	1	N/A
Total	**449**	**21,337**

Source: Forest Service 2020a.
N/A = indirect impacts are calculated by buffer distances (0.5 mile for woodpeckers) from the action alternatives and occur outside of the SGP components.
0 acres indicates that SGP components would not cross or overlap modeled habitat.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Because there is potentially suitable habitat for mountain quail, any individuals would likely continue to use the mine site as they currently do in limited areas.

Access Roads

Existing roads would continue to affect wildlife through habitat fragmentation, vehicle-wildlife collisions, and noise, light, and fugitive dust impacts.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat or source of noise and light impacts.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

Determination

The action alternatives may directly and indirectly impact mountain quail individuals and habitat but would not likely contribute to a trend towards ESA listing or loss of viability of the species within the planning area. The Johnson Creek Route Alternative would directly and indirectly impact the least amount of habitat (e.g., Douglas-fir, ponderosa pine, Western larch, and riparian habitats). Therefore, based on the impact analysis above for the mountain quail and its habitat, the action alternatives would result primarily in localized, short-term, long-term, and permanent, minor impacts to the mountain quail.

7.2.2.4 Habitat Family 5 – Forest and Range Mosaic

Gray Wolf

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Mine Site

Direct impacts on gray wolves would include habitat loss in the wildlife analysis area. Additional indirect impacts on gray wolves would include displacement due to noise and light or increased human activity.

These same effects also could reduce prey availability or redistribute their populations in the wildlife analysis area, causing wolves to travel farther for foraging opportunities. This could expose them to increased competition with other wolf packs as they seek new territory and would be a potential indirect effect.

The Johnson Creek Route Alternative would have similar effects on gray wolves as the 2021 MMP.

Access Roads

Several wolf packs occur in the FCRNRW area, which is near the Burntlog Route. Direct impacts on gray wolves would include habitat loss and an increased potential of vehicle-wildlife collisions along the Burntlog Route. Vehicle traffic associated with the access roads could increase the risk of wildlife-vehicle collisions. All employees and contractors would be trained to reduce wildlife collisions. Perpetua would develop a wildlife mortality-reporting procedure and form to be used for reporting accidental 2021 MMP-related wildlife mortality. Any adverse wildlife encounters would be reported to appropriate state and federal wildlife managers, and in accordance with state and federal laws. Restricting public access on the Burntlog Route would likely reduce impacts due to mortality.

Indirect impacts would include displacement due to noise and light or increased human activity. The new road systems and groomed OSV trails could serve as hunting corridors for wolves, changing their movement patterns and indirectly increasing predation of big game species, including elk (Forest Service 2017b). Although additional roadways could expose gray wolves to hunting pressure from humans in the wildlife analysis area, hunting or discharge of firearms during construction and operations in the Operations Area Boundary by SGP employees and contractors would be prohibited. Signs would be posted throughout the mine site and off-site facilities and training would be provided to notify employees that hunting is prohibited, and employees would be prohibited from carrying firearms on any SGP site. Although design features would reduce impacts, there would still be a direct decrease in habitat, and increase in risk of disturbance and injury or mortality. These same effects also could reduce prey availability in the SGP area, causing wolves to range farther. This indirect effect also could expose them to increased competition with other wolf packs as they seek new territory.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be built, and the Johnson Creek Route would be used instead. This would shift disturbance away from the FCRNRW area, where gray wolf packs are known to occur.

Utilities

Direct impacts on gray wolves would include loss or fragmentation of habitat along utility corridors, substations, and communication towers due to land clearing activities and land use changes. Construction impacts would likely displace wolves farther distances, but would be temporary (e.g., up to 3 years). Vegetation would be cleared only in those areas necessary for 2021 MMP activities to preserve natural habitat to the greatest extent practicable.

The Johnson Creek Route Alternative would have similar effects on gray wolves as the 2021 MMP.

Off-site Facilities

Direct impacts on gray wolves would include habitat loss in the wildlife analysis area and could include displacement due to noise and light or increased human activity. These same effects also could reduce prey availability in the SGP area, which would indirectly affect the gray wolf.

The Johnson Creek Route Alternative would have similar effects on gray wolves as the 2021 MMP.

Habitat Impacts

The focal species selected for the Wildlife Conservation Strategy (WCS) for the BNF and PNF represent the appropriate habitat types and are surrogates for many other species, including gray wolf. Thus, there are no specific habitat models available for this species.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Gray wolves would likely continue to use the mine site area as they currently do.

Access Roads

Existing roads also would continue to affect wildlife through habitat fragmentation and vehicle-wildlife collisions.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat or source of noise and light impacts.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

Determination

The action alternatives may directly and indirectly impact gray wolf individuals and habitat (i.e., general habitat types), but would not likely contribute to a trend towards ESA listing or loss of viability of the species within the planning area. Therefore, based on the impact analysis above for the gray wolf and its habitat, the action alternatives would result primarily in localized, short-term, long-term, and permanent, minor impacts to the gray wolf.

Peregrine Falcon

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Mine Site

Direct impacts on peregrine falcon would include potential habitat loss in the wildlife analysis area. Indirect impacts would include displacement due to noise and light and increased human activity. These same effects also could reduce avian prey availability or redistribute their populations in the wildlife analysis area, which could indirectly impact falcons.

The Johnson Creek Route Alternative would have similar effects on peregrine falcons as the 2021 MMP.

Access Roads

Direct impacts on peregrine falcon would include habitat loss within and adjacent to breeding territories that are known to occur in the FCRNRW area. Indirect impacts would include displacement due to noise and light from increased human activity and traffic.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be built. There are known breeding territories within the FCRNRW area that would not be impacted under the Johnson Creek Route

Alternative. However, traffic would be higher along the Johnson Creek Route (Johnson Creek and the East Fork SFSR), where nesting also has been documented, and this would be an indirect impact.

Utilities

Direct impacts on peregrine falcons would include loss or fragmentation of habitat along utility corridors, substations, and communication towers due to land clearing activities and land use changes. Construction impacts would likely displace falcons farther distances, but would be temporary (e.g., 3 years). Vegetation would be cleared only in those areas necessary for 2021 MMP activities to preserve natural habitat to the greatest extent practicable.

The Johnson Creek Route Alternative would have similar effects on peregrine falcons as the 2021 MMP.

Off-site Facilities

Direct impacts on peregrine falcons would include habitat loss in the wildlife analysis area and could include displacement due to noise and light or increased human activity.

The Johnson Creek Route Alternative would have similar effects on peregrine falcons as the 2021 MMP.

Habitat Impacts

The focal species selected for the WCS for the BNF and PNF represent the appropriate habitat types and are surrogates for many other species, including peregrine falcon. Thus, there are no specific habitat models available for this species.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Peregrine falcons would likely continue to use the mine site area as they currently do.

Access Roads

Existing roads, especially Johnson Creek Road, would continue to affect falcons through habitat fragmentation and disturbance due to noise and light impacts.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat or source of noise and light impacts.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

Determination

The action alternatives may directly and indirectly impact peregrine falcon individuals and habitat (e.g., forest and non-forest vegetation types within 10 miles of suitable nesting cliffs) but would not likely contribute to a trend towards ESA listing or loss of viability of the species within the planning area. Therefore, based on the impact analysis above for the peregrine falcon and its habitat, the action alternatives would result primarily in localized, short-term, long-term, and permanent, minor impacts to the peregrine falcon.

Rocky Mountain Bighorn Sheep

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figures 7-17 and **7-18** show the components of the 2021 MMP and Johnson Creek Route Alternative within the wildlife analysis area compared to modeled habitat.

Mine Site

There is more Rocky Mountain bighorn sheep summer habitat in the vicinity of the mine site than winter habitat. As such, there would be approximately 501 acres of direct impacts to summer modeled habitat and 104 acres of winter modeled habitat under the 2021 MMP at the mine site (**Table 7-18**). This direct loss of habitat would displace any individuals that occur in the wildlife analysis area, which appears to be limited. The mine site and associated infrastructure may displace sheep around the perimeter of the disturbances. Rocky Mountain bighorn sheep are very mobile and able to avoid localized direct threat of injury or mortality. Although additional roadways near the mine site could expose individuals to direct vehicle collisions and associated mortality. Personnel and contractors traveling in vehicles would be required to observe posted speed limits or state secondary road speed limits, and to drive at speeds appropriate to reduce the possibility of vehicle-wildlife accidents.

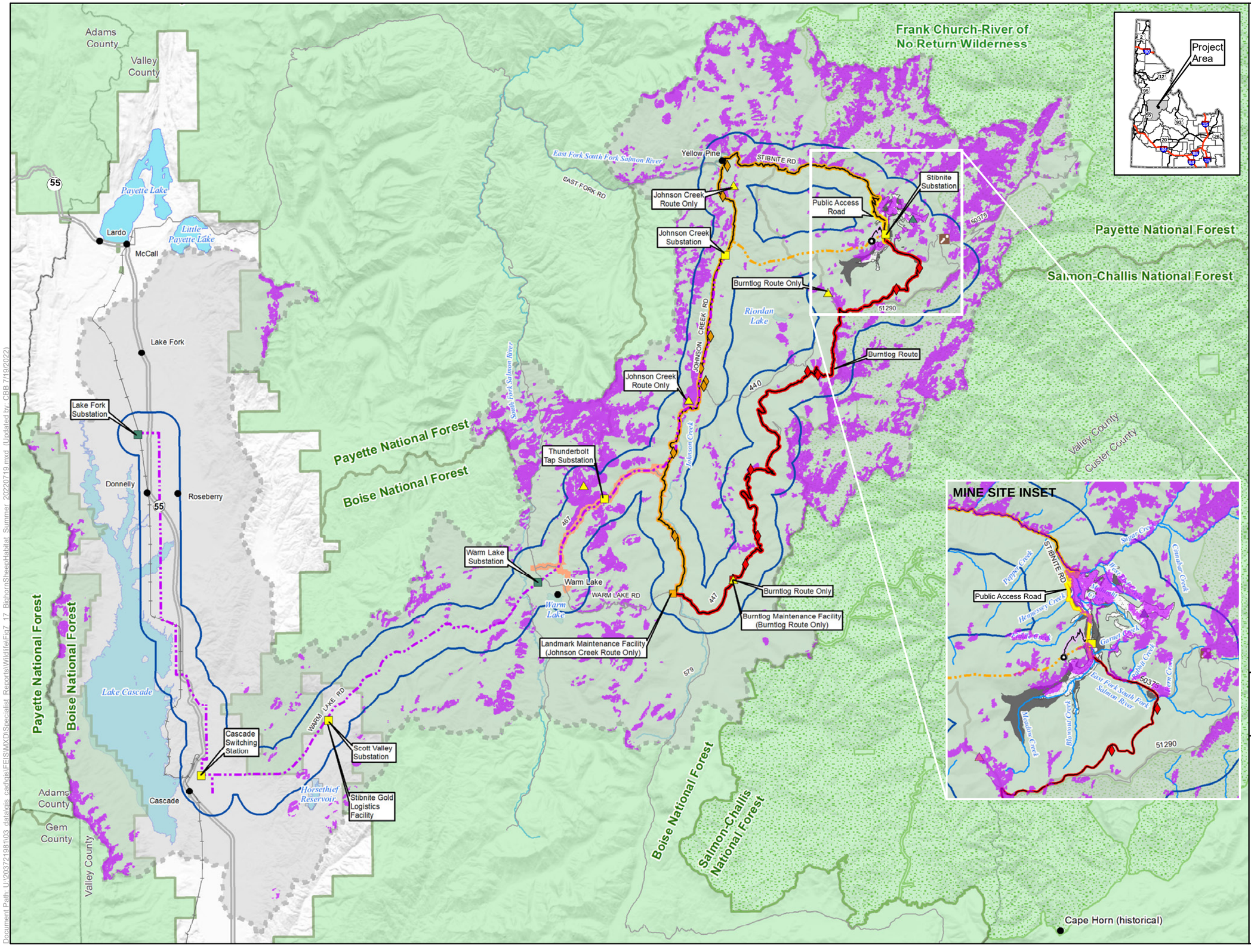
Light and noise impacts are reduced by vegetation, topography, and distance from the impact sources. Therefore, indirect impacts on sheep would differ depending on the specific conditions at each 2021 MMP component location, based on the density of vegetation and proximity to adjoining hillsides and valleys. As part of SGP design features, buildings, equipment, and drill rigs would have limited external lighting and use noise-reduction strategies when feasible (**Section 2.4**). The result would generally be a reduction in the area of habitat disturbed at most sites.

There would be no hunting or discharge of firearms during construction and operations in the Operations Area Boundary by SGP employees and contractors. Signs would be posted at the SGP area and training would be provided to notify employees that hunting is prohibited, and employees would be prohibited from carrying firearms on the SGP site. However, illegal harvest of big game species is a potential risk and would be an indirect impact.

The Johnson Creek Route Alternative would generally have the same effects on summer and winter modeled habitat as the 2021 MMP.

Access Roads

Because bighorn sheep are known to occur in the FCRNRW area, they could potentially be affected by loss of potential habitat along the access roads, and direct impacts would include approximately 62 acres of modeled summer habitat and 10 acres of modeled winter habitat. The new 15-mile-long section of



LEGEND

- Wildlife Habitat Analysis Area Affected Environment
- Existing Condition Analysis Area
- Bighorn Sheep Summer Modeled Habitat
- Stibnite Historic Disturbance

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Cell Tower Access
- Public Access Road
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities

- New Transmission Line
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site
- Existing Communication Tower
- New Cell Tower

Offsite Facilities

- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route
** Substation locations are approximate
*** Associated with Burntlog Route only
**** Associated with Johnson Creek Route only

Note: The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road

0 2.5 5 Miles

1 inch = 4.5 miles

Figure 7-17
Bighorn Sheep (Summer) Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

Document Path: U:\2023\21981\03_data\gis_cad\gis\EFEIS\MXD\Specialist_Reports\Wildlife\Fig7_17_BighornSheepHabitat_Summer_20220719.mxd (Updated by CBB 7/19/2022)

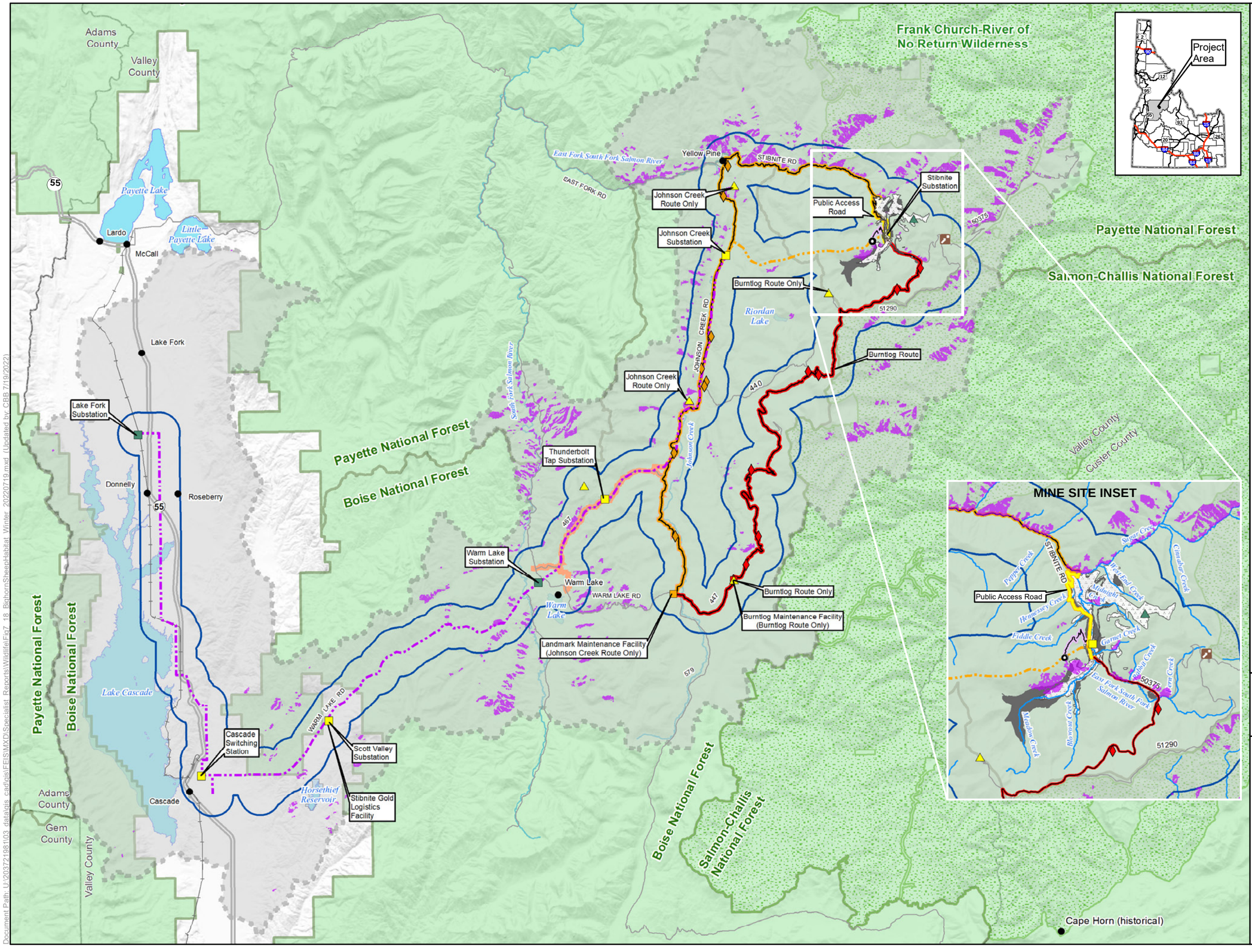


Figure 7-18
Bighorn Sheep (Winter) Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

Document Path: U:\20372\1981\03_data\gis_cad\gis\EIS\MXD\Specialist Reports\Wildlife\Fig7_18_BighornSheepHabitat_Winter_20220719.mxd (Updated by CBB 7/19/2022)

Burntlog Route would be constructed and plowed year-round and have an AADT level of 50 vehicles during operations, which would likely directly disrupt or alter Rocky Mountain bighorn sheep movements. The intensity of this impact could range from minor injury to mortality. The duration ranges from temporary road construction (e.g., 3 years) to short-term (during 12 to 15 years of mining and ore processing operations). It is not expected that the increased risk of injury or mortality would become permanent, because the new segment of the Burntlog Route would be reclaimed upon closure, and traffic levels on the existing roads would return to current levels. The geographic extent of these impacts would be limited to the vicinity of the access road. Additionally, the 10.4-mile groomed OSV trail along the existing Cabin Creek Road (Forest Road 467) would cross Rocky Mountain bighorn sheep winter habitat, which may disrupt them due to OSV noise.

Although additional roadways could expose Rocky Mountain bighorn sheep to increased illegal hunting pressure from humans in the wildlife analysis area, legal hunting is extremely limited in this area of Idaho and IDFG carefully manages Rocky Mountain bighorn sheep populations and regulates the relatively low number of permits issued each year; therefore, additional hunter access is unlikely to appreciably increase hunting pressure on Rocky Mountain bighorn sheep in the SGP area. Additionally, hunting or discharge of firearms during construction and operations in the Operations Area Boundary would be prohibited for SGP employees and contractors. Signs would be posted throughout the SGP area and training would be provided to notify employees that hunting is prohibited, and employees would be prohibited from carrying firearms on the SGP site. Legal public hunting along public access roads would continue to be allowed. Roadways also are used as corridors by predators such as wolves or mountain lions, which could indirectly increase predation on Rocky Mountain bighorn sheep.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be built. However, there is a comparable amount of modeled suitable habitat adjacent to the Johnson Creek Route as well. There would be 57 acres of direct impacts to modeled summer habitat and 22 acres of direct impacts to modeled winter habitat under the Johnson Creek Route Alternative (**Table 7-18**).

Utilities

Direct impacts on Rocky Mountain bighorn sheep could include loss or fragmentation of habitat along utility corridors, substations, and communication towers due to land clearing activities and land use changes. There would be 73 acres of direct impacts to modeled summer habitat and 23 acres of direct impacts to modeled winter habitat under the 2021 MMP for the utility corridors (**Table 7-18**). Construction impacts would likely displace wildlife farther distances, but this would be temporary (e.g., 3 years). Vegetation would be cleared only in those areas necessary for 2021 MMP activities to preserve natural habitat to the greatest extent practicable.

Noise-reduction strategies would be used to reduce indirect effects on sheep. Equipment would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

The Johnson Creek Route Alternative would have similar effects on Rocky Mountain bighorn sheep and modeled habitat as the 2021 MMP.

Off-site Facilities

There would be no direct impacts to modeled summer or winter habitat due to construction and operation of the off-site facilities under any of the action alternatives. Indirect impacts would also be unlikely, as modeled habitat is limited within 1 mile of these facilities.

Habitat Impacts

Table 7-18 Rocky Mountain Bighorn Sheep Direct and Indirect Impacts

SGP Component	Directly Impacted Modeled Habitat (acres) - Summer	Indirectly Impacted Modeled Habitat (acres) - Summer	Directly Impacted Modeled Habitat (acres) - Winter	Indirectly Impacted Modeled Habitat (acres) - Winter
2021 MMP				
Mine Site	501	N/A	104	N/A
Access Roads	62	N/A	10	N/A
Utilities	73	N/A	23	N/A
Off-site Facilities	0	N/A	0	N/A
Total	**636**	**12,673**	**137**	**2,755**
Johnson Creek Route Alternative				
Mine Site	500	N/A	104	N/A
Access Roads	57	N/A	22	N/A
Utilities	72	N/A	23	N/A
Off-site Facilities	0	N/A		N/A
Total	**629**	**10,842**	**149**	**2,668**

Source: Forest Service 2020a.
N/A = indirect impacts are calculated by buffer distances (0.5 mile for woodpeckers) from the action alternatives and occur outside of the SGP components.
0 acres indicates that SGP components would not cross or overlap modeled habitat.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Rocky Mountain bighorn sheep may use the mine site area as they have in limited areas in the past.

Access Roads

Existing roads also would continue to affect wildlife through habitat fragmentation and vehicle-wildlife collisions.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat or source of noise and light impacts.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

Determination

The action alternatives may directly and indirectly impact Rocky Mountain bighorn sheep individuals and habitat but would not likely contribute to a trend towards ESA listing or loss of viability of the species within the planning area. However, due to their value as a big game species in Idaho, impacts may include potential changes in abundance and distribution of bighorn sheep, and therefore impacts to bighorn sheep hunting opportunities in the surrounding region. Across all action alternatives, more summer habitat (e.g., most forest types and tree size classes within 2 miles of a steep rock, cliff, or talus slope) would be directly and indirectly impacted than winter habitat (e.g., sagebrush-dominated cover types within 2 miles of a steep rock, cliff, or talus slope). For summer habitat, the Johnson Creek Route Alternative would indirectly impact the least habitat (due to the Burntlog Route not being constructed). For winter habitat, the action alternatives would have very similar direct and indirect impacts. Therefore, based on the impact analysis above for the bighorn sheep and its habitat, the action alternatives would result primarily in localized, short-term, long-term, and permanent, moderate impacts to the bighorn sheep.

7.2.2.5 Habitat Family 7 – Forests, Woodland, and Sagebrush

Townsend's Big-eared Bat

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Mine Site

Direct disturbance to the Townsend's big-eared bat would be possible through habitat loss at the mine site. Although some historic mine workings that may serve as winter hibernacula habitat are present in the wildlife analysis area, there are no known occurrences of the Townsend's big-eared bat. After closure and reclamation, the pit walls of the Hangar Flats and West End pits would be exposed for a long time period, which could potentially create roost sites for them. The Forest Service would require that any potential drill pad sites adjacent to any open mine workings or natural caves should be observed for the presence of bats. If necessary, to maintain key features of habitat or to avoid disruption, activities would be modified in coordination with the Forest Service (**Section 2.4**).

The 2021 MMP also would cause an increase in noise and light in the wildlife analysis area, mostly in the vicinity of the mine site. Bat behaviors that may change as a result of increased noise or light include changes in roosting or foraging patterns that could lead to fragmentation of habitat. The potential effects on wildlife habitat are dependent on geographical conditions because sound propagation is reduced by distance, vegetation, and intervening topography. Noise-reduction strategies (e.g., enclosure of ore processing facility, use of electricity instead of diesel generators, muffling equipment, etc.) would be used to reduce indirect effects on sensitive wildlife species. Buildings, equipment, and drill rigs would have limited external lighting, and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Refer to the silver-haired bat section, which discusses additional indirect impacts that could likely also impact the Townsend's big-eared bat, including emissions exposure and loss of insects due to air emissions and fugitive dust.

The Johnson Creek Route Alternative would have similar effects on Townsend's big-eared bat as the 2021 MMP.

Access Roads

Disturbance to the Townsend's big-eared bat would be possible due to habitat loss along the access roads, but unlikely because of their limited occurrence in the area. Because they can occupy forested habitats within 15 miles of cave/rock crevices, they could potentially be displaced by the removal of summer roosting habitat.

Disturbance to the Townsend's big-eared bat due to road construction and vehicle traffic along the Burntlog Route also would be possible. Potential effects could include direct disturbance and displacement, although signal masking due to traffic noise is unlikely, because traffic noise does not overlap much with bat echolocation calls (Caltrans 2016). The noise-reduction strategies mentioned above employed along access roads would likely be sufficient to reduce noise impacts on the Townsend's big-eared bat. Refer to the silver-haired bat section, which contains additional indirect impacts that would likely also impact the Townsend's big-eared bat.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be built and habitat along that corridor would not be impacted. However, bats along the Johnson Creek Route may be impacted in a similar manner.

Utilities

Direct impacts on the Townsend's big-eared bat could include loss or fragmentation of habitat along utility corridors, substations, and communication towers due to land clearing activities and land use changes. Construction impacts would likely displace wildlife farther distances, but would be temporary (e.g., 3 years). Vegetation would be cleared only in those areas necessary for the 2021 MMP activities to preserve natural habitat to the greatest extent practicable.

Noise and light reduction strategies would be used to reduce indirect effects on the Townsend's big-eared bat. Equipment would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Lighting impacts could alter the Townsend's big-eared bat's natural activities, but construction of these areas would be temporary (e.g., 3 years). Refer to the silver-haired bat section, which contains additional indirect impacts that would likely also impact the Townsend's big-eared bat.

The Johnson Creek Route Alternative would have similar effects on Townsend's big-eared bat as the 2021 MMP.

Off-site Facilities

Direct impacts on the Townsend's big-eared bat are unlikely near the off-site facilities, because no construction or infrastructure would impact the habitats used by the Townsend's big-eared bat in the wildlife analysis area. Noise and light reduction strategies would be used to reduce indirect effects on the Townsend's big-eared bat within 1 mile of these facilities. Equipment would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Lighting impacts could alter the Townsend's big-eared bat's natural activities, but construction of these areas would be temporary (e.g., 3 years). Refer to the silver-haired bat section, which contains additional indirect impacts that would likely also impact the Townsend's big-eared bat.

The Johnson Creek Route Alternative would have similar effects on Townsend's big-eared bat as the 2021 MMP.

Habitat Impacts

The focal species selected for the WCS for the BNF and PNF represent the appropriate habitat types and are surrogates for many other species, including Townsend's big-eared bat. Thus, there are no specific habitat models available for this species.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Townsend's big-eared bats have not been observed, but are assumed to occur in the mine site, and individuals would likely use the mine site much as they currently do.

Access Roads

Existing roads also would continue to affect wildlife through habitat fragmentation and noise, light, and fugitive dust impacts.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat, source of noise and light impacts, or increased risk of collision for the Townsend's big-eared bat.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

Determination

The action alternatives may directly and indirectly impact Townsend's big-eared bat individuals and habitat (e.g., ponderosa pine, Douglas fir, and grand fir stands), but would not likely contribute to a trend towards ESA listing or loss of viability of the species within the planning area. Therefore, based on the impact analysis above for the Townsend's big-eared bat and its habitat, the action alternatives would result primarily in localized, long-term and permanent, minor impacts to the Townsend's big-eared bat.

7.2.2.6 Habitat Family 13 – Riverine Riparian and Wetland

Bald Eagle

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Mine Site

The 2021 MMP could directly disturb bald eagles in the analysis area through habitat loss, disturbance from increased human activity, and helicopter flights. Direct take of adult birds due to construction or operational activities is possible, but unlikely, because most individuals are expected to avoid areas of activity. However, it is possible that nests, eggs, and young could be directly disturbed by vegetation removal (including cutting of trees) during construction if it occurs during the nesting season. Trees found to contain nests would not be disturbed or cut. A Forest Service wildlife biologist would be notified of any occupied sensitive species nests encountered. Although design features would reduce impacts, there would still be a decrease in habitat.

The 2021 MMP would cause an increase in noise and light in the wildlife analysis area, mostly in the vicinity of the mine site. Construction and operations, vehicle traffic, and helicopter use are likely to directly disturb or displace individuals. Wildlife behaviors that may change as a result of increased noise include nesting (loss of a nest equals "take") and/or foraging changes. A likely indirect effect is that there would be a reduction in prey species (i.e., fish) within the mine site.

The bald eagle also could be impacted by direct collision risks with structures at the mine site. Transmission line structures to serve 2021 MMP facilities and the new 138-kV transmission line in the mine site would be a potential source of mortality for raptors (APLIC 2012). However, the utility line design would meet APLIC raptor-protection criteria and include insulating or covered apparatus for perch accommodation to reduce risks to raptor species.

The Johnson Creek Route Alternative would have similar effects on bald eagle as the 2021 MMP.

Access Roads

The 2021 MMP could directly disturb bald eagles in the wildlife analysis area through habitat loss due to tree clearing, road construction, and increased human activity along access roads. Direct take of adult birds due to these activities is unlikely, because most individuals are expected to avoid areas of activity. However, there are known eagle nests along Johnson Creek Road and Warm Lake, and it is possible that eagles would be displaced from these territories due to the increased traffic.

Bald eagles are opportunistic scavengers of carrion. Roadkill from 2021 MMP traffic could attract them to roadsides where they also would be exposed to vehicle-wildlife collisions. The operational traffic associated with the workforce, supplies, haulage, and other miscellaneous traffic, including road maintenance on the access roads, is expected to produce an annual average daily traffic level of 50 vehicles. Perpetua would establish appropriate speed limits (i.e., generally 30 miles per hour or less) for the Burntlog Route, site haul roads, and light vehicle access roads on the 2021 MMP site to reduce the possibility of vehicle-wildlife collisions. All staff and contractors would be trained to observe posted speed limits and reduce wildlife collisions. However, wildlife-vehicle collisions are still a possibility. Any adverse wildlife encounters would be reported to appropriate state and federal wildlife managers. Restricting public access on the Burntlog Route and removing roadkill from roadways would likely reduce impacts due to mortality.

Noise-reduction strategies would be used to reduce indirect effects on bald eagles. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Although timing restrictions would restrict some activities within a certain radius of active nest trees for raptor species, which would help reduce habitat impacts, some displacement and nest failure could occur. Cutting of trees for 2021 MMP activities would avoid avian tree nests, where feasible, and a Forest Service wildlife biologist would be notified of any occupied sensitive species nests encountered. Although design features would reduce direct impacts, there would still be a decrease in habitat.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be constructed and thus the area associated with the Burntlog Route would not be impacted. However, since there are known nest sites along the Johnson Creek Route, the increased traffic under the Johnson Creek Route Alternative may displace eagles from these territories.

Utilities

The 2021 MMP could directly disturb bald eagles in the analysis area through habitat loss due to clearing and construction activities for utility corridors, substations, and communication towers. Direct take of adult birds due to these activities is unlikely because most individuals are expected to avoid areas of activity. However, it is possible that nests, eggs, and young would be disturbed by vegetation removal, including cutting of trees if it occurs during the nesting season. To the extent practicable, trees found to contain nests would not be disturbed or cut. No trees with active nests would be cut.

The cell tower, communication tower, repeater sites, and new 138-kV transmission line would be a potential source of mortality for bald eagles (APLIC 2012). The utility line design would meet APLIC raptor-protection criteria and include insulating or covered apparatus for perch accommodation to reduce risks to raptor species. Electric transmission line structures to serve 2021 MMP facilities would be designed and constructed to avoid raptor perching (to minimize the risk of being electrocuted). However, the long-term presence of structures and communication towers would pose a risk of collision and direct mortality.

Noise and light from construction of the utility corridors, substations, and communication towers is likely to disturb or displace individuals. However, construction of these areas would be temporary (e.g., 3 years), and is not expected to fragment habitat. Once the construction is complete, it is expected that bald eagles would resume use of the area. The noise-reduction strategies employed along utility corridors and near communication towers would reduce noise impacts on individual bald eagles.

The Johnson Creek Route Alternative would have similar effects on bald eagle as the 2021 MMP.

Off-site Facilities

The 2021 MMP is unlikely to directly disturb bald eagles in the analysis area through habitat loss due to clearing and construction activities for off-site facilities.

The 2021 MMP could disturb individual bald eagles in the wildlife analysis area through noise and light due to construction of the off-site facilities. Noise-reduction strategies would be used to reduce indirect effects on bald eagles. Lighting best management practices (e.g., downturned/shielded lights, reduced number used, directional lighting, etc.) would be used to reduce indirect effects on sensitive wildlife species. Buildings would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine

enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

The Johnson Creek Route Alternative would have similar effects on bald eagle as the 2021 MMP.

Habitat Impacts

The focal species selected for the WCS for the BNF and PNF represent the appropriate habitat types and are surrogates for many other species, including bald eagle. Thus, there are no specific habitat models available for this species.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Because there is potentially suitable habitat for bald eagles and they are assumed to occur in the mine site, individuals would likely continue to use the mine site as they currently do in limited areas.

Access Roads

Existing roads also would continue to affect wildlife through habitat fragmentation, particularly along Johnson Creek Road and near Warm Lake where there are known nest sites.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat, source of noise and light impacts, or increased risk of collision for bald eagles.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

Determination

The action alternatives may directly and indirectly impact bald eagle individuals and habitat (e.g., mature forest types within 1.25 miles of major waterbodies) but would not likely contribute to a trend towards ESA listing or loss of viability of the species within the planning area. Therefore, based on the impact analysis above for the bald eagle and its habitat, the action alternatives would result primarily in localized, long-term and permanent, minor impacts to the bald eagle.

Columbia Spotted Frog

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Figure 7-19 shows the components of the 2021 MMP and Johnson Creek Route Alternative within the analysis area compared to the riparian analysis area.

Mine Site

Amphibians are considered reliable indicators of environmental quality (Boyer and Grue 1995). Water quality criteria for frogs and other amphibians do not currently exist. Rather, the following discussion summarizes impacts on fish resources from chemical contaminants associated with SGP (see the Fisheries and Aquatic Habitat Specialist Report [Forest Service 2022g]), as fish have historically been used as surrogates for amphibians in evaluating chemical impacts in aquatic environments (Glaberman et al. 2019).

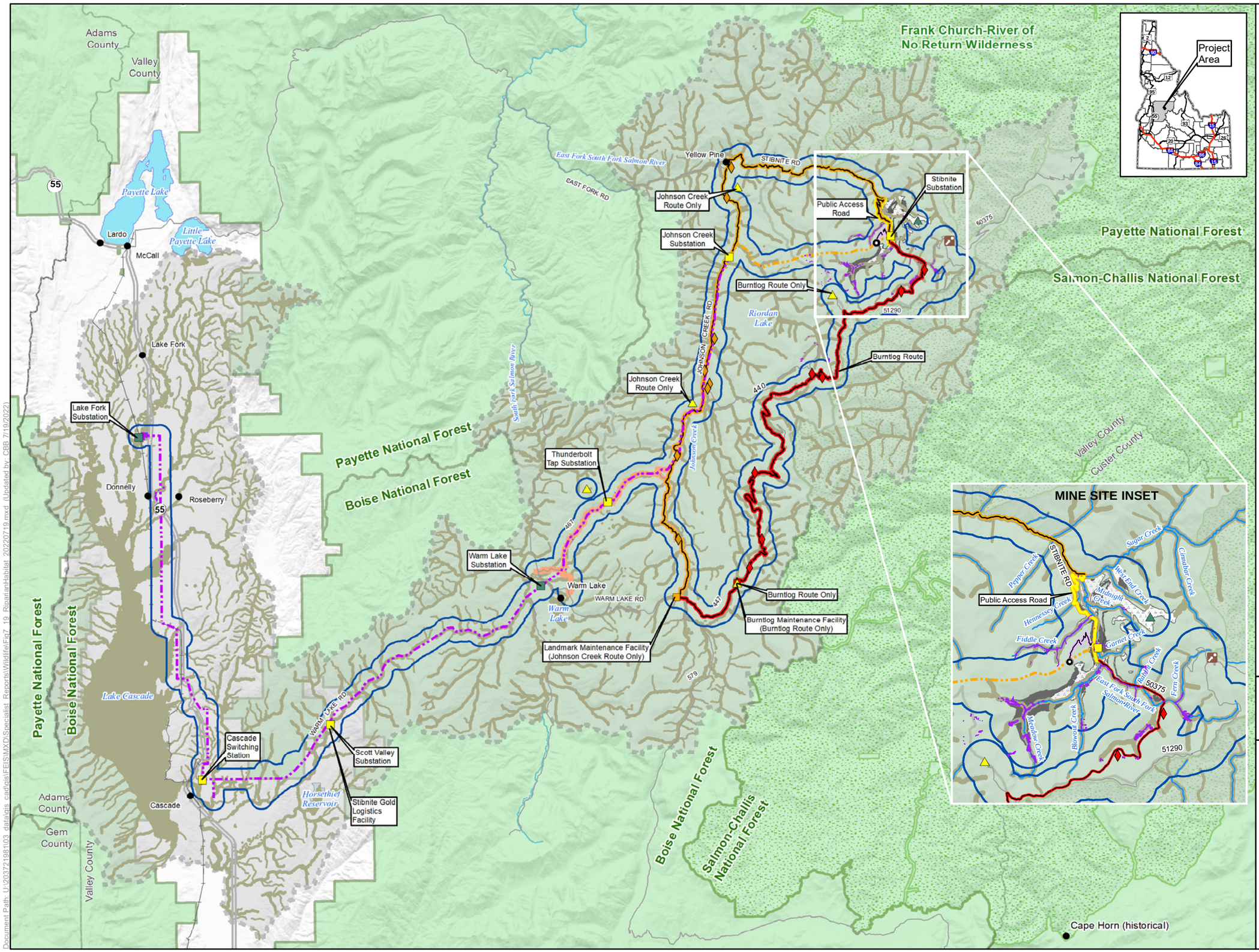


Figure 7-19
Riparian Habitat and Project Components in the Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

Document Path: U:\2023\21981\03_data\gis_cad\gis\FEIS\MXD\Specialist_Reports\Wildlife\Fig7_19_RiparianHabitat_20220719.mxd (Updated by: CBB 7/19/2022)

Despite analysis area improvements to water quality as a result of the removal and reclamation of legacy mine wastes, exceedances of the most stringent water quality standards (including both human health and aquatic life) for water column antimony, arsenic, copper, and mercury are anticipated to extend indefinitely throughout SGP post-closure. In considering only the aquatic life criteria, which are more relevant for the protection of fish species, impacts due to antimony and arsenic are not anticipated. For copper and mercury, impacts may be minimal but uncertainties in predicting future conditions exist. For copper, the Biotic Ligand Model-based criteria are preliminary and do not encompass the range of monitoring nodes and the range of variability required for Biotic Ligand Model implementation (Brown and Caldwell 2020). For mercury, while the predicted concentrations do not exceed the aquatic life criterion based on water column, it is uncertain whether incremental change in water column concentrations beyond baseline would cause fish tissue concentrations to exceed the tissue-based criterion.

A Water Management Plan has been developed (Brown and Caldwell 2021) and the Water Quality Specialist Report (Forest Service 2022h) provides more details regarding changes to water quality. The Fisheries and Aquatic Habitat Specialist Report (Forest Service 2022g) provides an analysis of changes and summary of effects on fish under the 2021 MMP.

The 2021 MMP could directly disturb Columbia spotted frog in the riparian analysis area through permanent impacts to wetlands in the mine site area. Up to 621 acres of direct impacts to this habitat would occur in the mine site (**Table 7-19**). Columbia spotted frogs have been observed in the riparian analysis area near the operational areas and open pits along the East Fork SFSR, and their presence is also likely based on habitat (i.e., streams and wetlands). Disturbance of water sources would occur in areas occupied by spotted frogs, placing them at risk of direct mortality or displacement. The presence of traffic in the mine site could expose them to direct mortality from vehicles as well.

The Forest Service would require that potential water sources be surveyed for Columbia spotted frog egg masses and other amphibians after ice melt, and the 2021 MMP would avoid disturbing any water sources with identified egg masses or other species, with some exceptions (**Section 2.4**). Construction of a natural stream channel for the East Fork SFSR and reclaimed stream channels, wetlands, and riparian habitat (Forest Service 2022f) upon closure would reclaim some riparian habitat for Columbia spotted frogs in the future.

The 2021 MMP would cause an increase in noise and light in the riparian analysis area, mostly in the vicinity of the mine site. Columbia spotted frogs could be impacted by an interference in communication during breeding activities. Noise-reduction strategies (e.g., enclosure of ore processing facility, use of electricity instead of diesel generators, muffling equipment, etc.) would be used to reduce indirect effects on sensitive wildlife species. Buildings, equipment, and drill rigs would have limited external lighting, and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Additionally, light and noise impacts could be reduced by vegetation, topography, and distance from the impact sources. Therefore, indirect impacts on wildlife would differ depending on the specific conditions at each individual 2021 MMP component location based on the density of vegetation and proximity to adjoining hillsides and valleys.

Another indirect effect for Columbia spotted frog could occur in wetlands affected by fugitive dust and emissions.

Amphibians and insects may be exposed to metals (e.g., mercury) and other elements from atmospheric emissions and tailings piles associated with gold and silver mining activities (Custer et al. 2009; Eagles-

Smith et al. 2018; Jones and Miller 2005). Emissions of metals from mine operations and ore processing, in the form of particulate matter and dust, may be deposited directly on local soils and waterways. In addition, rainwater and snow melt may provide a pathway for these elements to leach from tailings piles or be physically transported as solid particles into adjacent waterbodies. These elements may enter the food web through plants and insects and then be consumed by insectivorous wildlife, potentially causing injury if exposure is sufficient. The Forest Service would require an adaptive management plan to address dust and emissions (**Section 2.4**). Although this measure would reduce impacts, there would still likely be indirect impacts to amphibians like the Columbia spotted frog.

Under the Johnson Creek Route Alternative, effects would generally be the same as the 2021 MMP.

Access Roads

The 2021 MMP could directly disturb Columbia spotted frog in the riparian analysis area through impacts to wetlands along the access roads, and up to 120 acres of modeled habitat could be impacted along the Burntlog Route. Road construction, culvert installation, disturbance of roadside ditches that contain enough water for egg laying, and increased traffic levels may cause direct mortality. Restricting public access on the Burntlog Route would likely reduce impacts due to mortality. Anurans (including Columbia spotted frogs) are very susceptible to mortality from roadways (Jochimsen et al. 2004) when they cross them or emerge from their eggs in the spring. The new segment of the Burntlog Route would be decommissioned and reclaimed during mine closure, but the effects would mostly still be considered permanent due to the long time-period. As described for the mine site, potential water sources would be surveyed for Columbia spotted frog egg masses and other amphibians after ice melt, and the 2021 MMP would avoid disturbing any water sources with identified egg masses or other species.

The 2021 MMP would cause an increase in noise, light, and fugitive dust in the riparian analysis area, which could directly affect frogs along the access roads. These indirect impacts are described in the mine site section. Another indirect impact to amphibians along access roads could include fugitive dust. Dust associated with construction of facilities and roads, road maintenance, and vehicle travel may have indirect impacts on insects. Increased dust deposition could result in negative impacts to pollinating insects. For SGP, the potential for dust deposition is likely to be higher in the immediate area of roads and other surface-disturbing actions but would diminish with distance from these actions. Dust impacts on insects would start during construction and continue through closure and reclamation. Some dust deposition also may occur in the post-closure period where monitoring-related travel on dirt roads would occur; however, this would be negligible. Effects of dust on insects would occur immediately at the time of dust propagating activities and is likely to continue throughout the lifetime of SGP.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be constructed and there would be no impacts along the proposed Burntlog Route corridor. There would be 126 acres of direct impacts to modeled habitat under the Johnson Creek Route Alternative. Increased traffic along the existing Johnson Creek Route would likely increase direct mortality and indirect impacts (due to noise, light, and fugitive dust) along these roadways.

Utilities

The 2021 MMP could directly disturb Columbia spotted frogs in the riparian analysis area through impacts to wetlands due to clearing and construction activities for utility corridors, substations, and communication towers. Direct impacts to modeled habitat are estimated to be 302 acres under the 2021 MMP. The effects on wetlands would be considered temporary during construction (up to 3 years). However, impacts to forested wetlands would likely be permanent as ROW management practices

generally do not allow the establishment of woody vegetation. Construction activities associated with the utilities may cause direct mortality for some frogs.

As described for the mine site, potential water sources would be surveyed for Columbia spotted frog egg masses and other amphibians after ice melt, and the 2021 MMP would avoid disturbing any water sources with identified egg masses or other species.

The 2021 MMP would cause an increase in noise and light in the riparian analysis area, which could directly affect frogs in the utilities. These indirect impacts are described in the mine site section.

The Johnson Creek Route Alternative would have similar effects on Columbia spotted frog as the 2021 MMP.

Off-site Facilities

The 2021 MMP would impact 6 acres of modeled habitat for construction of the off-site facilities (**Table 7-19**). It is possible that individual frogs could be directly or indirectly impacted from these activities. The operating procedures and design features described above would be used to reduce impacts where possible.

Under the Johnson Creek Route Alternative, the Landmark Maintenance Facility would be relocated to the southern side of Warm Lake Road; however, it is not expected that this change would cause effects different from the 2021 MMP.

Habitat Impacts

The focal species selected for the WCS for the BNF and PNF represent the appropriate habitat types and are surrogates for many other species, including Columbia spotted frog. Thus, there are no specific habitat models available for this species. However, the riparian analysis area has been used for estimating impacts to this amphibian. Indirect impacts are assessed by including any forested wetlands or riparian areas within 0.5 mile of SGP components. For each alternative, indirect impacts would be higher for riparian areas than for forested wetlands.

Table 7-19 Columbia Spotted Frog Direct and Indirect Impacts

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
2021 MMP		
Mine Site	621	N/A
Access Roads	120	N/A
Utilities	302	N/A
Off-site Facilities	6	N/A
Total	**1,049**	**19,294**

SGP Component	Directly Impacted Modeled Habitat (acres)	Indirectly Impacted Modeled Habitat (acres)
Johnson Creek Route Alternative		
Mine Site	618	N/A
Access Roads	126	N/A
Utilities	301	N/A
Off-site Facilities	8	N/A
Total	**1,053**	**15,948**

Source: Forest Service 2020a.
N/A = indirect impacts are calculated by buffer distances (0.5 mile for woodpeckers) from the action alternatives and occur outside of the SGP components.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Columbia spotted frogs would likely continue to use the mine site as they currently do.

Access Roads

Existing roads also would continue to affect frogs through habitat fragmentation, direct mortality risks due to vehicle-wildlife collisions, and noise, light, and fugitive dust impacts from vehicles.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of riparian habitat.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

Determination

The action alternatives may directly and indirectly impact Columbia spotted frog individuals and habitat but would not likely contribute to a trend towards ESA listing or loss of viability of the species within the planning area. The Johnson Creek Route Alternative would have the fewest direct impacts to habitat (e.g., forested wetlands and riparian areas) as well as fewest indirect impacts. Therefore, based on the impact analysis above for the Columbia spotted frog and its habitat, the action alternatives would result primarily in localized, short-term, long-term, and permanent, minor impacts to the Columbia spotted frog.

7.2.2.7 Idaho Species of Greatest Conservation Need

Direct impacts on Species of Greatest Conservation Need (SGCN) could include direct mortality (i.e., wildlife-vehicle collisions, removal of nest or roost trees, etc.) or loss of habitat due to land clearing activities and land use changes. Indirect impacts could include reduced use of foraging or breeding habitat or reduced prey resources in the analysis areas.

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

General Habitat Species

Mine Site

Direct effects on general habitat SGCN would primarily be due to loss and fragmentation of habitat, and disturbance from light, noise, and increased human activity. There would be a direct loss of habitat in the wildlife analysis area at the mine site under the 2021 MMP. Displaced individuals would likely only be lost to the population if the adjacent environment were at maximum carrying capacity, to the extent that there were not enough available habitats to support them. In such a case, individuals would have to travel farther, exposing them to predation risks and energetic loss.

Light and noise impacts associated with mine site activities are likely to disturb or displace these SGCN. Bird and bat behaviors that may change as a result of increased noise or light including changes in roosting or foraging patterns that could lead to fragmentation of habitat. The estimated total average hourly noise levels from the mine site during the operations phase would be 102 dBA with blasting, which would extend out to 2.2 miles before attenuating to the threshold of 55 dBA (Forest Service 2022c). However, under the blasting scenario, SGP-related noise levels from the mine site during operations would attenuate to well below average ambient sound levels, because the impacts are reduced by vegetation, topography, and distance from the impact sources. Noise-reduction strategies (e.g., enclosure of ore processing facility, use of electricity instead of diesel generators, muffling equipment, etc.) would be used and could reduce indirect effects on wildlife. Equipment would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. The result would generally be a reduction in the area of habitat disturbed at most sites, but there would be indirect effects regardless. Timing restrictions would restrict some activities (e.g., blasting, drilling, etc.) within 1 mile of active winter hibernacula and summary maternity sites, which would help reduce habitat impacts.

The Johnson Creek Route Alternative would have similar effects on general habitat SGCN as the 2021 MMP.

Access Roads

Direct effects on general habitat for SGCN would primarily be due to loss and fragmentation of habitat, and disturbance from light, noise, fugitive dust, and increased human activity under the 2021 MMP. Construction of 15 miles of new road for the Burntlog Route would likely fragment habitat for SGCN and may act as a barrier to movement for some species. The new 15-mile-long section of Burntlog Route would be constructed and plowed year-round and have an AADT level of 50 during operations, which could disturb the bird and bat SGCN. The intensity of this impact could range from minor displacement to mortality. The duration ranges from temporary road construction to short-term (during 12 to 15 years of mining and ore processing operations). It is not expected that the increased risk of injury or mortality would become permanent, because the new segment of the Burntlog Route would be reclaimed upon closure, and traffic levels on the existing roads would return to current levels. The geographic extent of these impacts would be limited to the vicinity of the access road. Restricting public access on the Burntlog Route would likely reduce impacts due to mortality.

Light, noise, and fugitive dust impacts associated with road construction, maintenance, and vehicle traffic are likely to disturb or displace these birds and bats. SGP design features would help reduce these impacts, but not eliminate them. The estimated noise levels from SGP-related traffic on the Burntlog

Route during the operations phase would be 49 dBA. The estimated SGP-related noise level from road maintenance activity on the mine access road would range from 88 dBA during the summer months to 90 dBA during the winter months, when snow removal is required (Forest Service 2022c).

Under the Johnson Creek Route Alternative, the Burntlog Route would not be constructed. All traffic would access the SGP area via the Johnson Creek Route. General habitat SGCN with occurrence along these existing roadways may be impacted from increased traffic levels.

Utilities

Direct impacts on general habitat for SGCN could include loss or fragmentation of habitat along utility corridors, or at substations and communication towers due to land clearing activities and land use changes under the 2021 MMP. The addition of new utility access roads, as well as new transmission lines and upgraded transmission lines, could impact individual SGCN. Construction impacts would likely displace wildlife, but effects would be temporary (up to 3 years). Vegetation would be cleared only in those areas necessary for 2021 MMP activities to preserve natural habitat to the greatest extent practicable. During operations, it's likely that wildlife would use the utility corridors again.

Noise and light reduction strategies would be used to reduce indirect effects on bird and bat SGCN. Equipment would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

The Johnson Creek Route Alternative would have similar effects on general habitat for SGCN as the 2021 MMP.

Off-site Facilities

Direct impacts on general habitat for SGCN due to the off-site facilities would include loss or fragmentation of habitat. Construction and operation of the off-site facilities of the 2021 MMP are unlikely to disturb most species, because construction activities are not planned to occur in suitable habitat used by them. Noise and lighting reduction strategies would be used to reduce indirect effects on them. Buildings would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

The Johnson Creek Route Alternative would have similar effects on general habitat for SGCN as the 2021 MMP.

Riparian Species

Mine Site

Direct effects on riparian SGCN would primarily be due to permanent impacts to wetlands in the mine site area under the 2021 MMP, and approximately 621 acres of direct impacts would occur (**Table 7-19**). Construction of a natural stream channel for the East Fork SFSR and reclaimed stream channels, wetlands, and riparian habitat (Forest Service 2022f) upon closure would reclaim some riparian habitat for these species in the future, but the effects would be long-term (e.g., 20 years) in these cases.

Implementation of the 2021 MMP would cause an increase in noise and light in the riparian wildlife analysis area, mostly in the vicinity of the mine site. Bird behaviors that may change as a result of increased noise and light include changes in nesting (loss of a nest equals "take") and/or foraging patterns that could lead to fragmentation of habitat. The noise and light increase may affect western toad breeding activities in the mine site. Noise-reduction strategies (e.g., enclosure of ore processing facility, use of electricity instead of diesel generators, muffling equipment, etc.) would be used to reduce indirect effects on sensitive wildlife species. Buildings, equipment, and drill rigs would have limited external lighting, and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. Additionally, light and noise impacts are reduced by vegetation, topography, and distance from the impact sources. Therefore, indirect impacts on wildlife would differ depending on the specific conditions at each individual 2021 MMP component location, based on the density of vegetation and proximity to adjoining hillsides and valleys.

The Johnson Creek Route Alternative would have similar effects on riparian SGCN as the 2021 MMP.

Access Roads

The 2021 MMP could directly disturb these riparian SGCN in the riparian analysis area through impacts to wetlands (**Table 7-19**). Road construction, culvert installation, disturbance of roadside ditches that contain enough water for egg laying, and increased traffic levels may cause direct mortality to the western toad. Anurans (including western toads) are very susceptible to mortality from roadways (Jochimsen et al. 2004) when they cross them or emerge from their eggs in the spring. The Forest Service would require that potential water sources be surveyed for amphibian egg masses after ice melt, and the 2021 MMP would avoid disturbing any water sources with identified egg masses or other species (**Section 2.4**). The grebes and sandhill crane would likely be impacted from loss of riparian habitat throughout the life of the mine.

Noise, light and fugitive dust disturbance from road construction, road maintenance, and routine vehicle traffic are likely to disturb or displace individual birds or toads that do occur in the access road vicinity. Western toads could be impacted by an interference in communication during breeding activities. Noise-reduction strategies (e.g., enclosure of ore processing facility, use of electricity instead of diesel generators, muffling equipment, etc.) would be used to reduce indirect effects on sensitive wildlife species. Buildings, equipment, and drill rigs would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

Under the Johnson Creek Route Alternative, there would be no impacts associated with the Burntlog Route as it would not be constructed. However, riparian SGCN along the Johnson Creek Route may be impacted from the increased traffic.

Utilities

The 2021 MMP could directly disturb riparian SGCN in the riparian analysis area through direct impacts to wetlands (**Table 7-19**) due to clearing and construction activities for utility corridors, substations, and communication towers. Some effects would be considered temporary during construction (up to 3 years). However, impacts to forested wetlands would likely be permanent as ROW management practices generally do not allow the establishment of woody vegetation. Construction activities associated with the utilities may cause direct mortality for some western toads, but likely not for the bird species. Potential

water sources would be surveyed for amphibian egg masses, as described for the access roads. During operations, it's likely that wildlife would use the utility corridors again.

Noise and light disturbance from construction of the utility corridors, substations, and communication towers may temporarily disturb or displace grebes or cranes that use the area. Western toads could be impacted by an interference in communication during breeding activities. Noise-reduction strategies (e.g., enclosure of ore processing facility, use of electricity instead of diesel generators, muffling equipment, etc.) would be used to reduce indirect effects on sensitive wildlife species. Buildings, equipment, and drill rigs would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

The Johnson Creek Route Alternative would have similar effects on riparian SGCN as the 2021 MMP.

Off-site Facilities

The 2021 MMP would impact 6 acres of modeled habitat (**Table 7-19)** for the off-site facilities, although it is unlikely to directly disturb riparian SGCN in the riparian analysis area, with the possible exception of western toads that may use the affected wetland area.

The Johnson Creek Route Alternative would have similar effects on riparian SGCN as the 2021 MMP.

Alpine Species

Mine Site

Direct impacts on the hoary marmot are possible in the mine site due to habitat loss and associated habitat fragmentation, year-round vehicle traffic causing disturbance and potential avoidance behavior, and a potential risk of vehicle collisions causing injury or mortality under the 2021 MMP. Impacts to persistent snow cover (i.e., wolverine analysis area) are used as a surrogate for marmot habitat. Direct take of these species due to construction or operational activities is possible, but unlikely, because hoary marmots prefer higher elevation meadows or rocky talus slopes where construction activities are unlikely to occur.

The 2021 MMP would cause an increase in noise and light in the wolverine analysis area, mostly in the vicinity of the mine site. Construction and operations, vehicle traffic, and helicopter use are likely to directly disturb or displace individuals. Wildlife behaviors that may change as a result of increased noise include foraging or denning changes. Noise-reduction strategies would be used to reduce indirect effects on this species. Buildings, equipment, and drill rigs would have limited external lighting, and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

The Johnson Creek Route Alternative would have similar effects on hoary marmot as the 2021 MMP.

Access Roads

There would be a direct habitat loss along the access roads for the hoary marmot under the 2021 MMP. Direct mortality due to construction or operational activities is possible, but unlikely, because hoary marmots are expected to avoid areas of activity.

The 2021 MMP would cause an increase in noise, light, and fugitive dust in the analysis area, due to road construction, vehicle traffic, and maintenance. Noise, light, and fugitive dust design features described for the mine site would likely reduce impacts.

Under the Johnson Creek Route Alternative, there would be a reduction of impacts due to the Burntlog Route not being built. However, any habitats adjacent to the Johnson Creek Route would be impacted from upgrades and increased traffic levels.

Utilities

There would be a direct habitat loss within the utilities for the hoary marmot under the 2021 MMP. Direct mortality due to construction or operational activities is possible, but unlikely, because the hoary marmot is expected to avoid areas of activity.

The 2021 MMP would cause an increase in noise and light in the analysis area, due to construction, operation, and maintenance of the utilities. Noise and light design features described for the mine site would likely reduce impacts.

The Johnson Creek Route Alternative would have similar effects on hoary marmot as the 2021 MMP.

Off-site Facilities

The 2021 MMP is unlikely to disturb hoary marmots due to clearing and construction activities for off-site facilities, because a small amount of persistent snow cover years 1 through 7 are expected to be impacted for these facilities. However, indirect effects on them could include reduced use of nearby foraging or denning habitat.

The Johnson Creek Route Alternative would have similar effects on hoary marmot as the 2021 MMP.

Direct and Indirect Effects from the No Action Alternative

Mine Site

SGCN would likely continue to use the mine site area as they currently do.

Access Roads

Existing roads also would continue to affect wildlife through habitat fragmentation and vehicle-wildlife collisions and noise, light, and fugitive dust impacts from traffic.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat or source of noise and light impacts.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

Determination

The action alternatives may directly and indirectly impact SGCN (including general habitat, riparian, and alpine species) individuals and habitat. Therefore, based on the impact analysis above for SGCN and their

habitat, the action alternatives would result primarily in localized, short-term, long-term, and permanent, minor impacts to SGCN.

7.2.2.8 General Wildlife Species

Direct impacts on general wildlife species could include direct mortality (i.e., wildlife-vehicle collisions, removal of nest or roost trees, etc.) or loss of habitat due to land clearing activities and land use changes. Indirect impacts could include reduced use of foraging or breeding habitat or reduced prey resources in the analysis area.

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Mine Site

Direct effects on general wildlife species would primarily be due to loss and fragmentation of habitat; direct mortality through vehicle-wildlife collisions; and disturbance from light, noise, and increased human activity under the 2021 MMP. Displaced individuals would likely only be lost to the population if the adjacent environment were at maximum carrying capacity, to the extent that there were not enough available habitats to support them. In such a case, individuals would have to travel farther, exposing them to predation, vehicle-wildlife collisions, and energetic loss.

General wildlife would likely be displaced around the perimeter of the mine site. Additional roadways in the mine site would expose individuals to direct vehicle collisions or increased hunting pressure from humans in the wildlife analysis area. There would be no hunting or discharge of firearms during construction and operations in the Operations Area Boundary by SGP employees and contractors. Signs would be posted at the SGP area and training would be provided to notify employees that hunting is prohibited, and employees would be prohibited from carrying firearms on the SGP site. Legal public hunting along public access roads would continue to be allowed. However, illegal harvest of some species is a potential risk. Employees and contractors traveling in vehicles would be encouraged to observe posted speed limits or state secondary road speed limits, and to drive at speeds appropriate to reduce the possibility of vehicle-wildlife accidents.

Light and noise impacts associated with mine site activities are likely to disturb or displace common wildlife species. The estimated total average hourly noise levels from the mine site during the operations phase would be 102 dBA with blasting, which would extend out to 2.2 miles before attenuating to the threshold of 55 dBA (Forest Service 2022c). However, under the blasting scenario, SGP-related noise levels from the mine site during operations would attenuate to well below average ambient sound levels, because the impacts are reduced by vegetation, topography, and distance from the impact sources. Noise-reduction strategies (e.g., enclosure of ore processing facility, use of electricity instead of diesel generators, muffling equipment, etc.) would be used to reduce indirect effects on wildlife. Several terrestrial wildlife species have shown responses to anthropogenic noise levels beginning at 40 dBA (Shannon et al. 2016). However, because the existing (ambient) sound levels vary between 20 and 40 dBA, it is likely that SGP area wildlife would have a higher tolerance for noise. Equipment would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use. As part of the SGP, buildings, equipment, and drill rigs would have limited external lighting when feasible. The result would generally be a reduction in the area of habitat disturbed at most sites.

Hazardous materials and chemicals would be transported to the mine site in U.S. Department of Transportation-certified containers by trained personnel and would be stored in designated areas employing secondary containment measures. A Hazardous Materials Handling and Emergency Response Plan would address procedures for responding to accidental spills or releases of hazardous materials to minimize environmental effects. Used products would be stored on site in approved containers that would be separate from other trash and garbage products. Therefore, there is little chance of wildlife being exposed to hazardous materials.

The Johnson Creek Route Alternative would have similar effects on general wildlife species as the 2021 MMP.

Access Roads

Direct effects on general wildlife species would primarily be due to loss and fragmentation of habitat; direct mortality through vehicle-wildlife collisions; and disturbance from light, noise, fugitive dust, and increased human activity under the 2021 MMP. Construction of 15 miles of new road for the Burntlog Route would likely fragment habitat for general wildlife species and may act as a barrier to movement for some species. The new 15-mile-long section of Burntlog Route would be constructed and plowed year-round and have an annual average daily traffic level of 50 vehicles, which would likely directly disrupt wildlife movements. The intensity of this impact could range from minor displacement to mortality. The duration ranges from temporary road construction (up to 3 years) to short-term (during 12 to 15 years of mining and ore processing operations). It is not expected that the increased risk of injury or mortality would become permanent, because the new segment of the Burntlog Route would be reclaimed, and traffic levels on the existing roads would return to current levels. The geographic extent of these impacts would be limited to the vicinity of the access road.

Although additional roadways could expose general wildlife species to increased hunting pressure from humans in the wildlife analysis area, hunting or discharge of firearms during construction and operations within the Operations Area Boundary by SGP employees and contractors would be prohibited. Signs would be posted throughout the SGP area and training would be provided to notify employees that hunting is prohibited, and employees would be prohibited from carrying firearms on the SGP site. Legal public hunting along public access roads would continue to be allowed. All staff and contractors would be trained to reduce wildlife collisions. Perpetua would develop a wildlife mortality-reporting procedure and form to be used for reporting accidental 2021 MMP-related wildlife mortality. Any adverse wildlife encounters would be reported to appropriate state and federal wildlife managers, and in accordance with state and federal laws. Roadways also are used as corridors by predators such as wolves, which could indirectly increase predation of some general mammal species.

Light, noise, and fugitive dust impacts associated with road construction, maintenance, and vehicle traffic are likely to disturb or displace common wildlife species. SGP design features would help reduce these impacts, but not eliminate them. The estimated noise levels from SGP-related traffic on the Burntlog Route during the operations phase would be 49 dBA. The estimated SGP-related noise level from road maintenance activity on the mine access road would range from 88 dBA during the summer months to 90 dBA during the winter months, when snow removal is required (Forest Service 2022c).

Under the Johnson Creek Route Alternative, the Burntlog Route would not be built. This would avoid effects of noise disturbance, fugitive dust, habitat loss, and habitat fragment on wildlife in the vicinity of Burnt Log Road (Forest Road 447). However, general wildlife species that currently utilize habitats along the Johnson Creek Route would likely be more impacted due to increased fugitive dust and noise disturbance from increased traffic.

Utilities

Direct impacts on general wildlife species could include loss or fragmentation of habitat along utility corridors, substations, and communication towers due to land clearing activities and land use changes under the 2021 MMP. The addition of new utility access roads, as well as new transmission lines, and upgraded transmission lines, could impact individual general wildlife species. Construction impacts would likely displace wildlife but would be temporary (up to 3 years). Vegetation would be cleared only in those areas necessary for 2021 MMP activities to preserve natural habitat to the greatest extent practicable. However, impacts to forested wetlands would likely be permanent as ROW management practices generally do not allow the establishment of woody vegetation.

Noise-reduction strategies would be used to reduce indirect effects. Equipment would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

The Johnson Creek Route Alternative would have similar effects on general wildlife species as the 2021 MMP.

Off-site Facilities

Construction and operation of the off-site facilities under the 2021 MMP are unlikely to disturb most general wildlife species, because construction activities are not planned to occur in suitable habitat used by them. Noise and lighting reduction strategies would be used to reduce indirect effects on species in the vicinity. Buildings would have limited external lighting and would employ noise-minimizing practices. Construction equipment engines would be equipped with adequate mufflers, intake silencers, and engine enclosures when feasible. When practicable, pumps, generators, and engines would be turned off when not in use.

Although construction and operation of the off-site facilities themselves would likely not cause direct mortality to general wildlife species, vehicle traffic associated with the facilities could result in vehicle-wildlife collisions. All staff and contractors would be trained to reduce wildlife collisions.

The Johnson Creek Route Alternative would have similar effects on general wildlife species as the 2021 MMP.

Direct and Indirect Effects from the No Action Alternative

Mine Site

General wildlife species would likely continue to use the mine site area as they currently do.

Access Roads

Existing roads also would continue to affect wildlife through habitat fragmentation and vehicle-wildlife collisions and noise, light, and fugitive dust impacts from traffic.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat or source of noise and light impacts.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

Determination

The action alternatives may directly and indirectly impact general wildlife species individuals and habitat. Therefore, based on the impact analysis above for general wildlife species and their habitat, the action alternatives would result primarily in localized, short-term, long-term, and permanent, minor impacts to general wildlife species.

7.2.2.9 Big Game Species

Potential effects on big game species would be similar to those discussed for general wildlife species. The discussion below focuses on issues specific to big game species while **Section 7.2.2.8** contains additional impacts to general wildlife.

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Mine Site

Big game wildlife species are very mobile and generally able to avoid localized direct threat of injury or mortality due to construction. However, big game species would likely be displaced around the perimeter of the mine site disturbances. Additional roadways in the mine site would expose individuals to direct vehicle collisions or increased hunting pressure from humans in the wildlife analysis area.

Although there are no identified wildlife migration corridors between winter and spring ranges, elk are predicted to use the area for calving in the summer, and big game animals likely use the wildlife analysis area to migrate. Elk and deer may be displaced around the perimeter of the mine site and associated infrastructure, which would directly affect high-value seasonal habitat for elk and mule deer. Blum et al. (2015) observed that mule deer tended to avoid disturbed mining areas in Nevada and rerouting around disturbances would increase their energy expenditures during migration, potentially decreasing survival or productivity. However, given the relatively small size of the mine site in context of the region and available habitat, any direct effect on survival or productivity would likely be small.

The Johnson Creek Route Alternative would have similar effects on big game species as the 2021 MMP.

Access Roads

Roadways also are used as corridors by predators such as wolves, which could indirectly increase predation of elk and mule deer. Plowing the Burntlog Route would increase the access into a previously less accessible area for wolves and coyotes. Likewise, the 10.4-mile groomed OSV trail along the existing Cabin Creek Road (Forest Road 467) may increase access for predators during the winter.

Although there are no officially designated wildlife migration corridors between winter and spring ranges, big game animals likely use the wildlife analysis area to migrate. Roadways under the 2021 MMP may displace elk and mule deer or increase the possibility of vehicle-wildlife collisions. Under the 2021 MMP, the AADT level during operations would be 50. The following are linear components of the 2021 MMP that may present a barrier to the movement of wildlife. Warm Lake Road (CR 10-579) is not specifically a part of either access route; however, it is used by both access routes. The existing and proposed road segments are as follows:

- Johnson Creek Route (Johnson Creek Road [CR 10-413], and Stibnite Road [CR 50-412])

- Burntlog Route (Existing Burnt Log Road [Forest Road 447] to be upgraded and extended 15 miles to Thunder Mountain Road [Forest Road 50375], which also would be upgraded)

If fawning/calving activity is encountered during 2021 MMP activities, the activity would cease and/or be modified in coordination with the Forest Service. Although this and other design features would reduce impacts, there would still be a direct decrease in habitat, and increase in risk of disturbance and injury or mortality.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be constructed. Impacts to big game species in the vicinity of Burnt Log Road (Forest Road 447) would likely be avoided. However, big game species that currently utilize habitats along the Johnson Creek Route would be impacted due to increased traffic and noise disturbance associated with only using Johnson Creek Route for the SGP.

Utilities

There are no officially designated wildlife migration corridors between winter and spring ranges, or any elk winter range in the wildlife analysis area. The following are linear 2021 MMP components that may present a barrier to the movement of wildlife, although big game species would likely still use these corridors. The existing and proposed transmission line segments are as follows:

- Existing transmission line segment to be upgraded from East Fork to the Johnson Creek substation – 42 miles
- New transmission line segment from the Johnson Creek substation to the mine site – 8.5 miles

The Johnson Creek Route Alternative would have similar effects on big game species as the 2021 MMP.

Off-site Facilities

Although there are no officially designated wildlife migration corridors between winter and spring ranges, big game animals likely use the wildlife analysis area to migrate. The off-site facilities would be unlikely to disrupt or alter big game herd movements, except for displacing them a short distance, which would have a negligible impact.

The Johnson Creek Route Alternative would have similar effects on big game species as the 2021 MMP.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Big game species would likely continue to use the mine site area as they currently do.

Access Roads

Existing roads also would continue to affect wildlife through habitat fragmentation and vehicle-wildlife collisions.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat or source of noise and light impacts.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

Determination

The action alternatives may directly and indirectly impact big game species individuals and habitat. Therefore, based on the impact analysis above for big game species and their habitat, the action alternatives would result primarily in localized, short-term, long-term, and permanent, moderate impacts to big game species.

7.2.2.10 Migratory Bird Species and Bald and Golden Eagles

Direct impacts on migratory bird species and bald and golden eagles could include direct mortality (i.e., collisions with vehicles, structures, removal of nest trees, etc.) or loss of habitat due to land clearing activities and land use changes. Indirect impacts on these species could include reduced use of foraging or nesting habitat; reduced prey resources (insects and pollinators) in the analysis areas; or disturbance from noise, light, and emissions. Bald eagles are assessed above in **Section 7.2.2.6**, and golden eagles would likely face similar impacts. Effects on migratory birds under the action alternatives are similar in nature to the effects discussed in **Section 7.2.2.8**. Therefore, this section focuses only on the differences for migratory bird species.

Direct and Indirect Effects from the 2021 MMP and Johnson Creek Route Alternative

Mine Site

Under the 2021 MMP, direct take of adult birds due to construction or operational activities is possible, but unlikely, because most individuals are expected to avoid areas of activity. However, it is possible that nests, eggs, and young could be directly disturbed by vegetation removal (including cutting of trees) during construction if it occurs during the nesting season. Impacts to the priority habitats mentioned in **Table 6-20** also may directly affect the migratory bird species found in the analysis areas. The Partners in Flight Idaho Bird Conservation Plan (Ritter 2000) contains several goals for the various habitats to reduce impacts on migratory bird species. Implementation of the SGP would require removal of vegetation from several habitat types during the life of the mine but would reclaim several habitats during closure. Although both habitats listed in **Table 6-20** (i.e., dry ponderosa pine and riparian habitats) would be directly disturbed in the short term, portions of the area would be reclaimed in the long term, including impacted wetlands, stream channels, and associated riparian habitat (Forest Service 2022f). These activities would accomplish some of the Partners in Flight Idaho Bird Conservation Plan goals. Cutting of trees for 2021 MMP activities and removal of snags would avoid avian tree nests, where feasible; and a Forest Service wildlife biologist would be notified of any occupied sensitive species nests or dens encountered. Although design features would reduce impacts, there would still be a decrease in habitat.

Migratory bird species also could be impacted by direct collision risks with structures at the mine site. Electric transmission line structures to serve 2021 MMP facilities and the new 138-kV transmission line in the mine site area would be a potential source of mortality for migratory bird species and raptors (APLIC 2012). However, the utility line design would meet APLIC raptor-protection criteria and include insulating or covered apparatus for perch accommodation to reduce risks to these species.

The 2021 MMP would cause an increase in noise and light in the wildlife analysis area, mostly in the vicinity of the mine site. Construction and operations, vehicle traffic, and helicopter use are likely to directly disturb or displace individuals. Wildlife behaviors that may change as a result of increased noise

include nesting (loss of a nest equals "take") and/or foraging changes. Chronic noise can interfere with an animal's ability to detect important sounds, while intermittent noise is often perceived as a threat, which can lead to a reduction in fitness (Francis and Barber 2013). Increased noise levels can mask some lower-frequency bird calls, interrupting mating processes. Additionally, Kleist et al. (2018) observed that anthropogenic noise could disrupt stress hormone signaling and lead to lower survival rates across several bird species (i.e., ash-throated flycatcher, western bluebird, mountain bluebird), which may be similar to migratory bird species in the SGP area. Over time, noise can change the composition of avian communities in favor of more noise-tolerant species, which reduces the number of species. Birds migrating through may avoid the area during noisy periods instead of stopping over during migration. Permanent physical damage to a bird's ability to hear can occur from short-duration, loud sounds (exceeding 140 dBA for single blasts or 125 dBA for multiple blasts), or from continuous (greater than 72 hours) noise at levels above 110 dBA (Dooling and Popper 2007). The average hourly noise level during construction at the mine site would be 94 dBA (at 50 feet) and 102 dBA (at 50 feet) with blasting during operations (Forest Service 2022c). As such, the SGP would not be expected to result in permanent hearing loss for birds. Additionally, light and noise impacts are reduced by vegetation, topography, and distance from the impact sources. Therefore, indirect impacts on wildlife would differ depending on the specific conditions at each 2021 MMP component location, based on the density of vegetation and proximity to adjoining hillsides and valleys. Bright lighting can confuse birds into becoming active earlier in the day and staying alert throughout the night. It also can attract night-flying or migrating birds, causing them to alter their natural activities or expose them to accidental collisions with structures.

Possible direct and indirect effects are that there could be emission exposure and a reduction in prey species near the mine site activities, due to insects being affected by emissions or fugitive dust.

Insects and insectivorous birds may be exposed to metals (e.g., mercury) and other elements from atmospheric emissions and tailings piles associated with gold and silver mining activities (Custer et al. 2009; Eagles-Smith et al. 2018; Jones and Miller 2005). Emissions of metals from mine operations and ore processing, in the form of particulate matter and dust, may be deposited directly on local soils and waterways. In addition, rainwater and snow melt may provide a pathway for these elements to leach from tailings piles or be physically transported as solid particles into adjacent waterbodies. These elements may enter the food web through plants and insects and then be consumed by insectivorous wildlife, potentially causing injury if exposure is sufficient. The environmental design features would require an adaptive management plan to address dust and emissions (**Section 2.4**). Although this environmental design feature would reduce impacts, there would still likely be indirect impacts to insectivorous migratory birds.

As part of SGP design features, buildings, equipment, and drill rigs would employ noise-minimizing practices and would have limited external lighting when feasible. The result would generally be a reduction in the area of habitat disturbed at most sites. The noise and light reduction strategies employed in the SGP area would reduce noise impacts on migratory birds, but not eliminate them. Timing restrictions would restrict some activities within a certain radius of active nest trees for avian species, which would help reduce habitat impacts.

The Johnson Creek Route Alternative would have similar effects on migratory bird species as the 2021 MMP.

Access Roads

Migratory bird species, including focal species that are migratory, could be directly impacted and disturbed in the wildlife analysis area through vehicle mortality, habitat loss due to tree clearing, road construction, traffic noise and fugitive dust, and increased human activity along access roads. Direct take

of adult birds due to these activities is possible, but unlikely, because most individuals are expected to avoid areas of activity. However, it is likely that nests, eggs, and young would be directly disturbed by vegetation removal, including cutting of trees, if it occurs during the nesting season. Ground disturbance associated with road construction and upgrades could cause injury or mortality of ground-nesting birds if conducted during the breeding season. Cutting of trees for 2021 MMP activities would avoid avian tree nests, where feasible, and a Forest Service wildlife biologist would be notified of any occupied sensitive species nests encountered. Although design features would reduce direct impacts, there would still be a decrease in habitat. The Burntlog Route may present a barrier to movement for sensitive migratory bird species.

Additionally, noise, light, and fugitive dust from road construction, road maintenance, and routine vehicle traffic is likely to disturb or displace individual migratory bird species or bald and golden eagles from roadside habitats. Increased ambient noise levels can mask some lower-frequency bird calls, interrupting mating processes. Additionally, Kleist et al. (2018) observed that anthropogenic noise could disrupt stress hormone signaling and lead to lower survival rates across several bird species (i.e., ash-throated flycatcher, western bluebird, mountain bluebird), which may be similar to migratory bird species in the SGP area. McClure et al. (2013) observed that simulated traffic noise led to a decline in bird abundance at sites in southern Idaho by about one quarter, and that many migratory bird species may avoid sites with such noise levels. The average hourly noise level during construction for the access roads would be 91 dBA (at 50 feet) and 86 (winter) to 88 (summer) dBA (at 50 feet) during operations (Forest Service 2022c). As such, the SGP would not be expected to result in permanent hearing loss for birds. Bright lighting can attract night-flying or migrating birds, causing them to alter their natural activities or expose them to accidental collisions with structures.

Noise-, light-, and fugitive dust-reduction strategies described for the mine site and for other general wildlife species would be used to reduce indirect effects on migratory bird species.

Under the Johnson Creek Route Alternative, the Burntlog Route would not be constructed. However, the existing roadways included in the Johnson Creek Route would be upgraded and would likely cause direct and indirect impacts to migratory birds. Due to the increased fugitive dust and noise disturbance from increased traffic, the Johnson Creek Route may present a barrier to movement of sensitive migratory bird species.

Utilities

The 2021 MMP could directly disturb migratory bird species in the wildlife analysis area through habitat loss due to clearing and construction activities for utility corridors, substations, and communication towers. Direct take of adult birds due to these activities is unlikely because most individuals are expected to avoid areas of activity. However, it is likely that nests, eggs, and young would be disturbed by vegetation removal, including cutting of trees if it occurs during the nesting season. To the extent practicable, trees found to contain nests would not be disturbed or cut. No trees with active nests would be cut.

The cell tower, communication tower, repeater sites, and new or upgraded 138-kV transmission line would be a potential source of mortality for migratory bird species and raptors through accidental collisions with structures, cell towers, or transmission lines (APLIC 2012). In the long-term, the utility line design would meet APLIC raptor-protection criteria and include insulating or covered apparatus for perch accommodation to reduce risks to raptor species. Electric transmission line structures to serve 2021 MMP facilities would be designed and constructed to avoid raptor perching (for predation purposes and to

minimize the risk of being electrocuted). However, the long-term presence of structures and communication towers would pose a risk of collision and direct mortality.

The average hourly noise level during construction for the utilities would be 84 dBA (at 50 feet) without helicopter use and 100 dBA (at 50 feet) with helicopter use and attenuate to 55 dBA approximately 53 feet from the substation during operations (Forest Service 2022c). As such, the SGP would not be expected to result in permanent hearing loss for birds. Noise- and light-reduction strategies described for the mine site and for other general wildlife species would be used to reduce indirect effects on migratory bird species.

Construction effects (i.e., displacement) to these areas would be temporary (up to 3 years), but long-term (e.g., 20 years) effects could include habitat fragmentation due to the utility corridors. The following are linear 2021 MMP components that may present a barrier to the movement of sensitive migratory bird species (i.e., smaller birds or those that use mature interior forest). The existing and proposed transmission line segments are as follows:

- Existing transmission line segment to be upgraded from East Fork to the new Johnson Creek substation – 42 miles
- New transmission line segment from Johnson Creek substation to the mine site – 8.5 miles

The Johnson Creek Route Alternative would have similar effects on migratory bird species as the 2021 MMP.

Off-site Facilities

The 2021 MMP is unlikely to directly disturb migratory bird species in the wildlife analysis area, because only approximately 4 acres of habitat would be affected due to clearing and construction activities for off-site facilities. Direct take of adult birds due to these activities is unlikely, because most individuals are expected to avoid areas of activity. It also is unlikely that nests, eggs, and young would be disturbed by vegetation removal because nest sites are most likely not adjacent to roadways where the facilities would be built.

The average hourly noise level during construction for the off-site facilities would be 85 dBA (at 50 feet) and 84 dBA (at 50 feet) due to the borrow area activity during operations (Forest Service 2022c). As such, the SGP would not be expected to result in permanent hearing loss for birds. Noise- and light-reduction strategies described for the mine site and for other general wildlife species would be used to reduce indirect effects on migratory bird species.

The Johnson Creek Route Alternative would have similar effects on migratory bird species as the 2021 MMP.

Direct and Indirect Effects from the No Action Alternative

Mine Site

Migratory bird species and bald and golden eagles would likely continue to use the mine site area as they currently do.

Access Roads

Existing roads also would continue to affect wildlife through habitat fragmentation and vehicle-wildlife collisions and noise, light, and fugitive dust impacts from traffic.

Utilities

No new transmission lines or communication towers would be constructed, so there would be no new loss of habitat or source of noise and light impacts.

Off-site Facilities

There would be no new loss of habitat or source of noise and light impacts due to off-site facilities.

Determination

The action alternatives may directly and indirectly impact migratory bird species individuals and habitat. Therefore, based on the impact analysis above for migratory bird species and their habitat, the action alternatives would result primarily in localized, short-term, long-term, and permanent, minor impacts to migratory bird species.

7.3 Mitigation and Monitoring

Mitigation measures required by the Forest Service would represent reasonable and effective means to reduce the impacts identified in the previous sections or to reduce uncertainty regarding the forecasting of impacts into the future. These mitigation measures are in addition to the Forest Service requirements and proponent-proposed design features (**Section 2.4**) accounted for in the preceding impact analysis. Mitigation measures may be added, revised, or refined based on public comment, agency comment or continued discussions with Perpetua regarding this specialist report or subsequent analysis under NEPA. The adopted mitigation measures will be finalized in the Final EIS.

7.4 Cumulative Effects

7.4.1 Past and Present Actions

Past actions include activities that may have been initiated in the past but also could involve present operations such as mineral exploration, infrastructure development, and non-mining related actions. They may have lingering effects in degrading the environment or may influence trends in the physical, biological, or social environment.

Present actions include mining projects and their related activities (i.e., exploration, reclamation) that may have just commenced or are currently underway and are causing impacts. They also may include other non-mining related projects currently in progress, such as timber sales or vegetation treatment; recreation; other utility lines (e.g., powerlines) and roads; maintenance and use of the existing transportation network; urban development in Valley County; private land development and uses; and sand and gravel extraction.

Past and present actions that have an interactive, synergistic, and/or additive effect (per 40 CFR 1508.7) with a specific resource (such as lingering effects or influencing trends) in the SGP area are described below:

Mineral Exploration and Mining Activities – Past and present mineral exploration and mining have occurred in the vicinity of the mine site, including prospecting, exploration, underground mining, and open pit mining. To support past mining, other related activities occurred in the vicinity, including ore milling and processing, tailings disposal, smelting, heap leaching of ore, spent heap leach ore disposal, development rock disposal, hydropower generation, water retention dam construction, sawmill operations,

electric power transmission line construction, and occupancy by thousands of people in housing camps and later in the town of Stibnite.

Two major periods of mineral exploration, development, and operations have occurred in the past century, and have left behind substantial environmental impacts. Between the mid-1920s and the 1950s, the area was mined for gold, silver, antimony, and tungsten mineralized materials by both underground and, later, open pit mining methods. The second period of major activity started with exploration activities in 1974 and was followed by open pit mining and seasonal on-off heap leaching and one-time heap leaching from 1982 to 1997, with ore provided by multiple operators from several locations, and processed in adjacent heap leaching facilities (Forest Service 2015a).

The mining, milling, and processing activities created numerous legacy impacts including underground mine workings, multiple open pits, development rock dumps, tailings deposits, heap leach pads, spent heap leach ore piles, a mill and smelter site, three town sites, camp sites, a ruptured water dam (with its associated erosion and downstream sedimentation), haul roads, an abandoned water diversion tunnel, and an airstrip.

Other past and/or present mining projects considered in the cumulative effects analysis include:

- **Fourth of July Mine** – Located in Government Creek on National Forest System (NFS) land, Fourth of July Mine has been inactive (Forest Service 2012a).
- **Camp Bird Mine** – Located in Logan Creek on private land, Camp Bird Mine has been inactive for more than 30 years (Forest Service 2012c).
- **Valley County Quarry Development** – Development and operation of an aggregate source to support the road maintenance activities on McCall-Stibnite Road (County Road [CR] 50-412), Johnson Creek Road (CR 10-413), and other backcountry roads as determined by Valley County (Forest Service 2017d).
- **Walker Millsite** – Located in Logan Creek on private land, the plan of operations approved in 1990 included a 50 ton per day ball mill and gravity milling process with the following components: a 50-foot by 100-foot by 8-foot-deep tailings impoundment, 1,000 feet of access road, a water transmission line, and explosives magazine. The millsite on NFS land has been reclaimed (Forest Service 2012c).
- **Golden Hand No. 1 and No. 2 Lode Mining Claims** – Located in the Big Creek drainage on 1,309 acres of NFS land, approximately 19 miles north of Yellow Pine, the plan of operations included drilling operations, trenching and sampling, and reopening the caved Ella Mine adit. The project also would include the collection of subsurface geological information to prepare for a new mineral examination. The claims encompass approximately 20 acres each and are adjacent to Coin Creek (Forest Service 2012c).
- **Cinnabar Mine** – Located 15 miles east of Yellow Pine and approximately 50 acres in extent, most of the mining occurred during the 1950s. No reclamation has been performed at the site and contaminants of concern include mercury, methylmercury, and arsenic (EPA 2020).

Exploration activities for potential future mining development have been occurring for the last decade and are ongoing at or within the vicinity of the SGP. Affiliates of Midas Gold initiated mineral exploration activities in 2009 as part of the Golden Meadows Exploration Project to better define the mineral deposit potential for the area. Activities associated with the Golden Meadows Exploration Project included the

use of the existing road network, and construction of several temporary roads to access drill sites, drill pad construction, drilling on both NFS and private lands, and reclamation (Forest Service 2015). The following is a brief summary of the activities:

- **Midas Gold Exploratory Drilling (2009-2012)** –Exploratory drilling consisting of approximately 6 to 122 drill pads mostly occurred on private land. Crews were housed on private property in Yellow Pine. All equipment was staged on private property and drilling activities generally occurred 24 hours per day. Water withdrawal sites included existing sediment retention ponds and streams. Private and Forest Service temporary roads were used and/or authorized to access drill pads located on NFS lands. Road maintenance was needed to open the existing roads. For winter activities, chained rubber-tired vehicle, helicopter, snowcat, or snowmobile provided access. Where drill pads were located next to roads, some snow plowing occurred at select locations. During snow-free periods, access occurred by helicopter, and where there was authorized access on NFS land or on private land, rubber-tired vehicles also were used for access. Midas Gold also drilled 16 new groundwater alluvial and bedrock monitoring wells on 8 pads in 2012 (Forest Service 2015a).

- **Monitoring Wells for the Golden Meadows Project (2013)** – Midas Gold drilled four new groundwater alluvial and bedrock monitoring wells on two pads in 2013. Exploration drilling was conducted in 26 drill areas within NFS land. Twenty-four of the drill areas were accessed by helicopter (i.e., for transport of equipment and crew) and contained temporary helicopter-supported drill pads. No temporary roads were needed for these 24 drill areas (Forest Service 2015a).

- **Midas Gold Baseline Studies (2013-2017)** – Baseline data collection studies including water quality, fishery surveys, wildlife surveys, and vegetation mapping were conducted (Forest Service 2015a).

- **Winter Geotechnical Study (2017)** – Exploration drilling was conducted in 26 drill areas within NFS land. Twenty-four of the drill areas were accessed by helicopter (i.e., for transport of equipment and crew) and contain temporary helicopter-supported drill pads. No temporary roads were needed for these 24 drill areas (Forest Service 2015a).

- **Geotechnical Studies along Meadow Creek (2017)** – Geotechnical study field work program was conducted in support of feasibility level engineering work on the proposed tailings impoundment and impoundment dam foundation conditions. Midas Gold utilized a track mounted Cone-Penetrometer Test rig to access eight locations along Meadow Creek in September/October 2017 (Forest Service 2015a).

- **Operations Exploratory Drilling (2016-2019)** – In addition to exploratory drilling for the winter geotechnical study in 2017, expansion of an existing borrow source on NFS land just east of the camp and shop area also occurred. The borrow material supplied approximately 7,000 cubic yards of crushed rock to support the exploration program, including road maintenance and site reclamation activities and also was used by previous operators and the Forest Service. Approximately 141,000 gallons of fuel (diesel, gasoline, and jet fuel) per calendar year was transported on existing Valley County roads to the fuel storage facility (located on private land) (Forest Service 2015a).

- **Exploration and Geotechnical Drilling (2018)** – Midas Gold drilled 62 exploration and geotechnical drilling pads within the project area. Fifty-six of the pads are track-supported and

the remaining six are helicopter-supported. None of the pads are steep slope drill pads. The 62 proposed pads are located in the vicinities of the following water bodies: Upper East Fork South Fork Salmon River, Meadow Creek, Middle East Fork South Fork Salmon River, Lower East Fork South Fork Salmon River, Upper Meadow Creek, and West End Creek (HDR 2017c).

- **On-going Monitoring for Golden Meadows Project** – Monitoring for weeds, water quality, minerals and geology, access and haul route water quality monitoring, monitoring of water quality best management practices and project standard operating procedures associated with haul and access road use, wildlife and rare plants continue to be conducted (Forest Service 2015a).

- **Burntlog Route Geophysical Investigation Field Work (2020-2021)** – Midas Gold collected geophysical data at proposed rock quarries, bridge abutments, cut slopes, and soil nail/mechanically stabilized earth wall locations using four methods including a Dynamic Cone Penetrometer Test, a track mounted excavator, a truck/track mounted hollow stem auger/core rig, and a helicopter assisted casing advancer/core drill rig. Midas Gold is investigating 24 locations by drilling or excavating 40 borings/test pits along the proposed Burntlog Route. The geophysical investigation field work will last approximately 40 days. Nearly half of the locations are situated along the existing Burntlog Road and the remaining sites are located along the proposed new alignment of the Burntlog Route between Trapper Creek and Stibnite (Midas Gold 2019).

Transportation Projects – Road maintenance, improvement projects, airstrip operations and maintenance, and culvert and bridge replacements have occurred in the past and are expected to continue in the future. Installation or improvement of culverts and bridges may impact aquatic habitat due to construction-related effects and erosion. Maintenance of existing roadways, culverts, and bridges will likely be short-term, while new roadways, culverts, and bridges would have a larger effect. More information regarding current and future road maintenance and airstrip operations are provided below:

- **Road Maintenance of NFS Roads** – Thunder Mountain Road (FR 50375) and Meadow Creek Lookout Road (FR 51290) are both NFS maintenance level 2 roads that received maintenance in 2014 and are on a regular maintenance schedule. Road maintenance activities include blading, slough removal, and culvert cleaning. It is assumed that private landowners on private lands keep roads open and maintained to meet their needs.

- **Road Maintenance of County Roads** –Warren Profile Gap Road (CR 50-340) and the road to the Big Creek Trailhead are currently maintained by Valley County under a cooperative agreement; both roads are on an annual or biannual maintenance schedule. Road maintenance activities include blading, slough removal, and culvert cleaning. Smith Creek and Pueblo Summit Roads have not received any maintenance for years (Forest Service 2016).

    - McCall-Stibnite Road (CR 50-412) is currently maintained by Valley County under a cooperative agreement, on a regular maintenance schedule. There is an agreement between Valley County and Midas Gold to allow Perpetua to provide maintenance along the road from Yellow Pine to Perpetua 's property, “the road will be continuously maintained during the open period. Maintenance will, in all respect, be subject to review and approval by the Valley County Road Superintendent. The Owner/Contractor will abide by the Schedule 8: Payette National Forest; Road Maintenance Best Management Practices. During winter operations the Owner/Contractor will maintain a vehicle and trailer parking and turn around area at Profile Creek and Stibnite. The Owner/Contractor will place a temporary Valley County owned and signed gate above the Profile Creek Road during the Spring Breakup to prohibit any full-size vehicles from entering the Yellow Pine-Stibnite Road, unless otherwise authorized. All-terrain

vehicles (ATV), utility-terrain vehicles, and snow mobile access on the Yellow Pine-Stibnite Road will still be permitted for the public at large during this temporary travel restriction."

- **Road Maintenance of State Roads** – SH 55 is maintained by the Idaho Transportation Department (ITD). Recent upgrades and improvements included the Banks Beach parking study and the ongoing Smiths Ferry safety improvements. SH 55 was recently repaved between Donnelly and McCall (ITD 2021). The project addressed wear and tear to increase the service life of the roadway.

- The ITD, Division of Aeronautics maintains and operates the Johnson Creek, Warm Springs, and Bruce Meadows airstrips which are located on NFS land.

Mine Closure and Reclamation – Closure and reclamation of Hecla and SMI mining and processing facilities located in the headwaters of East Fork SFSR and Sugar Creek occurred between 1993 and 2000. Several Comprehensive Environmental Response, Compensation, and Liability Act Removal Actions also were conducted in the same area by the Forest Service, Environmental Protection Agency, and Exxon-Mobil Corporation to minimize risks to human health and the environment from legacy mining and processing activities during the 1930s, 40s, and 50s.

Recreation and Tourism – Past and present recreation and tourism activities include sport hunting, fishing, trapping, boating and river recreation, camping, hiking, backpacking, outfitter/guide operations, tourist services – Big Creek Lodge, Elk Springs Outfitters, and Juniper Mountain Outfitters. These activities take place primarily from late spring to late fall, and there may be small plane, helicopter, and vehicle traffic associated with access.

Infrastructure Development – Past and present community infrastructure projects include the transmission line upgrades in the West Central Mountain Electric Plan 2014, which follows the general location of the SGP upgraded transmission line route (IPCo 2014). In 2020, IPCo rerouted approximately 2.5 miles of the existing Warm Lake Feeder overhead 7.2kV distribution line with approximately 2.75 miles of single-phase underground line in the Yellow Pine area (Forest Service 2020c).

Water Diversions and Hydro Power Projects – There are eight water diversions on federal and private lands in vicinity of the SGP area. There also are three residential, small-scale hydroelectric operations (0.4 to 0.9 cubic feet per second permitted), and one hydroelectric operation at Big Creek Lodge.

Wildland Fire, Noxious Weed Control, and Firewood Harvest – There have been numerous wildland fires in vicinity of the SGP area and it is likely more will occur in the future. Past fires within the headwaters of the East Fork SFSR and Sugar Creek include Indian Creek Point (12,204 acres); Tamarack (2,348 acres); Bishop Creek (2,610 acres); Cascade Complex (299,930 acres); Thunder City (13,263 acres), and Buck Fire (19,474 acres). In fall of 2021, the Krassel Ranger District conducted prescribed burns to areas east of Yellow Pine (Bald Hill project area) and along the SFSR (Four Mile project areas). Removal of firewood for non-commercial use has occurred in the past and is expected to continue in the future on NFS land, in compliance with general permit requirements for the Payette National Forest. Several noxious weed species have been identified in the vicinity of the SGP including spotted knapweed, Canada thistle, yellow toadflax, and rush skeletonweed. Treatment of noxious weeds occurs regularly throughout the area. Treatments include chemical spraying and pulling. Main areas of treatment for noxious weeds include Chamberlain area, Beaver Creek, and Big Creek trails, and along road access areas. The Lost Horse vegetation management project was completed within the Clear Creek drainage along FRs 405, 406, 407, 409, and 433; the objective of this project was to restore species composition and stand

structure while reducing undesirable tree densities and favoring retention of larger diameter, more fire-resistant trees (Forest Service 2020b).

Authorized in May 2021, the Big Creek Hazardous Fuel Reduction was a community protection project for Edwardsburg/Big Creek area using commercial and noncommercial treatments and prescription fire to reduce hazardous fuels. Treatments were on Forest Service lands along public roads and adjacent to private property, outside of wilderness. The project implementation reduced wildfire risk and fire severity/intensity on NFS lands around Big Creek and Edwardsburg and private property using commercial timber harvest, understory treatment, and prescribed burning. Approximately 10,290 acres were treated including, approximately 631 acres of mastication and/or hand thin, no removal; 847 acres of commercial and pre-commercial thinning; 1,047 acres of hand-thinning, no removal; 7,765 acres of natural fuel prescribed fire burn blocks; and less than 1 mile of temporary road constructed to facilitate equipment access and product removal reclaimed after vegetation management treatments were completed.

Forest Management - These activities include easements and other management actions. There are several easements in the SGP area and vicinity that are granted and maintained by the Forest Service including: Road Right-of-Way, Forest Road and Trail Act (FRTA) on McCall-Stibnite Road (CR 50-412), Road Right-of-Way and Linear Utility easement to the IPCo. The Yellow Pine Blowdown Project near Yellow Pine was conducted to remove down material from camping and recreating areas, reduce the risk of insect outbreak, and to reduce the fuel loading to help to ensure the safety of the Yellow Pine community. In 2020, the BNF decommissioned approximately 18 miles of non-system routes in the Six-bit Creek and Curtis Creek subwatersheds, part of the SFSR subbasin (Forest Service 2020b).

The South Fork Restoration and Access Management Plan (RAMP) is in the implementation phase with the decision dated July 13, 2021. The project's objective is to determine the minimum road system, improve watershed condition, provide all-terrain vehicle (ATV) and motorcycle trail opportunities, and provide dispersed camping and parking opportunities. The project includes numerous actions relating to watershed restoration, motorized and non-motorized access, and improvements of recreation facilities within the SFSR watershed within a 329,000-acre project area. Target dates for implementation are 2022-2027 (Forest Service 2021a).

Commercial and Subsistence Harvest of Fish and Wildlife – Past and present harvest of fish and wildlife for recreational and subsistence purposes puts some degree of pressure on those resources. Legal hunting, fishing, and trapping has occurred and is currently occurring in the SGP area and vicinity. Fish and wildlife resources are managed by the Idaho Department of Fish and Game and federal agencies to maintain sustainable populations. Managers use management tools such as harvest limits and areas open and closed to sport and commercial harvest of fish and wildlife to maintain sustainable resources and allocate harvest.

7.4.2 Reasonably Foreseeable Future Actions

Table 7-20 presents the reasonably foreseeable future actions and projects.

Table 7-20 Reasonably Foreseeable Future Actions in the Vicinity of the SGP Area

Project or Activity Name	Agency Document/ District	Brief Description	Approximate Implementation/ Construction/ Operation Dates
Stibnite Mine Site ASAOC	EPA and Forest Service ASAOC	Address legacy mining impacts, including time critical removal actions consisting of stream diversion ditches and removal of about 325,000 tons of development rock and tailings.	2022 - 2024
East Fork Salmon River RAMP	PNF	Scoping for the East Fork Salmon River (EFSR) RAMP estimated to start late 2021. The spatial extent of the EFSR RAMP could include Yellow Pine, Big Creek, and Thunder Mountain within the PNF. The purpose of the EFSR RAMP is travel management. The Forest Service would conduct travel planning to identify a Minimum Road System (MRS) (36 CFR 212 Subpart A) and the routes open for public use (36 CFR 212 Subpart B), including motorized trail opportunities, dispersed camping, and parking opportunities and update the Forest Motor Vehicle Use Map.	Expected Decision: 10/2022 Expected Implementation: 11/2022
Burntlog Route Geophysical Investigation	CE (BNF SOPA)	- Minerals and geology The purpose of the investigation is to collect crucial geophysical data along the existing Burnt Log Road and proposed new alignment between Trapper Creek and Stibnite.	Scoping Start: 02/10/2020 Expected Decision: 03/2022 Expected Implementation: 09/2022
Nez Perce Tribe Research Equipment	CE / PNF SOPA	Replacement of an existing propane tank servicing a fish detection system (PIT array) with a 1,000-gallon tank in an existing hardened area to ensure fuel supply through winter months.	Scoping initiation: 11/2021 Expected Decision: 04/2022 Expected Implementation: 07/2022
Stallion Gold – Horse Heaven Project		Surface exploration of gold and antimony deposits. The project consists of 695 unpatented federal mining claims and mineral rights on 13,950 acres. This project would share its eastern boundary with the SGP.	

Source: FHWA 2020; Forest Service 2018b, 2020c, 2020d, 2020e, 2021a, and 2021b; ITD 2020, 2021
CE = Categorical Exemption
EA = Environmental Assessment
EIS = Environmental Impact Statement
FHWA-WFLHD = Federal Highway Administration, Western Federal Lands Highway Division
NOA = Notice of Availability
SOPA = Schedule of Proposed Actions.

7.4.3 Cumulative Effects Analysis

The cumulative effects analysis area for wildlife and wildlife habitat that could be directly or indirectly affected by the SGP consists of the analysis areas described in **Section 5.2**.

Cumulative effects associated with the SGP consider the range of existing and foreseeable activities and their potential effects with respect to wildlife and wildlife habitat. Past and present actions that have, or are currently, affecting wildlife and wildlife habitat, as well as reasonably foreseeable future actions (RFFAs) that could cumulatively contribute to wildlife and wildlife habitat impacts in the analysis area include mineral exploration and mining activities, closure and reclamation projects, transportation projects, recreation and tourism effects, wildfire and noxious weed control projects, and development projects (**Table 7-21**).

Table 7-21 Cumulative Effects on Wildlife Species in the Analysis Areas

Cumulative Project Type	Potential Effects on Wildlife
Mineral Exploration and Mining Activities	Several historic mines in the analysis areas have changed the habitat over time through removal of vegetation and displacement of wildlife species. Currently planned or future mine development will modify additional habitat types during development; these habitats will likely also be reclaimed in part on closure of the mine projects. During exploratory drilling, development, and operations, the increased noise and light impacts and road networks will be a source of disturbance and mortality for wildlife and will likely also displace several species.
Closure and Reclamation Projects	Projects that are currently undergoing reclamation, or will in the future, will likely improve habitat for wildlife. These projects will likely be closed, which involves the removal of some of the infrastructure involved and reclamation of native habitats. Additional habitat would generally become available to wildlife use within different time frames, depending on the type of reclamation. Early seral and grassland habitats would be available for wildlife within a short time, while mature forest types would not be available for decades.
Transportation Projects	Road maintenance, improvement projects, and bridge replacements are likely in the analysis areas. As roadways represent a threat to wildlife due to vehicle-wildlife collisions, habitat fragmentation, and noxious weed introduction, these types of projects are likely to also cause an impact on wildlife. Maintenance of existing roadways will likely only be short-term, while new roadways would have a larger effect.
Recreation and Tourism	Recreational activities (i.e., camping, hiking, hunting, trapping, trail riding, firewood harvest, etc.) are likely to continue to affect wildlife in the future. Increased road and trail networks open new areas to additional human disturbance, which will likely displace wildlife. Hunting activities also could decrease localized wildlife populations, although these are regulated closely by Idaho Department of Fish and Game.
Wildfire and Noxious Weed Control Projects	Wildfires and noxious weeds have affected wildlife throughout the analysis areas. Additional wildfires are likely to affect wildlife in the future by reducing mature forest structure and transitioning to early seral communities. Small-scale harvesting of timber on private lands in the area also is likely to reduce the amount of forested habitat available. Control of invasive and noxious plant species also is likely to affect wildlife positively, because spraying or hand-pulling will reduce the invasive species present
Development Projects	Private residential developments are likely to impact wildlife in the future. Native habitats would be disturbed for wildlife, and additional human presence would likely displace individuals.

These RFFAs would result in loss of habitat, but all projects (private or federal actions) would have to meet the requirements of Section 7 of the ESA, which include consultation with federal agencies (e.g., USFWS, National Oceanic and Atmospheric Administration, etc.) on listed species, completion of appropriate analysis documents, and compliance with agency-mandated reasonable and prudent measures to protect listed species. In addition, actions on PNF and BNF must meet the standards of the Forest Plans, which specifically addresses threatened, endangered, proposed, or candidate species, as well as sensitive species and species of special interest, such as elk, and related habitat.

7.4.3.1 No Action Alternative

Under the No Action Alternative, the analysis area would still be impacted by the types of projects discussed under the 2021 MMP. However, the No Action Alternative itself would not contribute additional impacts to wildlife and their habitats.

7.4.3.2 2021 MMP

The 2021 MMP would impact 3,266 acres from the combined mine site, access roads, utilities, and off-site facilities, which would be a large increase of disturbed habitat compared to other past, present, and RFFAs in the area. Various components of this larger area would be considered habitat for different species, depending on the potential vegetation groups, tree size classes, and canopy cover classes present. However, these impacts would be offset and reduced through restoration of vegetation communities native to the area during the closure and reclamation process. The result is that long-term, net impacts (e.g., functional habitat losses and disturbed habitat in the analysis areas) would be minimized, although it would be decades before habitats would be reclaimed to similar functionalities. The effects of road upgrades and traffic-related incidents with wildlife are likely under the 2021 MMP, which would contribute to the other past, present, and RFFAs.

Following closure and reclamation of the mine site, existing and ongoing mineral exploration for the SGP would cease in the wildlife analysis areas. Activities that would continue in the future, and may contribute to cumulative effects on wildlife and habitats in the analysis areas would include mineral exploration activities outside the mine site; other closure and reclamation projects; continued road use, transportation infrastructure improvements and maintenance; recreational and tourism activities; wildfire and vegetation management actions (e.g., mechanical vegetation treatment, salvage harvest, and prescribed fire); and private development projects. Potential cumulative effects from these types of actions would include further ground disturbance and habitat alteration. These reasonably foreseeable future actions would have the potential to disturb wildlife habitats because of vegetation removal and ground disturbance. RFFAs would be governed by applicable laws and regulations and would be required to conform to applicable forest plan standards on PNF and BNF.

Cumulative impacts from past and present projects have resulted in temporary and permanent losses of habitats and ecological functions in the region, and future projects also would likely impact terrestrial wildlife species. However, the region is still somewhat remote and relatively wild, and the types of projects listed above are unlikely to significantly change this wilderness character in the near term, with the exception of additional wildfires reducing mature forest structure.

The 2021 MMP includes a variety of reclamation projects over the course of mine construction, operation, and closure and reclamation. However, the 2021 MMP would likely result in impacts that would be considered to permanently contribute to an adverse cumulative impact on these resources when combined with past, present, or RFFAs.

7.4.3.3 Johnson Creek Route Alternative

The Johnson Creek Route Alternative would impact 3,096 acres from the combined mine site, access roads, utilities, and off-site facilities footprints, and would be a large increase in the amount of disturbed habitat compared to other past, present, and RFFAs in the area. Because the size of the disturbance footprint is smaller than that of the 2021 MMP due to the absence of the Burntlog Route, the cumulative impacts of the Johnson Creek Route Alternative would be less than under the 2021 MMP.

7.5 Short-term Uses and Long-term Productivity

The National Environmental Policy Act recognizes that short-term uses and long-term productivity of the environment are linked. The uses of environmental resources—or impacts on those resources—have corollary opportunity costs. These costs relate to lost opportunities and productivity that could continue into the future. This section discusses whether the short-term uses of environmental resources by the SGP would affect (either positively or negatively) the long-term productivity of the environment.

This section provides a brief overview of the short-term effects of the alternatives versus the maintenance and enhancement of potential long-term productivity of the environmental resources in the SGP area. Short-term refers to the timeframe for the proposed SGP (the 20-year life of the mine). Long-term refers to an indefinite period after the SGP ends.

7.5.1 No Action Alternative

The No Action Alternative is not expected to affect the long-term productivity of the environment.

7.5.2 2021 MMP

Wildlife resources contribute to biological productivity, and the long-term productivity of these resources provides economic, ecological, and recreational benefits. Construction and operation of the mine and associated off-site facilities would result in some temporary, short-, mid-, and long-term impacts on wildlife. During construction, wildlife habitat would be removed from the footprint of the proposed mine site and from land associated with off-site facilities, access roads, and utilities. Habitat loss would be short-term in some areas, and long-term in others, depending on the type of vegetative cover. Timbered areas to be cleared would take decades to re-generate, during which a loss of primary and secondary habitat for many species would occur. Natural recovery and reclamation of habitat would take place outside the footprint of the proposed mine site after construction activities cease. Additional habitat would be lost for the duration of the SGP, because the increase in human activity would cause avoidance of the area by certain sensitive wildlife species. The risk of wildlife injury or mortality also would be increased as a result of the increase in human activity.

These short-term impacts would persist long enough to potentially affect the long-term productivity for some sensitive wildlife species or those with limited habitat. It is possible that some species would not return to the area after being displaced, which would be a long-term impact.

7.5.3 Johnson Creek Route Alternative

Although there would be construction or operational differences, the Johnson Creek Route Alternative would have short-term effects similar to the 2021 MMP. The exception is that upgrading the Johnson Creek Route would have fewer long-term impacts to many sensitive species and habitats than developing the Burntlog Route under the 2021 MMP.

7.6 Irreversible and Irretrievable Commitments of Resources

The Council on Environmental Quality guidelines require an evaluation of "any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented" (40 Code of Federal Regulations 1502.16). Resources that would be irreversibly or irretrievably used during implementation of the alternatives would include a range of natural, physical, human, and financial resources.

Irreversible – A commitment of resources is irreversible when the impacts of the alternatives would limit the future options for use of the resource. This applies primarily to non-renewable resources or to processes or resources that are renewable over long periods of time.

Certain biological resources that would be affected by the action alternatives are renewable only over long-time spans, including mature vegetation, seedbanks, and topsoil. Loss of these resources would be considered irreversible. Reclamation of high-value habitats for wildlife species such as wolverine, lynx, and tree-nesting bird species may require long periods of time (decades).

Irretrievable – A commitment of resources is irretrievable when the impacts of an action would result in a loss of production, harvest, or use of renewable resources; it describes the temporal loss of renewable resources. These opportunities are foregone for the period of the alternatives, during which the resource cannot be used.

An irretrievable commitment of resources occurs when a resource that is renewable over a relatively short period of time is consumed during the life of a project and is therefore unavailable for other uses until the use ceases, and it is renewed and once again available. It is the temporal loss of resources that is considered irretrievable.

The SGP would remove the land from other uses while it is ongoing, but the current use would eventually be returned through reclamation. The temporal loss of the land for other uses would be irretrievable. This includes biological resources that are renewable over a short time, such as vegetation, wetlands, and streams. Although the loss of the resource is reversible, the temporal loss of the use of the resource is irretrievable. The temporal loss of biological resources that are renewable only over long-time spans would be considered irretrievable.

Any incidental or induced mortality of wildlife resulting from the SGP would result in an irretrievable commitment of these resources. Although most animals displaced from the affected areas are expected to survive relocation, some displaced animals may not survive the stresses of relocation; their loss would be irretrievable.

Any reduction in habitat functions also would be irretrievable. Once the habitat is reclaimed to its full function, the irretrievable loss would be limited to the temporal loss of habitat during the period before it was reclaimed.

7.6.1 No Action Alternative

There would be no irreversible and/or irretrievable commitment of resources under the No Action Alternative.

7.6.2 2021 MMP

7.6.2.1 Irreversible

Although most wildlife species are considered renewable, certain biological resources that would be affected by the 2021 MMP are renewable only over long-time spans, including mature vegetation, including snags, seedbanks, and topsoil. Loss of these resources would be considered irreversible. Reclamation of high-value habitats for wildlife species such as Canada lynx, wolverines and migratory bird species may require long periods of time (decades). Impacts to populations of threatened or endangered species, or species with low populations, such as Canada lynx or wolverine, would be considered irreversible, because recovery may take a long period of time or not occur at all. The direct mortality of wildlife also would be an irreversible impact.

7.6.2.2 Irretrievable

Irretrievable commitments include biological resources that are renewable over a short time, such as vegetation, wetlands, and streams. Although the loss of the resource itself is reversible, the temporal loss of the use of the resource is irretrievable. The 2021 MMP activities would cause a temporal loss of habitat for a number of species; both from direct removal of vegetation, and indirectly through avoidance due to human presence. Some species sensitive to human presence, such as Canada lynx and wolverine, may not return to the area for years after the mine is closed.

Injury or mortality of individuals, such as burrow-dwelling species and slow-moving species that are unable to relocate when ground-disturbance activities begin, or through vehicle or transmission line collisions, would result in an irretrievable commitment of these resources. Although most animals displaced from the affected areas are expected to survive relocation, some displaced animals may not survive due to the associated dangers of migration and competition for resources; their loss also would be irretrievable.

Any reduction in habitat functions also would be irretrievable. Once the habitat is reclaimed to its full function, the irretrievable loss would only be the temporal loss of habitat during the period before it was reclaimed. Some vegetation and soil habitats would be lost for future use by wildlife until reclamation could be successfully implemented. Wildlife displaced from the affected habitat may relocate throughout the region, changing the availability of game for hunters and predators. The change could increase or decrease hunting success, but any reduction in game availability would represent an irretrievable loss of opportunity.

7.6.3 Johnson Creek Route Alternative

7.6.3.1 Irreversible

There would be irreversible effects similar to the 2021 MMP.

7.6.3.2 Irretrievable

Under the Johnson Creek Route Alternative, there would not be improvements or construction of new segments for Burntlog Route, which would be a significant reduction of irretrievable commitments compared to the 2021 MMP. Relocation of the maintenance facility could affect different habitats.

7.7 Summary

For wildlife and wildlife habitat, the important differences among the alternatives lie in the acres of habitat loss, the amount and location of the disturbance from noise and human activity, and the location of the facilities. The Johnson Creek Route Alternative would have the smallest amount of habitat loss (3,096 acres), with 170 fewer acres than the 2021 MMP due to the elimination of the Burntlog Route, which also would substantially reduce the magnitude and extent of impacts on most wildlife, especially wolverine, big game, and migratory birds.

Table 7-22 provides a summary comparison of SGP impacts by issues and indicators for each alternative.

Table 7-22 Comparison of SGP Impacts by Alternative

Issue	Indicator	Baseline Conditions	No Action Alternative	2021 MMP	Johnson Creek Route Alternative
The SGP may cause changes in wildlife habitat in the analysis area that may affect wildlife species including special-status species (endangered, threatened, Management Indicator Species, and sensitive species)	Acres of general wildlife habitat disturbed.	Hydrologic Unit Code 12 Wildlife Analysis Area: 613,793 acres	Same as Baseline Condition	Direct Habitat Impacts: 3,266 acres	Direct Habitat Impacts: 3,096 acres
	Acres of special-status wildlife habitat disturbed.	Canada Lynx Analysis Area: 656,493 acres NIDGS Analysis Area: 17,917 acres Wolverine Analysis Area: 316,035 acres Wildlife Analysis Area: 613,793 acres	Same as Baseline Condition	Canada Lynx Direct Impacts: 194 acres NIDGS Direct Impacts: 63 acres Wolverine Direct Impacts: 2,342 acres White-headed Woodpecker: 16 acres Lewis's Woodpecker: 11 acres American Three-toed Woodpecker: 57 acres Black-backed Woodpecker: 89 acres Dusky Grouse: 160 acres Boreal Owl: 37 acres Fisher: 54 acres Flammulated Owl: 44 acres Great Gray Owl: 270 acres Northern Goshawk: 89 acres Pileated Woodpecker: 1 acre Silver-haired bat: 219 acres Mountain Quail: 405 acres Bighorn Sheep (Summer): 636 acres Bighorn Sheep (Winter): 137 acres Columbia Spotted Frog: 1,049 acres	Canada Lynx Direct Impacts: 175 acres NIDGS Direct Impacts: 63 acres Wolverine Direct Impacts: 2,005 acres White-headed Woodpecker: 29 acres Lewis's Woodpecker: 25 acres American Three-toed Woodpecker: 48 acres Black-backed Woodpecker: 80 acres Dusky Grouse: 208 acres Boreal Owl: 36 acres Fisher: 45 acres Flammulated Owl: 64 acres Great Gray Owl: 225 acres Northern Goshawk: 81 acres Pileated Woodpecker: 1 acre Silver-haired bat: 275 acres Mountain Quail: 449 acres Bighorn Sheep (Summer): 629 acres Bighorn Sheep (Winter): 149 acres Columbia Spotted Frog: 1,053 acres
	Acres of disturbance and the proximity of the proposed mining operations to high-value habitats such as crucial and or high-value big game ranges, wetlands, and seep and spring areas.	Not applicable.	Same as Baseline Condition	Direct Habitat Impacts: 3,266 acres Canada Lynx Direct Impacts: 194 acres NIDGS Direct Impacts: 63 acres Wolverine Direct Impacts: 2,342 acres Bighorn Sheep (Summer): 636 acres Bighorn Sheep (Winter): 137 acres Columbia Spotted Frog: 1,049 acres	Direct Habitat Impacts: 3,096 acres Canada Lynx Direct Impacts: 175 acres NIDGS Direct Impacts: 63 acres Wolverine Direct Impacts: 2,005 acres Bighorn Sheep (Summer): 629 acres Bighorn Sheep (Winter): 149 acres Columbia Spotted Frog: 1,053 acres
	Change in noise levels (in decibels) in—or in proximity to—wildlife habitat	Existing ambient sound levels were measured at various noise-sensitive receptor sites and varied between 34 and 64 dBA.	Same as Baseline Condition	Ongoing noise levels would attenuate to 55 dBA within 0.8 miles of the disturbances based on distance alone. Temporary disturbances (e.g., blasting, winter road maintenance) would be audible further away. Construction: Mine site noise would attenuate to 55 dBA at 0.8 mile from source; access road construction would attenuate to 55 dBA at 0.57 mile on distance alone. Operations: Based on distance alone, mine site noise would attenuate to 55 dBA at 1.5 miles; blasting would	Same as the 2021 MMP, with the exception of the Burntlog Route – noise from traffic on Johnson Creek Route would be similar. Helicopter installation of utility structures would reduce habitat impacts but would introduce noise that could affect sensitive species. Construction: Helicopter use would attenuate to 55 dBA approximately 1.7 miles from the source of the activity on distance alone.

Issue	Indicator	Baseline Conditions	No Action Alternative	2021 MMP	Johnson Creek Route Alternative
				attenuate to 55 dBA at 2.2 miles; road maintenance would attenuate at 0.4 to 0.55 miles; and mine traffic would be below the threshold at 49 dBA. Closure: Noise impacts would be similar to the construction phase.	
The SGP may affect wildlife by introducing barriers to movement, including the mine site, infrastructure, new/existing maintained roads, new transmission line.	Miles of new roads proposed for the SGP.	Access Roads – existing roads – 89 miles Utilities – existing roads – 30 miles	Same as Baseline Condition	Access Roads – 15 miles new road on Burntlog Route Cabin Creek OSV route – 10.4 miles groomed OSV route Utilities – new utility access roads – 25 miles	Access Roads – No new access road miles. No Cabin Creek OSV route.
	Acres of disturbance for new and upgraded transmission lines.	Existing transmission lines –459 acres	Same as Baseline Condition	New transmission lines – 115 acres Upgraded transmission lines – 158 acres	Same as the 2021 MMP.
	Length of potential movement barriers.	There are no known or designated wildlife corridors for big game species or listed species. Linkage areas for Canada lynx have been estimated to occur north to south across Warm Lake Road, and east to west across the South Fork of the Salmon River.	Same as Baseline Condition	Potential barriers: Mine Site – 6 miles long x 1 mile wide Access Roads – new roads – 38 miles Utilities – new utility access roads: 25 miles and new transmission corridors: 115 acres Off-site Facilities – no barrier effects	Same as the 2021 MMP, with the exception of the Burntlog Route, which would reduce new access road mileage as a barrier.
The SGP may affect wildlife by potentially increasing the risk of direct injury or mortality.	Amount of increased traffic along the access routes, or acres of ground disturbance for less-mobile species.	Baseline AADT: Warm Lake Road – 1,670 Johnson Creek Road – 70 Stibnite Road – 30 Burnt Log Road – 70	Same as Baseline Condition	AADT – Construction through Post Closure: Warm Lake Road – 1,826 - 1,868 Johnson Creek Road – 70 - 135 Stibnite Road – 30 - 95 Burnt Log Road – 120	AADT – Construction through Post Closure: Warm Lake Road – 1,826 – 1,868 Johnson Creek Road – 70 - 120 Stibnite Road – 30 - 80
	Miles of new roads and new transmission lines.	Access Roads – existing roads – 135 miles Utilities – existing roads – 30 miles	Same as Baseline Condition	Access Roads – new roads – 28 miles Utilities – new utility access roads – 25 miles	Access Roads – new roads – 0 miles Utilities – same as the 2021 MMP.
	Miles of existing roads that are not currently plowed that would be plowed.	Currently plowed: Warm Lake Road – 26 miles Stibnite Road – 14 miles	Same as Baseline Condition	Proposed (new) to be plowed: Burnt Log Road – 21 miles (currently groomed). Burnt Log Road Extension – 15 miles (proposed new).	Proposed (new) to be plowed: Johnson Creek Road – 17 miles (conversion of existing OSV portion of Johnson Creek Road).

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Appendix A
Modeling Parameters

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Appendix A – Modeling Parameters

1.0 INTRODUCTION

This appendix provides additional information about the modeling parameters used for the species analyzed in the Wildlife and Wildlife Habitat Specialist Report for the SGP.

2.0 CANADA LYNX

Revision of the 2000 Lynx Conservation and Assessment Strategy (LCAS) was initiated in September 2010 and completed in 2013. The 2013 LCAS (Interagency Lynx Biology Team 2013) is a full revision of the 2000 LCAS, incorporating all prior amendments and clarifications, substantial new scientific information that has emerged since 2000, including related parts of the Lynx Recovery Outline, as well as drawing on experience gained in implementing the 2000 LCAS. The 2013 LCAS made several major changes to the 2000 LCAS, including formally stratifying lynx habitat into core areas and secondary/peripheral areas, along with associated conservation measures for those habitat areas. Direction provided in the 2013 LCAS recommends delineation of Lynx Analysis Units (LAUs) only in designated core areas. Therefore, areas identified as secondary areas, such as the entire Ecogroup, consisting of the Payette National Forest (PNF), Boise National Forest (BNF), and Sawtooth National Forest, which share joint Land and Resource Management Plans (LRMPs), would no longer require management of LAUs.

The 2013 LCAS directs habitat management and conservation measures for secondary areas focused on providing a mosaic of habitat components to support snowshoe hare, maintaining connectivity for lynx movement and dispersal across the landscape, and preserving an acceptable amount and distribution of foraging habitat over time. However, until the 2003 Forest Plan is amended, or revised, to directly incorporate the 2013 LCAS direction, any changes in management must comply with existing Forest Plan standards, based on the 2000 LCAS, unless a project-specific Forest Plan amendment is adopted.

Consequently, effects to Canada lynx analyzed in this specialist report are based on modeled LAUs. LAUs were also delineated based upon guidance provided in the LOC for "Section 7 Consultation for Lynx Regarding Ongoing Activities / Existing Projects within the Payette National Forest" (dated September 12, 2000, File # 113.000/1-4-00-I-765). The existing habitat model (Appendix WL-A), originally created in 2009, was cross-walked with updated vegetation data and revised in 2017, utilizing the best available science (Galloway and Penny 2017). The 2013 LCAS describes the same basic habitat associations as the 2000 LCAS and vegetative communities capable of providing modeled habitat conditions include PVGs 3, 7, 8, 9, 10, and the source habitat capacity model predicts potential suitable source habitat at the mid-scale level (Forest) by LAU and by the parameters described in the model. Source habitat is expected to contain macrovegetation (i.e., cover types and structural stages) that contribute to stationary and/or positive population growth, and contribute to source environments, a composite of environmental conditions resulting in stationary or positive population growth in specific areas and time ranges (Wisdom et al. 2000). The source habitat capacity model, in this case, predicts potential for overall lynx habitat capacity, including primary (breeding) and secondary habitat. It defines acreages of vegetative communities in selected Potential Vegetation Groups (PVGs), which include preferred habitat types, such as Engelmann spruce, lodgepole pine, and mixed-conifer types with Douglas fir and subalpine fir.

Current or existing suitable habitat, a subset of source habitat capacity, is further defined by parameters such as post-burn habitat (updated to better represent horizontal cover in snowshoe hare habitat on the PNF), road density, and plantation age. Current habitat modeling parameters are based on previously defined relationships among vegetation, snowshoe hares, and lynx.

Although the 2017 model provides an overall estimate of both source habitat capacity and existing habitat at the mid-scale, it is limited by specie's specific data for tree size class and tree canopy cover. It is further limited by lack of finer scale habitat feature data required for primary (breeding) and secondary habitat, such as dead and downed large wood density, snag density, and understory cover estimates. As a result of these limiting factors, some of which are required components for lynx breeding habitat, the model overestimates both current and potential suitable habitat.

Table 2-1 also lists the Cover Type equivalent(s) from the 2009 Lynx Habitat Model for each of the new Map Units selected. These were simply added in an effort to show what Cover Types from the 2009 model the new Map Unit classifications were taking the place of. The Cover Type equivalents were determined by comparing the definitions and/or descriptions of both the Cover Types (Forest Service 2003a, 2010) and the Map Units (Boise National Forest VCMQ Document 2014). A Geographic Information System (GIS) exercise that intersected the new vegetation layer with the old cover type spatial layer was also used to inform the Cover Type equivalent choices by showing which cover types a Map Unit overlapped with spatially. For most Map Units this resulted in many different cover types occurring within a given Map Unit. However, in most cases there were only a few cover types with meaningful acreages that gave a sense of what Cover Types were now being represented by which Map Units.

The following Map Units are recommended to be used to model source habitat for the Canada Lynx: Douglas Fir, Douglas Fir/Lodgepole Pine, Engelmann Spruce, Lodgepole Pine, Subalpine Fir, Western Larch, Aspen, Riparian Shrublands, Burned Forest Shrublands, and Burned Herbland.

Table 2-1 Map Units that have the Potential to Provide Lynx Source Habitat Capacity and Source Habitat

Map Unit (MU)	Map Unit Code	Rationale For Inclusion in the Model	Cover Type Equivalent from 2009 Lynx Mid-scale Habitat Model (Hergenrider 2009)
Douglas Fir	DS	Douglas-fir on moist sites identified as both a primary and secondary vegetation providing habitat for lynx (Ruediger et al. 2000).	Douglas Fir (4212), Mixed Subalpine Forest (4270), Lodgepole Pine (4203), Mesic Shrub (3210), Douglas Fir/Lodgepole Pine (4223)
Douglas Fir/Lodgepole Pine	DFL	Douglas-fir on moist sites identified as both a primary and secondary vegetation providing habitat for lynx (Ruediger et al. 2000). Lodgepole pine identified as a primary vegetation type providing habitat for lynx (Ruediger et al. 2000; Rugierro et al. 1999).	Douglas Fir/Lodgepole Pine (4223), Lodgepole Pine (4203), Mixed Subalpine Forest (4270), Douglas Fir (4212)
Engelmann Spruce	ES	Identified as a primary vegetation type providing habitat for lynx (Ruediger et al. 2000; Rugierro et al. 1999).	Engelmann Spruce (4201)*, Lodgepole Pine (4203), Mixed Subalpine Forest (4270)
Lodgepole Pine	LP	Identified as a primary vegetation type providing habitat for lynx (Ruediger et al. 2000; Rugierro et al. 1999).	Lodgepole Pine (4203), Mixed Subalpine Forest (4270), Douglas Fir (4212), Mixed Whitebark Pine Forest (4260)

Map Unit (MU)	Map Unit Code	Rationale For Inclusion in the Model	Cover Type Equivalent from 2009 Lynx Mid-scale Habitat Model (Hergenrider 2009)
Subalpine Fir	SA	Identified as a primary vegetation type providing habitat for lynx (Ruediger et al. 2000; Rugierro et al. 1999).	Mixed Subalpine Forest (4270), Lodgepole Pine (4203), Mixed Whitebark Pine Forest (4260), Douglas Fir (4212), Subalpine Fir (4208)
Western Larch	WL	Larch forests are identified as potential lynx habitat when interspersed with subalpine fir (Interagency Lynx Biology Team 2013).	Douglas Fir (4212), Mixed Mesic Forest (4280)
Aspen	AS	Ruediger et al. (2000) noted that aspen may also contribute to lynx habitat when interspersed with primary vegetation (lodgepole pine, subalpine fir, and Engelmann spruce).	Aspen (4101), Broadleaf Forests (4100-4199), Douglas Fir (4212), Mesic Shrub (3210), Mixed Broadleaf/Conifer Forests (4300)
Riparian Shrublands	RSH	Riparian shrublands within the appropriate PVGs are included. Riparian areas are typically narrow bands with dense vegetation that provide important foraging and travel areas for lynx within the context of the larger forested Map Units.	Conifer Riparian (3210), Mesic Shrub (3210), Douglas Fir (4212), Riparian (6000-6999)
Burned Forest Shrubland	BFS	Selection of these MUs within the appropriate PVGs would represent burned forested habitat that will eventually regenerate back into source habitat at some point in time during succession.	Non-Developed Grasslands (3100-3199), Non-Developed Shrublands (3200-3499), Lodgepole Pine (4203), Mixed Subalpine Forest (4270), Douglas Fir (4212), Douglas Fir/Lodgepole Pine (4223)
Burned Herbland	BHE		

* There was no data associated with the Engelmann Spruce (4201) Cover Type

2.1 Tree Size Class Discussion

Tree size class (TSC) was not specified as a habitat parameter used in the Lynx Mid-scale model (Hergenrider 2009). Any changes to TSC that have occurred since 2007 would be accounted for by using the new 2011 vegetation data and removing fires and plantations >15 years old as specified in the model rationale. No changes to TSC parameters for the Lynx Mid- scale model are recommended.

2.2 Tree Canopy Cover Discussion

Tree Canopy Cover classifications for both the 2010 Forest Plan Amendment and New 2011 Vegetation Layer are compared below in **Table 2-2**.

Table 2-2 Tree Canopy Cover Class Differences Between 2010 Forest Plan Amendment and New 2011 Vegetation Layer

Tree Canopy Cover Class		
2010 Forest Plan/Appendix A Range	New Vegetation Layer (2011)	Changed or New Classification?
10 – 39% Low	10 – 19% (Low Tree Canopy)	change
	20 – 29% (Low-Medium Tree Canopy)	change
	30 – 44% (Medium Tree Canopy)	change
40 – 69% Moderate	45 – 59% (Medium-High Tree Canopy)	change
>70% High	60% (High Tree Canopy)	change

In the 2009 Lynx Mid-scale Model canopy cover class was only used when selecting habitat within PVG 11 habitat types. This was done to exclude the more open areas that had less than 40 percent canopy cover as these areas are generally not expected to have enough contiguous vegetation for lynx or lynx prey. Densities of PVG 11 stands can be highly variable and often grade into patchy krummholz stringers, in part due to the harsh growing conditions and poor soils at these high elevations (Forest Plan, Appendix A). Canopy cover class was only applied to one PVG as a measure to avoid an over-estimation of PVG 11 habitat types in the existing model and was not a parameter that was necessarily developed from the literature and applied across all PVGs as a habitat constraint. Therefore, canopy cover class will be used in the same capacity for this model update.

It is recommended that tree canopy cover classes Medium-High (45-59%) and High (>60%) be included, and tree canopy cover classes Low (10-19%), Low-Medium (20-29%), and Medium (30-44%) be excluded within PVG 11 habitat types for this update. This would closest resemble the canopy cover class constraints for PVG 11 habitat types from the 2009 model.

2.3 Updated Forest Modeling Parameters for Canada Lynx Source Habitat Capacity and Source Habitat

Source Habitat Capacity (SHC)*

1. Use Lynx Analysis Unit (LAU) boundaries, typically at the 5th Hydrologic Unit Code (HUC) boundary, to depict habitat. 2. Select PVGs 3, 7, 8, 9, 10, and 11.

3. Select the following map units and gridcodes:

MU_CLASS IN ('Aspen', 'Douglas Fir/Lodgepole', 'Engelmann Spruce', 'Forest Shrubland', 'Lodgepole Pine', 'Riparian Herbaceous', 'Riparian Shrubland/Deciduous Tree', 'Subalpine Fir Mix', 'Western Larch', 'Whitebark Pine Mix', 'Douglas Fir') AND gridcode IN(3 , 7 , 8 , 9 , 10)

MU_CLASS IN ('Aspen', 'Douglas Fir/Lodgepole', 'Engelmann Spruce', 'Forest Shrubland', 'Lodgepole Pine', 'Riparian Herbaceous', 'Riparian Shrubland/Deciduous Tree', 'Subalpine Fir Mix', 'Western Larch', 'Whitebark Pine Mix') AND (gridcode IN (11) AND CC_CLASS IN('TC3: Medium Tree Canopy Cover: 30-44%' , 'TC4: Medium-High Tree Canopy Cover: 45-59%' , 'TC5: High Tree Canopy Cover:

>= 60%')

Select high shrub cover where available.

5. Create a cookie cutter (mask):

a) Identifying **PVGs 7-11** that represent contiguous islands >= 10 acres.
b) Buffering contiguous islands >= 10 acres by 510 m (2000').

6. Select poly/pixels falling within cookie cutter.

7. Remove all non-NF lands from #6. The result = Source Habitat Capacity.

Current or Existing Suitable Habitat

(This is a subset of Source Habitat Capacity)

1. Use Source Habitat Capacity grid created above.

2. Remove burned areas (wildfires) ≤ 20 yo, to represent fire-induced lodgepole pine habitat with dense, tall US shrub layers.

3. Remove plantations ≤ 20 years old. (This will capture GFSS from vegetation management.)

4. Remove a 10-meter buffer of highways and county roads. Validate with aerial imagery and ground-truth, where possible.

* Predicts potential for source habitat, but limited by tree size class, tree and shrub canopy cover, and lack of D/D inventory data.

To more accurately assess the magnitude of effects, the 2013 LCAS describes first and second tier anthropogenic influences on lynx and lynx habitat. First tier influences are those with the potential to impact lynx populations and habitat, such as climate change, vegetation management, wildland fire, and habitat fragmentation. Second tier influences are those that may impact individual lynx and result in 'take', but not necessarily impact lynx at the population level, such as incidental trapping, recreation, minerals and energy-related activities, illegal shooting, forest / backcountry roads and trails, and domestic grazing.

3.0 WOLVERINE

In order to assess potential effects of project activities on wolverine, modeled persistent spring snow cover was utilized (based on Copeland et al. 2010). This model uses moderate-resolution imaging spectroradiometer (MODIS), which classifies daily snow data at 500-meter spatial resolution by terrestrial pixels and measures four cover classes; snow, bare ground, cloud, and night for each year (2009-2015). The model depicts the number of years, out of seven, in which snow cover was present in the spring in selected pixels (April 24-May 15). This time frame generally corresponds to the period of wolverine den abandonment. Most dens were located in areas that were snow covered for 6-7 years out of the total seven years studied, indicating selection for den sites in areas with the highest consistent snow coverage.

The 2009-2015 spring snow layer was updated from Copeland et al. (2010) (2000-2006 data). The spatial data layer represents spring snow cover over southern Idaho, SW Montana, and NW Wyoming for the 7-year period from 2009-2015. To support the Wolverine-Winter Recreation Research Project, the temporal extent was chosen to coincide with dates in which wolverines and winter recreationists were actively monitored and also included areas that exhibited snow cover in selected pixels in years 6-7, which showed the strongest correlation with wolverine locations (Heinemeyer et al. 2017).

4.0 NORTHERN IDAHO GROUND SQUIRREL

Northern Idaho ground squirrel (NIDGS) habitat modeling utilized in this technical report is based on parameters associated with existing and extant NIDGS from the 2007 habitat model developed for the PNF and BNF (Crist and Nutt 2007). Five parameters were utilized to predict potential NIDGS habitat: LANDFIRE Existing Vegetation Types, LANDFIRE canopy cover, landtype/soils, slope, and aspect, with landtype being the Forest Service surrogate for soils information. Cover types were originally selected (2006) to represent vegetative features in colonies, across land ownerships, and included canopy cover classes of <30 and <40 percent in selected classes. Model limitations included: no crosswalk between Forest Service landtypes between Forests, no crosswalk between Natural Resources Conservation Service (NRCS) soils across counties, and no crosswalk between NRCS soils and Forest Service landtypes.

Habitat modeling was based on querying parameters associated with existing and extant NIDGS colonies. Colony information was provided by Diane Evans Mack, Idaho Department of Fish and Game, Nongame Biologist, McCall Subregion and was current as of the end of the 2006 field season. The 2006 NIDGS Habitat Model developed by Carey Crist and Lisa Nutt, Boise National Forest, was the foundation for the 2007 version. Parameters were refined and/or updated based on findings during the 2006 field season and the availability of new data sets (i.e., LANDFIRE).

4.1 Model Parameters

Five parameters were used to predict potential NIDGS habitat: LANDFIRE Existing Vegetation Types (EVTs), LANDFIRE canopy cover, landtype/soils, slope, and aspect. Note that landtype is the Forest Service surrogate for soils information.

Cover types were originally (2006) selected to represent vegetative features in colonies because they are mapped across ownerships (federal and non-federal); represent current vegetation conditions as classified by the 1995 Montana LandSat Satellite Imagery; and because they are likely to be an influential factor in the ability for a NIDGS colony to occupy a site. All cover types were selected for modeling purposes if they had 10 or more pixels within a colony. As of 2007, twenty-one cover types had been identified. These included: 2010, 2020, 3100, 3110, 3180, 3210, 3350, 4101, 4206, 4207, 4212, 4230, 4270, 4280, 4300, 6110, 6120, 6210, 6310, 7300, and 7800. A problem with using cover types was that canopy cover data associated with the 1995 Montana LandSat Imagery was too coarse to be useful for modeling this species' habitat (canopy cover for cover types broken into the following classes for forest only <10 percent, 10-39 percent, 40-69 percent, >70 percent). In 2007, LANDFIRE (Landscape Fire and Resource Management Planning Tools Project) data became available to use. This is an interagency vegetation, fire, and fuel characteristics mapping project that provides coverage for existing vegetation types (EVTs) across the Boise and Payette National Forests and has a canopy cover component that classifies tree, shrub and herb cover in 10 percent intervals. The decision was made to change from cover types to EVTs so that we could use canopy cover in the model. This parameter had been identified by the Northern Idaho Ground Squirrel Technical Team in 2006 as being desired to better refine modeled habitat. There were 14 LANDFIRE EVTs that occurred in the NIDGS colonies that were selected for the model (2159, 2056, 2140, 2145, 2125, 2124, 2227, 2053, 2126, 2065, 2139, 2080, 2220, and 2182). See **Table 4-1** for definitions of these EVTs. **Table 4-2** defines the tree size class and **Table 4-3** defines the canopy cover class.

The parameter for canopy cover had been eliminated from consideration in 2006 due to limitations in accurately identifying canopy closure from the LandSat imagery. However, the advent of LANDFIRE offered a means to better address these limitations so canopy cover was included as a parameter in the 2007 model. Based on NIDGS Technical Team meeting notes from 3/14/2006 that stated the model should try and screen for <30 percent tree canopy cover, the following LANDFIRE canopy cover classes were selected: 100, 101, 102, 103, 111, 112, 113, 114, 115, 116, 121, 122, 123, 124, 125, 126, 127, and 128. Note the canopy cover class of >30 and <40 percent was included in the selected classes. This is slightly higher than the recommendation from the Technical Team; however, some colonies included this level of cover.

Landtypes represent the soils classification on the Forest Service lands for the Boise and Payette National Forests. Contact with the NRCS office in Boise, Idaho was made to secure Valley County, Washington County, and Adams County soils information for private lands. Note that when NIDGS models used

landtype information, it was a compilation of the landtypes that colonies occur on, in addition to the NRCS soil types that colonies occur on. A limitation of this model is that there is no crosswalk between NRCS soils across the three counties, no crosswalk between USFS landtypes between Forests, and no crosswalk between NRCS soils and USFS landtypes. This means similar soils are not detected by the model across ownerships. As a result of the different classification systems on adjacent federal and non-federal lands, a line often forms along the administrative boundary where soil types changed. Development of crosswalks to portray like soils is a needed improvement to this habitat model. By linking each county soils map and the federal landtype data we were able to create a soils layer across ownerships. There are no NIDGS colonies in Washington County and a crosswalk between the soil classification in Washington, Adams, or Valley County does not currently exist. At such time that either of these situations changes, the Washington County soils information is ready to be used in habitat modeling efforts. Landtypes included in the model are: 101-1, 101-2, 107-1, 109- 1, 109-12, 109-3, 109-4, 113, 130, 130-1, 131, 131-1, 132a, 132b, 132b-1, 132c, 133a-1, 134, and 134-1. NRCS types from Adams County include: 81108, 81133, 81137, 81180, 81181, 81195, 81198, 81199, 81200, 81201, 81207, 81213, 81215, 81234, 81235, 81272, 81273, and 81297. NRCS types from Valley County include: 154145, 154150, 154156, 154157, 154158, 154164, 154175, 154183, 154186, 154192, 154194, and 154196.

Slope and aspect information was calculated across all ownerships. A review of each parameter against all known colonies was completed. We used histograms to assess the range, mean, and median of each parameter. The parameters defined in the 2006 model were substantiated (slope and aspect) and further refined (slope) based on additional colony locations from the 2006 data. A thirty percent slope parameter had been used in the first model but with the addition of newly documented colonies during the 2006 field season, greater than 75% of colony habitats were found to occur on slopes less than 12 percent. We selected a slope parameter of 15 percent or less for the 2007 model. Aspect data from the newly documented 2006 colonies substantiated the aspect parameter and there was no change from the range of 90 to 290 degrees.

4.2 Parameters Evaluated but not Selected

Parameters that are not included in the habitat model include Payette National Forest Strata data, PVGs, cover types, and elevation.

Strata was excluded because coverage for that parameter did not exist on any ownership except the PNF and therefore restricted modeling capabilities.

PVGs were also excluded from use in modeling because most of the eleven forested PVGs occurred in NIDGS colonies and the parameter did not appear to be a sensitive enough indicator.

Cover types were originally selected to represent vegetative features in colonies because they are mapped across ownerships (federal and non-federal), represent current vegetation conditions as classified by the 1995 Montana LandSat Satellite Imagery; and because they are likely to be an influential factor in the ability for a NIDGS colony to occupy a site. As described under the selected parameter section, use of cover types with LandSat did not allow for the use of a canopy cover parameter in the model, which was desired by the NIDGS Technical Team, so cover types were replaced with LANDFIRE EVTs.

Elevation was eliminated since the summer 2005 discovery of two NIDGS colonies near the Lick Creek Lookout on the PNF at approximately 7,000 feet (2,000 feet higher than the species was thought to occur at) implies elevation may not be a limiting factor.

Table 4-1 Crosswalk from PNF Strata Layer to Tree Size Class and Canopy Cover Class Update: 09 June 2011

Strata (PNF Strata Document 2004)		Crosswalk	
Strata	**Description**	**Tree Size Class**	**Canopy Cover Class**
20	Clearcuts	Sapling	Low
21	Partial Cuts –Low Stocking	Medium	Low
22	Partial Cuts – Moderate Stocking	Medium	Moderate
23	Mature/Over-mature – High Stocking	Large	High
24	Mature/Over-mature – Moderate Stocking	Large	Moderate
25	Mature/Over-mature – Low Stocking	Large	Low
26	Partial Cuts (mature/over-mature) Moderate Stocking	Large	Moderate
29	Burned Areas	G/F/S/S	<10%
30	Sapling/Poles – Natural Regeneration	Small	Variable
32	Sapling/Poles - Planted	Small	High
33	Immature/Mature – Low Stocking	Medium	Low
34	Immature/Mature – Moderate Stocking	Medium	Moderate
35	Immature/Mature – High Stocking	Large	High
41	Unsuitable – Low Stocking	Medium	Low
42	Unsuitable – Moderate to High Stocking	Large	Moderate
60	Non-Forest	-	-
61	Non-Forest – Cultivated	-	-
70	Hardwoods or High Brush	-	-
98	Water (noncensus = <40 ac or <120 ft wide)	-	-
99	Water (census = >40 ac or >120 ft wide)	-	-

Table 4-2 Tree Size Class (2003 PNF, Forest Plan)

Size Class Group	Definition
Grass/forb/Shrub/Seedling	< 4.5 ft tall
Sapling	0.1" to 4.9" DBH
Small Trees	5.0" to 11.9" DBH
Medium Trees	12.0" to 19.9" DBH
Large Trees	>20" DBH

DBH = Diameter at breast height

Table 4-3 Canopy Cover Class (2003 PNF, Forest Plan)

Canopy Cover Group	Definition
Low	10 – 39%
Moderate	40 – 69%
High	70 % or more

* Areas with less than 10% canopy cover are considered Non-Forested.

5.0 BLACK-BACKED WOODPECKER

Mid-scale Modeling Update for the Black-backed Woodpecker
March 21, 2019 Payette National Forest
Joe Foust, District Wildlife Biologist, Cascade RD, Boise National Forest on Detail to the Payette National Forest

The purpose of this document is to update the Black-backed Woodpecker Mid-scale Model developed for the Boise National Forest in 2009 (Nutt et al. 2009), which is being used as the base habitat model for the 2019 Payette National Forest Baseline Habitat Modeling Update. This mid-scale model was developed for use at the scale of the entire Forest but is useful for habitat patch and pattern information at the scale of the fifth hydrologic unit code. It has been ten years since the original mid- scale species model for the Boise National Forest's modeling effort was created. In order to complete the 2019 Payette National Forest Baseline Habitat Modeling Update effort, there was a need to update three key components of the modeling process, including the new existing vegetation layer that had different canopy cover and tree size classes, the new 5th HUC boundaries, and the most up to date fire data. For the vegetation portion, in order to run the mid-scale habitat model with this new data a crosswalk that linked the old breakdown classes to the new breakdowns was needed, which is the focus of this document. This model update effort also offered an opportunity to review any new literature published since the 2009 model was created and validate selected habitat parameters.

5.1 Review of New Species Literature since 2009

The Boise NF mid-scale habitat model for the Black-backed Woodpecker (BBWO) was created in 2005 and revised in 2009 (Nutt et al. 2009). This literature review of published information between 2009 and 2017 was conducted to validate whether model parameters from 2009 are still consistent with the literature for this species. Any references that had relevant habitat information pertaining to tree size class (TSC) and canopy cover class (CCC) were listed in the Crosswalk tables in the TSC and CCC sections. All new literature reviewed for this 2019 Black-backed Woodpecker Mid-scale Model Update, including those references that did not provide relevant habitat information regarding TSC or CCC, are listed and briefly summarized at the end of this document. It should be noted that the literature review for this update was completed in 2017; however, the actual review of this document and subsequent update of the habitat model did not occur until 2019.

5.2 Application of Mid-scale Species Habitat Parameters to New Vegetation Structure Classes

A new existing vegetation map was completed for the mid-scale in 2012 using imagery acquired from 2008 and field data collected from 2007 through 2011. The data represent conditions across the Forest through the fall of 2008. This map was updated for the Payette National Forest in 2016 and called the "Forest Derived Product." Forest Derived Products are Forest-level updates of the contractor provided maps that better facilitate Forest-level data needs. These can be added to or updated as emerging Forest-level needs arise. This included post-processing of polygon delineations to reduce the noise of many small polygons by aggregating these to produce polygons that more adequately represent a larger unit on the ground (i.e. "stands"), to meet the minimum map unit of 5 acres for most polygons, and to reduce the overall number of polygons for processing. Size class polygons were then reattributed utilizing the same imagery used by the original mapping product and newer imagery as it became available. The original contractor mapping process generalized much of the size class polygons into the medium size class (10.0-19.9" Diameter at breast height [DBH]). The hand-edits of the size class attributes helped to spread the distribution of size classes into the seedling, sapling, small and large tree classes and more closely mirror Forest Inventory data. Secondly, the canopy cover map needed to be updated to incorporate changes due to recent fires. Rule sets utilizing post-fire vegetation condition were developed to adjust canopy cover changes where necessary and reviewed with newer imagery. No changes were made to the dominance type map and all changes made to the size class and canopy cover class were made to nest into the correct corresponding dominance types in that map, so that the map integrity between the three layers was maintained. An update to the accuracy assessment was also completed for the Forest Derived Products.

Although there was no change to the Potential Vegetation Group (PVG), this new existing vegetation product created new categories for tree size class and canopy cover class. The final dominance type map units, size classes and canopy cover classes conform to the mid-level mapping standards referenced in the Existing Vegetation Classification and Mapping Technical Guide Version 1.0 (Brohman and Bryant, 2005). This existing vegetation map provides the Payette National Forest with a new baseline of current condition. However, the classification for the components of this vegetation map are different than the classifications used in previous vegetation mapping efforts used for the Payette National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service 2003a, Redmond et al. 1998). Therefore, crosswalks needed to be developed to translate the categories for size class and canopy cover classes used

for the 2009 model in order to run the models on the new existing vegetation product. The following documentation explains how the parameters were cross-walked from the 2009 model into the 2019 model.

5.3 Parameter Review Discussion

The following parameter review discussion describes the vegetation parameters used to model source habitat when under historic range of variability (HRV) conditions.

5.3.1 PVG Discussion

No new information was found during the literature review on potential vegetation group (PVG) preferences for the black-backed woodpecker. No change is recommended.

5.3.2 Tree Size Class Discussion

Tree Size Class (TSC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 5-1**.

Table 5-1 Tree Size Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer

2003 Forest Plan/Appendix A Range	New Vegetation Layer (2011)	Changed or New Classification
Grass/Forb/Shrub/Seedling (GFSS) (<4.5' tall)	Seedling (<4.5' tall)	change in name only
Sapling (1.0 – 4.9" DBH)	Sapling (0.1 – 4.9" DBH)	
Small (5.0 – 12.0" DBH)	Small (5 – 9.9" DBH)	change
Medium (12.1 – 20" DBH)	Medium (10 – 19.9" DBH)	change
Large (>20.0" DBH)	Large (20 – 29.9" DBH)	change
	Very Large (> 30" DBH)	new

The literature describes nesting, forage, and roosting habitat to be solidly within the Medium (10-19.9" DBH) Tree Size class (Bonnot et al. 2009; Bull et al. 1986; Dudley 2007; Dudley et al. 2012; Goggans et al. 1989; Saab and Dudley 1998). The new Medium Tree Size class goes down to 10 inches DBH, two inches smaller than what the lower threshold for the Medium Classification was for the 2010 Forest Plan Amendment (12 inches DBH). This is perhaps a better fit for this species as most mean diameters were in the 10 to 14-inch range.

A few studies reported mean diameters of either nesting/foraging trees or the habitat surrounding nesting or foraging sites to be less than 10 inches. Saab and Dudley (1998) reported snags in nest stands to average > 9 inches DBH, while Goggans et al. (1989) reported a mean stem size at nest sites (0.49-ac plot around nest) of 8.0 inches DBH. Although in these instances mean tree sizes dip slightly below the Medium TSC range, inclusion of the next class lower, the Small TSC (5-9.9" DBH), would not accurately represent the larger body of information described in the literature and would overestimate source habitat for this species. Therefore, the Small TSC is not recommended for inclusion in the source habitat model.

There was a large amount of quantitative information on mean tree sizes of nest or forage trees/sites used by BBWOs and the majority reported mean diameters at the lower end of the Medium TSC as described above. However, many references also qualitatively described BBWO nesting, forage, and roosting habitat as occurring within mature or over-mature stands or containing some large living or dead tree component (Bull et al. 1986; Goggans et al. 1989; Tremblay et al. 2016; Wisdom et al. 2000[1], Hutto and Hanson 2009[1], Hoyt and Hannon 2002[1], Nappi and Drapeau 2009[1]). In some cases BBWOs also selected against young stands, logged stands, multi-storied stands (Goggans et al. 1989; Nappi and Drapeau 2009[1]). This implies that BBWOs were actually using those relatively smaller trees (at the lower end of Medium TSC) in stands that contained a large tree component. Because that qualitative description was so prevalent in the literature it is recommended that the model also includes the Large (20-29.9" DBH) and Very Large (≥ 30" DBH) tree size classes to incorporate this important habitat element.

Table 5-2 shows the crosswalk between Tree Size class parameters found in the literature and the new recommended Tree Size class breakouts and lists the references that supported the rationale for the final selection of habitat parameters.

It is recommended that Medium (10-19.9" DBH), Large (20-29.9" DBH), and Very Large (>30" DBH) Tree Size classes be used to model source habitat for the black-backed woodpecker, both for within and outside the Historical Range of Variation (HRV).

Table 5-2 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Size Class Parameter

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Bonnot, T., J. J. Millspaugh, M. A. Rumble. 2009. Multi-scale nest-site selection by black-backed woodpeckers in outbreaks of mountain pine beetles. Forest Ecology and Management. 259 (2009) 220-228. (South Dakota)	(Nesting and Forage) At the nest area scale, used areas averaged a lower mean DBH (x=23 cm (9 in); SE = 1.0 (0.4 in)) and contained higher densities of snags > 15 cm (6 in) DBH. (pg. 224)	Medium – 10-19.9" DBH
Bull, Evelyn L., S.R. Peterson, and J.W. Thomas. 1986. Resource partitioning among woodpeckers in northeastern Oregon. PNW-444 Research Note. 19 pp. (Oregon)	(Nesting) Nests usually occurred in small diameter (<50 cm (20 in) DBH), tall (>15 m), recently dead (<5 yrs) trees. Mean DBH of nest trees = 37 cm (SD=21.1) (n = 15) [14.5 in]. The preference for small diameter (<50 cm (20 in) DBH) trees was unusual. This species often excavates nests in sapwood. Trees smaller than 50 cm DBH have a higher percentage of sapwood. (Forage) forage trees (live and dead) averaged 31 cm DBH ± 16 SD [12 in + 6] (n = 133 trees)	Medium – 10-19.9" DBH

[1] Reference described in 2009 Black-backed Woodpecker Documentation of Modeling Parameters for Use in Mid- and Fine-Scale Habitat Models (Nutt et al. 2009).

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Dudley, Jon. 2005. Home range size and foraging habitat of black-backed woodpeckers. Thesis. Boise State University. 88 p. (Idaho)	(Nesting) Black-backed Woodpeckers generally select nesting habitats that contain high densities of relatively small diameter snags and trees and various levels of log cover. (Forage) Management recommendations: Microhabitats should include 369.9 ± 27.0 snags and trees per ha of recently dead, relatively large (31.3 ± 1.4 cm [12 in + 0.6]) diameter ponderosa pine and Douglas-fir.	Medium – 10-19.9" DBH
Dudley, J. G., V. A. Saab, and J. P. Hollenbeck. 2012. Foraging-habitat selection of black-backed woodpeckers in forest burns of southwestern Idaho. The Condor. 114(2):348-357. (Idaho)	(Foraging) Foraging tree scale – mean DBH = 32.8 cm (3.4) [12.9 in (1.3)] Habitat surrounding forage tree (0.04 ha plot) =24.8 cm (1.2) [9.8 in (0.47)]	Medium – 10-19.9" DBH
(This study has two separate reports that give the same parameter information, both are listed below)	(Nesting) Mean stem size at nests sites (in 0.49-ac plot around nest) was 8.0 inches DBH (SD = 1.5, range 5-11). Mean DBH of	Medium – 10-19.9" DBH
Goggans, Rebecca, Rita D. Dixon, and L.Claire Seminara. 1989. Habitat use by three-toed and black-backed woodpeckers, Deschutes National Forest, Oregon. Oregon Dept. Fish and Wildlife and USDA Forest Service. Nongame Wildlife Program. Technical Report #87-3-02. 44 pp. And Goggans, Rebecca, Rita D. Dixon, and L.Claire Seminara. 1988. Habitat use by three-toed and black-backed woodpeckers, Deschutes National Forest, Oregon. Oregon Dept. Fish and Wildlife and USDA Forest Service. Nongame Project No. 87-3- 02. 103 pp. (Oregon)	nest trees was 11.0 in (SD = 15.9, range = 40-120, n = 33). Mean nest tree height was 70 feet. (Forage) Mean DBH for forage sites in mixed conifer stands = 11.0 inches; mixed con/lodgepole stands = 10.0; Lodgepole stands = 9.0 inches. Mean DBH of trees foraged on = 15.0 inches (SD = 4.9, range 2-39, n = 340) Mean DBH of roost trees was 11.0 inches. Reported selection by radio-tagged individuals for single-story mature and old forests, and against young stands, multi- storied stands, and logged areas. Also noted that BBWOs roost in mature and over-mature sawtimber stands and avoided single storied stands of seedling, sapling, and poles, multi-storied stands, and cut stands.	
Saab, Vicki and Jon Dudley. 1998. Responses of cavity-nesting birds to stand-replacement fire and salvage logging in ponderosa pine/Douglas fir forests of southwestern Idaho. USDA Forest Service. Research Paper. RMRS-RP-11. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 17 p. (Idaho)	(Nesting) Nest trees selected by black- backed woodpeckers averaged the smallest diameter (x = 32.4 cm + 2.8 [12.7" + 1.1]) compared with other cavity nesters. Black-backed woodpeckers excavated the smallest snags available and nested in trees with light to medium decay and intact tops. Black-backed woodpeckers favored the unlogged stands. Tree densities (primarily snags) were highest at nest sites and lowest at random sites (>123 snags [>23 cm DBH] per ha; [>50 snags (>9 inches DBH per acre]).	Medium – 10-19.9" DBH

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Tremblay, Junior A., Rita D. Dixon, Victoria A. Saab, Peter Pyle and Michael A. Patten. (2016). Black- backed Woodpecker (Picoides arcticus), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/bkbwoo DOI: 10.2173/bna.509. Accessed February 15, 2017.	Loss of mature and old forest stands are detrimental to the BBWO in potentially two ways (Nappi and Drapeau 2009, Tremblay et al. 2015): 1) reducing amount of suitable unburned habitats in the landscape, and 2) reducing quality of future burned stands as they would contain a greater proportion of small trees and fewer large trees for foraging and nesting. Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	Medium – 10-19.9" DBH Large – 20-29.9" DBH Very Large >30" DBH

DBH = diameter at breast height

5.3.3 Tree Canopy Cover Discussion

Tree Canopy Cover Class (CCC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 5-3**.

Table 5-3 Canopy Cover Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer (Tree Canopy Cover Only)

Tree Canopy Cover Class		
2003 Forest Plan/Appendix A Range	**New Vegetation Layer (2011)**	**Changed or New Classification?**
10 – 39% Low	10 – 19% (Low Tree Canopy)	change
	20 – 29% (Low-Medium Tree Canopy)	change
	30 – 44% (Medium Tree Canopy)	change
40 – 69% Moderate	45 – 59% (Medium-High Tree Canopy)	change
	60% (High Tree Canopy)	change
>70% High		

This species is associated with disturbance events such as mountain pine beetle infestations and wildfire that create areas with high densities of snags and insect prey (Dudley 2005, Tremblay et al. 2016, Wisdom et al. 2000, Hutto and Hanson 2009). Quantitative descriptions of canopy cover were limited in the literature primarily because many studies occurred in burned habitat and so canopy cover was not a factor. However, there were references that looked at BBWO use of unburned stands where mountain pine beetle infestations were the primary disturbance. Goggans et al. (1989) reported a mean canopy cover of 24 percent in uncut stands used for nesting, 40 percent for roosting habitat, and reported that in stands used for foraging canopy cover was less than 60 percent in 74 percent of stands and greater than 60 percent in 26 percent of stands. Bull et al. (1986) reported a mean canopy cover of 46 percent for nesting stands. Dudley (2005) used a study area on the Boise National Forest that contained both burned and

unburned habitats and reported that foraging males selected for stands with 70-100 percent canopy cover and avoided stands in the 10-40 percent range. Dudley (2005) also recommended that habitat patches should have canopy covers generally greater than 40 percent. In South Dakota Vierling et al. (2008) reported that out of 20 BBWO nest sites found after a fire, 11 occurred in stands that had a high (>70%) pre-fire canopy cover, 8 were in stands that had a moderate (40-70%) pre-fire canopy cover, and only one was found in stands with low (<40%) pre-fire canopy cover, indicating a preference for burned stands that had live canopy covers greater than 40 percent before the fire. These studies indicate that BBWOs can utilize a wide range of canopy covers that fall within the Low-Medium, Medium, Medium-High, and High Canopy Cover classifications.

Inclusion of the Medium-High and High Canopy Cover classes is also supported by other sources in the literature. Those studies that occurred in burned sites and didn't report on canopy cover qualitatively described preferred habitat as having high densities of snags (Hutto and Hanson 2009, Saab and Dudley 1998, Dudley et al. 2012, Rota 2013), implying that the pre-fire stands originally had high densities of trees and likely Medium to High Canopy Covers. Another subset of studies (Bull et al. 1986; Goggans et al. 1989; Hoyt and Hannon 2002; Hutto and Hanson 2009; Nappi and Drapeau 2009; Tremblay et al. 2016; Wisdom et al. 2000) reported preference for mature or over-mature stands, which also likely had canopy cover in the upper range of classes.

While BBWO use of canopy cover in the Low-Medium and Medium classes seems to be supported in the literature, it may be somewhat of a misrepresentation of what live stand structure the species actually uses. The beetle-infested stands where many studies occurred were a result of stands developing dense conditions, which would then cause tree mortality and eventually lead to an outbreak (or wildfire) event that attracted BBWOs. The mortality in those unburned stands would likely cause canopy cover measurements to be less than what the pre-infested stand originally had and is likely why some studies reported canopy covers that fall within the Low-Medium and Medium classes. In all cases where studies considered pre-disturbance stand conditions live canopy covers before the fire or infestation were found to be greater than 40 percent (Dudley 2005; Russell et al. 2007 ***in*** Hutto and Hanson 2009; Vierling et al. 2008). Selection of the Low-Medium and Medium Canopy Cover classes would have the potential to include stands with lower canopy covers that are within their historical range of variation that wouldn't necessarily be susceptible to stand-replacing fire or MPB outbreaks and could result in over-estimation of source habitat. To avoid this, the Low-Medium and Medium Canopy Cover classes are not recommended for inclusion in the mid-scale model for black-backed woodpecker.

To assess source habitat, modeling would best approximate the findings of the literature by selecting for forested stands in the Medium-High (45-59%) and High (>60%) Tree Canopy Cover classes for preferred PVGs within their historic range of variability (HRV).

Table 5-4 shows the crosswalk between parameters (or qualitative descriptions) found in the literature and the new tree canopy cover classes and lists the references that supported the rationale for the final selection of habitat parameters.

Selecting forested stands in the Medium-High (45-59%) and High (>60%) Canopy Cover classes is recommended for modeling black-backed woodpecker source habitat.

Table 5-4 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Canopy Cover Class Parameters

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Bull, Evelyn L., S.R. Peterson, and J.W. Thomas. 1986. Resource partitioning among woodpeckers in northeastern Oregon. PNW- 444 Research Note. 19 pp. (Oregon)	Nests occurred in stands with a mean canopy closure of 46 percent.	Medium (30-44%) Medium-High (45-59%)
Dudley, Jonathan G. 2005. Home range size and foraging habitat of black-backed woodpeckers. Thesis. Boise State University. Boise, ID., 88 pp. (Boise NF, Idaho)	(Forage) As a group at the landscape scale, there was strong selection for the 70 - 100 % (high) crown closure category and strong avoidance for 10 - 40 % (low). (pg 49) Mgmt. recommendations: Moderate and high crown closures should comprise 56 ± 4.6 % of cover types in an approximate 3:2 ratio. (pg. 51)	Medium-High (45-59%) High (>60%)
	Habitat patches should be largely characterized by 40-70% and 70-100% crown closures…	
(This study has two separate reports that give the same parameter information) Goggans, Rebecca, Rita D. Dixon, and L.Claire Seminara. 1989. Habitat use by three-toed and black-backed woodpeckers, Deschutes National Forest, Oregon. Oregon Dept. Fish and Wildlife and USDA Forest Service. Nongame Wildlife Program. Technical Report #87-3-02. 44 pp. And Goggans, Rebecca, Rita D. Dixon, and L.Claire Seminara. 1988. Habitat use by three-toed and black-backed woodpeckers, Deschutes National Forest, Oregon. Oregon Dept. Fish and Wildlife and USDA Forest Service. Nongame Project No. 87-3-02. 103 pp. (Oregon)	(Nesting) Mean canopy closure for nests in uncut stands was 24 percent, and for nests in cut stands, 11 percent. (Forage) Canopy closure was less than 60 percent in 74 percent of the stands and greater than 60 percent in 26 percent. (Roosting) Canopy closure in 14 of 18 (78 percent) stands measured at roost sites was less than 60 percent and in 4 stands was greater than 60 percent. Mean canopy closure was 40 percent.	Low-Medium (20-29%) Medium (30-44%) Medium-High (45-59%)
Hoyt, J.S. and S.J. Hannon. 2002. Habitat associations of black- backed and three-toed woodpeckers in the boreal forest of Alberta. Can. J. For. Res. 32: 1881-1888. (Alberta)	Black-backed woodpeckers do occupy unburned old growth forests in the northeastern boreal forests in Alberta. In 2-year post-fire habitats black-backed woodpeckers increased with increasing (tree) densities.	N/A
Hutto, R. L. and C.T. Hanson. July 9, 2009. Letter to U.S. Forest Service Regional Foresters in Regions 1, 2, 4, 5, 6, 9, and 10	Black-backed Woodpeckers select high-severity patches in areas where pre-fire canopy cover and tree density are moderate to high (Russell et al. 2007, Vierling et al. 2008).	Medium (30-44%) Medium-High (45-59%) High (>60%)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
	Russell et al. (2007) also found that 89% of nests were in areas where pre-fire canopy cover was 40-100%, while only 52% of non-nest random locations had 40-100% canopy cover; occurrences are positively associated with an increasing number and diameter of snags. Some data indicate that dense, old forest (unburned) with high levels of snags and downed logs, may help Black-backed Woodpeckers temporarily survive in periods without fire, or	
	when fires are too far away (Hoyt and Hannon 2002, Tremblay et al. 2009). Moderate and high suitability habitat for the Black-backed Woodpecker consists of large areas (72-131 ha or larger) of montane and boreal conifer forest wherein most or all trees are killed from a severe fire event (generally, 75-100% mortality) 6 or fewer years earlier, and the area has not been salvage logged. The pre- disturbance forest is mature/old-growth with moderate to high canopy cover.	
Nappi, A., P. Drapeau. 2009. Reproductive success of the black-backed woodpecker (Picoides arcticus) in burned boreal forests: Are burns source habitats? Biological Conservation 142, 1381-1391. (Quebec)	Nest density and reproductive success were higher in areas with high proportions of burned mature forests than in areas dominated by burned young forests. Forest management practices that reduce the amount of mature and over-mature forests can affect the quality of post-fire habitats important to the black-backed woodpecker and other fire-associated species.	N/A
Rota, Christopher T., 2013. Not all forests are disturbed equally: Population dynamics and resource selection of black- backed woodpeckers in the Black Hills, South Dakota. Dissertation. University of Missouri-Columbia. 170 pgs. (South Dakota)	Black-backed Woodpeckers exhibited consistently high probability of using trees situated in relatively high basal area stands.	N/A
Tremblay, Junior A., Rita D. Dixon, Victoria A. Saab, Peter Pyle and Michael A. Patten. (2016). Black-backed Woodpecker (Picoides arcticus), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/bkbwoo DOI: 10.2173/bna.509. Accessed February 15, 2017.	This species is dependent on landscapes that experience regular fire and other large-scale forest disturbances. Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	N/A

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Vierling, K. T., L. B. Lentile, and N. Nielsen-Pincus (2008). Preburn characteristics and woodpecker	Out of 20 nest sites found in burned habitat, 11 occurred in high (>70% canopy cover) pre-fire canopy cover stands, 8 were in moderate (40-	Medium-High (45-59%) High (>60%)
use of burned coniferous forests. Journal of Wildlife Management 72:422–427. (South Dakota)	70%) pre-fire canopy cover stands, and only one was in low (<40% canopy cover) pre-fire canopy cover stands, indicating a preference for burned stands that had >40% canopy cover before the fire (Table 1, pg. 424).	
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendell.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad- scale Trends and Management Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW-GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol. (Quigley, Thomas M., tech. ed.: Interior Columbia Basin Ecosystem Management Project: scientific assessment).	Burned conifer forests (Caton 1996, Hoffman 1997, Hutto 1995, Marshall 1992, Saab and Dudley 1998) and other insect-infested forests (Goggans and others 1988) provide key conditions necessary for both nesting and foraging. Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	N/A

5.4 Source Habitat Conditions When Outside HRV Discussion

Black-backed woodpeckers can utilize some forested conditions that are not within the historical range of variability in PVGs 3, 4, 6, and 7. These conditions generally consist of higher densities, greater species diversity, and more complex vegetative structure than what would have developed when stands in these PVGs were experiencing historical disturbance processes. These dense conditions would also make stands more susceptible to insect infestations or stand-replacing wildfire which are important to this disturbance-dependent species. For PVGs 3, 4, 6, and 7, when functioning outside HRV, the High canopy cover class should be included when in the Medium, Large, and Very Large tree size classes.

5.5 Additional Modeling Parameters

The recommendation is to include areas that have burned within the last 5 years that are greater than 72 ha (178 acres) as an additional modeling parameter to portray black-backed woodpecker source habitat. See *Additional Modeling Parameters* section in *Black-backed Woodpecker Documentation of Modeling Parameters For Use in Mid- and Fine-Scale Habitat Models* document (Nutt et al. 2009) for the rationale in support of this parameter.

5.6 Updated Forest Modeling Parameters for Black-backed Woodpecker Source Habitat

The updated mid-scale habitat parameters for the black-backed woodpecker are as follows:

Within HRV

PVGs: 3, 4, 6, 7, 8, 9, and 10

Tree Size Class: Medium, Large*, and Very Large* Canopy Cover Class: PVGs 3, 4, 6, and 7 = Medium-High

PVGs 8, 9, and 10 = Medium-High and High

* Large and very large tree size classes do not occur in PVG 10

Outside HRV

PVGs: 3, 4, 6, and 7

Tree Size Class: PVGs 3, 4, 6, and 7 = Medium, Large, and Very Large Canopy Cover Class: PVGs 3, 4, 6, and 7 = High

Additional Modeling Parameters

Areas outside of those described above that have burned within the last 5 years and are ≥72 hectares (178 acres)

5.7 New Literature Sources Reviewed for this Update

Below is a list of all new literature reviewed for this 2017 Black-backed Woodpecker Mid-scale Modeling Update, including those references that did not provide relevant habitat information regarding tree size class or canopy cover class parameters. This list was compiled to both inform the next literature review and/or model update of what references were reviewed and to document the entire 2016/2017 literature review process.

Reference – Tremblay, Junior A., Rita D. Dixon, Victoria A. Saab, Peter Pyle and Michael A. Patten. (2016). Black-backed Woodpecker (*Picoides arcticus*), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/bkbwoo DOI: 10.2173/bna.509. Accessed February 15, 2017.

This species account was updated in 2016, likely due to recent research on population dynamics and relationships to different types of disturbed habitat. While no new information pertaining to tree size class and canopy cover class needs of the species were updated, the species account did mention in the Conservation and Management section that reductions in mature forest are likely detrimental to species' persistence.

Reference - Bonnot, T., J. J. Millspaugh, M. A. Rumble. 2009. Multi-scale nest-site selection by black-backed woodpeckers in outbreaks of mountain pine beetles. Forest Ecology and Management. 259 (2009) 220-228.

This study was a continuation of a previous study in the same area that looked at nesting success in forests with mountain pine beetle outbreaks (Bonnot et al. 2008). The 2008 study was reviewed for the 2009 Black-backed Woodpecker model. The 2009 study looked at characteristics of habitat around 42 known nest sites at 3 different spatial scales; territory (250 m around nest), nest area (12.5 m radius around nest), and nest tree. The study found that at the territory scale selection was based mostly on food availability (densities of trees infested with mountain pine beetle), at the nesting area scale selection was based on snag densities, and at the nest tree scale aspen and recently killed ponderosa pine were selected for. For the nest area scale, "used areas averaged a lower mean DBH (x = 22.3 cm; SE = 1.0) and contained higher densities of snags ≥15 cm DBH (x = 267.8 snags per ha; SE = 30.96) than available areas." The study recognized the often contradictory management goals to harvest stands to curb beetle infestations while attempting to maintain enough snag density to provide forage and nesting habitat for this species. Also had a temporal recommendation for avoiding silvicultural treatments from May 15 – July 31 to reduce direct impacts to food resources during the nesting season.

Reference - Drever, M.C. and K. Martin. 2009. Response of woodpeckers to changes in forest health and harvest: Implications for conservation of avian biodiversity. Forest Ecology and Management. 259 (210) 958-966.

This was a study that looked at correlations between species richness in forest woodpeckers and species richness of all other forest birds, theorizing that management practices that maintained or improved species richness for one group would also improve it for the other. The variables they looked at were primarily tree species and beetle-killed pine, along with harvest. These variables were fairly broad scale and the study didn't offer any nesting or forage-specific vegetation parameters that could be used for this modeling update.

Reference – Dudley, J. G., V. A. Saab, and J. P. Hollenbeck. 2012. Foraging-habitat selection of black-backed woodpeckers in forest burns of southwestern Idaho. The Condor. 114(2):348-357.

This study looked at forage habitat selection in burned forests between 6 and 8 years since the fire at three scales: foraging tree, local habitat surrounding forage tree (0.04 ha), and coarse scale (patches within home ranges 224-778 ha in size). Conclusions were based on 100 radio locations of four adult males. Overall the best model showed that black-backed woodpeckers selected both patches with dense trees and larger diameter trees. Found that fire severity was not important. For salvage logging projects recommends that large diameter snags and weakened trees be retained in clumped distribution to provide long-term foraging habitat for the species. **Table K-2-5** contains summary vegetation data at all three scales and was used to inform this modeling update. While this study was in burned habitat, the vegetation plot data was useful because it showed what size classes and tree densities woodpeckers selected for after a burn, which would need to be present pre-burn.

Reference - Fogg, A. M., L. J. Roberts, and R. D. Burnett. 2014. Occurrence patterns of Black-backed Woodpeckers in green forest of the Sierra Nevada Mountains, California, USA. *Avian Conservation and Ecology* **9**(2): 3. http://dx.doi.org/10.5751/ACE-00671-090203

This study established black-backed woodpecker location data throughout unburned portions of the Sierra Nevada Mountains, collected habitat data at the sites, and then used occupancy models to assess which parameters, if any, were selected for. Analysis found that woodpeckers selected for physiographic variables such as elevation, latitude, and aspect more than habitat structure, although there were weak associations with tree diameter, snag numbers and forest species (lodgepole). In general, the study didn't

offer any mid-scale parameters for tree size class and canopy cover class that could be used in this update. Recommended that even though the species is typically found in higher densities within recently burned habitat, unburned habitats should not be overlooked during conservation planning efforts for the black-backed woodpecker.

Reference – Latif, Q. S., V. A. Saab, J. G. Dudley, and J. P. Hollenbeck. 2013. Ensemble modeling to predict habitat suitability for a large-scale disturbance specialist. Ecology and Evolution. 3(13):4348-4364.

This study used habitat suitability models with different combinations of environmental variables (burn severity, topographic slope, and pre-fire canopy cover) to predict where black-backed woodpeckers would occur on the landscape. The only parameter used in these models that was relevant to this update was the pre-fire canopy cover that was used as a proxy for stand density, although it was not clear in the discussion exactly what the parameter used was (proportion of neighborhood over 40 percent).

Reference - Nappi, A., P. Drapeau. 2009. Reproductive success of the black-backed woodpecker (*Picoides arcticus*) in burned boreal forests: Are burns source habitats? Biological Conservation 142, 1381-1391.

This study focused primarily on reproductive and nesting success of black-backed woodpeckers within a 3-year time period following burns. Relative nest success was 84% after first year, 73% after 2nd year, and dropped to just 25% after the 3rd year. The study also found that nest density and reproductive success were higher in areas with high proportions of burned mature forests compared to burned young forests. The authors suggested that mature and over-mature forests need to be maintained across the landscape because they likely increase the quality of post-fire habitats.

Reference – Rota, Christopher T., 2013. Not all forests are disturbed equally: Population dynamics and resource selection of black-backed woodpeckers in the Black Hills, South Dakota. Dissertation. University of Missouri-Columbia. 170 pgs.

This research looked at the role of summer wildfire, fall prescribed fire, and mountain pine beetle (MPB) infestations have in creating source habitat for the BBWO. The study compared adult survival, juvenile survival, and reproductive rates for each of these types in an effort to derive habitat-specific growth rates as a function of those underlying demographic parameters. This allowed the author to assess what roles the three disturbances had on maintaining populations of black-backed woodpeckers (whether a source or sink). The study found that population growth rates were greatest in summer wildfire burned habitat, intermediate in MPB outbreaks, and lowest in fall prescribed burns. Furthermore, MPB infestations were likely sinks and fall prescribed fire was not considered a viable substitute for summer wildfire. BBWOs showed a high probability of using disturbed trees $\geq$27 cm [10.6 inches] DBH in stands 27.8 m^2 basal area/ha (the mean basal area surrounding used trees). On average, trees $\geq$ 27 cm DBH constituted 11.1 m^2/ha (approx. 40%) of the basal area surrounding used trees. As a result, the author recommends that at least 40% of the basal area of burned patches/stands be composed of trees $\geq$27 cm DBH to provide for black-backed woodpecker nesting and forage habitat. Observations of foraging woodpecker showed a preference for relatively large-diameter trees, similar to findings in Dudley et al. 2012.

Reference – Rota, Christopher T., M. A. Rumble, J. J. Millspaugh, C. P. Lehman, D. C. Kesler. 2014. Space- use and habitat associations of black-backed woodpeckers (*Picoides arcticus*) occupying recently

disturbed forests in the Black Hills, South Dakota. Forest Ecology and Management. 313 (2014), 161-168.

This is essentially a condensed version of the Rota (2013) dissertation above.

Reference - Rota, C. T., M. A. Rumble, C. P. Lehman, D. C. Kesler, and J. J. Millspaugh. 2015. Apparent foraging success reflects habitat quality in an irruptive species, the black-backed woodpecker. The Condor. 117 (2015), 178-191.

This study was similar to the Rota (2013) dissertation and Rota et al. (2014) paper above. This looked more specifically at forage success, which did include some habitat relationships, but only looked at very specific traits of the foraging tree such as number of insects gleaned, what degree consumed by the burn, and of course which habitat category (summer wildfire, fall prescribed fire, MPB infestation).

Found that foraging success was positively associated with the diameter of burned trees in fire-created habitats, which suggested that relatively large burned trees may be an important foraging resource for this species. However, the paper didn't offer any specific parameters as far as what "relatively large" trees are, etc., as everything was reported in 95% confidence intervals, so there was no translation into parameters relevant to this update. Findings were, however, consistent with other studies (Dudley et al. 2012; Nappi and Drapeau 2011; Rota et al. 2014), that showed BBWOs selected for relatively large diameter trees within their home range. A guess is that 'relatively large' means ≥27 cm, as this was the size recommendation found in both Rota (2013) and Rota et al. (2014).

Reference - Russell, R. E., V. A. Saab, J. J. Rotella, and J. G. Dudley (2009). Detection probabilities of woodpecker nests in mixed conifer forests in Oregon. The Wilson Journal of Ornithology. 121(1):82-88.

This paper reported on detection probabilities of for nesting BBWO and hairy woodpecker. The focus was on the ability of observers to detect nests and didn't offer any habitat characteristics relevant to this modeling update.

Reference - Siegel, Rodney B., Morgan W. Tingley, Robert L. Wilkerson, Christine A. Howell, Matthew Johnson, and Peter Pyle. 2015. Age structure of black-backed woodpecker populations in burned forests. The Auk. 133(1):69-78.

This study looked at the age structure of black-backed woodpecker populations in recently burned habitats. Found that natal dispersal is the primary method that this species uses to colonized burned areas, and that breeding dispersal is uncommon. Also reported that the decline of populations 6-10 years after a burn likely is a function of the lifespan of the birds that colonized the burned area. There were no habitat indicators that would inform this model update.

6.0 BIGHORN SHEEP

6.1 Source Habitat Model

The source habitat model for bighorn sheep used in the specialist report was originally designed by the Hells Canyon Initiative (HCI) (**Table 6-1**). The HCI is managed by the Hells Canyon Bighorn Sheep Restoration Committee, a State, Federal, and private partnership to restore Rocky Mountain bighorn sheep in the Hells Canyon of Oregon, Idaho, and Washington. Source habitat is defined as those characteristics of macrovegetation that contribute to stationary or positive population growth, which is distinguished from habitats associated with species occurrence since such habitats may or may not contribute to long-term population persistence (Wisdom et al. 2000). The original suitable habitat model was primarily a two-component model that consisted of escape terrain and horizontal visibility. The water sources component was not used in the Payette National Forest version of this model because the criteria used in the HCI model (>3.2 kilometers [km] from a water source) encompassed every portion of the Payette National Forest. The Payette National Forest model also did not include the lambing range.

Table 6-1 Hells Canyon Initiative Bighorn Sheep Habitat Model

Habitat Component	Criteria	Source
Escape Terrain		
Slope	31° ≤ slope ≤85°	Gudorf et al. 1996; Smith et al. 1991
Buffer	300 meters (m) or land areas ≤1,000 m wide bounded on ≥ sides by escape terrain (500 m)	Gudorf and Sweanor 1996; Smith et al. 1991
Minimum area	1.6 hectares (ha)	Gudorf and Sweanor 1996
Visibility		
Horizontal visibility	Grassland, rock, open shrub, or forest cover <40%, from satellite imagery	Schirokauer 1996
Water Availability		
Water sources	≤3.2 km	Smith et al. 1991; Gudorf and Sweanor 1996
Ranges		
Summer range	Suitable habitat within 300 m of escape terrain	Smith et al. 1991; Gudorf and Sweanor 1996; Schirokauer 1996
Winter range	Suitable habitat all aspects below 1,463 m; aspect 135°–225°above 1,463 m	Coggins pers. Comm;.Gudorf and Sweanor 1996; Smith et al. 1991
Lambing range	Escape terrain 45°–315° ≤1 km from water ≥2contiguous ha	Gudorf and Sweanor 1996

Table Source: Hells Canyon Bighorn Sheep Restoration Committee (1997).

The source habitat model used for the specialist report needed several modifications prior to use. First, the geographic range of the model only covered the Hells Canyon and not the entire Payette National Forest. The second issue concerned the vegetation layer used in the horizontal visibility component of the original model. The HCI model utilized vegetation supervised classification of Thematic Mapper satellite imagery, which was too broad and contained no canopy cover information, resulting in an insufficient level of detail for the vegetation data. To solve the problems of scale and detail, Payette National Forest modelers used a different vegetation dataset for horizontal visibility and included low canopy cover forested cover types. Using forested types is supported by the HCI's cited literature but was not used by the HCI because of limitations of the supervised classification of TM satellite imagery.

The escape terrain component was found to overmap in areas that met the steepness criterion but lacked the ruggedness to make the area source habitat. To correct this problem, Payette National Forest modelers used a ruggedness ArcGIS script (Sappington et al. 2007) to create a ruggedness surface that was then overlaid with the telemetry and observation data. From this overlay, modelers created a histogram of ruggedness to determine the ruggedness cutoff point for source habitat, which was 310 or less out of a range of 0 to 3455. Adding this new criterion changed the overall amount of mapped source habitat by 2% and reduced the correlation between the source habitat and telemetry data from 92% to 90%.

The winter version of the source habitat model was also modified for the specialist report. The original HCI model and the previous version used restricted the habitat to southern aspects above 4,800 feet or 1,463 m, which grossly overmapped the amount of winter source habitat. However, field reviewers found that most of the areas above 1,463 m are covered by snow and therefore not suitable habitat. To overcome this problem, Payette National Forest modelers used persistent snow data (Copeland et al. 2010) and removed from winter source habitat areas above 1,463 m that were snow covered 2 or more years out of the last 7. This change in mapping dropped the amount of mapped winter source habitat by 18%; however, it only dropped the correlation between winter source habitat and winter telemetry points from 82% to 80%.

The horizontal visibility component used the vegetation dataset from the LANDFIRE project (The National Map LANDFIRE 2006), an interagency effort to map vegetation and fuels data in a consistent fashion and at a scale useful at an incident level nationally. The nonforest vegetation cover types from the HCI model were crosswalked into the LANDFIRE nonforested cover types by Payette National Forest staff. Documentation created by the HCI stated that forested cover types of less than 40% canopy cover can be used in the model; however, they were not used in the actual model because canopy cover was not included in the original supervised classification of TM satellite imagery.

Forested cover types for canopy cover ≤30% were added to the model using LANDFIRE. The ≤30% canopy cover for forest cover type was chosen based on review by Payette National Forest staff using the 2004 National Agricultural Imagery Program (NAIP) 1-m full-color photographs. The LANDFIRE data at ≤40% canopy cover in forested types tended to map canopy covers that appeared denser than 40% cover, particularly on the east zone of the Payette National Forest. This discrepancy would have overestimated the amount of source habitat available to bighorn sheep on the eastern portion of the Payette National Forest and may have contributed to some undermapping of source habitat on the western side where the canopy covers better matched photograph images. However, underestimating the habitat in the western side of the Payette National Forest appeared to be less of an error compared to the amount that would have been overmapped in the east. This choice of using a ≤30% canopy cover was also confirmed during a season of field reviews of the habitat data.

Modelers also decided to filter the habitat model to a minimum mapping size of 2.0 hectares. The original HCI model only filtered the escape terrain component to approximately 1.6 hectares. The overall 2.0-hectare minimum mapping area filter was a more appropriate filter because of the nature of the LANDFIRE vegetation data. The final product and the forest cover type/canopy cover choices were verified with NAIP photography and on-the-ground field reviews at several locations throughout a field season.

The source habitat model used for the specialist report was compared with over 54,000 telemetry and observation points, mainly from Hells Canyon and the Salmon River canyon; 90% of all known bighorn sheep telemetry points fell within the modeled summer source habitat and 80% fell within the winter source habitat. A final review of all source habitat model components and outcomes was completed by the IDT and accepted as adequate to fulfill the needs of this analysis. In one area, the output of the source habitat model was manually edited. In the Lost Valley area, the model was determined to be overmapping the presence of source habitat, leading to an overestimate in the risk of contact analysis. This manual change was also accepted by the IDT. Detailed information on each input and function for bighorn sheep summer source habitat in the Hells Canyon and the Payette National Forest is found in **Table 6-2**. **Table 6-3** shows winter source habitat for bighorn sheep in Hells Canyon and the Payette National Forest. **Table 6-4** describes the LANDFIRE cover types.

Table 6-2 Summer Habitat Model

Name	Explanation[1]
CON selection of nonforest cover types	This command creates the nonforested input for the horizontal visibility portion of the Bighorn Sheep Summer Source Habitat model. The input data is Existing Vegetation Type downloaded from LANDFIRE on May 2, 2007. The map algebra command is "con (F:\Bighorn\Landfire\33677953\33677953 in {12, 31, 2001, 2006, 2079, 2080, 2081, 2106, 2123, 2124, 2125, 2126, 2127, 2134, 2135, 2139, 2140, 2142, 2143, 2144, 2145, 2153, 2169, 2181, 2182, 2183, 2220, 2062, 2065, 2144, 2070, 2017, 2115, 2165},1)".
CON selection of forest cover types and canopy covers	This command creates the forested input for the horizontal visibility portion of the Bighorn Sheep Summer Source Habitat model. The input data are Existing Vegetation Type and Existing Vegetation Cover downloaded from LANDFIRE on May 2, 2007. The map algebra command is "con ((F:\Bighorn\Landfire\33677953\33677953 in {2008, 2009, 2011, 2012, 2016, 2018, 2019, 2020, 2035, 2036, 2037, 2038, 2039, 2041, 2042, 2045, 2046, 2047, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2060, 2061, 2063, 2154, 2156, 2157, 2158, 2161, 2166, 2167, 2173, 2174, 2178, 2200, 2203, 2205, 2206, 2208, 2227, 2228, 2232} and F:\Bighorn\Landfire\30745420\30745420 in {101, 102}), 1)". The canopy covers from LANDFIRE are as follows: 101, Tree Cover ≥10 and <20%; 102, Tree Cover ≥20 and <30%.
MERGE of forested and nonforest selections	This command merges the forested and nonforest components of the horizontal visibility component of the Bighorn Sheep Summer Source Habitat model. The map algebra for this command is "merge (nonforest, forest)".
Project Raster from Albers to Universal Transverse Mercator (UTM)	This command changes the projection of the combined forested and nonforested vegetation components. The LANDFIRE projection was Albers NAD83, which was projected to the local projection of UTM Zone 11 NAD83.
Region Group for minimum mapping size	This Region Group command is the first step in filtering for a minimum mapping unit. This command takes the input and groups the cells based on if they touch and then gives all the touching cells the total count for that group.
CON selection of minimum mapping size of 5 acres	This command selects from the grouped input groups of cell 5 acres or larger. The map algebra for this command is "con (F:\Bighorn\Landfire\hor_vis_rg.count ≥23,1)".

Name	Explanation[1]
"Slope ≥31 and ≤85 degrees" CON	This CON function selects slopes from the slope grid derived from the National Elevation Dataset elevation grid. The slopes selected are equal to or greater than 31° and less than or equal to 85° and roughness index of ≤310. This selection is as follows "C:\Projects\BHS_Final\Data\Elevations\deg_slp ≥31 AND C:\Projects\BHS_Final\Data\Elevations\deg_slp ≤85" and C:\Projects\BHS_Final\Data\Elevations\ruf_10000 ≤310.
Region Group	This command takes the input and groups the cells based on if they touch and then gives all the touching cells the total count for that group.
CON & ZONALAREA (Single Output Map Algebra)	This command selects from the grouped input groups of cell 16000 or larger. The map algebra for this command is "con (zonalarea (slpgp) ≥16000, 1)".
CON & EUCDISTANCE LE 300 (Single Output Map Algebra)	This CON function calculates the straight line distance from the input then selects all cells ≤300 m. The map algebra for this command is "con (eucdistance (escslp) ≤300, 1)".
CON & EUCDISTANCE GT 500 (Single Output Map Algebra)	This CON function calculates the straight line distance from the input then selects all cells greater than 500 m. The map algebra for this command is "con (eucdistance (escslp) > 500, 1)".
CON & EUCDISTANCE GE 500 (Single Output Map Algebra)	This CON function calculates the straight line distance from the input then selects all cells ≥500 m. The map algebra for this command is "con (eucdistance (gt500) ≥500, 1)".
CON & ISNULL (Single Output Map Algebra)	This CON function erases the "buff300" from "wi500" to create the final output for the escape terrain component. The map algebra for this function is "con (isnull (buff300), con (wi500 == 1, 1), 1)".
CON combines the two model components	This CON command combines the two model components so that on the cell and overlap from the two inputs appear in the final output.

[1] See **Table 6-4** for descriptions of the LANDFIRE cover types

Table 6-3 Winter Habitat Model

Name	Explanation[1]
CON selection of nonforest cover types	This command creates the nonforested input for the horizontal visibility portion of the Bighorn Sheep Winter Source Habitat model. The input data is Existing Vegetation Type downloaded from LANDFIRE on May 2, 2007. The map algebra command is "con (F:\Bighorn\Landfire\33677953\33677953 in {12, 31, 2001, 2006, 2079, 2080, 2081, 2106, 2123, 2124, 2125, 2126, 2127, 2134, 2135, 2139, 2140, 2142, 2143, 2144, 2145, 2153, 2169, 2181, 2182, 2183, 2220, 2062, 2065, 2144, 2070, 2017, 2115, 2165},1)".
CON selection of forest cover types and canopy covers	This command creates the forested input for the horizontal visibility portion of the Bighorn Sheep Winter Source Habitat model. The input data are Existing Vegetation Type and Existing Vegetation Cover downloaded from LANDFIRE on May 2, 2007. The map algebra command is "con ((F:\Bighorn\Landfire\33677953\33677953 in {2008, 2009, 2011, 2012, 2016, 2018, 2019, 2020, 2035, 2036, 2037, 2038,2039, 2041, 2042, 2045, 2046, 2047, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056,2057, 2060, 2061, 2063, 2154, 2156, 2157, 2158, 2161, 2166, 2167, 2173, 2174, 2178,2200, 2203, 2205, 2206, 2208, 2227, 2228, 2232} and F:\Bighorn\Landfire\30745420\30745420 in {101, 102}), 1)". The canopy covers from LANDFIRE are as follows: 101, Tree Cover ≥10 and <20%; 102, Tree Cover ≥20 and <30%.
MERGE of forested and nonforest selections	This command merges the forested and nonforest components of the horizontal visibility component of the Bighorn Sheep Winter Source Habitat model. The map algebra for this command is "merge (nonforest, forest)".

Name	Explanation[1]
Project Raster from Albers to Universal Transverse Mercator (UTM)	This command changes the projection of the combined forested and nonforested vegetation components. The LANDFIRE projection was Albers NAD83, which was projected to the local projection of UTM Zone 11 NAD83.
Region Group for minimum mapping size	This Region Group command is the first step in filtering for a minimum mapping unit. This command takes the input and groups the cells based on if they touch and then gives all the touching cells the total count for that group.
CON selection of minimum mapping size of 5 acres	This command selects from the grouped input groups of cell 5 acres or larger. The map algebra for this command is "con (F:\Bighorn\Landfire\hor_vis_rg.count ≥23,1)".
"Slope ≥31 and ≤85 degrees" CON	This CON function selects slopes from the slope grid derived from the National Elevation Dataset elevation grid. The slopes selected are equal to or greater than 31° and ≤85° and roughness index of ≤310. This selection is as follows "C:\Projects\BHS_Final\Data\Elevations\deg_slp ≥31 AND C:\Projects\BHS_Final\Data\Elevations\deg_slp ≤85" and C:\Projects\BHS_Final\Data\Elevations\ruf_10000 ≤310.
Region Group	This command takes the input and groups the cells based on if they touch and then gives all the touching cells the total count for that group.
CON & ZONALAREA (Single Output Map Algebra)	This command selects from the grouped input groups of cell 16000 or larger. The map algebra for this command is "con (zonalarea (slpgp) ≥16000, 1)".
CON & EUCDISTANCE LE 300 (Single Output Map Algebra)	This CON function calculates the straight line distance from the input then selects all cells ≤300 m. The map algebra for this command is "con (eucdistance (escslp) ≤300, 1)".
CON & EUCDISTANCE GT 500 (Single Output Map Algebra)	This CON function calculates the straight line distance from the input then selects all cells greater than 500 m. The map algebra for this command is "con (eucdistance (escslp) > 500, 1)".
CON & EUCDISTANCE GE 500 (Single Output Map Algebra)	This CON function calculates the straight line distance from the input then selects all cells ≥500 m. The map algebra for this command is "con (eucdistance (gt500) ≥500, 1)".
CON & ISNULL (Single Output Map Algebra)	This CON function erases the "buff300" from "wi500" to create the final output for the escape terrain component. The map algebra for this function is "con (isnull (buff300), con (wi500 == 1, 1), 1)".
CON combines the two model components	This CON command combines the two model components so that on the cell and overlap from the two inputs appear in the final output.
Southern Aspects above 4,800 feet excluded	The Map Algebra expression creates a grid that masks out area above 4,800 feet that are not on southern aspect. “con ((c:\Projects\BHS_Final\Data\Elevation\large_elev le 1463.04) OR ((c:\Projects\BHS_Final\Data\Elevation\large_elev gt 1463.04) and (c:\Projects\BHS_Final\Data\Elevation\large_asp ge 135 and c:\Projects\BHS_Final\Data\Elevation\large_asp le 225)), 1)”
Perennial Snow Areas excluded	The Map Algebra expression masks out, of the southern aspect mask, areas that are covered by persistent snow. “con((win_area1 eq 1) and (pere_snow le 1),1)”
Merge winter exclusions with the escape terrain and horizontal visibility	This CON command combines the winter exclusions with the escape terrain and horizontal visibility components so that only the areas that overlap between components are the only areas in the final output.

[1] See **Table 6-4** for descriptions of the LANDFIRE cover types

Table 6-4 LANDFIRE Cover Types

No.	Type of Vegetation
12	Snow/Ice
31	Barren
2001	Inter-Mountain Basins Sparsely Vegetated Systems
2006	Rocky Mountain Alpine/Montane Sparsely Vegetated Systems
2008	North Pacific Oak Woodland
2009	Northwestern Great Plains Aspen Forest and Parkland
2011	Rocky Mountain Aspen Forest and Woodland
2012	Rocky Mountain Bigtooth Maple Ravine Woodland
2016	Colorado Plateau Pinyon-Juniper Woodland
2017	Columbia Plateau Western Juniper Woodland and Savanna
2018	East Cascades Mesic Montane Mixed-Conifer Forest and Woodland
2019	Great Basin Pinyon-Juniper Woodland
2020	Inter-Mountain Basins Subalpine Limber-Bristlecone Pine Woodland
2035	North Pacific Dry Douglas-fir Forest and Woodland
2036	North Pacific Hypermaritime Sitka Spruce Forest
2037	North Pacific Maritime Dry-Mesic Douglas-fir-Western Hemlock Forest
2038	North Pacific Maritime Mesic Subalpine Parkland
2039	North Pacific Maritime Mesic-Wet Douglas-fir-Western Hemlock Forest
2041	North Pacific Mountain Hemlock Forest
2042	North Pacific Mesic Western Hemlock-Silver Fir Forest
2045	Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest
2046	Northern Rocky Mountain Subalpine Woodland and Parkland
2047	Northern Rocky Mountain Mesic Montane Mixed Conifer Forest
2049	Rocky Mountain Foothill Limber Pine-Juniper Woodland
2050	Rocky Mountain Lodgepole Pine Forest
2051	Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Wood
2052	Southern Rocky Mountain Mesic Montane Mixed Conifer Forest and Woodland
2053	Northern Rocky Mountain Ponderosa Pine Woodland and Savanna
2054	Southern Rocky Mountain Ponderosa Pine Woodland
2055	Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland
2056	Rocky Mountain Subalpine Wet-Mesic Spruce-Fir Forest and Woodland

No.	Type of Vegetation
2057	Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodland
2060	East Cascades Oak-Ponderosa Pine Forest and Woodland
2061	Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland
2062	Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland
2063	North Pacific Broadleaf Landslide Forest and Shrubland
2065	Columbia Plateau Scabland Shrubland
2070	Rocky Mountain Alpine Dwarf-Shrubland
2079	Great Basin Xeric Mixed Sagebrush Shrubland
2080	Inter-Mountain Basins Big Sagebrush Shrubland
2081	Inter-Mountain Basins Mixed Salt Desert Scrub
2106	Northern Rocky Mountain Montane-Foothill Deciduous Shrubland
2115	Inter-Mountain Basins Juniper Savanna
2123	Columbia Plateau Steppe and Grassland
2124	Columbia Plateau Low Sagebrush Steppe
2125	Inter-Mountain Basins Big Sagebrush Steppe
2126	Inter-Mountain Basins Montane Sagebrush Steppe
2127	Inter-Mountain Basins Semi-Desert Shrub-Steppe
2134	Columbia Basin Foothill and Canyon Dry Grassland
2135	Inter-Mountain Basins Semi-Desert Grassland
2139	Northern Rocky Mountain Lower Montane-Foothill-Valley Grassland
2140	Northern Rocky Mountain Subalpine-Upper Montane Grassland
2142	Columbia Basin Palouse Prairie
2143	Rocky Mountain Alpine Fell-Field
2144	Rocky Mountain Dry Turf
2145	Rocky Mountain Subalpine-Montane Mesic Meadow
2153	Inter-Mountain Basins Greasewood Flat
2154	Inter-Mountain Basins Montane Riparian Systems
2156	North Pacific Lowland Riparian Forest and Shrubland
2157	North Pacific Swamp Systems
2158	North Pacific Montane Riparian Woodland and Shrubland
2161	Northern Rocky Mountain Conifer Swamp

No.	Type of Vegetation
2165	Northern Rocky Mountain Foothill Conifer Wooded Steppe
2166	Middle Rocky Mountain Montane Douglas-fir Forest and Woodland
2167	Rocky Mountain Poor-Site Lodgepole Pine Forest
2169	Northern Rocky Mountain Subalpine Deciduous Shrubland
2173	North Pacific Wooded Lava Volcanic Flowage
2174	North Pacific Dry-Mesic Silver Fir-Western Hemlock-Douglas-fir Forest
2178	North Pacific Hypermaritime Western Red-cedar-Western Hemlock Forest
2181	Introduced Upland Vegetation—Annual Grassland
2182	Introduced Upland Vegetation—Perennial Grassland and Forbland
2183	Introduced Upland Vegetation—Annual and Biennial Forbland
2200	Pseudotsuga menziesii-Quercus garryana Woodland Alliance
2203	Juniperus occidentalis Woodland Alliance
2205	Tsuga mertensiana-Abies amabilis Woodland Alliance
2206	Pseudotsuga menziesii Giant Forest Alliance
2208	Abies concolor Forest Alliance
2220	Artemisia tridentata ssp. vaseyana Shrubland Alliance
2227	Pseudotsuga menziesii Forest Alliance
2228	Larix occidentalis Forest Alliance
2232	Abies grandis Forest Alliance

7.0 DUSKY GROUSE

Mid-scale Modeling Update for the Dusky Grouse (Summer)
March 21, 2019 Payette National Forest
Joe Foust, District Wildlife Biologist, Cascade RD, Boise National Forest on Detail to the Payette National Forest

The purpose of this document is to update the Dusky Grouse (Summer) Mid-scale Model developed for the Boise National Forest in 2008 (Geier-Hayes et al. 2008), which is being used as the base habitat model for the 2019 Payette National Forest Baseline Habitat Modeling Update. This mid-scale model was developed for use at the scale of the entire Forest but is useful for habitat patch and pattern information at the scale of the fifth hydrologic unit code. It has been eleven years since the original mid- scale species model for the Boise National Forest's modeling effort was created. In order to complete the 2019 Payette National Forest Baseline Habitat Modeling Update effort, there was a need to update three key components of the modeling process, including the new existing vegetation layer that had different

canopy cover and tree size classes, the new 5th HUC boundaries, and the most up to date fire data. For the vegetation portion, in order to run the mid-scale habitat model with this new data a crosswalk that linked the old breakdown classes to the new breakdowns was needed, which is the focus of this document. This model update effort also offered an opportunity to review any new literature published since the 2008 model was created and validate selected habitat parameters.

7.1 Review of New Species Literature since 2008

The Boise NF mid-scale habitat model for the Dusky Grouse (summer) was created in 2005 and revised in 2008 (Geier-Hayes et al. 2008). This literature review of published information between 2008 and 2017 was conducted to validate whether model parameters from 2008 are still consistent with the literature for this species. Any references that had relevant habitat information pertaining to tree size class (TSC) and canopy cover class (CCC) were listed in the Crosswalk tables in the TSC and CCC sections. All new literature reviewed for this 2019 Dusky Grouse (summer) Mid-scale Model Update, including those references that did not provide relevant habitat information regarding TSC or CCC, are listed and briefly summarized at the end of this document. It should be noted that the literature review for this update was completed in 2017; however, the actual review of this document and subsequent update of the model did not occur until 2019.

7.2 Application of Mid-scale Species Habitat Parameters to New Vegetation Structure Classes

A new existing vegetation map was completed for the mid-scale in 2012 using imagery acquired from 2008 and field data collected from 2007 through 2011. The data represent conditions across the Forest through the fall of 2008. This map was updated for the Payette National Forest in 2016 and called the "Forest Derived Product." Forest Derived Products are Forest-level updates of the contractor provided maps that better facilitate Forest-level data needs. These can be added to or updated as emerging Forest-level needs arise. This included post-processing of polygon delineations to reduce the noise of many small polygons by aggregating these to produce polygons that more adequately represent a larger unit on the ground (i.e., "stands"), to meet the minimum map unit of 5 acres for most polygons, and to reduce the overall number of polygons for processing. Size class polygons were then reattributed utilizing the same imagery used by the original mapping product and newer imagery as it became available. The original contractor mapping process generalized much of the size class polygons into the medium size class (10.0-19.9" DBH). The hand-edits of the size class attributes helped to spread the distribution of size classes into the seedling, sapling, small and large tree classes and more closely mirror Forest Inventory data. Secondly, the canopy cover map needed to be updated to incorporate changes due to recent fires. Rule sets utilizing post-fire vegetation condition were developed to adjust canopy cover changes where necessary and reviewed with newer imagery. No changes were made to the dominance type map and all changes made to the size class and canopy cover class were made to nest into the correct corresponding dominance types in that map, so that the map integrity between the three layers was maintained. An update to the accuracy assessment was also completed for the Forest Derived Products.

Although there was no change to the Potential Vegetation Group (PVG), this new existing vegetation product created new categories for tree size class and canopy cover class. The final dominance type map units, size classes and canopy cover classes conform to the mid-level mapping standards referenced in the Existing Vegetation Classification and Mapping Technical Guide Version 1.0 (Brohman and Bryant

2005). This existing vegetation map provides the Payette National Forest with a new baseline of current condition. However, the classification for the components of this vegetation map are different than the classifications used in previous vegetation mapping efforts used for the Payette National Forest Land and Resource Management Plan (LRMP) (Redmond et al. 1998; USDA Forest Service 2003a). Therefore, crosswalks needed to be developed to translate the categories for size class and canopy cover classes used for the 2008 model in order to run the models on the new existing vegetation product. The following documentation explains how the parameters were cross-walked from the 2008 model into the 2019 model.

7.3 Parameter Review Discussion

7.3.1 PVG Discussion

No new information was found during the literature review on potential vegetation group (PVG) preferences for the Dusky Grouse (summer). No change is recommended.

7.3.2 Tree Size Class Discussion

Tree Size Class (TSC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 7-1**.

Table 7-1 Tree Size Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer

2003 Forest Plan Appendix A Range	New Vegetation Layer (2011)	Changed or New Classification?
Grass/Forb/Shrub/Seedling	Seedling (<4.5' tall)	change in name only
Sapling (0.1 – 4.9 " DBH)	Sapling (0.1 – 4.9" DBH)	
Small (5.0 – 12.0" DBH)	Small (5 – 9.9" DBH)	change
Medium (12.1 – 20" DBH)	Medium (10 – 19.9" DBH)	change
Large (>20.0" DBH)	Large (20 – 29.9" DBH)	change
	Very Large (≥ 30" DBH)	new

Dusky grouse nest on the ground and forage on seeds, berries, and insects. In the spring and summer dusky grouse utilize lush forbs and grasses for both food and concealment of nests and early broods until these food and cover sources begin to dry up, after which they gradually move into more woody shrub and tree habitats. Areas of homogenous grass are generally avoided (Cade and Hoffman 1990).

While use of herblands, grasslands, and shrublands (mountain mahogany, chokecherry, serviceberry, rose, bitterbrush, sagebrush) is commonly described as summer habitat, use of these habitats primarily occurs when they are within or adjacent to forested stands, typically within open ponderosa pine or Douglas-fir habitat types (Cade and Hoffman 1993; Caswell 1954; Mussehl et al. 1963, Pelren and Crawford 1999; Stauffer and Peterson 1986; Wisdom et al. 2000). For example, Mussehl et al. (1963) found broods in the Judith Mountains of Montana primarily in bunchgrass-balsamroot-low shrub adjacent to coniferous forest and that broods in the Bitterroot area ranged across the bunchgrass-balsamroot types into semi-open ponderosa pine stands. Mussehl et al. (1963) also stated that broods were more often found within

50 yards of shrub or tree cover. Beer (1943) noted that BLGR moved to lower elevations in the spring (March and April) where there are openings in the forest suitable for rearing young, and Popper et al. (1996) reported that 23 of 25 radio-collared birds used summer daytime roosts within 50 meters of suitable roost trees, indicating a presence of some kind of forested overstory.

Wisdom et al. (2000) described dusky grouse summer source habitat as contrast habitat that occurs on the interface between forest and openings and generally at lower elevations than in winter. These openings, whether natural or created by harvest or fire, can develop an inter-mix of herb, shrub, and/or seedling vegetation that provides cover and forage for dusky grouse, and yet are still within the larger matrix of a later seral forest.

While few literature sources discussed specific tree size class preferences for dusky grouse summer habitat, much of the literature generally characterizes summer nesting and roost habitat as having a tree component. However, there is no indication of a preference for any given size class. Within the recommended PVGs (1, 2, and 5), seral or climax shrubs or some residual live conifers were likely present in all growth stages under the historical fire regime. Therefore, all tree size classes have the potential to provide the herb, shrub, and tree contrast habitats described in the literature and should be included in the source habitat model.

Table 7-2 shows the crosswalk between Tree Size class parameters found in the literature and the new recommended Tree Size class breakouts and lists the references that supported the rationale for the final selection of habitat parameters.

It is recommended that Seedling (4.5’ tall), Sapling (0.1-4.9” DBH), Small (5-9.9” DBH, Medium (10-19.9” DBH), Large (20-29.9” DBH), and Very Large (> 30” DBH) Tree Size classes be used to model summer source habitat for the dusky Grouse.

Table 7-2 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Size Class Parameter

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Beer, J. 1943. Food habits of the blue grouse. Journal of Wildlife Management. Vol. 7(1): 32-44	Blue grouse are found mainly in the “Douglas- fir belt”. During the last of March and in April the blue grouse leave their winter homes in the firs on the high ridges and migrate to lower country where the snow has melted and there are **openings in the forest** suitable for rearing the young.	---
Cade, B.S.; Hoffman, R.W. 1993. Differential migration of blue grouse in Colorado. The Auk 110(1): 70-77. (Colorado)	Summer--breeding areas: open coniferous, aspen, mountain-shrub.	---
Caswell, E.B. 1954. A preliminary study on the life history and ecology of the blue grouse in west central Idaho. Master’s Thesis, Moscow, ID: University of Idaho, University of Idaho Graduate School. 105 pages (Central Idaho)	Solid stands of Douglas-fir on north slopes were not used as heavily as **more open stands or small dense** stands on other aspects.	---

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Mussehl, T.W. 1963. Blue grouse brood cover selection and land- use implications. Journal of wildlife management. 27(4): 547-555.	A key component was the mosaic of various lifeforms, which provided a high degree of concealment. Broods were most often found within **50 yards of shrub or tree cover**. As the chicks matured, woody cover became more important for resting, feeding on berries, and escape. Broods in the Judith Mountains were found primarily in bunchgrass-balsamroot-low shrub **adjacent to coniferous forest**. Broods in the Bitterroot area ranged across much more area from the bunchgrass- balsamroot into the semi-open **ponderosa pine stands**.	---
Pelren, Eric C. and Crawford, John A. (1999) "Blue Grouse nesting parameters and habitat associations in northeastern	"Blue Grouse in northeastern Oregon frequently nest in parkland habitats," suggesting **open forested** conditions.	---
Oregon," *Great Basin Naturalist*: Vol. 59: No. 4, Article 9. (northeastern Oregon)		
Popper, Kenneth J.; Pelren, Eric C.; and Crawford, John A. (1996) "Summer nocturnal roost sites of Blue Grouse in northeastern Oregon," *Great Basin Naturalist*: Vol. 56: No. 2, Article 11. (Northeastern Oregon)	Twenty-three of 25 radio-equipped birds were within 50 m of potentially useful **roost trees**. During daytime, radio-equipped birds were seldom located in trees (<1% of 614 observations, July-August 1991 through 1993; E. Pelren unpublished data). However, almost all birds flushed during the day landed in trees, and conifer needles were found in crops of birds taken from the study area in August and September 1981 and 1982 (Crawford et al. 1986). These descriptions of roost habitat indicate that there is a forested component of BLGR summer habitat.	---
Stauffer, D.F.; Peterson, S.R. 1986. Seasonal microhabitat relationships of blue grouse in southeastern Idaho. Great Basin Naturalist. Vol. 46(1): 117-122. (Southeastern Idaho)	Habitats are open, but the presence of some trees indicates that **areas with at least some taller cover were preferred**. Mountain mahogany sites were used spring through autumn and had the highest tree cover of all "open" sites. Blue grouse selected sites within the mixed shrub type that had **higher than average woody cover of small trees and shrubs**. In the maple vegetation type, percent coniferous cover and deciduous cover was lower at sites used in the spring, than summer. Blue grouse selected sites with relatively high herbaceous cover. **Clumps of small trees and shrubs may enhance brood habitat** by providing nesting sites and site protection.	Sapling (0.1 – 4.9" DBH) Small (5-9.9" DBH)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendell.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-scale Trends and Management	Spring and summer habitats are generally at lower elevations than winter. In the summer, blue grouse uses contrast habitats that occur on the interface between forest and openings, particularly **forest and open shrubby areas**. Source habitat in summer includes **all forested vegetation stages except stem exclusion** in the following covertypes: Interior Douglas-fir, Interior Ponderosa pine, and	All Tree Size Classes
Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW-GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol. (Quigley, Thomas M., tech. ed.: Interior Columbia Basin Ecosystem Management Project: scientific assessment).	Western Larch; all stages in Aspen; all stages in Chokecherry-serviceberry-rose, Antelope bitterbrush, and Wheatgrass. Source Habitat from Appendix 1, Volume 3, Table 1, pages 437-440 Cover types/structural stage for summer: Interior Douglas-fir, Western Larch, Interior Ponderosa pine/old multi-story, old single-story, unmanaged young multi- story, managed young multi-story, understory re-initiation, stand initiation. Aspen/old multi-story, unmanaged young, managed young, understory re- initiation, stem exclusion closed canopy, stand initiation; Chokecherry-serviceberry-rose/open tall shrub, open low-medium shrub, closed low-medium shrub; Antelope bitterbrush/closed low-medium shrub; Wheatgrass/closed herbland.	

DBH = diameter at breast height

7.3.3 Tree Canopy Cover Discussion

Tree Canopy Cover (TCC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 7-3**.

Table 7-3 Tree Canopy Cover Class Differences Between 2003 Forest Plan Appendix A and New 2011 Vegetation Layer

Tree Canopy Cover Class		
2003 Forest Plan Appendix A Range	**New Vegetation Layer (2011)**	**Changed or New Classification?**
10 – 39% Low	10 – 19% (Low Tree Canopy)	change
	20 – 29% (Low-Medium Tree Canopy)	change
	30 – 44% (Medium Tree Canopy)	change
40 – 69% Moderate	45 – 59% (Medium-High Tree Canopy)	change
>70% High	60% (High Tree Canopy)	change

Most of the literature describes "open" forest or the herb/shrub-interface as important for summer nesting, young rearing, and forage habitat for this species (Stauffer and Peterson 1986, Wisdom et al. 2000, Cade and Hoffman 1993, Beer 1943, Caswell 1954, Pelren and Crawford 1999). These open or edge conditions are typically associated with some level of overhead tree canopy. Mussehl (1963) stated that a key component of summer habitat is the mosaic of various life forms, including the interface between forest and openings, which provides a high degree of concealment. This kind of mosaic commonly occurs in the lower range of tree canopy covers. Stauffer and Peterson (1986), a study in southeastern Idaho, reported mean tree canopy covers for four open vegetation types of 8 percent (sagebrush), 37 percent (mountain mahogany), 8 percent (mixed shrub), and 24 percent (maple), percentages which included both coniferous and deciduous trees. The values from this study and the many qualitative descriptions noted above support inclusion of the Low and Low-Medium Tree Canopy Cover Classes. These classes would allow ample light to reach the ground, necessary for development of the herb and shrub layer, and would maintain the overstory tree canopy structure, which is important for overhead concealment and shade, especially towards the end of summer when forbs and grasses become desiccated. Inclusion of the Medium tree canopy cover class, especially the upper end, would not likely be open enough to develop dense herb and shrub components, and as a result, is not recommended for inclusion in the model.

To assess source habitat, modeling would best approximate the findings of the literature by selecting for forested stands in the Low (10-19%) and Low-Medium (20-29%) Tree Canopy Cover classes for preferred PVGs within their historic range of variability (HRV).

Table 7-4 shows the crosswalk between parameters (or qualitative descriptions) found in the literature and the new tree canopy cover class breakouts and lists the references that supported the rationale for the final selection of habitat parameters.

Selecting forested stands in the Low (10-19%) and Low-Medium (20-29%) Tree Canopy Cover classes is recommended for modeling dusky grouse (Summer) source habitat.

Table 7-4 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Canopy Cover Class Parameters

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Zwickel, Fred C. and James F. Bendell. (2005). Dusky Grouse (Dendragapus obscurus), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/dusgro DOI: 10.2173/bna.15a Accessed on April 12, 2017.	Nest sites are extremely variable but almost always on ground. May be on recent burns with little cover (Figure 33) and in virtually all community types occupied in breeding season. Most nests have overhead cover (Caswell 1954), but a single dead twig may suffice. Among 612 nests, <2% had no overhead cover (Zwickel and Bendell 2004). On breeding range, territorial males feed mainly within confines of their territories. Those with arboreal song-posts tend to feed within trees from which they sing. In spring, hens may be attracted to clearings for foraging. Hens with young broods often select open areas, often mesic sites with lush vegetation, perhaps owing to insect abundance (Wing 1947, Mussehl 1963a). In mid to late summer, broods, especially, may move to more mesic sites or those with greater canopy cover as vegetation in open areas desiccates (Marshall 1946, Zwickel 1973).	---

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Stauffer, D.F.; Peterson, S.R. 1986. Seasonal microhabitat relationships of blue grouse in southeastern Idaho. Great Basin Naturalist. Vol. 46(1): 117-122. (Southeastern Idaho)	Habits are **open**, but the presence of some trees indicates that areas with at least some taller cover were preferred. Table 2, pg. 119. – Mean tree canopy cover for 4 open vegetation types were **8%** (sagebrush), **37%** (mnt. mahogany), **8%** (mixed shrub), and **24%** (maple). These values reflect both coniferous and deciduous trees. These open types provide suitable habitat for hooting by male blue grouse. Lewis (1961) reported **tree cover of 6.6%** and canopy height of 3.3 m at hooting sites on Vancouver Island. In Montana, Martinka (1972) found a **tree crown cover of 30%** at male display sites and Maestro (1971) noted that breeding blue grouse preferred areas of **41%-50% tree cover** in Utah.	Low (10-19%) Low-Medium 20-29%) Medium (30-44%)
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendell.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-scale Trends and Management Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW-GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol. (Quigley, Thomas M., tech. ed.: Interior Columbia Basin Ecosystem Management Project: scientific assessment).	In the summer, blue grouse uses **contrast habitats** that occur on the **interface between forest and openings**, particularly forest and open shrubby areas. Most often found in areas with **a high abundance of shrubs** used for cover and foraging. This includes shrubby areas that have developed post-fire or from other management activities that create **early seral shrub conditions adjacent to later seral forest stages.** Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	---
Mussehl, T.W. 1963. Blue grouse brood cover selection and land-use implications. Journal of wildlife management. 27(4): 547- 555.	Relatively **high canopy coverage** was a physical requirement of herbaceous cover. JF: Moderate or high tree canopy cover would not provide enough sunlight to the ground to develop high herbaceous or shrub cover. This study found that high herbaceous cover was more important to early brood concealment than shrub or	---
	tree vegetation and didn't mention tree canopy cover at all, but also reported that young were most often found within 50 yards of brush or tree cover, or both, indicating that there was a tree canopy component to brood rearing habitat.	
Cade, B.S.; Hoffman, R.W. 1993. Differential migration of	Summer--breeding areas: **open coniferous**, aspen, mountain-shrub.	---

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
blue grouse in Colorado. The Auk 110(1): 70-77. (Colorado)	**Open habitats** used for breeding occurred at lower elevations than wintering habitats.	
Beer, J. 1943. Food habits of the blue grouse. Journal of Wildlife Management. Vol. 7(1): 32-44	During the last of March and in April blue grouse leave their winter homes in the firs on the high ridges and migrate to lower country where the snow has melted and there are **openings in the forest** suitable for rearing the young. Animal food made only 1.7 percent of the adult diet, but is very important to the young grouse. It is probably for this reason that the blue grouse **usually nest in the open** where there is an abundant supply of insects.	---
Caswell, E.B. 1954. A preliminary study on the life history and ecology of the blue grouse in west central Idaho. Master's Thesis, Moscow, ID: University of Idaho, University of Idaho Graduate School. 105 pages. (Central Idaho)	Solid stands of Douglas-fir on north slopes were not used as heavily as **more open stands** or small dense stands on other aspects.	---
Pelren, Eric C. and Crawford, John A. (1999) "Blue Grouse nesting parameters and habitat associations in northeastern Oregon," *Great Basin Naturalist*: Vol. 59: No. 4, Article 9. (northeastern Oregon)	"Blue Grouse in northeastern Oregon frequently nest in **parkland habitats**," suggesting **open forested** conditions.	Low (10-19%) Low-Medium 20-29%) (inferred from "parkland habitats" description)

7.4 Source Habitat Conditions When Outside HRV Discussion

None.

7.5 Additional Modeling Parameters

None.

7.6 Model Limitations

This species is documented in the literature as being a contrast species, requiring the juxtaposition of habitats used for foraging and concealment. This juxtaposition occurs from the adjacency of non-forest cover types and forested PVGs or from the arrangement of successional community types within PVGs. The model cannot take this need for juxtaposed habitats into account and therefore will overestimate the amount of source habitat for this species.

7.7 Updated Forest Modeling Parameters for Dusky Grouse (Summer) Source Habitat

The updated mid-scale habitat parameters for the dusky grouse (summer) are as follows:

Within HRV

PVGs: 1, 2, 3, 5, and 6

Tree Size Class: Seedling, Sapling, Small, Medium, Large, and Very Large Tree Canopy Cover Class: Low and Low-Medium

Note: This species is documented in the literature as being a contrast species, requiring the juxtaposition of habitats used for foraging and concealment. This juxtaposition occurs from the adjacency of non-forest covertypes and forested PVGs or from the arrangement of successional community types within PVGs. The model cannot take this need for juxtaposed habitats into account and therefore will overestimate the amount of source habitat for this species.

Source habitat is defined by those characteristics of macro-vegetation *that contribute to stationary or positive population growth*.

7.8 New Literature Sources Reviewed for this Update

Below is a list of all new literature reviewed for this 2019 Dusky Grouse (Summer) Mid-scale Modeling Update, including those references that did not provide relevant habitat information regarding tree size class or canopy cover class parameters. This list was compiled to both inform the next literature review and/or model update of what references were reviewed and to document the entire 2016/2017 literature review process.

The literature search found no new references more recent than 2008 that pertained to habitat preferences. A summary of relevant habitat information from *The Birds of North America* online account was also included because it is a good synthesis of all available habitat information for this species.

Reference – Zwickel, Fred C. and James F. Bendell. (2005). Dusky Grouse (*Dendragapus obscurus*), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/dusgro DOI: 10.2173/bna.15a

Accessed on April 12, 2017.

The following excerpts from the Birds of North America (BNA) online account are pertinent to this update:

7.8.1 Nesting

Almost certainly variable, but little direct study. Sites range from coastal old-growth forest (humid sites) to xeric shrub/steppe (hot, dry sites), to subalpine habitats (cold sites).

Extremely variable but almost always on ground; 2/620 on stumps. May be on recent burns with little cover (Figure 33) and in virtually all community types occupied in breeding season. Most nests have overhead cover (Caswell 1954), but a single dead twig may suffice. Among 612 nests, <2% had no overhead cover (Zwickel and Bendell 2004).

7.8.2 Foraging

From Wing et al. 1944 , Armleder 1980 , Bendell and Elliott 1967 , and others as noted. On breeding range, territorial males feed mainly within confines of their territories. Those with arboreal song-posts tend to feed within trees from which they sing. In spring, hens may be attracted to clearings for foraging. Hens with young broods often select open areas, often mesic sites with lush vegetation, perhaps owing to insect abundance (Wing 1947 , Mussehl 1963a). In mid to late summer, broods, especially, may move to more mesic sites or those with greater canopy cover as vegetation in open areas desiccates (Marshall 1946 , Zwickel 1973).

The following reference from 1999 was also used to inform this model update but was not referenced in the original 2008 model, even though it would have been available at the time.

Reference - Pelren, Eric C. and Crawford, John A. (1999) "Blue Grouse nesting parameters and habitat associations in northeastern Oregon," *Great Basin Naturalist*: Vol. 59: No. 4, Article 9.

This study looked at nesting habitat characteristics in northeastern Oregon. The study collared 27 blue grouse hens and followed them from spring 1992 through spring 1997. Mean hatch date was May 31. While there were no relationships found between nesting success and hatch date or habitat parameters, there was a relationship detected for the presence of overhead logs. All ten nests that were under logs were successful, whereas only 10 of 17 nest that didn't have overhead structure were successful. This was the only habitat feature that was related to nesting success. There were no quantitative parameters given to use for this model update, as nesting habitat was highly variable, but the researchers reported qualitatively that blue grouse in this study frequently nest in **parkland habitats**," suggesting **open forested** conditions.

8.0 BOREAL OWL

Mid-scale Modeling Update for the Boreal Owl
March 21, 2019 Payette National Forest
Joe Foust, District Wildlife Biologist, Cascade RD, Boise National Forest on Detail to the Payette National Forest

The purpose of this document is to update the Boreal Owl Mid-scale Habitat Model developed for the Boise National Forest in 2009 (Nutt et al. 2009), which is being used as the base habitat model for the 2019 Payette National Forest Baseline Habitat Modeling Update. This mid-scale model was developed for use at the scale of the entire Forest but is useful for habitat patch and pattern information at the scale of the fifth hydrologic unit code. It has been ten years since the original mid-scale species model for the Boise National Forest's modeling effort was created. In order to complete the 2019 Payette National Forest Baseline Habitat Modeling Update effort, there was a need to update three key components of the modeling process, including the new existing vegetation layer that had different canopy cover and tree size classes, the new 5th HUC boundaries, and the most up to date fire data. For the vegetation portion, in order to run the mid-scale habitat model with this new data, a crosswalk that linked the old breakdown classes to the new breakdowns was needed, which is the focus of this document. This model update effort also offered an opportunity to review any new literature published since the original 2009 model was created and validate selected habitat parameters.

8.1 Review of New Species Literature since 2010

The Boise NF mid-scale habitat model for the Boreal Owl was created in 2005 and last revised in 2009 (Nutt et al. 2009). This literature review of published information between 2009 and 2017 was conducted to validate whether model parameters from 2009 are still consistent with the literature for this species. Any references that had relevant habitat information pertaining to tree size class (TSC) and canopy cover class (CCC) were listed in the Crosswalk tables in the TSC and CCC sections. All new literature reviewed for this 2019 Boreal Owl Mid-scale Model Update, including those references that did not provide relevant habitat information regarding TSC or CCC, are listed and briefly summarized at the end of this document. It should be noted that the literature review for this update was completed in 2017; however, the actual review of this document and subsequent update of the model did not occur until 2019.

8.2 Application of Mid-scale Species Habitat Parameters to New Vegetation Structure Classes

A new existing vegetation map was completed for the mid-scale in 2012 using imagery acquired from 2008 and field data collected from 2007 through 2011. The data represent conditions across the Forest through the fall of 2008. This map was updated for the Payette National Forest in 2016 and called the "Forest Derived Product." Forest Derived Products are Forest-level updates of the contractor provided

maps that better facilitate Forest-level data needs. These can be added to or updated as emerging Forest-level needs arise. This included post-processing of polygon delineations to reduce the noise of many small polygons by aggregating these to produce polygons that more adequately represent a larger unit on the ground (i.e. "stands"), to meet the minimum map unit of 5 acres for most polygons, and to reduce the overall number of polygons for processing. Size class polygons were then reattributed utilizing the same imagery used by the original mapping product and newer imagery as it became available. The original contractor mapping process generalized much of the size class polygons into the medium size class (10.0-19.9" DBH). The hand-edits of the size class attributes helped to spread the distribution of size classes into the seedling, sapling, small and large tree classes and more closely mirror Forest Inventory data. Secondly, the canopy cover map needed to be updated to incorporate changes due to recent fires. Rule sets utilizing post-fire vegetation condition were developed to adjust canopy cover changes where necessary, and reviewed with newer imagery. No changes were made to the dominance type map and all changes made to the size class and canopy cover class were made to nest into the correct corresponding dominance types in that map, so that the map integrity between the three layers was maintained. An update to the accuracy assessment was also completed for the Forest Derived Products.

Although there was no change to the Potential Vegetation Group (PVG), this new existing vegetation product created new categories for tree size class and canopy cover class. The final dominance type map units, size classes and canopy cover classes conform to the mid-level mapping standards referenced in the Existing Vegetation Classification and Mapping Technical Guide Version 1.0 (Brohman and Bryant, 2005). This existing vegetation map provides the Payette National Forest with a new baseline of current condition. However, the classification for the components of this vegetation map are different than the classifications used in previous vegetation mapping efforts used for the Payette National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service 2003a, Redmond et al. 1998). Therefore, crosswalks needed to be developed to translate the categories for size class and canopy cover classes used for the 2009 model in order to run the models on the new existing vegetation product. The following documentation explains how the parameters were cross-walked from the 2009 model into the 2019 model.

8.3 Parameter Review Discussion

8.3.1 PVG Discussion

No new information was found during the literature review. No change is recommended.

8.3.2 Tree Size Class Discussion

Tree Size Class (TSC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 8-1**.

Table 8-1 Tree Size Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer

2003 Forest Plan Appendix A	New Vegetation Layer (2011)	Changed or New Classification
Grass/Forb/Shrub/Seedling (GFSS) (<4.5' tall)	Seedling (<4.5' tall)	change in name only
Sapling (1.0 – 4.9 " DBH)	Sapling (0.1 – 4.9" DBH)	
Small (5.0 – 12.0" DBH)	Small (5 – 9.9" DBH)	change
Medium (12.1 – 20" DBH)	Medium (10 – 19.9" DBH)	change
Large (>20.0" DBH)	Large (20 – 29.9" DBH)	change
	Very Large (> 30" DBH)	new

Table 8-2 shows the crosswalk between Tree Size Class parameters found in the literature and the new Tree Size Class breakouts.

Hayward et al. 1993 and Hayward 1994 appear to be only sources from which modeling parameters can be drawn from, and both papers essentially represent the same study. Hayward 1994 was used as the primary source for this exercise because it summarized findings and offered additional information on roosting habitat parameters. Several other later papers mention data and results from Hayward 1994, but none offer any new details on boreal owl nesting, roosting, or foraging habitat specifics, including tree size preferences. Many sources also mention mature or old forest but don't quantify what that means (Hayward 1997, Hayward and Hayward 1993, Wisdom et al. 2000). There is no question that the literature still supports including the Large Tree and Very Large size classes for modeling nesting and forage habitat. However, inclusion of the Medium Tree size class needs revisited due to the slight expansion of this class down to 10 inches DBH from the original 12.1 inches DBH. The Medium Tree size class is now 10-19.9 inches DBH.

Characterizations of study parameters from Hayward 1994c described the area surrounding documented winter roosting sites as having approximately 67 trees per acre (tpa) for trees over 9 inches DBH, 84 tpa for trees over 9 inches DBH at summer roosting sites, and 23 ($\pm$6.5) tpa for trees greater than 15 inches DBH at nesting sites. These habitat parameters indicate the importance of the medium tree component

within Boreal Owl nesting and roost/forage[2] habitat. In addition, some references suggest that a complex or multi-layered canopy is important for nesting habitat (Hayward et al. 1993; Hayward 1994c; Wisdom et al. 2000; Groves et al. 1997). Medium Tree size class stands often have multi-layered canopies with larger trees mixed in that could provide snag recruitment for nesting structures.

It is recommended that Medium (10 – 19.9" DBH), Large (20 – 29.9" DBH), and Very Large ((> 30" DBH) Tree Size classes be used to model source habitat for the boreal owl, both for within and outside the Historical Range of Variation (HRV).

Table 8-2 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Size Class Parameter

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Hayward, Gregory D. 1994c. Review of technical knowledge: Boreal owls. In: Hayward, G.D.; Verner, J., tech. eds. 1994. Flammulated, boreal, and great gray owls in the United States: a technical conservation assessment. Gen. Tech. Rep. RM-253. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station: 92- 127.	(nesting) Density of trees at nest site = 398 + 162 trees/ha for trees 2.5-23 cm DBH translates to 161 + 66 tpa for trees 1-9" DBH. Nest sites averaged 57 (+16) trees/ha over 38 cm DBH (nesting) = 23 (+6.5) tpa over 15 in. DBH (roosting/forage) 430 roosts from 24 collared owls winter roosts - 1,620 trees/ha with trees 2.5-23 cm and 165 trees/ha >23.1 cm translates to 656 tpa with trees 1-9" DBH and 67 tpa for trees > 9" DBH Summer roosts - 2,618 trees/ha with trees 2.5-23 cm and 208 trees/ha > 23.1 cm translates to 1,060 tpa with trees 1-9" DBH and 84 tpa for trees > 9" DBH.	Medium – 10-19.9" DBH Large – 20-29.9" DBH Very Large - > 30" DBH
Hayward, Greg D., P.H. Hayward and E.O. Garton. 1993. Ecology of boreal owls in the northern Rocky Mountains. Wildlife Monographs. 124: 1-59.	This paper was the original study publication, but didn't summarize the findings pertaining to tree size as thoroughly as Hayward 1994c. Around nest sites density of trees larger than 23.1 cm **(9")** DBH averaged 212 $\pm$ 86/ha, or 86 $\pm$ 35 tpa Qualitative descriptions of habitat such as "Nest sites restricted to mature and old forest stands with complex physical structure." and "best foraging habitat was associated with older spruce-fir stands."	Medium – 10-19.9" DBH Large – 20-29.9" DBH Very Large - $\geq$ 30" DBH

8.3.3 Tree Canopy Cover Discussion

Tree Canopy Cover (TCC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 8-3**.

[2] Hayward 1994c noted that while forage habitat data was very limited in their study, they were able to document many roost sites, and that roost sites likely represented the end of the previous night's foraging activity. As a result, the area around the roost site could be used to characterize forage habitat.

Table 8-3 Canopy Cover Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer (Tree Canopy Cover Only)

Tree Canopy Cover Class		
2003 Forest Plan Appendix A Range	**New Vegetation Layer (2011)**	**Changed or New Classification?**
10 – 39% Low	10 – 19% (Low Tree Canopy)	change
	20 – 29% (Low-Medium Tree Canopy)	change
	30 – 44% (Medium Tree Canopy)	change
40 – 69% Moderate	45 – 59% (Medium-High Tree Canopy)	change
>70% High	60% (High Tree Canopy)	change

The study by Hayward et al. 1993 (also Hayward 1994c) is the only source that quantitatively describes nesting and roosting/foraging habitat parameters for the boreal owl. In this study they describe the area around nest sites as having roughly 30 percent canopy cover for trees with heights greater than 8 meters in the canopy (Table 4, page 24). However, this is not the total canopy cover. If all of the canopy cover values for each canopy layer are added, the total canopy cover would be 79%, although this does not take into account crown overlap. Regardless, total canopy cover would still be substantially more than the 30 percent value for just the dominant canopy layer. Hayward et al. (1993) also found that within the 0.1-acre plot surrounding 19 nest sites canopy cover averaged 55 percent +/- 7.7, solidly within the Medium-High tree canopy cover class (TCCC). The study also described the area surrounding winter roost sites (0.1- acre plot) with roughly 58 percent canopy cover, at the high end of Medium-High TCCC, and summer roost sites with 63 percent canopy cover, within the High TCCC.

Selecting forested stands in the Medium-High (45-59%) and High ($\geq$ 60%) Tree Canopy Cover classes is recommended for modeling boreal owl source habitat, both within and outside HRV. The Medium Tree Canopy Cover Class was not selected because it would likely overestimate suitable habitat at this modeling scale.

Table 8-4 below shows the crosswalk between Tree Canopy Cover class parameters found in the literature and the new Tree Canopy Cover class breakouts by reference.

Table 8-4 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Canopy Cover Class Parameter

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Hayward, Gregory D. 1997. Forest management and conservation of boreal owls in north America. J. Raptor Research 31(2): 114-124.	"In Idaho forest structure at summer roost sites had a high canopy cover…"	>=60% (High)
Hayward, Greg D., P.H. Hayward and E.O. Garton. 1993. Ecology of boreal owls in the northern Rocky Mountains. Wildlife Monographs. 124: 1-59.	Central Idaho Study – Frank Church RNRW From Table 4, page 24 (n=33) – Nest and calling sites averaged **30% (±4.3)** overstory	45 – 59% (Medium-High) >=60% (High)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
	(>8m above ground) canopy cover (not actual canopy cover but cover of upper canopy). From Table 5, page 25 – Average canopy cover for areas around 19 nest sites in FCRNR Wilderness was **55% ± 7.7**. (area measured was 0.1- acre) From Table 7, page 27 - Forest stands used for winter roosts (n=189) averaged **58.5% (±1.91) canopy cover**. Summer roosts (n=241) averaged **63.5% (±1.54) canopy cover**. (area measured was a tenth-acre plot surrounding roost site)	
Hayward, Gregory D. 1994c. Review of technical knowledge: Boreal owls. In: Hayward, G.D.; Verner, J., tech. eds. 1994. Flammulated, boreal, and great gray owls in the United States: a technical conservation assessment. Gen. Tech. Rep. RM-253. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station: 92-127.	Same as Hayward et al. 1993	45 – 59% (Medium-High) >=60% (High)

8.4 Updated Forest Modeling Parameters for Boreal Owl Source Habitat

The updated mid-scale habitat parameters for the boreal owl are as follows:

Within HRV

PVGs: 3, 4, 7, 8, 9, and 11

Tree Size Class: Medium, Large, and Very Large

Canopy Cover Class: PVGs 3, 4, 7, and 11 = Medium-High

PVGs 8 and 9 = Medium-High and High

Outside HRV

PVGs 3, 4, 7, and 11

Tree Size Class: Medium, Large, and Very Large Canopy Cover Class: High

Additional Modeling Parameters

Parameters described above at >= 5,000 feet elevation

8.5 New Literature Sources

Below is a list of all new literature reviewed for this 2019 Boreal Owl Mid-scale Model Update that was not already used in the original modeling paper *Boreal Owl Documentation of Modeling Parameters for Use in Mid- and Fine-Scale Habitat Models, Boise National Forest* (Nutt et al. 2009). Some references that were reviewed did not provide useful habitat information but are listed below to inform the next literature review and/or model update and to document the entire literature review process.

The results of the literature review completed by the Payette National Forest for this species in 2015 for its modeling update was used for this update in order to avoid duplicating efforts. Only one reference, summarized below, was listed in their review. I was not able to access this reference when finalizing this modeling update document due to a problem with the reference's web site.

Reference - Niemi, G. J. 2015. Boreal Owl: Its habitat and prey in the Superior National Forest. Final Report to USDA/Forest Service, Superior National Forest.

Study in Minnesota. Notes "A secondary cavity nester (Mikkola 1983), the Boreal Owl is dependent on species such as the Pileated Woodpecker (*Dryocopus pileatus*) and Northern flicker (*Colaptes auratus*) and forest processes (e.g., pathogens and forest insects) that create and maintain large cavity trees (Hayward 1997)."

9.0 FISHER

Mid-scale Modeling Update for the Fisher
April 3, 2019 Payette National Forest
Joe Foust, District Wildlife Biologist, Cascade RD, Boise National Forest on Detail to the Payette National Forest

The purpose of this document is to update the Fisher Mid-scale Habitat Model developed for the Boise National Forest in 2008 (Nutt et al. 2008), which is being used as the base habitat model for the 2019 Payette National Forest Baseline Habitat Modeling Update. This mid-scale model was developed for use at the scale of the entire Forest but is useful for habitat patch and pattern information at the scale of the fifth hydrologic unit code. It has been eleven years since the original mid-scale species model for the Boise National Forest's modeling effort was created. In order to complete the 2019 Payette National Forest Baseline Habitat Modeling Update effort, there was a need to update three key components of the modeling process, including the new existing vegetation layer that had different canopy cover and tree size classes, the new 5th HUC boundaries, and the most up to date fire data. For the vegetation portion, in order to run the mid-scale habitat model with this new data a crosswalk that linked the old breakdown classes to the new breakdowns was needed, which is the focus of this document. This model update effort also offered an opportunity to review any new literature published since the original 2008 model was created and validate selected habitat parameters.

9.1 Review of New Species Literature since 2008

The Boise NF mid-scale habitat model for the Fisher was created in 2005 and last revised in 2008 (Nutt et al. 2008). This literature review of published information between 2008 and 2017 was conducted to validate whether model parameters from 2008 are still consistent with the literature for this species. Any references that had relevant habitat information pertaining to tree size class (TSC) and canopy cover class

(CCC) were listed in the Crosswalk tables in the TSC and CCC sections. All new literature reviewed for this 2019 Fisher Mid-scale Model Update, including those references that did not provide relevant habitat information regarding TSC or CCC, are listed and briefly summarized at the end of this document. It should be noted that the literature review for this update was completed in 2017; however, the actual review of this document and subsequent update of the model did not occur until 2019.

9.2 Application of Mid-scale Species Habitat Parameters to New Vegetation Structure Classes

A new existing vegetation map was completed for the mid-scale in 2012 using imagery acquired from 2008 and field data collected from 2007 through 2011. The data represent conditions across the Forest through the fall of 2008. This map was updated for the Payette National Forest in 2016 and called the "Forest Derived Product." Forest Derived Products are Forest-level updates of the contractor provided maps that better facilitate Forest-level data needs. These can be added to or updated as emerging Forest-level needs arise. This included post-processing of polygon delineations to reduce the noise of many small polygons by aggregating these to produce polygons that more adequately represent a larger unit on the ground (i.e. "stands"), to meet the minimum map unit of 5 acres for most polygons, and to reduce the overall number of polygons for processing. Size class polygons were then reattributed utilizing the same imagery used by the original mapping product and newer imagery as it became available. The original contractor mapping process generalized much of the size class polygons into the medium size class (10.0-19.9" DBH). The hand-edits of the size class attributes helped to spread the distribution of size classes into the seedling, sapling, small and large tree classes and more closely mirror Forest Inventory data. Secondly, the canopy cover map needed to be updated to incorporate changes due to recent fires. Rule sets utilizing post-fire vegetation condition were developed to adjust canopy cover changes where necessary, and reviewed with newer imagery. No changes were made to the dominance type map and all changes made to the size class and canopy cover class were made to nest into the correct corresponding dominance types in that map, so that the map integrity between the three layers was maintained. An update to the accuracy assessment was also completed for the Forest Derived Products.

Although there was no change to the Potential Vegetation Group (PVG), this new existing vegetation product created new categories for tree size class and canopy cover class. The final dominance type map units, size classes and canopy cover classes conform to the mid-level mapping standards referenced in the Existing Vegetation Classification and Mapping Technical Guide Version 1.0 (Brohman and Bryant 2005). This existing vegetation map provides the Payette National Forest with a new baseline of current condition. However, the classification for the components of this vegetation map are different than the classifications used in previous vegetation mapping efforts used for the Payette National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service 2003a, Redmond et al. 1998). Therefore, crosswalks needed to be developed to translate the categories for size class and canopy cover classes used for the 2008 model in order to run the models on the new existing vegetation product. The following documentation explains how the parameters were cross-walked from the 2008 model into the 2019 model.

9.3 Parameter Review Discussion

The following parameter review discussion describes the vegetation parameters used to model source habitat when under historic range of variability (HRV) conditions.

9.3.1 PVG Discussion

No new information was found during the literature review on potential vegetation group (PVG) preferences for the fisher. No change is recommended.

9.3.2 Tree Size Class Discussion

Tree Size Class (TSC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 9-1**.

Table 9-1 Tree Size Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer

2003 Forest Plan Appendix A	New Vegetation Layer (2011)	Changed or New Classification
Grass/Forb/Shrub/Seedling (GFSS) (<4.5' tall)	Seedling (<4.5' tall)	change in name only
Sapling (1.0 – 4.9 " DBH)	Sapling (0.1 – 4.9" DBH)	
Small (5.0 – 12.0" DBH)	Small (5 – 9.9" DBH)	change
Medium (12.1 – 20" DBH)	Medium (10 – 19.9" DBH)	change
Large (>20.0" DBH)	Large (20 – 29.9" DBH)	change
	Very Large (≥ 30" DBH)	new

Fisher use a variety of forest age classes, stand densities, and structure for denning, resting, and foraging activities throughout the year. Jones (1991) conducted a study in north-central Idaho on the nearby Nez Perce National Forest, and because it is the still the most comprehensive local work to date in the vicinity of the Boise National Forest, it provides the basis for habitat parameters used in this mid-scale model update. The study characterized the complexity of fisher habitat use which was presented in the context of summer and winter habitat.

In summer, mature and old growth forests made up 92 and 74 percent of resting and hunting sites, respectively, and non-forest and pole-sapling types were avoided. These older stands had more large diameter trees (>18.5 inches DBH), snags (13.5 – 20.5 inches DBH), and logs (13.5 – 21.5 inches DBH) relative to available habitat, and would be well represented by the Medium, Large, and Very Large Tree Size classes.

In winter fisher preferred younger stands mostly for hunting and in some cases resting. However, even though these stands were classified as young forest they contained remnant large trees and snags commonly associated with older forests, and fisher sought this large structure out within these younger stands. These stands had a higher availability of live trees greater than 18.5 inches DBH, snags greater than 20.5 inches, and logs greater than 18.5 inches DBH than surrounding habitat. Most denning also occurred in winter. Large logs used for dens had a median diameter (at the small end) of 21 inches.

While young stands were generally preferred in winter, mature and old growth forests were also used for resting sites presumably for their thermal cover value and potentially firmer snow conditions (for better

mobility). Similar to summer habitat, stands with the preferred large structure used in winter would also fit well into the Medium, Large, and Very Large Tree Size classes.

Other studies in Idaho, Montana, California, Washington, and British Columbia also characterize fisher habitat as requiring medium and large diameter live trees, snags, and logs (Schwartz et al. 2013, Purcell et al. 2009, Zielinski et al. 2004, Aubrey et al. 2013, Wisdom et al. 2000). While some of these studies may have included Coastal habitats or were in areas that typically have trees species and conditions that grow larger trees than what's available in Central Idaho (many of the California and Washington studies), they were included because they show the preference of this species for large trees, especially for resting and denning, and in nearly every case fishers used larger structure than what was available. As a result, it is recommended that the Medium, Large, and Very Large Tree Size classes be used to model fisher source habitat.

Table 9-2 shows the crosswalk between Tree Size class parameters found in the literature and the new recommended Tree Size class breakouts, and lists the references that supported the rationale for the final selection of habitat parameters.

It is recommended that Medium (10-19.9" DBH), Large (20-29.9" DBH) and Very Large (> 30" DBH) Tree Size classes be used to model source habitat for the fisher, both for within and outside the Historical Range of Variation (HRV).

Table 9-2 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Size Class Parameter

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Jones, Jeffrey L. 1991. Habitat use of fisher in north-central Idaho. M.S. Thesis. Univ. of Idaho, Moscow. 146 pp. (Jones and Garton (1994) was developed from this reference) (Idaho)	(Summer Habitat) During summer**, mature and old growth forests** occupied 92 percent and 74 percent of **resting and hunting** sites, respectively. Old growth was characterized by dense canopies, high densities of large diameter trees, snags and logs, high coniferous understory cover, and moderate deciduous understory cover. Fisher selected **mature to old-growth** grand fir **forests in summer**; particularly those with a relatively high composition of pacific yew, moderate to large-diameter spruce, and large diameter Douglas-fir. These stands had more large-diameter trees (>47 cm or **18.5 inches DBH**), snags (34.3-52.1 cm or **13.5-20.5 inches DBH**), and logs (34.3-54.6 cm or **13.5-21.5 inches DBH**) relative to available habitat. Summer habitat had significantly less 11.4-21.6 cm (4.5 to 8.5 inches) DBH grand fir and 11.4-47.0 cm (4.5 to 18.5 inches) DBH lodgepole and ponderosa pine when compared to random sites. (Winter Habitat)	Medium (10-19.9" DBH) Large (20-29.9" DBH) Very Large (>30" DBH)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
	For 39 observations during winter, young forests were preferred, whereas they were avoided in summer. These stands had a higher availability of trees ≥47 cm (**18.5 inches**) DBH, snags ≥52.1 cm (**20.5 inches**) DBH, and logs ≥47.0 cm (**18.5 inches**) DBH relative to plots 50 m away. Large logs were used as temporary **dens** in winter. Even though sites were classed as young forest, they contained characteristics commonly associated with older forests (47.0-62.2 cm (**18.5 to 24.5 inches**) DBH trees exceeding 27.2/ha and 34.3-52.1 cm (**13.5 to 20.5 inches**) DBH snags exceeding 19.8/ha. Snags used as rest sites had a median diameter of 34 inches DBH.	
	In winter habitat, when compared to random sites, there was significantly less 21.6-47.0 cm (8.5 to 18.5 inches) DBH grand fir, 11.4-21.6 cm (4.5 to 8.5 inches) DBH lodgepole and >47 cm (18.5 in) DBH subalpine fir.	
Schwartz, M.K., DeCesare, N.J., Jimenez, B.S., Copeland, J.P., Melquist, W.E., 2013. Stand-and landscape-scale selection of large trees by fishers in the Rocky Mountains of Montana and Idaho. Forest Ecology and Management 305, 103–111. (Idaho and Montana)	The study found that female fishers consistently selected large trees at both the stand and landscape scales (large trees were considered ≥ 38 cm (**15 inches**) DBH).	Medium (10-19.9" DBH) Large (20-29.9" DBH) Very Large (>30" DBH)
Purcell, K.L., Mazzoni, A.K., Mori, S.R., Boroski, B.B., 2009. Resting structures and resting habitat of fishers in the southern Sierra Nevada, California. Forest Ecology and Management 258, 2696–2706. (California)	(Resting) Mean DBH of 57 live resting trees were 95 cm (**37 inches**) (SD = 29 cm); mean DBH of 12 resting snags was 117 cm (**46 inches**) (SD = 47 cm).	Very Large (>30" DBH)
Zielinski, W.J., Truex, R.L., Schmidt, G.A., Schlexer, F.V., Schmidt, K.N., Barrett, R.H., 2004. Resting habitat selection by fishers in California. J. Wildl. Manag. 68: 475–492. (California)	(Resting) Tree size class 5 (>61.0-cm DBH) (**24 inches DBH**) was the most frequent tree size class surrounding resting sites in the Coastal area, whereas class 4 (28.0– 61.0 cm) (**11 – 24 inches**) was the most frequent class in the Sierra study area. Most resting structures at both of our study areas were in standing trees, and most of these were large (*mean* > 100-cm or 39 inches DBH).	Medium (10-19.9" DBH) Large (20-29.9" DBH) Very Large (>30" DBH)
Aubry, K.B., Raley, C.M., Buskirk, S.W., Zielinski, W.J., Schwartz, M.K., Golightly, R.T., Purcell, K.L., 2013. Meta-analysis of habitat selction at resting sites by fishers in the pacific	Fisher consistently selected resting sites with denser overhead cover and larger diameter of conifers and hardwoods than were available. Three sites reported mean DBH of live conifers (≥ 4 inches) greater than 20 inches and the remaining 7 sites had mean DBHs of between	Medium (10-19.9" DBH) Large (20-29.9" DBH) Very Large (>30" DBH)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
coastal states and provinces. J. Wildl. Manage 77 (5). (WA, OR, CA, BC)	10 and 20 inches, and at all but one site fishers used trees larger than what was available.	
Weir, R.D., M. Phinney, E. C. Lofroth. 2009. Big, sick, and rotting: Why tree size, damage, and decay are important to fisher reproductive	All den sites were either aspen (*Populus tremuloides*) or balsam poplar trees (*Populus balsamifera spp. Balsamifera*), so may not be very comparable to the BNF,	Large (20-29.9" DBH) Very Large (>30" DBH)
habitat. Forest Ecology and Management. 265: 230-240. (British Columbia)	even though the BNF does have some aspen (relative to northeastern BC): aspen with a mean DBH of 50 cm, SD = 11, n = 20) (20 inches) or balsam poplar trees with a mean DBH of 58 cm, SD = 11, n = 11) (23 inches).	
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendell.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-scale Trends and Management Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW-GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol. (Quigley, Thomas M., tech. ed.: Interior Columbia Basin Ecosystem Management Project: scientific assessment).	Source habitat for fishers includes late- seral stages of the montane community group and unmanaged young forests. Unmanaged young forests contain **sufficient large-diameter snags and logs.** Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	N/A
Groves, Craig R., Bart Butterfield, Abigail Lippincott, Blair Csuti and J. Michael Scott. 1997. Atlas of Idaho's Wildlife: Integrating Gap Analysis and Natural Heritage Information. Idaho Dept. Fish and Game. Boise, Idaho. (Idaho)	In Idaho, prefers mature or old-growth coniferous forests (forested riparian habitats in spring, summer and fall, and younger-aged forests in winter).	N/A

DBH = diameter at breast height

9.3.3 Tree Canopy Cover Discussion

Tree Canopy Cover (TCC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 9-3**.

Table 9-3 Canopy Cover Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer (Tree Canopy Cover Only)

Tree Canopy Cover Class		
2003 Forest Plan Appendix A Range	**New Vegetation Layer (2011)**	**Changed or New Classification?**
10 – 39% Low	10 – 19% (Low Tree Canopy)	change
	20 – 29% (Low-Medium Tree Canopy)	change
	30 – 44% (Medium Tree Canopy)	change
40 – 69% Moderate	45 – 59% (Medium-High Tree Canopy)	change
>70% High	60% (High Tree Canopy)	change

As in the tree size class discussion above, the Jones (1991) study from north-central Idaho was used as the primary reference for determining canopy cover class parameters for this mid-scale model update. The study documented that fisher generally avoided areas with less than 40 percent canopy cover in both summer and winter. More specifically, resting fisher preferred stands with greater than 61 percent canopy cover in summer, and stands with less than 40 percent canopy cover were rarely used for hunting. Similarly, in winter resting fisher also preferred canopy covers greater than 61 percent, while hunting fisher preferred stands with greater than 81 percent. Based on the study's results, the author recommended maintaining canopy cover above 79 percent to maintain quality summer and winter fisher habitat, although how much or at what scale was unclear. These findings and recommendations firmly fall within the Medium-High and High Canopy Cover classes. Stands with Medium-High and High Canopy Cover would be more likely to develop complex structure and multiple canopy layers that provide habitat for a diverse prey base, thermal cover, deflect snow build up for easier mobility in winter, and ample resting structure.

Use of the Medium-High and High Canopy Cover classes is also supported by other studies that reported preference for canopy covers at or above 60 percent (Aubrey et al. 2013; Purcell et al. 2009; Zielinski et al. 2004). Preference for high canopy cover was fairly universal across all study sites from the Sierra Nevada range in California, north into Washington and British Columbia. The one outlier was a study in the Chilcotin Plateau, an interior plain in central British Columbia (Davis 2009). In this study mean canopy cover was substantially lower (less than 40 percent) compared to all other studies found in the literature. The author explained that the difference could be because of the extremely poor soils and harsh growing conditions in this particular area that reduced productivity, and posited that fisher were possibly selecting habitat based on something other than canopy cover. Regardless, the vast majority of the literature describe fisher using relatively high canopy covers.

As a result, modeling would best approximate the findings of the literature by selecting for forested stands in the Medium-High and High Tree Canopy Cover classes for preferred PVGs within their historic range of variability (HRV).

Table 9-4 shows the crosswalk between parameters (or qualitative descriptions) found in the literature and the new tree canopy cover classes, and lists the references that supported the rationale for the final selection of habitat parameters.

Selecting forested stands in the Medium-High (45-59%) and High (>60%) Tree Canopy Cover classes is recommended for modeling fisher source habitat.

Table 9-4 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Canopy Cover Class Parameters

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Jones, Jeffrey L. 1991. Habitat use of fisher in north-central Idaho. M.S. Thesis. Univ. of Idaho, Moscow. 146 pp. (Jones and Garton (1994) was developed from this reference) (Idaho)	In both summer and winter habitat, fisher avoided more open areas with <40 percent crown cover. **In summer, resting fishers preferred stands with ≥61 percent canopy cover**. Stands with less than 40 percent crown closure were rarely used for hunting. In winter, resting fishers also preferred canopy closures of ≥ 61 percent; while hunting fishers preferred stands with ≥81 percent canopy cover but used other canopy classes randomly. Of 39 observations in young forest in winter, 25 percent had canopy cover exceeding 73 percent. Mgmt. recommendation: to maintain quality summer and winter fisher habitat provide ample stands with canopy cover >79 percent (pg. 116).	Medium-High (45-59%) High (≥ 60%)
Aubry, K.B., Raley, C.M., Buskirk, S.W., Zielinski, W.J., Schwartz, M.K., Golightly, R.T., Purcell, K.L., 2013. Meta-analysis of habitat selction at resting sites by fishers in the pacific coastal states and provinces. J. Wildl. Manage 77 (5). (WA, OR, CA, BC)	Fisher consistently selected resting sites with denser overhead cover and larger diameter of conifers and hardwoods than were available. Seven of the 9 sites reported mean overhead cover **> 60 percent**.	Medium-High (45-59%) High (≥ 60%)
Purcell, K.L., Mazzoni, A.K., Mori, S.R., Boroski, B.B., 2009. Resting structures and resting habitat of fishers in the southern Sierra Nevada, California. Forest Ecology and Management 258, 2696–2706. (California)	"Management practices that support the growth and retention of greater numbers of large trees and snags, while maintaining a minimum of **61%** (based on moosehorn) or **56%** (generated via Forest Vegetation Simulator) **canopy cover** and a complex horizontal and vertical forest structure, can improve and provide for future fisher habitat."	High (≥ 60%)
	Mean canopy cover at 61 resting sites was **73.7 percent** (SD = 12.5) versus 55.3 percent at 154 random sites,	

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Zielinski, W.J., Truex, R.L., Schmidt, G.A., Schlexer, F.V., Schmidt, K.N., Barrett, R.H., 2004. Resting habitat selection by fishers in California. J. Wildl. Manag. 68: 475–492. (California)	"Maintaining dense canopy in the vicinity of large trees, especially if structural diversity is increased, will improve the attractiveness of these large trees to fishers." Habitat characteristics at resting sites for 21 fishers had an average canopy closure of **93.4 percent** versus 88.8 percent at random sites. This shows that even though there was high canopy closure everywhere, fishers still selected for the highest that was available. Most resting and random sites at both study areas were in the Dense CWHR canopy category **(>60% canopy closure**).	High (≥ 60%)
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendell.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-scale Trends and Management Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW-GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol. (Quigley, Thomas M., tech. ed.: Interior Columbia Basin Ecosystem Management Project: scientific assessment).	Fishers in Idaho avoided stands with <40 percent canopy cover (Jones 1991, Jones and Garton 1994).	Medium-High (45-59%) High (≥ 60%)

9.4 Source Habitat Conditions When Outside HRV Discussion

Fisher can utilize some forested conditions that are not within the historical range of variability under PVGs 3 and 6. For PVGs 3 and 6, when in the High Canopy Cover class, would potentially develop higher tree densities, more decadent large snags and logs (denning and resting substrate), and more complex vegetative structure than what would have developed when stands in these PVGs were experiencing historical disturbance processes.

9.5 Additional Modeling Parameters

This species is documented in the literature as being associated with riparian habitats and drainages (Jones 1991). Special habitat features for fishers include down logs for denning and resting (Buskirk and Powell 1994; Raphael and Jones 1997). Snags are also a special habitat feature. The model cannot take these parameters into account and, therefore, will overestimate the amount of suitable habitat for this species.

9.6 Updated Forest Modeling Parameters for Fisher Source Habitat

The updated mid-scale habitat parameters for the Fisher are as follows:

Within HRV

PVGs: 3, 6, 8, 9, and 10

Tree Size Class: Medium, Large*, and Very Large* Canopy Cover Class: PVGs 3 and 6 = Medium-High

PVGs 8, 9, and 10 = Medium-High and High

Outside HRV

PVGs: 3 and 6

Tree Size Class: Medium, Large, and Very Large Canopy Cover Class: High

Model Limitations: This species is documented in the literature as being associated with riparian habitats and drainages (Jones 1991). Special habitat features for fishers include down logs for denning and resting (Buskirk and Powell 1994, Raphael and Jones 1997). Snags are also a special habitat feature. The model cannot take these parameters into account and, therefore, will overestimate the amount of suitable habitat for this species.

* Large and very large tree size classes do not occur in PVG 10

9.7 New Literature Sources Reviewed for this Update

Below is a list of all new literature reviewed for this 2019 Fisher Mid-scale Modeling Update, including those references that did not provide relevant habitat information regarding tree size class or canopy cover class parameters. This list was compiled to both inform the next literature review and/or model update of what references were reviewed and to document the entire 2016/2017 literature review process.

9.7.1 References from Idaho and Idaho/Montana

Reference – Olson, L. E., J. D. Sauder, N. M. Albrecht, R. S. Vinkey, S. A. Cushman, M. K. Schwartz. 2013. Modeling the effects of dispersal and patch size on predicted fisher (*Pekania [Martes] pennanti*) distribution in the U.S. Rocky Mountains. Biological Conservation. 169: 89-98.

This study looked at how climate change, available habitat, rate of habitat change combine to affect future fisher distribution in Idaho and Montana. Canopy closure was used as an input to the models and was taken from LandFire cover data set, but this study didn't report on what specific canopy closures were preferred by fisher as the habitat results were a combination of many variables including climatic, topographic, and vegetation. The results indicated that tree height was the best predictor of fisher habitat, which is closely correlated with canopy closure. However, there was no specific crosswalk between tree height and canopy closure categories, so it is unclear what canopy closure parameters were preferred by fisher.

Reference - Schwartz, M.K., DeCesare, N.J., Jimenez, B.S., Copeland, J.P., Melquist, W.E., 2013. Stand- and landscape-scale selection of large trees by fishers in the Rocky Mountains of Montana and Idaho. Forest Ecology and Management 305, 103–111.

The purpose of this study was to examine environmental features selected by fishers at both the stand and landscape scales. The study found that female fishers consistently selected large trees at both scales (large trees were considered ≥ 38 cm (15 inches) DBH). Unfortunately, no specific parameters were given. For canopy cover, the study reported that the most supported model was a landscape model with lots of stands in the high canopy cover class, but again, no specific parameters were given. At the stand level modeling did not detect a preference, but this could be because habitat in the study area generally had canopy cover over 50 percent and so selection was difficult to detect.

One important conclusion was that "while fishers can be detected in riparian stringers that bisect open landscapes, this habitat may not be sufficient for persistence," and the large tree component needs to be fairly abundant on the landscape. Furthermore, "Forest activities that promote the growth of multi- stage stands with ample structure and variation in tree widths and ages will provide the best habitat for fishers."

Reference - Sauder, J.D., Rachlow, J.L., 2014. Both forest composition and configuration influence landscape-scale habitat selection by fishers (*Pekania pennanti*) in mixed coniferous forests of the Northern Rocky Mountains. For. Ecol. Manage. 314, 75–84.

This study looked at fisher habitat selection regarding forest composition and configuration (patterns) at broad spatial (landscape) scales. Results indicated "fishers selected landscapes for home ranges with larger, more contiguous patches of mature forest and reduced amounts of open areas. Landscapes that had ≥50% mature forest arranged in connected, complex shapes with few isolated patches, and open areas comprising ≤5% of the landscape characterized a forest pattern selected by fishers in our study." The take-away from this study is that fisher strongly selected for large patches of contiguous mature forest that were closer together and that had limited amounts of open areas, but "that were arranged in complex, highly connected patterns." This study was comparing models at the landscape scale and looked at habitat selection from more of a patch and pattern perspective and not necessarily from a habitat structure perspective, although there were some structure covariates, and so did not offer any specific habitat parameters that would inform this model update. It also actually warned that "high canopy cover is not the best metric to use in evaluating fisher habitat; the proximity index of mature forest, or even the abundance of mature forest would be more appropriate. If canopy cover must be used, we encourage forest managers to be aware of and explore potentially confounding issues associated with the metric." However, for this model update canopy cover is one of the three metrics we must use.

Reference - Sauder, J.D., Rachlow, J.L., 2015. Forest heterogeneity influences habitat selection by fishers (*Pekania pennanti*) within home ranges. For. Ecol. Manage. 347, 49-56.

This study compared two hypotheses about habitat selection within home ranges where fishers select core use areas based on 1) abundant and contiguous mature forest or 2) variability and diversity of habitats. Results showed that core use areas had intermediate amounts of landscape edge and high canopy cover forest, suggesting that the heterogeneity of habitat is as or more important than strictly high canopy cover. While the study determined that canopy cover was still an important habitat component for fisher, it didn't necessarily quantify what the thresholds were for the parameter for the purposes of this model update, other than reporting that the 55.8 percent of the median home range was made up of mature

forest. Mature forest was assumed to be represented by the 25-50 m canopy height category and not defined by canopy cover, although the two are closely correlated.

9.7.2 References that Collectively Encompass the Pacific Coastal States and Provinces Region (BC, WA, OR, CA)

Reference -Aubry, K.B., Raley, C.M., Buskirk, S.W., Zielinski, W.J., Schwartz, M.K., Golightly, R.T., Purcell, K.L., 2013. Meta-analysis of habitat selction at resting sites by fishers in the pacific coastal states and provinces. J. Wildl. Manage 77 (5).

This study analyzed habitat selection by fishers at 8 study areas in the Pacific Northwest, including British Columbia south to California. The study assessed the importance of 9 habitat variables typically associated with fisher resting sites. The study found that summary effect sizes were statistically significant for all 9 attributes measured. Specific to canopy cover and tree size, fisher consistently selected resting sites with denser overhead cover and larger diameter of conifers and hardwoods than were available. The results gave mean differences between use and availability, which clearly indicate a selection. Mean overhead cover (percent cover of veg ≥2m above ground) and mean DBH of live conifers ≥10 cm (4 inches) values were listed in the Appendix by study area.

Mean overhead covers (used vs. available in percent) for all sites were 39.8/34.4; 61.4/49.9; 83.1/67.4; 78.5/82.4; 89.6/76.5; 94.6/84.0; 73.7/55.7; and 92.6/86.6. Seven of the 9 sites reported mean overhead cover > 60 percent. Mean DBH of live conifers > 10 cm (4 inches) (used vs. available in cm) for all sites was 38.0/32.3; 51.6/31.7; 36.5/33.8; 39.9/35.3; 46.0/33.5; 79.7/66.4; 31.4/34.0; and 58.5/51.5. Three sites reported mean DBH of live conifers (≥ 4 inches) greater than 20 inches and the remaining 7 sites had mean DBHs of between 10 and 20 inches, but at all but one site fishers used trees larger than what was available.

9.7.3 References from British Columbia

Reference – Weir, R.D., M. Phinney, E. C. Lofroth. 2009. Big, sick, and rotting: Why tree size, damage, and decay are important to fisher reproductive habitat. Forest Ecology and Management. 265: 230-240.

This study looked at factors affecting den site selection by female fishers in boreal mixed-wood forests of British Columbia. The paper reported on tree size parameters for den sites, but all den sites were either aspen or balsam poplar trees, so may not be very comparable to the BNF, even though the BNF does have some aspen (relative to northeastern BC). All dens occurred in internal cavities in large, diseased, and decaying trembling aspen (*Populus tremuloides*) with a mean DBH of 50 cm, SD = 11, n = (**20 inches**) or balsam poplar trees (*Populus balsamifera spp. Balsamifera*) with a mean DBH of 58 cm, SD = 11, n = 11) (**23 inches**).

Reference – Weir, R.D., Corbould, F.B., 2010. Factors Affecting Landscape Occupancy by Fishers in North-Central British Columbia. J. Wildl. Manag. 74 (3), 405–410.

This study looked at the factors that affected the probability of fisher occupying habitat in British Columbia. The probability of a home range being occupied decreased with the increase of wetlands and logging activity. Home range habitat with canopy (tree) cover ≥ 30 percent was selected for in this study. However, such a large range of canopy cover does not provide meaningful habitat parameters for this model update. There was no information on tree size.

Reference – Davis, Larry R. 2009. Denning ecology and habitat use by fisher (*Martes pennanti*) in pine dominated ecosystems of the Chilcotin Plateau. Thesis. Dept. of Biological Sciences, Simon Fraser University. 124 pg.

This study reported very low canopy cover, termed tree cover in the study, compared to all other references found in the literature. The author cited that the cause may be because of the harsh growing conditions in this particular area which caused low productivity, and also hypothesized that fisher could just be selecting for something else and that forest structure may be more important in this study area. "Percent Tree Cover" ranged from 5 percent to 40 percent within the study area for 18 fisher. 'Tree cover' was defined as the percentage cover of trees ≥12.5 cm (5 inches) DBH measured in an 11.28-m radius plot. Tree sizes were generally much lower as well, but fisher selected the largest trees available.

9.7.4 References from California

Reference – Purcell, K.L., Mazzoni, A.K., Mori, S.R., Boroski, B.B., 2009. Resting structures and resting habitat of fishers in the southern Sierra Nevada, California. Forest Ecology and Management 258, 2696–2706.

This study looked at resting habitat and structure for fishers in the Sierra Nevada range of California. The study reported that "resting structures were found primarily in live trees (76%) and snags (15%). Trees used by fishers for resting were among the largest available and frequently had mistletoe infestations.

Ponderosa pines were used more often than expected and incense cedars less than expected. Snags were also large and in fairly advanced stages of decay. Habitat at fisher resting sites had higher canopy cover, greater basal area of snags and hardwoods, and smaller and more variable tree sizes compared to random sites." Recommendations were "Management practices that support the growth and retention of greater numbers of large trees and snags, while maintaining a minimum of 61% (based on moosehorn) or 56% (generated via Forest Vegetation Simulator) canopy cover and a complex horizontal and vertical forest structure, can improve and provide for future fisher habitat."

Mean DBH of 57 live resting trees were 95 cm (37 inches) (SD = 29 cm); mean DBH of 12 resting snags was 117 cm (46 inches) (SD = 47 cm).

Mean canopy cover at 61 resting sites was 73.7 percent (SD = 12.5) versus 55.3 percent at 154 random sites, while average DBH of trees surrounding 61 resting sites was 29.7 cm (12 inches) (SD = 7.1 cm) versus 33.2 cm (13 inches) (SD = 11.6 cm) at 154 random sites.

Reference – Purcell, K.L.; C. M. Thompson, and W. J. Zielinski. 2012. Chapter 4: Fishers and American Martens, *in* North, Malcolm, ed. 2012. Managing Sierra Nevada forests. Gen. Tech. Rep. PSW-GTR-237. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 184 p.

This reference summarized habitat information from available literature on Fisher (and marten) from the Sierra Nevada range in California. Listed habitat preferences include the following:

- Trees and snags used as rest sites are typically among the largest available, often >35 in diameter at breast height (DBH) (range 13 to 71 in) (89 cm; range 34 to 180 cm) (Martin and Barrett 1991, Purcell et al. 2009, Spencer 1987, Zielinski et al. 2004).

- Habitat conditions in the immediate vicinity of resting structures (resting sites) are characterized by complex vertical and horizontal structure, dense canopy cover, large trees, and snags (Purcell et al. 2009, Spencer et al. 1983, Zielinski et al. 2004).
- Canopy cover is consistently the most important variable distinguishing resting sites from available sites for fishers, with results suggesting a minimum canopy cover target of approximately 60 percent (Purcell et al. 2009).

Reference – Zielinski, W.J., Truex, R.L., Schmidt, G.A., Schlexer, F.V., Schmidt, K.N., Barrett, R.H., 2004. Resting habitat selection by fishers in California. J. Wildl. Manag. 68: 475–492.

This study looked at the resting habitat ecology of fishers in two disjunct populations in California; the northwestern coastal mountains and southern Sierra Nevada range. Collared 45 fishers and documented 599 resting locations. Study found that "resting structures were among the largest diameter trees available, averaging 117.3 $\pm$ 45.2 (mean $\pm$ SE) cm (**46 inches**) for live conifers, 119.8 $\pm$ 45.3 for conifer snags, and 69.0 $\pm$ 24.7 for hardwoods. Females used cavity structures more often than males, while males used platform structures significantly more than females." Authors recommended that "managers can maintain resting habitat for fishers by favoring the retention of large trees and the recruitment of trees that achieve the largest sizes. Maintaining dense canopy in the vicinity of large trees, especially if structural diversity is increased, will improve the attractiveness of these large trees to fishers." Habitat characteristics at resting sites was average canopy closure for 21 fishers was reported as 93.4 percent versus 88.8 percent at random sites. This shows that even though there was high canopy closure everywhere, fishers still selected for the highest that was available.

Most resting and random sites at both study areas were in the Dense CWHR canopy category (**>60% canopy closure**). Tree size class 5 (>61.0-cm DBH) (**24 inches DBH**) was the most frequent tree size class at resting sites in the Coastal area, whereas class 4 (28.0–61.0 cm) (**11 – 24 inches**) was the most frequent class in the Sierra study area. Most resting structures at both of our study areas were in standing trees, and most of these were large (*mean* > 100-cm or **39 inches DBH**).

Reference – Zielinski, W.J., Dunk, J.R., Yaeger, J.S., LaPlante, D.W., 2010. Developing and testing a landscape-scale habitat suitability model for fisher (*Martes pennanti*) in forests of interior northern California. For. Ecol. Manage. 260 (9), 1579–1591.

The purpose of this study was to develop a landscape-scale suitability model to predict fisher occurrence and identify fisher habitat. The models used a total of seven variables, and the Medium and Large Tree, Mammalian Prey, and Structurally Complex Forest were the three variables that had positive relationships with predicted values. One vegetation component in the models was the California Wildlife Habitat Relationships (CWHR) value that was a rating based on combinations of cover type, canopy closure, and tree size class. Because these parameters were bunched into a suitability rating and then inserted into the model, it was unclear exactly what parameters were used to determine habitat suitability. As a result, there were no habitat parameters relevant to this model update.

Reference – Sweitzer, R.A., B.J. Furnas, R.H. Barrett, K.L. Purcell, C.M. Thompson. 2016. Landscape fuel reduction, forest fire, and biophysical linkages to local habitat use and local persistence of fishers (*Pekania pennanti*) in Sierra Nevada mixed-conifer forests. Forest Ecology and Management. 361: 208-225.

This study assessed the persistence of fisher following fuel reduction and forest fire disturbances and how habitat linkages could be impacted by those events. While those relationships aren't necessarily relevant to this model update, this study did report on some qualitative habitat descriptions for canopy cover class. Reported that probability of detecting fisher during surveys was higher in high canopy cover stands and that fisher occupancy was positively related to high canopy cover. Overall, fisher preferred forest habitats with relatively high canopy cover.

For modeling purposes, a covariate that included an index of canopy cover based on proportions of cell with canopy closure classes of M (40-59%) or D (60-100%) was used. Predicted fisher occupancy was higher in forest cells with more areas of moderate (M) and dense (D) canopy cover. They described the use of the denMD covariate and what it equals, but it was not clear if this is the threshold that fishers were selecting or was just an example. It appeared from the data that fisher were selecting for cells where the index was 0.80 or more, and these cells represented a one km^2 cell with 80 percent of the cell in either M or D canopy closure class. So, while the parameters were not that definable for the purposes of this model update, I think it would be accurate to say that fisher were either selecting for greater than 40 percent canopy cover within this study or at least more likely to be found within those cells.

In addition, this study noted that relatively high canopy closure was important for foraging fishers, which was already known for both resting and denning fishers (Purcell et al. 2009; Zhao et al. 2012).

Because it was not clear how the index related to actual fisher selection, I did not use this reference for the model update.

The article (Sweitzer, R.A., B.J. Furnas. 2016. Data from camera surveys identifying co-occurrence and occupancy linkages between fishers (*Pekania pennanti*), rodent prey, mesocarnivores, and larger predators in mixed-conifer forests. Elsevier. Data in Brief. 783-792.) was developed from this study and used the same data set and variables.

9.7.5 References from Washington

Reference – Halsey, S.M., W.J. Zielinski, R.M. schiller. 2015. Modeling predator habitat to enhance reintroduction planning. Landscape Ecol. 30:1257-1271.

This study's objective was to develop a predictive model that would identify where reintroduction would be most successful in southern Washington. The model needed to incorporate habitat needs of fisher as well as its primary predator (bobcat) habitat. This study didn't develop any new parameter information, but it did choose to use a canopy cover of **>60 percent** to depict suitable fisher habitat (based on research conducted by Zielinski et al. 2004) for use in the model. Otherwise, this study contained no relevant habitat parameter information for use in the model update.

10.0 FLAMMULATED OWL

Mid-scale Modeling Update for the Flammulated Owl
March 26, 2019 Payette National Forest
Joe Foust, District Wildlife Biologist, Cascade RD, BNF, on Detail to the PNF

The purpose of this document is to update the Flammulated Owl Mid-scale Habitat Model developed for the Boise National Forest in 2008 (Nutt et al. 2008), which is being used as the base habitat model for the 2019 Payette National Forest Baseline Habitat Modeling Update. This mid-scale model was developed for use at the scale of the entire Forest but is useful for habitat patch and pattern information at the scale of the fifth hydrologic unit code. It has been eleven years since the original mid- scale species model for the Boise National Forest's modeling effort was created. In order to complete the 2019 Payette National Forest Baseline Habitat Modeling Update effort, there was a need to update three key components of the modeling process, including the new existing vegetation layer that had different canopy cover and tree size classes, the new 5th HUC boundaries, and the most up to date fire data. For the vegetation portion, in order to run the mid-scale habitat model with this new data a crosswalk that linked the old breakdown classes to the new breakdowns was needed, which is the focus of this document. This model update effort also offered an opportunity to review any new literature published since the original 2008 model was created and validate selected habitat parameters.

10.1 Review of New Species Literature since 2010

The Boise NF mid-scale habitat model for the Flammulated Owl was created in 2005 and revised in 2008 (Nutt et al. 2008). This literature review of published information between 2008 and 2017 was conducted to validate whether model parameters from 2008 are still consistent with the literature for this species. Any references that had relevant habitat information pertaining to tree size class (TSC) and canopy cover class (CCC) were listed in the Crosswalk tables in the TSC and CCC sections. All new literature reviewed for this 2019 Flammulated Owl Mid-scale Model Update, including those references that did not provide relevant habitat information regarding TSC or CCC, are listed and briefly summarized at the end of this document. It should be noted that the literature review for this update was completed in 2017; however, the actual review of this document and subsequent update of the model did not occur until 2019.

10.2 Application of Mid-scale Species Habitat Parameters to New Vegetation Structure Classes

A new existing vegetation map was completed for the mid-scale in 2012 using imagery acquired from 2008 and field data collected from 2007 through 2011. The data represent conditions across the Forest through the fall of 2008. This map was updated for the Payette National Forest in 2016 and called the "Forest Derived Product." Forest Derived Products are Forest-level updates of the contractor provided maps that better facilitate Forest-level data needs. These can be added to or updated as emerging Forest-level needs arise. This included post-processing of polygon delineations to reduce the noise of many small polygons by aggregating these to produce polygons that more adequately represent a larger unit on the ground (i.e., "stands"), to meet the minimum map unit of 5 acres for most polygons, and to reduce the overall number of polygons for processing. Size class polygons were then reattributed utilizing the same imagery used by the original mapping product and newer imagery as it became available. The original contractor mapping process generalized much of the size class polygons into the medium size class (10.0-

19.9” DBH). The hand-edits of the size class attributes helped to spread the distribution of size classes into the seedling, sapling, small and large tree classes and more closely mirror Forest Inventory data. Secondly, the canopy cover map needed to be updated to incorporate changes due to recent fires. Rule sets utilizing post-fire vegetation condition were developed to adjust canopy cover changes where necessary, and reviewed with newer imagery. No changes were made to the dominance type map and all changes made to the size class and canopy cover class were made to nest into the correct corresponding dominance types in that map, so that the map integrity between the three layers was maintained. An update to the accuracy assessment was also completed for the Forest Derived Products.

Although there was no change to the Potential Vegetation Group (PVG), this new existing vegetation product created new categories for tree size class and canopy cover class. The final dominance type map units, size classes and canopy cover classes conform to the mid-level mapping standards referenced in the Existing Vegetation Classification and Mapping Technical Guide Version 1.0 (Brohman and Bryant 2005). This existing vegetation map provides the Payette National Forest with a new baseline of current condition. However, the classification for the components of this vegetation map are different than the classifications used in previous vegetation mapping efforts used for the Payette National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service 2003a, Redmond et al. 1998). Therefore, crosswalks needed to be developed to translate the categories for size class and canopy cover classes used for the 2008 model in order to run the models on the new existing vegetation product. The following documentation explains how the parameters were cross-walked from the 2008 model into the 2019 model.

10.3 Parameter Review Discussion

10.3.1 PVG Discussion

No new information was found during the literature review on potential vegetation group (PVG) preferences for the flammulated owl. No change is recommended.

10.3.2 Tree Size Class Discussion

Tree Size Class (TSC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 10-1**.

Table 10-1 Tree Size Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer

2003 Forest Plan Appendix A	New Vegetation Layer (2011)	Changed or New Classification
Grass/Forb/Shrub/Seedling (GFSS) (<4.5’ tall)	Seedling (<4.5’ tall)	change in name only
Sapling (1.0 – 4.9“ DBH)	Sapling (0.1 – 4.9” DBH)	
Small (5.0 – 12.0” DBH)	Small (5 – 9.9” DBH)	change
Medium (12.1 – 20” DBH)	Medium (10 – 19.9” DBH)	change
Large (>20.0” DBH)	Large (20 – 29.9” DBH)	change
	Very Large (> 30" DBH)	new

For modeling nesting habitat, the majority of literature sources support selecting the Medium (10-19.9" DBH), Large (20 – 29.9" DBH) and Very Large (>= 30" DBH) Tree Size classes (Barnes 2007; Powers et al. 1996; Moore and Frederick 1991; Groves et al. 1997; Goggans 1986; McCallum and Gelbach 1988; Bull et al. 1990), as tree size parameter measurements in those studies were largely from the nest trees themselves. These and other studies also quantitatively described tree size characteristics within habitat beyond just the nest tree, including habitat surrounding the nest tree and/or owl location sites (Moore and Frederick 1991; Groves et al. 1997), at location sites (including forage and roost sites) within home ranges established by radio-collared individuals (Goggans 1986), and within observed roosting habitat (Barnes 2007). These additional habitat characterizations collectively reported preferred tree size parameters solidly within the Medium Tree Size class.

It is recommended that Medium (10-19.9" DBH), Large (20-29.9" DBH), and Very Large (>30" DBH) Tree Size classes be used to model source habitat for the flammulated owl.

Table 10-2 shows the crosswalk between Tree Size class parameters found in the literature and the new Tree Size Classes.

Table 10-2 Table Showing Crosswalk Between Parameters Found in the Literature and New TSC Parameter

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Barnes, Keith P. 2007. Ecology, Habitat Use, and Probability of Detection of Flammulated Owls in the Boise National Forest (Idaho). Boise State University, Boise, ID. M.S. Thesis. 96 p. (Idaho)	PIPO were selected in larger size classes than available (peak of distribution **21-28"** DBH) For day roosts medium-sized trees were selected (peak distribution **9-13"** DBH). Nest tree (n=14) DBH ranged from **11-46"**, with a **mean** DBH **of 23±10"**	Medium – 10-19.9" DBH Large – 20-29.9" DBH Very Large - ≥30" DBH
Powers, L.R., A. Dale, P.Q. Gaede, C. Rodes, L. Nelson, J.J. Dean and J.D. May. 1996. Nesting and food habits of the flammulated owl (Otus flammeolus) in southcentral Idaho. J. Raptor Res. 30(1): 15-20 p. (Idaho but not in PP hab)	Mean DBH of 13 nest trees was **19.6 inches** (SD=7.4).	Medium – 10-19.9" DBH Large – 20-29.9" DBH
Moore, Teresa L. and G.D. Frederick. 1991. Distribution and habitat of flammulated owls (*Otus flammeolus*) in west-central Idaho. Idaho Dept. Fish and Game, Boise. 28pp. (Idaho)	Mean DBH was 32 cm (SD=5) **[13 inches**].	Medium – 10-19.9" DBH
Goggans, Rebecca. 1986. Habitat use by flammulated owls in	Owls used forested stands with trees 30- 50 cm DBH [**12-20 inches DBH**].	Medium – 10-19.9" DBH Large – 20-29.9" DBH

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
northeastern Oregon. Corvallis, OR: Oregon State University. M.S. Thesis. 54 pp. (northeastern Oregon)	Characteristics at 20 nests showed a mean tree diameter was 56.3 cm (SD=11.9, Range= 22-80) [**22 inches DBH**].	Very Large - ≥30" DBH
Groves, Craig, T. Frederick, G. Frederick, E. Atkinson, M. Atkinson, J. Shepherd, and G. Servheen. 1997. Density, distribution, and habitat of flammulated owls in Idaho. Great Basin Naturalist 57(2): 116-123. (Idaho)	In Nez Perce and Payette NF study sites mean DBH for all trees within habitat plots was 32 cm (**13"**) and 31 cm (**12"**), respectively.	Medium – 10-19.9" DBH
McCallum, D.A. and F.R. Gehlbach. 1988.Nest-site preferences of flammulated owls in western New Mexico. Condor. 90 (3): 653- 661. (western New Mexico)	Mean DBH for 17 nests was 46.2 ± 10.7 cm DBH [**18 ± 4 inches DBH**].	Medium – 10-19.9" DBH Large – 20-29.9" DBH
Bull, Evelyn L., A. Wright, and M. Henjum. 1990. Nesting habitat of flammulated owls in Oregon. Journal of Raptor Res. 24(3): 52-55. (Oregon)	Average nest tree DBH was 72 cm (SD=16.1, range 40-97) [**28 in**] Important nesting habitat included large- diameter dead trees with cavities at least as large as a northern flicker cavity…in mature trees (>50 cm DBH) [**20 inches**] in older stands of PIPO/PSME forest types or grand fir types with PIPO in the overstory. Stands with trees >50cm DBH [**20 inches**] were preferred nest sites.	Large – 20-29.9" DBH Very Large - ≥30" DBH

DBH = diameter at breast height

10.3.3 Tree Canopy Cover Discussion

Tree Canopy Cover (TCC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 10-3**.

Table 10-3 Canopy Cover Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer (Tree Canopy Cover Only)

Tree Canopy Cover Class		
2003 Forest Plan Appendix A Range	**New Vegetation Layer (2011)**	**Changed or New Classification?**
10 – 39% Low	10 – 19% (Low Tree Canopy)	change
	20 – 29% (Low-Medium Tree Canopy)	change
	30 – 44% (Medium Tree Canopy)	change
40 – 69% Moderate	45 – 59% (Medium-High Tree Canopy)	change
>70% High	60% (High Tree Canopy)	change

A review of the literature shows that there is strong support for selection of the Medium (30-44%) and Medium-High (45-59%) Tree Canopy Cover classes. Studies that measured canopy covers for nesting sites had canopy covers of 29 percent (Barnes 2007) and 55 percent (Bull et al. 1990) immediately surrounding the nest tree. Other studies that measured habitat within the larger context of a breeding territory or along calling transects reported canopy covers of 45 percent (Barnes 2007), 52-64 percent (Groves et al. 1997), 64 percent (Moore and Frederick 1991), and less than 50 percent (Goggans 1986). Goggans (1986) also measured selected roost habitat and found the majority of roost sites to be within canopies greater than 50 percent.

Inclusion of canopy cover classes below 30 percent would include more open forested communities that may not provide multi-storied canopies important for roosting and forage for this species, while inclusion of canopy cover classes above 59 percent would include habitats generally too dense for even forage or roost habitat and likely overestimate source habitat overall. Selection of the Medium and Medium-High Canopy Cover classes is expected to encompass the broad range of habitats used by this species, from stands with complex, multi-storied canopies that are used for nesting and roost habitat to those more open-canopied stands at the lower end of the canopy cover range that provide small openings and edge habitat used for forage.

Selecting forested stands in the Medium (30-44%) and Medium-High (45-59%) Canopy Cover classes is recommended for modeling flammulated owl source habitat.

Table 10-4 shows the crosswalk between parameters found in the literature and the new Tree Canopy Cover Classes.

Table 10-4 Crosswalk Between Parameters Found in the Literature and New Tree Canopy Cover Class Parameters

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Barnes, Keith P. 2007. Ecology, Habitat Use, and Probability of Detection of Flammulated Owls in the Boise National Forest (Idaho). Boise State University, Boise, ID. M.S. Thesis. 96 p. (Idaho)	Canopy cover at nest trees was **29.1 ± 23.6%** and canopy cover within foraging scale territories (n=17) was **45.0±10.0%.**	Medium (30-44%)
Groves, Craig, T. Frederick, G. Frederick, E. Atkinson, M. Atkinson, J. Shepherd, and G. Servheen. 1997. Density, distribution, and habitat of flammulated owls in Idaho. Great Basin Naturalist 57(2): 116-123. (Idaho)	Mean percent canopy cover at 17 locations along calling transects ranged from **52-64 percent**.	Medium-High (45-59)
Moore, Teresa L. and G.D. Frederick. 1991. Distribution and habitat of flammulated owls (*Otus flammeolus*) in west- central Idaho. Idaho Dept. Fish and Game, Boise. 28pp. (Idaho)	Canopy cover was **64 percent** (SD =12) where owls were located in forested areas.	Medium-High (45-59)
Goggans, Rebecca.1986. Habitat use by flammulated owls in northeastern Oregon. Corvallis, OR: Oregon State University. M.S. Thesis. 54 pp. (northeastern Oregon)	Forest stands used by owls were characterized by canopies with **less than 50%** closure… High foliage density was a key component for day roost selection. Seventy-four percent of roosts (n=37) had canopies greater than **50 percent.** Owls avoided stands with high stem density likely due to lack of ground vegetation (which would affect the diversity and abundance of ground dwelling arthropods) and decreased maneuverability (density of limbs and stems).	Medium (30-44%) Medium-High (45-59)
Bull, Evelyn L., A. Wright, and M. Henjum.1990. Nesting habitat of flammulated owls in Oregon. Journal of Raptor Res. 24(3): 52-55. (Oregon)	Nest tree sites had a canopy closure of **55%** (20.1)	Medium-High (45-59)

10.4 Updated Forest Modeling Parameters for Flammulated Owl Source Habitat

The updated mid-scale habitat parameters for the flammulated owl are as follows:

PVGs: 2, 3, 5, and 6

Tree Size Class: Medium, Large, and Very Large

Tree Canopy Cover Class: Medium and Medium-High

10.5 New Literature Sources Reviewed But Not Relevant to 2016 Mid-scale Modeling Update

Below is a list of all new literature reviewed for this 2019 Flammulated Owl Mid-scale Modeling Update, including those references that did not provide relevant habitat information regarding tree size class or canopy cover class parameters. This list was compiled to both inform the next literature review and/or model update of what references were reviewed and to document the entire 2016/2017 literature review process.

Reference – Linkhart, Brian D. and D. Archibald McCallum. (2013). Flammulated Owl (*Psiloscops flammeolus*), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/flaowl DOI: 10.2173/bna.93. Accessed September 2016.

The species account was last updated in 2013. However, there were no new habitat parameters reported in the updated species account by the authors. The literature cited section was also scanned for new references that could be used in this update.

Reference – Arsenault, David P., 2010. Flammulated Owl (*Otus flammeolus*). Chapter 28 ***in*** Raptors of New Mexico, Jean-Luc E. Cartron editor. 728 p.

Good overview of species natural history with great photos, including habitat photos, but no qualitative parameters for habitat characteristics.

Reference – Carlisle, Jay, Jack Stenger, and Robert Miller. 2011. 2010 breeding season surveys for flammulated owls on the Sawtooth National Forest and BLM Shoshone Field Office in southcentral Idaho. 2010 Annual Report. *Prepared for* Idaho Dept. of Fish and Game, Conservation Sciences Program; BLM Shoshone Field Office; and U.S. Fish and Wildlife Division of Migratory Birds and Habitat Programs. *Prepared by* Idaho Bird Observatory. 45 p.

This is a summary of the survey effort conducted on Sawtooth NF, Sawtooth NRA, and BLM Shoshone Field Office lands. The paper had limited habitat data with respect to canopy cover, and no tree size data. Canopy cover was a parameter collected within 50 meters of the calling point, but I couldn't find this parameter listed or summarized anywhere in the document. There was a reported "Forest Cover" but this was a parameter collected within 300 meters of each point, so it was not presumably the same as canopy cover as it is being used in this modeling update. It wasn't clear if the habitat sampling plots were collected around the detection site or the estimated owl singing site.

Reference – Mika, M. 2010. Phylogeography and landscape genetics of the Flammulated Owl: Evolutionary history reconstruction and metapopulation dynamics. Ph.D. dissertation, Las Vegas, University of Nevada.

Ph.D. dissertation on flammulated owl genetics. No habitat information.

Reference – Nelson, M. D., D. H. Johnson, B. D. Linkhart and P. D. Miles. 2010. Flammulated Owl (*Otus flammeolus*) breeding habitat abundance in ponderosa pine forests of the United States. In Proceedings of the Fourth International Partners in Flight Conference: Tundra to Tropics.

Study used FIA plot data to assess current and historic extent of PP and Jeffrey pine that is flammulated owl habitat across 11 western states. Found that these forest types have decreased 14 percent overall in the past two decades. Also estimated the amount of breeding habitat using three different data sets (FIA, LANDFIRE, and GAP). The study only used a few habitat parameters such as forest type, stand age class, percent stocking class, and average DBH class, so there wasn't anything useful for this modeling update.

Reference – Scholer, Micah N.; Leu, Matthias; and Belthoff, James R. (2014). "Factors Associated with Flammulated Owl and Northern Saw-Whet Owl Occupancy in Southern Idaho". *Journal of Raptor Research, 48*(2), 128-141. http://dx.doi.org/10.3356/JRR-13-00049.1

This work developed distribution models for FLOW and saw whet owls to explore associations between habitat factors and owl occupancy. Habitat data at three different scales (0.4 km, 1 km, and 3 km) was used. The relationships specific to flammulated owls that resulted were that flams occurred in areas with higher proportions of Douglas fir at the 0.4 km scale, used less diverse land cover types at the 1 km scale, and used south-facing slopes at the 3 km scale. Also found that canopy cover was not a strong predictor of occurrence. The models that were developed identified occupancy variables at scales greater than the home range size for flams as being important predictors for occupancy, which means that the species should be managed at scales beyond their home range. Wasn't any useful habitat data though that could be used in our mid-scale models.

Reference – Seidensticker, Mathew T., "Nest Site Characteristics and Breeding Biology of Flammmulated Owls in Missoula Valley" (2011). *Theses, Dissertations, Professional Papers.* Paper 698.

This study (thesis) looked at nest site characteristics and breeding biology of flams in Montana, near Missoula. The study only found four nests in 3 nest trees (2 nests were in the same tree in different years), so the sample size is pretty low. The study focuses on the nest cavities, nest trees, roost sites, and cavity-bearing trees within the breeding territories, and takes measurements of all mentioned, but doesn't measure the habitat surrounding these sites. As a result, it doesn't provide useful habitat parameters for this model update other than size of nesting substrate.

Reference – Seidensticker, Mathew T; Holt, Denver W; Larson, Matthew D. Breeding status of flammulated owls in Montana. *Northwestern Naturalist;* Winter 2013; 94, 3; ProQuest Natural Science Collection. pg. 171

Same general study as Seidensticker 2011, only with a couple more nest sites. Still only measured nest tree characteristics and not the larger habitat area, so no habitat parameters that would inform this model update.

Reference – Waterbury, B., S. Ehlers, and J. Runco. 2009. Flammulated owl (*Otus flammeolus*) occurrence in east-central Idaho 2007-08. Final Report. Idaho Department of Fish and Game, Salmon, ID.

Even though this reference is dated 2008 I reviewed it anyway looking for new relevant information. However, the survey work was done in east-central Idaho where ponderosa pine is lacking so all the

habitat types flams were found in were Douglas fir dominated, which is probably not too relevant for our PP habitat types here in west-central Idaho were DF fir is more of a secondarily preferred habitat type and usually when mixed with PP.

11.0 GREAT GRAY OWL

Mid-scale Modeling Update for the Great Gray Owl
March 26, 2019 Payette National Forest
Joe Foust, District Wildlife Biologist, Cascade RD, Boise NF, on Detail to the PNF

The purpose of this document is to update the Great Gray Owl Mid-scale Habitat Model developed for the Boise National Forest in 2008 (Nutt et al. 2008), which is being used as the base habitat model for the 2019 Payette National Forest Baseline Habitat Modeling Update. This mid-scale model was developed for use at the scale of the entire Forest but is useful for habitat patch and pattern information at the scale of the fifth hydrologic unit code. It has been eleven years since the original mid- scale species model for the Boise National Forest's modeling effort was created. In order to complete the 2019 Payette National Forest Baseline Habitat Modeling Update effort, there was a need to update three key components of the modeling process, including the new existing vegetation layer that had different canopy cover and tree size classes, the new 5th HUC boundaries, and the most up to date fire data. For the vegetation portion, in order to run the mid-scale habitat model with this new data a crosswalk that linked the old breakdown classes to the new breakdowns was needed, which is the focus of this document. This model update effort also offered an opportunity to review any new literature published since the original 2008 model was created and validate selected habitat parameters.

11.1 Review of New Species Literature since 2008

The Boise NF mid-scale habitat model for the Great Gray Owl (GGOW) was created in 2005 and last updated in 2008 (Nutt et al. 2008). This literature review of published information between 2008 and 2017 was conducted to validate whether model parameters from 2008 are still consistent with the literature for this species. Any references that had relevant habitat information pertaining to tree size class (TSC) and tree canopy cover class (TCCC) were listed in the Crosswalk tables in the TSC and TCCC sections. All new literature reviewed for this 2019 Great Gray Owl Mid-scale Model Update, including those references that did not provide relevant habitat information regarding TSC or TCCC, are listed and briefly summarized at the end of this document. It should be noted that the literature review for this update was completed in 2017; however, the actual review of this document and subsequent update of the model did not occur until 2019.

11.2 Application of Mid-scale Species Habitat Parameters to New Vegetation Structure Classes

A new existing vegetation map was completed for the mid-scale in 2012 using imagery acquired from 2008 and field data collected from 2007 through 2011. The data represent conditions across the Forest through the fall of 2008. This map was updated for the Payette National Forest in 2016 and called the "Forest Derived Product." Forest Derived Products are Forest-level updates of the contractor provided

maps that better facilitate Forest-level data needs. These can be added to or updated as emerging Forest-level needs arise. This included post-processing of polygon delineations to reduce the noise of many small polygons by aggregating these to produce polygons that more adequately represent a larger

unit on the ground (i.e., "stands"), to meet the minimum map unit of 5 acres for most polygons, and to reduce the overall number of polygons for processing. Size class polygons were then reattributed utilizing the same imagery used by the original mapping product and newer imagery as it became available. The original contractor mapping process generalized much of the size class polygons into the medium size class (10.0-19.9" DBH). The hand-edits of the size class attributes helped to spread the distribution of size classes into the seedling, sapling, small and large tree classes and more closely mirror Forest Inventory data. Secondly, the canopy cover map needed to be updated to incorporate changes due to recent fires. Rule sets utilizing post-fire vegetation condition were developed to adjust canopy cover changes where necessary, and reviewed with newer imagery. No changes were made to the dominance type map and all changes made to the size class and canopy cover class were made to nest into the correct corresponding dominance types in that map, so that the map integrity between the three layers was maintained. An update to the accuracy assessment was also completed for the Forest Derived Products.

Although there was no change to the Potential Vegetation Group (PVG), this new existing vegetation product created new categories for tree size class and canopy cover class. The final dominance type map units, size classes and canopy cover classes conform to the mid-level mapping standards referenced in the Existing Vegetation Classification and Mapping Technical Guide Version 1.0 (Brohman and Bryant 2005). This existing vegetation map provides the Payette National Forest with a new baseline of current condition. However, the classification for the components of this vegetation map are different than the classifications used in previous vegetation mapping efforts used for the Payette National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service 2003a; Redmond et al. 1998). Therefore, crosswalks needed to be developed to translate the categories for size class and canopy cover classes used for the 2008 model in order to run the models on the new existing vegetation product. The following documentation explains how the parameters were cross-walked from the 2008 model into the 2019 model.

11.3 Parameter Review Discussion

The following parameter review discussion describes the vegetation parameters used to model source habitat when under historic range of variability (HRV) conditions.

11.3.1 PVG Discussion

No new information was found during the literature review on potential vegetation group (PVG) preferences for the great gray owl. No change is recommended.

11.3.2 Tree Size Class Discussion

Tree Size Class classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 11-1**.

Table 11-1 Tree Size Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer

2003 Forest Plan Appendix A	New Vegetation Layer (2011)	Changed or New Classification?
Grass/Forb/Shrub/Seedling (GFSS) (<4.5' tall)	Seedling (<4.5' tall)	change in name only
Sapling (0.1 – 4.9 " DBH)	Sapling (0.1 – 4.9" DBH)	
Small (5.0 – 12.0" DBH)	Small (5 – 9.9" DBH)	change
Medium (12.1 – 20" DBH)	Medium (10 – 19.9" DBH)	change
Large (>20.0" DBH)	Large (20 – 29.9" DBH)	change
	Very Large (≥ 30" DBH)	new

For modeling nesting habitat, the literature solidly supports selecting the Large and Very Large Tree Size classes (Franklin 1988; Bull et al. 1988; Bull and Henjum 1990; Wu et al. 2015), as most of these references reported mean nest tree sizes greater than 19 inches DBH. There is also some support for including the Medium Tree Size class for nesting habitat. While Franklin (1988) reported the mean DBH for twelve total nest trees at nearly 21 inches, the mean for the five of those that were stick nests was inches. Bull and Henjum (1990) also reported a subset of nests (26 percent) that occurred in stands with trees between 12 and 19 inches DBH. Even though the majority (74 percent) of nests in that study occurred in stands with trees greater than 19 inches DBH, GGOWs did use stands with trees between 12 and 19 inches DBH and selected against stands with less than 12-inch trees (Bull and Henjum 1990). Natural nest trees generally need to be large in order to have limbs sufficient to support a stick nest or have enough bole surface area to accommodate a family of large owls (Bull and Henjum 1990). However, stands in the Medium Size class can also develop stand characteristics that include large diameter broken topped trees or mistletoe clumps used for nesting platforms and downed wood that fledglings can use as escape or perch structure. The Medium Size class also provides habitat for the goshawk, which is the primary source of stick nests that are commonly used by the GGOW.

While forage habitat for GGOWs is largely described as associated with open meadow complexes, two studies reported that GGOWs used and in some cases preferred forested stands for foraging. Bull et al. (1988) described foraging stands as generally open with hunting perches in trees having a mean DBH of 27 cm (11 inches), largely within the Medium Size class. Bull and Henjum (1990) reported that foraging bouts usually occurred in mature forested stands with an open understory, which likely correlate to the Medium and Large Size classes. These Medium and Large Size class stands have the potential to provide complex stand structure and high levels of down wood material that are important for prey species, and roosting structure.

As a result, it is recommended that the Medium, Large, and Very Large Tree Size classes be used to model GGOW source habitat.

Table 11-2 shows the crosswalk between Tree Size class parameters found in the literature and the new recommended Tree Size classes, and lists the references that supported the rationale for the final selection of habitat parameters.

It is recommended that Medium (10-19.9" DBH), Large (20-29.9" DBH) and Very Large (>30" DBH) Tree Size classes be used to model source habitat for the great gray owl, both for within and outside the Historical Range of Variation (HRV).

Table 11-2 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Size Class (TSC) Parameters

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Franklin, Alan B. 1988. Breeding biology of the great gray owl in southeastern Idaho and northwestern Wyoming. *The Condor* 90:689-696. (Idaho and Wyoming)	(Nesting) Mean nest tree DBH was recorded by nest type; the range displayed is from 38.6 to 71.8 cm (n = 31) [**15.1-28.6 DBH**) (Table 1, pg. 691).	Medium (10-19.9" DBH) Large (20-29.9" DBH) Very Large (>30" DBH)
Bull, Evelyn L., M.G. Henjum, and R.S. Rohweder. 1988. Nesting and foraging habitat of great gray owls. *J. Raptor Res*. 22 (4): 107- 115. (NE Oregon)	(Nesting) The majority of stick nests were in ≥50 cm (**20 in**) DBH live western larch; while the majority of nests in broken-topped trees were in large diameter PIPO at least 7m tall. Mean DBH of stick nest trees was 58 cm (**23 in**). The mean DBH of broken-topped nest trees was **31 in**. Stick nests: 68 percent made by northern goshawks, 12 percent by red-tail hawks. (Foraging) Open stands of mature forest were used most for foraging, while sub-climax and dense over-mature stands and clearcuts were used less frequently.	Large (20-29.9" DBH) Very Large (>30" DBH)
Bull, Evelyn L. and Mark G. Henjum. 1990. Ecology of the Great Gray Owl. USDA Forest Service Pacific Northwest Research Station. PNW-GTR-265. 39pp. (Oregon)	(Nesting) Seventy-four percent of nests occurred in stands with trees greater than 49 cm DBH [**>19 inches DBH**]; 26 percent occurred in stands with trees 30-49 cm DBH [**12-19 inches DBH**]; no nests occurred in stands of trees less than 30 cm DBH [<12 inches DBH]. Trees chosen for nests were large in diameter because the top had to be wide enough to accommodate a family of owls. Nests in broken-topped trees were 49-64 cm DBH [**19- 25 inches DBH**] and 6-18 m tall [20-60 feet].	Medium (10-19.9" DBH) Large (20-29.9" DBH) Very Large (>30" DBH)
Wu, J. X., R. B. Siegel, H. L. Loffland, M. W. Tingley, S. L. Stock, K. N. Roberts, J. J. Keane, J R. Medley, R. Bridgman, C. Stermer. 2015. Diversity of great gray owl nest sites and nesting habitats in California. Journal of Wildlife Mgmt. 79(6): 937-947. (Sierra Nevada, California)	(Nesting) Mean DBH of nest trees was 100.5 + SD 30.3 cm (**40 inches**) and that nest trees were significantly larger than reference trees.	Large (20-29.9" DBH) Very Large (>30" DBH)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Bryan, T, and E. D. Forsman. 1987. Distribution, abundance, and habitat of great gray owls in southcentral Oregon. The Murrelet. 68:45-49. (Oregon)	All forests in which Great Gray Owls were located were old-growth (45 sites) or mature (18 sites) stands characterized by relatively large overstory.	N/A

DBH = diameter at breast height

11.3.3 Tree Canopy Cover Discussion

Tree Canopy Cover classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 11-3**.

A review of the literature shows the GGOW is strongly associated with high canopy covers in nest stands, as most studies reported nest stand densities of greater than 60 percent (Bull et al. 1988; Bull and Henjum 1990; Wu et al. 2015). Bryan and Forsman (1987) reported a mean canopy cover of 46.5 percent, within the Medium-High class. Fledgling juveniles also preferred high canopy covers (≥60%) after leaving the nest as these sites afford overhead and lateral hiding cover from predators.

Table 11-3 Tree Canopy Cover Class Differences Between 2003 Forest Plan Appendix A and New 2011 Vegetation Layer

Tree Canopy Cover Class		
2003 Forest Plan Appendix A Range	**New Vegetation Layer (2011)**	**Changed or New Classification?**
10 – 39% Low	10 – 19% (Low Tree Canopy)	change
	20 – 29% (Low-Medium Tree Canopy)	change
	30 – 44% (Medium Tree Canopy)	change
40 – 69% Moderate	45 – 59% (Medium-High Tree Canopy)	change
>70% High	60% (High Tree Canopy)	change

As mentioned in the tree size class section, forage habitat for GGOWs is largely described as associated with open meadow complexes. However, Bull et al. (1988) reported that GGOWs used and in some cases preferred forested stands for foraging, and other references also qualitatively describe foraging habitat as occurring in open forested stands with scattered trees or forest margins (Wisdom et al. 2000, Groves et al. 1997). These literature sources indicate that forested stands should also be considered potential GGOW foraging habitat, in addition to meadows. The Bull et al. (1988) study assessed canopy cover associations in three categories; <10 percent, 11-59 percent, and ≥60 percent. Foraging males preferred stands with 11-59 percent canopy cover and avoided stands with greater than 60 percent. In addition to foraging preferences, males most often roosted (71 percent of the time) in stands with 11-59 percent canopy cover (but also used ≥60 percent canopy cover stands 29 percent of the time). The 11-59 percent category spans across four of the new canopy cover classes, including Low, Low-Medium, Medium, and Medium-High.

All of these classes, in addition to the High Canopy Cover class, play a role in the life cycle of this species. GGOWs utilize open stands with little understory for foraging (Low, Low-Medium, and into the Medium classes), somewhat denser stands for some nesting and roost habitat (Medium-High), and dense stands for nearly all nesting and most roost habitat (High). As a result, modeling would best approximate the findings of the literature by selecting for forested stands in the Low, Low-Medium, Medium, Medium-High, and High Tree Canopy Cover classes for preferred PVGs within their historic range of variability (HRV).

Canopy cover will vary by PVG. For PVGs 8, 9, and 10 and within HRV, the Medium-High and High Canopy Cover classes (>45 percent) should be used. For PVGs 3, 7 and 11 within HRV, the Low, Low-Medium, Medium, and Medium-High Canopy Cover classes (11-59 percent) should be included.

Table 11-4 shows the crosswalk between parameters (or qualitative descriptions) found in the literature and the new tree canopy cover class breakouts, and lists the references that supported the rationale for the final selection of habitat parameters.

Selecting forested stands in the Low (11-19%), Low-Medium (20-29%), Medium (30-44%), Medium-High (45-59%), and High (>60%) Tree Canopy Cover classes is recommended for modeling great gray owl source habitat.

Table 11-4 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Canopy Cover Class (TCCC) Parameters

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TCCC Breakouts
	(Nesting) For 46 nest sites, 63 percent had canopy closure **≥ 60%**, while 30 percent had canopy closure between **11- 59%**.	
	Perches used the first week after the young left the nest had an average canopy closure of **50%** (S.D. = 22.16) and were all within 200 m of the nest.	
Bull, Evelyn L., M.G. Henjum, and R.S. Rohweder. 1988. Nesting and foraging habitat of great gray owls. *J. Raptor Res*. 22 (4): 107-115. (NE Oregon)	Within 2 weeks after fledging juveniles gradually became more mobile but generally stayed within forest stands with **≥ 60% canopy closure**. (Foraging) Males (n = 5) preferred stands with **11-59% canopy closure** and avoided clearings. Four of those males **avoided stands with ≥ 60% canopy closure**.	Low (10-19%) Low-Medium (20-29%) Medium (30-44%) Medium-High (45-59%) High (≥ 60%)
	(Roosting) Males roosted during the day most often (71% of the time) in stands with **11-59% canopy closure** and 29% of the time in stands with **≥ 60% canopy closure**.	

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TCCC Breakouts
	83% of 62 roost sites were in mature or older stands with 2 or more canopy layers. For reference, the 0-10% class comprised openings; the 11-59% class contained relatively open stands, many or which had been selectively logged; the ≥ 60% class was primarily unlogged, overmature forest stands.	
Bull, Evelyn L. and Mark G. Henjum. 1990. Ecology of the Great Gray Owl. USDA Forest Service Pacific Northwest Research Station. PNW-GTR-265. 39pp. (Oregon)	Of 49 nests most had canopy closure **≥ 60 percent**. Juvenile, foraging, and roosting canopy density preferences same as Bull et al. (1988) above. The areas used most often for nesting were unlogged, mature or older stands, and usually contained a fairly open understory facilitating easy flight, yet a fairly dense overstory (more than **60 percent canopy closure**) providing shade and concealment from above.	Low (10-19%) Low-Medium (20-29%) Medium (30-44%) Medium-High (45-59%) High (≥ 60%)
Wu, J. X., R. B. Siegel, H. L. Loffland, M. W. Tingley, S. L. Stock, K. N. Roberts, J. J. Keane, J R. Medley, R. Bridgman, C. Stermer. 2015. Diversity of great gray owl nest sites and nesting habitats in California. Journal of Wildlife Mgmt. 79(6): 937-947. (California)	(Nesting) Canopy cover within 50 meters of nest trees was **85.1** (+ 16.4) percent and was significantly greater than at reference sites.	High (≥ 60%)
Bryan, T, and E. D. Forsman. 1987. Distribution, abundance, and habitat of great gray owls in southcentral Oregon. The Murrelet. 68:45-49. (Oregon)	Mean canopy closure at 11 nest sites was **46.5 percent**.	Medium (30-44%) Medium-High (45-59%) High (≥ 60%)
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendell.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-scale Trends and Management Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW-GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol.	Stand-initiation habitats and herb-tree regeneration are primarily used for foraging habitat as well as open forested stands (**11-59 percent cover** (Bull and Henjum 1990)). Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	Low (10-19%) Low-Medium (20-29%) Medium (30-44%) Medium-High (45-59%)
(Quigley, Thomas M., tech. ed.: Interior Columbia Basin Ecosystem Management Project: scientific assessment).		

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TCCC Breakouts
Groves, C.R., B. Butterfield, A. Lippincott, B.Csuti, and J.M. Scott. 1997. Atlas of Idaho's Wildlife: Integrating Gap Analysis and Natural Heritage Information. Idaho Dept. Fish and Game, Nongame Wildlife Program. Boise, Idaho. (Idaho)	Forages in open areas where scattered trees or forest margins provide suitable sites for visual searching.	Low (10-19%) Low-Medium (20-29%) Medium (30-44%) Medium-High (45-59%)

11.4 Source Habitat Conditions When Outside HRV Discussion

Great gray owls can utilize some forested conditions that are not within the historical range of variability under PVGs 3, 7, 8, 9, 10 and 11. For PVGs 3, 7, and 11, when in the High tree canopy cover class, these conditions generally consist of higher tree densities and more complex vegetative structure than what would have developed when stands in these PVGs were experiencing historical disturbance processes.

For PVGs 8, 9, and 10, when in the Low, Low-Medium, Medium tree canopy cover classes, conditions outside HRV consisted of lower canopy covers, low tree densities, and less complex stand structure than what would have developed under HRV.

11.5 Additional Modeling Parameters

This species is documented in the literature as being a contrast species, requiring the juxtaposition of habitats used for foraging and for nesting and roosting. The model cannot take this need for juxtaposed habitats into account and therefore will overestimate the amount of suitable habitat for this species.

11.6 Model Limitations

This species is documented in the literature as being a contrast species, requiring the juxtaposition of habitats used for foraging and for nesting and roosting. The model cannot take this need for juxtaposed habitats into account and therefore will overestimate the amount of suitable habitat for this species.

11.7 Updated Forest Modeling Parameters for Great Gray Owl Source Habitat

The updated mid-scale habitat parameters for the Great Gray Owl are as follows:

Within HRV

PVGs: 3, 7, 8, 9, 10 and 11

Tree Size Class: Medium, Large*, and Very Large*

Tree Canopy Cover Class: PVGs 3, 7, and 11 = Low, Low-Medium, Medium, and Medium-High
PVGs 8, 9, and 10 = Medium-High and High

Outside HRV

PVGs: 3, 7, 8, 9, 10 and 11

Tree Size Class: Medium, Large*, and Very Large* Tree Canopy Cover Class: PVGs 3, 7, and 11 = High

PVGs 8, 9, and 10 = Low, Low-Medium, and Medium

Model Limitations: This species is documented in the literature as being a contrast species, requiring the juxtaposition of habitats used for foraging and for nesting and roosting. The model cannot take this need for juxtaposed habitats into account and therefore will overestimate the amount of suitable habitat for this species.

Source habitat is defined by those characteristics of macrovegetation that contribute to stationary or positive population growth.

* Large and very large tree size classes do not occur in PVG 10

11.8 New Literature Sources Reviewed for this Update

Below is a list of all new literature reviewed for this 2019 Great Gray Owl Mid-scale Modeling Update, including those references that did not provide relevant habitat information regarding tree size class or tree canopy cover class parameters. This list was compiled to both inform the next literature review and/or model update of what references were reviewed and to document the entire 2016/2017 literature review process.

The literature search found only five references dated more recent than 2008 and that would not have been available for the last update of the model, and that was habitat focused. A summary of relevant habitat information from *The Birds of North America* online account was also included because it is a good synthesis of all available habitat information for this species, although the species account has not been updated since 1993.

Reference – Bull, Evelyn L. and James R. Duncan. (1993). Great Gray Owl (*Strix nebulosa*), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/grgowl DOI: 10.2173/bna.41 Accessed March 8, 2017.

The following excerpts from the BNA online account are pertinent to this update:

In southern parts of range, deciduous or coniferous forests up to 2,800 m elevation. In California, for example, breeders prefer pine and fir forests adjacent to montane meadows between 750 and 2,250 m (Winter 1986). In central Oregon, meadow systems associated with coniferous forests (Forsman and Bryan 1987). In ne. Oregon, all forest types sampled had nests, with 50% in fir forests (Bull and Henjum 1990). In Idaho and Wyoming, over 90% of sightings of this species in lodgepole pine (*Pinus contorta*)/Douglas-fir (*Pseudotsuga menziesii*)/aspen (*Populus tremuloides*) zone (Franklin 1987).

Winter range is generally the same as breeding habitat, except at lower elevation with thinner snow cover in ne. Oregon (Bull and Henjum 1990) and in Yosemite National Park, CA (J. Winter pers. comm.).

11.8.1 Nesting

Broken-topped dead trees (snags), old raptor nests (most frequent) (e.g., abandoned Osprey, Goshawk, Raven nests; Voous 1988b), mistletoe brooms, or human-made platforms. Use of snags as nest sites increases in lower latitudes (Franklin 1987).

Reference - Jepsen, P.B., J. J. Keane, and H. B. Ernest. 2011. Winter distribution and conservation status of the Sierra Nevada great gray owl. Journal of Wildlife Management. 75(8): 1678-1687.

This study that looked at winter ecology of the GGOW. It used winter observation data and remotely sensed habitat variables, including canopy cover, to inform a predictive model that identified distribution of the species through probability of occurrence classes. Crown diameter was used as one of the model inputs instead of tree DBH, which was not useful for this model update. Canopy closure was used to help the model identify potential habitat, but overall was not the strongest predictor of habitat. Elevation was the strongest predictor for the model. The study only reported whether a variable had a positive or negative correlation and did not quantify those variables or define any kind of threshold that was preferred. The paper noted at the end that "Radio-telemetry studies are needed to investigate micro- and macro-habitat associations of wintering great gray owls", inferring that that was not the focus of this study.

Reference – Kalinowski, R. S., M. T. Johnson, A. C. Rich. 2014. Habitat relationships of great gray owl prey in meadows of the Sierra Nevada Mountains. Wildlife Society Bulletin. 38(3): 547-556.

This study looked at habitat relationships between GGOW and prey species (voles and pocket gophers) in meadow habitat and did not consider forage habitat outside of the wet meadows. GGOW forage habitat is primarily associated with open meadows and not forested habitat. GGOW source habitat is a combination of forested habitat used for nesting, roosting, and young rearing and open meadow habitat used for foraging. One weakness of the mid-scale GGOW model is that it cannot account for this juxtaposition of habitat. Because this study only looked at meadow habitat and not the forested component of GGOW habitat, it was not relevant to the model update.

Reference – van Riper III, C., J. J. Fontaine, J. W. van Wagtendonk. 2013. Great gray owls (*Strix nebulosa*) in Yosemite National Park: on the importance of food, forest structure, and human disturbance. Natural Areas Journal. 33(3): 286-295.

This study found that owl presence was tied to habitat type (red fir), the presence of meadows, prey densities, and snag availability. Also looked at how human presence influenced owl use of habitat. There were preferences shown for mid-elevation red fir and dry meadows that provide small mammal prey.

The study didn't really look at forested habitat parameters other than snag availability, so there was no relevant habitat information regarding tree size or canopy cover class.

Reference – Wu, J. X., R. B. Siegel, H. L. Loffland, M. W. Tingley, S. L. Stock, K. N. Roberts, J. J. Keane, J R. Medley, R. Bridgman, C. Stermer. 2015. Diversity of great gray owl nest sites and nesting habitats in California. Journal of Wildlife Mgmt. 79(6): 937-947.

This study compiled all known nest site data since 1973 and collected habitat data on 47 of the 56 total sites. Study found that mean DBH of nest trees was 100.5 + SD 30.3 cm (40 inches) and that nest trees were significantly larger than reference trees. Also, canopy cover within 50 meters of nest trees was 85.1 + 16.4 percent and was significantly greater than at reference sites. Also looked at distance to meadows (forage habitat) and reported that at higher elevations most nests were within 250 m from the nearest meadow while at lower elevations 31 percent of nests were greater than 750 m from a meadow. Management recommendations included retaining at least 4 snags greater than 40 inches DBH per hectare near meadows. These TSC and TCCC parameters were used for the GGOW mid-scale model update.

Of note is that tree species prevalent within the study area were ponderosa pine, black oak, incense cedar, sugar pine, Douglas fir, white fir, red fir, lodgepole pine, and Jeffrey pine, some of which are very different from what occurs on the Boise NF. While many of these species and habitat types may be different, the general habitat preferences regarding structure and density were considered to still be relevant to the model update.

Reference – Keane, J. J., H. B. Ernest, and J. M. Hull. 2011. Conservation and management of the great gray owl 2007-2009: assessment of multiple stressors and ecological limiting factors. National Park Service, Yosemite National Park and U.S. Forest Service, Pacific Southwest Research Station Interagency Report, Davis, California, USA.

This report is a summarization of all great gray owl research completed in Yosemite NP between 2007 and 2009. Keane and Ernest (2011), a reference reviewed for this update, was summarized in this report. This report did not review or discuss any habitat parameters relevant to this model update.

The following reference was also used to inform this model update but was not referenced in the original 2008 model, even though it would have been available at the time.

Reference - Bryan, T, and E. D. Forsman. 1987. Distribution, abundance, and habitat of great gray owls in southcentral Oregon. The Murrelet. 68:45-49.

This study looked at the distribution, abundance, and habitat of great gray owls in southcentral Oregon in 1984 and 1985. Habitat data was recorded at response and nest sites. Canopy "closure" was estimated visually, and tree density was measured for a 0.25 ha circular plot from the nest tree. Of 63 sites where owls were located, 60 were less than 0.3 km from a meadow and the other 3 were in forested stands between 0.3 and 0.8 km from a meadow. Fifty-nine of those sites were in stands dominated by lodgepole or a lodgepole/ponderosa pine mix, and all of the sites were within either "old growth" or "mature" stands. Forty-three sites had had some kind of selective logging or firewood cutting in the past 20 years. Of the 11 nests that were found, 6 were old NOGO nests in lodgepole pine, 4 were old red-tailed hawk nests in ponderosa pine, and one was in a cavity in a large broken-topped ponderosa pine. Eight nests were in live trees and the other 3 were in snags. Canopy 'closure' at nest sites was reported to be **46.5 percent** (SD = 21.50).

12.0 LEWIS'S WOODPECKER

Mid-scale Modeling Update for the Lewis's Woodpecker
March 21, 2019 Payette National Forest
Joe Foust, District Wildlife Biologist, Cascade RD, BNF, on Detail to the PNF

The purpose of this document is to update the Lewis's Woodpecker Mid-scale Habitat Model developed for the Boise National Forest in 2008 (Nutt et al. 2008), which is being used as the base habitat model for the 2019 Payette National Forest Baseline Habitat Modeling Update. This mid-scale model was developed for use at the scale of the entire Forest but is useful for habitat patch and pattern information at the scale of the fifth hydrologic unit code. It has been eleven years since the original mid- scale species model for the Boise National Forest's modeling effort was created. In order to complete the 2019 Payette National Forest Baseline Habitat Modeling Update effort, there was a need to update three key components of the modeling process, including the new existing vegetation layer that had different canopy cover and tree size classes, the new 5th HUC boundaries, and the most up to date fire data. For the vegetation portion, in order to run the mid-scale habitat model with this new data a crosswalk that linked the old breakdown classes to the new breakdowns was needed, which is the focus of this document. This model update effort also offered an opportunity to review any new literature published since the original 2008 model was created and validate selected habitat parameters.

12.1 Review of New Species Literature since 2008

The Boise NF mid-scale habitat model for the Lewis's Woodpecker (LEWO) was created in 2005 and revised in 2008 (Nutt et al. 2008). This literature review of published information between 2008 and 2017 was conducted to validate whether model parameters from 2008 are still consistent with the literature for this species. Any references that had relevant habitat information pertaining to tree size class (TSC) and canopy cover class (CCC) were listed in the Crosswalk tables in the TSC and CCC sections. All new literature reviewed for this 2019 Lewis's Woodpecker Mid-scale Model Update, including those references that did not provide relevant habitat information regarding TSC or CCC, are listed and briefly summarized at the end of this document. It should be noted that the literature review for this update was completed in 2017; however, the actual review of this document and subsequent update of the model did not occur until 2019.

12.2 Application of Mid-scale Species Habitat Parameters to New Vegetation Structure Classes

A new existing vegetation map was completed for the mid-scale in 2012 using imagery acquired from 2008 and field data collected from 2007 through 2011. The data represent conditions across the Forest through the fall of 2008. This map was updated for the Payette National Forest in 2016 and called the "Forest Derived Product." Forest Derived Products are Forest-level updates of the contractor provided maps that better facilitate Forest-level data needs. These can be added to or updated as emerging Forest-level needs arise. This included post-processing of polygon delineations to reduce the noise of many small polygons by aggregating these to produce polygons that more adequately represent a larger unit on the ground (i.e. "stands"), to meet the minimum map unit of 5 acres for most polygons, and to

reduce the overall number of polygons for processing. Size class polygons were then reattributed utilizing the same imagery used by the original mapping product and newer imagery as it became available. The

original contractor mapping process generalized much of the size class polygons into the medium size class (10.0-19.9" DBH). The hand-edits of the size class attributes helped to spread the distribution of size classes into the seedling, sapling, small and large tree classes and more closely mirror Forest Inventory data. Secondly, the canopy cover map needed to be updated to incorporate changes due to recent fires. Rule sets utilizing post-fire vegetation condition were developed to adjust canopy cover changes where necessary, and reviewed with newer imagery. No changes were made to the dominance type map and all changes made to the size class and canopy cover class were made to nest into the correct corresponding dominance types in that map, so that the map integrity between the three layers was maintained. An update to the accuracy assessment was also completed for the Forest Derived Products.

Although there was no change to the Potential Vegetation Group (PVG), this new existing vegetation product created new categories for tree size class and canopy cover class. The final dominance type map units, size classes and canopy cover classes conform to the mid-level mapping standards referenced in the Existing Vegetation Classification and Mapping Technical Guide Version 1.0 (Brohman and Bryant 2005). This existing vegetation map provides the Payette National Forest with a new baseline of current condition. However, the classification for the components of this vegetation map are different than the classifications used in previous vegetation mapping efforts used for the Payette National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service 2003a; Redmond et al. 1998). Therefore, crosswalks needed to be developed to translate the categories for size class and canopy cover classes used for the 2008 model in order to run the models on the new existing vegetation product. The following documentation explains how the parameters were cross-walked from the 2008 model into the 2019 model.

12.3 Parameter Review Discussion

12.3.1 PVG Discussion

No new information was found during the literature review on potential vegetation group (PVG) preferences for the Lewis's woodpecker. No change is recommended.

12.3.2 Tree Size Class Discussion

Tree Size Class (TSC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 12-1**.

Table 12-1 Tree Size Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer

2003 Forest Plan Appendix A	New Vegetation Layer (2011)	Changed or New Classification?
Grass/Forb/Shrub/Seedling (GFSS) (<4.5' tall)	Seedling (<4.5' tall)	change in name only
Sapling (0.1 – 4.9" DBH)	Sapling (0.1 – 4.9" DBH)	
Small (5.0 – 12.0" DBH)	Small (5 – 9.9" DBH)	change
Medium (12.1 – 20" DBH)	Medium (10 – 19.9" DBH)	change
Large (>20.0" DBH)	Large (20 – 29.9" DBH)	change
	Very Large (≥ 30" DBH)	new

The species conservation assessment completed by Abele et al. (2004) of various studies from Idaho, Colorado, Wyoming, and California found mean nest tree DBH was 18.5, 44, 19, and 26 inches, respectively. In another Idaho study, Saab et al. (2009) also reported a mean DBH of 20 inches compared to other available snags. These reported size classes fall in the upper end of the Medium Tree Size class and in the Large and Very Large Tree Size classes.

Examples in the literature that show use of the full range of the Medium Tree Size class are generally lacking, the exception being a study by Linden (1994) who reported LEWOs nesting in trees as small as 13 inches DBH. Three more recent studies in Utah, South Dakota, and Idaho reported mean nest tree sizes of 14, 15, and 16 inches, respectively; however, these studies occurred in either aspen or other habitat types with generally smaller maximum tree sizes than what occurs in central Idaho (Vande Voort 2011; Vierling et al. 2009; Newlon and Saab 2011) and as a result may not be comparable. It is important to note that all three of these studies reported that LEWOs selected the largest size available in their respective study areas. Several other references used in this model update also noted that same preference (Saab et al. 2009; Saab and Dudley 1998; Wisdom et al. 2000; Vierling 1997). Actual use, however, depends on species composition (ponderosa pine and grand fir) and the presence of rot in dead or dying trees, conditions which larger trees tend to provide for a longer period of time. For central Idaho where most tree species attain diameters of 20 inches or more, use of just the Large and Very Large Tree Size classes would be more appropriate and would more accurately represent the large tree preference for this species. Even though LEWOs can make use of snags in the Medium Tree Size class, inclusion of the Medium Tree Size class in the model would likely result in an overestimation of source habitat as the majority of the literature appears to support size classes only at the upper end of the range of this class.

Table 12-2 shows the crosswalk between tree size class parameters found in the literature and the new recommended tree size class breakouts, and lists the references that supported the rationale for the final selection of habitat parameters.

It is recommended that Large (20-29.9" DBH) and Very Large (>30" DBH) Tree Size classes be used to model source habitat for the Lewis's woodpecker.

Table 12-2 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Size Class Parameter

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Vierling, Kerri T., Victoria A. Saab and Bret W. Tobalske. (2013). Lewis's Woodpecker (*Melanerpes lewis*), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species- Account/bna/species/lewwoo DOI:	Average diameter of trees at nests 50.47 cm ± 0.97 SE (**20 inches dbh**) vs. 26.26 cm ± 2.45 (10 inches) at non-nest random tree	Medium (10-19.9" DBH) Large (20-29.9" DBH)
10.2173/bna.284. Accessed on March 31, 2017.		
Saab, V., R. Brannon, J. Dudley, L. Donohoo, D. Vanderzanden, V. Johnson, H. Lachowski. 2002. Selection of fire-created snags at two spatial scales by cavity-nesting birds. USDA Forest Service Gen. Tech. Rep. PSW- GTR-181. (Idaho)	Mean nest tree DBH (cm) in Idaho of 47.5 ± 1.1 SD (n=115) [**18.5 inches**].	Medium (10-19.9" DBH) Large (20-29.9" DBH) Very Large (>30" DBH)
Abele, S.C., V.A. Saab, and E.O. Garton. (2004, June 29). Lewis' Woodpecker (*Melanerpes lewis*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http: //www.fs.fed.us/r2/projects/scp/ assessments/lewiswoodpecker. pdf [November 5, 2007]	USDA Forest Service Region 2 Conservation Assessment of Lewis's woodpecker. Compiled literature on habitat characteristics of nest sites of Lewis's woodpeckers in western North America (Table 2). Mean nest tree DBH (cm) in Idaho 47.5 ± 1.1 SD (n=115) [**18.5 inches**]; in Colorado 112.6 ± 39 SD (n=47) [**44** **inches**]; in Wyoming 48 ± 8 SD (n=35) [**19 inches**]; and California 66.5 (n=37) [26 inches]. Sources of mean nest tree DBH info: Idaho: Saab and Dudley 1998, Saab et al 2002; Colorado: Tashio-Vierling 1994, Vierling 1997; Wyoming: Linder 1994, Linder and Anderson 1998; California: Raphael and White 1984 (nest tree).	Medium (10-19.9" DBH) Large (20-29.9" DBH) Very Large (>30" DBH)
Linder, K.A. 1994. Habitat utilization and behavior of nesting Lewis' woodpeckers (*Melanerpes lewis*) in the Laramie Range, Southeastern Wyoming. Master's Thesis. Laramie, WY: University of Wyoming, Department of Zoology and Physiology. 98 pages. (Wyoming)	Most of the nest trees were dead (92%). Minimum DBH was 33 cm (13 in), mean DBH was 48 cm (**19 inches**).	Medium (10-19.9" DBH) Large (20-29.9" DBH) Very Large (>30" DBH)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Raphael, M.G.; White, M. 1984. Use of snags by cavity-nesting birds in the Sierra Nevada. Wildlife Monographs No. 86: 1-66. (California)	Mean dimensions for Lewis's woodpecker nest trees: DBH=66.5 cm (**26.2 inches**); tree diameter at hole=52.2 cm (**20.6 inches**) Characteristics of Lewis's woodpecker nest trees in one specific area in the	Large (20-29.9" DBH) Very Large (>30" DBH)
	study (Sagehen Creek): mean DBH: 66.5 cm (**26 in**); min DBH: 56 cm (**22 in).**	
Saab, V. A., R. E. Russell, and J. G. Dudley. 2009. Nest-site selection by cavity-nesting birds in relation to postfire salvage logging. Forest Ecology and Management 257:151–159. (Idaho) (including Foothills Fire on the BNF)	LEWOs selected snags with a mean DBH of around 50 cm (**20 inches**) compared to much smaller snags sizes in the vicinity of the nest site.	Large (20-29.9" DBH) Very Large (>30" DBH)
Saab, V.A.; Dudley, J.G. 1998. Responses of cavity-nesting birds to stand–replacement fire and salvage logging in ponderosa pine/Douglas-fir forests of southwestern Idaho. Research Paper RMRS-RP-11. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 12 pages. (Southwest Idaho)	**For nest sites, selected the most open areas**, but with highest tree densities of large trees compared to controls. Used larger, heavily decadent trees in greater proportion than available. Mean nest tree DBH (cm) in Idaho 47.5 ± 1.1 SD (n=115) [**18.5 inches**]	Medium (10-19.9" DBH) Large (20-29.9" DBH) Very Large (>30" DBH)
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendell.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-scale Trends and Management Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW-GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol. (Quigley, Thomas M., tech. ed.: Interior Columbia Basin Ecosystem Management Project: scientific assessment).	Source habitat includes old-forest stages of the montane, lower montane and riparian woodlands terrestrial community groups. Structural stages vary by covertype but include old-forest single and multi-storied. Snags and trees used for nesting are generally the largest and softest of those available. Saab and Dudley found Lewis's nesting in areas of recent, large (>100,000 acre) stand-replacing fire. Nested in areas with "clumpy" snag distributions; **snags** 9 inches DBH averaged 24/acre; snags **21 inches DBH** averaged 6.3/acre. Sites recently burned by stand-replacing fire seem to provide more productive source habitats than unburned sites. Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	Medium (10-19.9" DBH) Large (20-29.9" DBH) Very Large (>30" DBH)
Vierling, K.T. 1997. Habitat selection of Lewis' woodpeckers in southeastern Colorado. Wilson Bull., 109(1): 121-	Nest trees were taller and of larger diameter than random trees in the sample area.	Very Large (>30" DBH)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
130. (Colorado)	Nest trees at both sites were larger in diameter than random trees (112.6 cm ± 38.8 vs 63.6 cm ± 54.9) (**44 inches** vs. 25 inches)	
Vierling, K.T., D.J. Gentry, A.M. Haines. 2009. Nest Niche Partitioning of Lewis's and Red-headed Woodpeckers in Burned Pine Forests. The Wilson Journal of Ornithology. (121(1):89-96. (South Dakota)	LEWOs preferred trees or snags that were larger and taller than available at random. Mean DBH of nest trees n=46) was 38.2 ± 1.09 (**15 inches**) versus 31.1 ± 1.07 (12 inches) at random sites.	Medium (10-19.9" DBH)
Newlon, K.R., and V.A. Saab. 2011. Nest-site selection and nest survival of Lewis's woodpecker in aspen riparian woodlands. The Condor. 113()1):183- 193. (south-central Idaho)	The study found that LEWOs selected nest trees that were larger than random trees within the study area Mean DBH of nest trees (aspen) was found to be 41.3 cm + 15.3 (**16 inches**).	Medium (10-19.9" DBH)
Vande Voort, Amy M., "Habitat Characteristics and Occupancy Rates of Lewis's Woodpecker in Aspen" (2011). *All Graduate Theses and Dissertations.* Paper 922. (Utah)	Mean nest tree DBH of 35.79 + 5.89 cm (**14 inches**). All nest trees in aspen.	Medium (10-19.9" DBH)

DBH = diameter at breast height

12.3.3 Tree Canopy Cover Discussion

Tree Canopy Cover (TCC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 12-3**.

Table 12-3 Tree Canopy Cover Class Differences Between the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer

Tree Canopy Cover Class		
2003 Forest Plan Appendix A Range	**New Vegetation Layer (2011)**	**Changed or New Classification?**
10 – 39% Low	10 – 19% (Low Tree Canopy)	change
	20 – 29% (Low-Medium Tree Canopy)	change
	30 – 44% (Medium Tree Canopy)	change
40 – 69% Moderate	45 – 59% (Medium-High Tree Canopy)	change
>70% High	60% (High Tree Canopy)	change

Most literature sources generally describe Lewis's Woodpecker nesting and foraging habitat as occurring in "open" forest conditions (Saab and Rich 1997; Vierling 1997; Linder 1994; Saab and Dudley 1998; Wisdom et al. 2000). LEWOs generally use clumps of trees/snags for nesting, roosting, and perching habitat. These clumps are commonly found within a matrix of more open habitat, either in open- canopied forested stands or in burned areas, which provides forage habitat for the species. Open conditions not only provide for maneuvering but also a robust shrub layer that is conducive to producing large populations of insects. The preference for open canopy conditions is also supported by Saab and Dudley (1998) who found that Lewis's woodpeckers occurred in large numbers in burned areas where existing tree numbers had been reduced from salvage harvesting.

There was limited quantitative information on canopy cover as a habitat parameter in the literature, likely because most studies occurred in burned habitat which would presumably have little to no canopy cover. A few sources did quantitatively address canopy cover, however. Abele et al. (2004) reported a mean canopy cover of 5.2 percent (n=115) in an Idaho study and 27.3 percent (n=35) in a Wyoming study. Vande Voort (2011) reported a mean canopy cover of 29 percent within aspen stands in Utah.

Saab and Dudley (1998) reported that LEWOs used stands that had moderate (40-70 percent) pre-fire canopy cover that would have presumably become low canopy cover following wildfire. Similarly Vierling et al. (2008) found that four of six nest sites were in areas that had Low (<40 percent) pre-fire canopy cover and the other two were in stands with moderate (40-70 percent) pre-fire canopy cover; again, areas that would likely become low canopy cover following a wildfire.

Because those studies that reported mean canopy covers all had values below 30 percent, and because most of the other references generally described source habitat as open-canopied or burned, use of the Low (10-19%) and Low-Medium (20-29%) tree canopy cover classes in the model would be expected to reasonably estimate LEWO source habitat. Inclusion of the Medium (30-44%) Tree Canopy Cover class, especially the upper end, would not likely facilitate the growth of a shrub layer that could provide invertebrate prey habitat, and would likely be too dense to allow the aerial foraging activity this species is known for. As a result, inclusion of the Medium Tree Canopy Cover class would likely result in an overestimate of source habitat at the mid-scale level and is not recommended for inclusion in this habitat model.

To assess source habitat, modeling would best approximate the findings of the literature by selecting for forested stands in the Low (10-19%) and Low-Medium (20-29%) Tree Canopy Cover classes for preferred PVGs within their historic range of variability (HRV).

Table 12-4 shows the crosswalk between parameters (or qualitative descriptions) found in the literature and the new tree canopy cover class breakouts, and lists the references that supported the rationale for the final selection of habitat parameters.

Selecting forested stands in the Low (10-19%) and Low-Medium (20-29%) Tree Canopy Cover classes is recommended for modeling Lewis's woodpecker source habitat.

Table 12-4 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Canopy Cover Class Parameters

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Abele, S.C., V.A. Saab, and E.O. Garton. (2004, June 29). Lewis' Woodpecker (*Melanerpes lewis*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http: //www.fs.fed.us/r2/projects/scp/assessments/lewiswoodpecker.pdf [November 5, 2007]	USDA Forest Service Region 2 Conservation Assessment of Lewis's woodpecker. Compiled literature on habitat characteristics of nest sites of Lewis's woodpeckers in western North America (Table 2). Mean canopy cover in Idaho 5.2 ± 5.6 SD percent (n=115); in Wyoming 27.3 ± 13 SD percent (n=35) Sources of canopy cover info: Idaho: Saab and Dudley 1998, Saab et al 2002; Wyoming: Linder and Anderson 1998.	Low (10-19%) Low-Medium 20-29%)
Saab, V., R. Brannon, J. Dudley, L. Donohoo, D. Vanderzanden, V. Johnson, H. Lachowski. 2002. Selection of fire-created snags at two spatial scales by cavity-nesting birds. USDA Forest Service Gen. Tech. Rep. PSW-GTR-181. (Idaho)	LEWOs selected stands that preburn were moderate crown closure stands of ponderosa pine and Douglas-fir, and that post burn were moderately dense stands of snags with relatively large diameters. This characterized nest-site selection by Lewis's woodpecker at the microhabitat and landscape scales. (*JFoust) - While the snag density was moderate in the burned stand, the canopy cover would have presumably been **Low** due to the burned condition of what was originally a moderate canopy cover stand prior to the burn.)* Burned landscapes used by nesting Lewis's woodpeckers were primarily composed of closely distributed, small to medium-sized stands of ponderosa pine/moderate crown closure (pre-fire). Regardless of cover type or treatment, moderate crown closure in a burned condition was the most important characteristic of a landscape feature in predicting the presence of a Lewis's woodpecker nest.	Low (10-19%) Low-Medium 20-29%)
Vande Voort, Amy M., "Habitat Characteristics and Occupancy Rates of Lewis's Woodpecker in Aspen" (2011). *All Graduate Theses and Dissertations.* Paper 922. (Utah)	The study reported a percent canopy cover of **29 percent**. The logistic models showed that crown cover was negatively associated with nest occurrence, indicating that less crown cover is favorable. The results indicated that LEWO selects large diameter trees in areas with **< 30 percent canopy cover**. (all nests were in aspen)	Low (10-19%) Low-Medium 20-29%)
Vierling, K. T., L. B. Lentile, and N. Nielsen-Pincus. 2008. Preburn characteristics and woodpecker use of burned coniferous forests. Journal of Wildlife Management 72:422–427.	Of 6 LEWO nests, 4 were located in areas that had **Low (<40%) prefire canopy cover**, and two were located in areas that had Medium (40-70%) prefire canopy cover.	Low (10-19%) Low-Medium 20-29%) Medium (30-44%)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
(South Dakota)		
Linder, K.A. 1994. Habitat utilization and behavior of nesting Lewis' woodpeckers (*Melanerpes lewis*) in the Laramie Range, Southeastern Wyoming. Master's Thesis. Laramie, WY: University of Wyoming, Department of Zoology and Physiology. 98 pages. (Wyoming)	Author stated that **open canopy**, abundant down and dead greater than 1 inch, and availability of perches were the primary characteristics related to nesting habitat selection.	---
Saab, V.A.; Dudley, J.G. 1998. Responses of cavity-nesting birds to stand–replacement fire and salvage logging in ponderosa pine/Douglas- fir forests of southwestern Idaho. Research Paper RMRS-RP-11. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 17 pages. (Southwest Idaho)	For nest sites, selected the most **open areas**, but with highest tree densities of large trees compared to controls. Lewis's Woodpeckers used the most **open nest sites** with a **mean** of 24.7 k 2.3 trees [>9" dbh] per acre. Lewis's Woodpecker is an aerial insectivore requiring openings for foraging maneuvers, which might explain why their nest sites were relatively open.	---
Vierling, K.T. 1997. Habitat selection of Lewis' woodpeckers in southeastern Colorado. Wilson Bull., 109(1): 121-130. (Colorado)	Nest in **open areas**—do not nest near dense tree stands. Speculation that dense stands impede foraging maneuverability as well as insect visibility.	---
Vierling, K.T., D.J. Gentry, A.M. Haines. 2009. Nest Niche Partitioning of Lewis's and Red- headed Woodpeckers in Burned Pine Forests. The Wilson Journal of Ornithology. (121(1):89-96. (South Dakota)	Sites were more likely to be used for nests if they had larger and taller snags, a higher density of shrubs, and **fewer tree and snag stems** compared to random sites.	---
Saab, V.A.; Rich, T.D. 1997. Large-scale conservation assessment for Neotropical migratory land birds in the interior Columbia basin. Gen. Tech. Rep. PNW-GTR-399. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 56 pages. (uigley, T.M. [ed] Interior Columbia Basin Ecosystem Management Project Scientific Assessment)	Lewis's woodpecker use **open, mature** coniferous forest and post-fire forests as primary nesting habitats. Lewis's woodpecker associated with **open ponderosa pine** and other fire-adapted habitats. Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	---
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendell.; Rich,	Nest sites are generally associated with an abundance of flying insects, **open canopy** or tree clumps, snags, and dense ground covers. Nesting	---

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad- scale Trends and Management Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW- GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol. (Quigley, Thomas M., tech. ed.: Interior Columbia Basin Ecosystem Management Project: scientific assessment).	sites often associated with recently burned pine forests. Openings created by stand-replacing fire may provide greater opportunity for foraging due to increased space, ground cover, and insects. Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	
Newlon, K.R., and V.A. Saab. 2011. Nest-site selection and nest survival of Lewis's woodpecker in aspen riparian woodlands. The Condor. 113()1):183-193. (south-central Idaho)	Lewis's Woodpecker nest sites differed from random non-nest sites by having **more trees**, fewer woody stems, and less bare ground.	---

12.4 Source Habitat Conditions When Outside HRV Discussion

None.

12.5 Additional Modeling Parameters

None.

12.6 Model Limitations

This species is documented in the literature to be associated with recent fires; adequate numbers of large, soft ponderosa pine or grand fir/white fir snags in clumps; and herb-shrub-dead/down material that provide large numbers of insects. The mid/fine-scale model cannot take these needs into account and therefore will overestimate the amount of suitable habitat for this species.

12.7 Updated Forest Modeling Parameters for Lewis's Woodpecker Source Habitat

The updated mid-scale habitat parameters for the Lewis's Woodpecker are as follows:

Within HRV

PVGs: 1, 2, and 5

Tree Size Class: Large and Very Large

Tree Canopy Cover Class: Low and Low-Medium

Note: This species is documented in the literature to be associated with recent fires (see comment on page 11); adequate numbers of large, soft ponderosa pine or grand fir/white fir snags in clumps; and herb-shrub- dead/down material that provide large numbers of insects. The mid/fine-scale model cannot take these needs into account and therefore will overestimate the amount of suitable habitat for this species.

Source habitat is defined by those characteristics of macrovegetation *that contribute to stationary or positive population growth*.

**Comment: Though Lewis's woodpecker is described as a "burn specialist", this may be an artifact of the time period these studies were conducted. These birds appear to require soft snags in clumps adjacent to open shrub- herb communities. In PVGs 1, 2, and 5, these conditions would have occurred under historical non-lethal fire regimes and endemic insect cycles rather than stand-replacing fire. Recent wildfires may be creating the open conditions with snags that have been lost on the landscape from changes in disturbance regimes and cutting/harvesting of large trees.

12.8 New Literature Sources Reviewed for this Update

Below is a list of all new literature reviewed for this 2019 Lewis's Woodpecker Mid-scale Modeling Update, including those references that did not provide relevant habitat information regarding tree size class or canopy cover class parameters. This list was compiled to both inform the next literature review and/or model update of what references were reviewed and to document the entire 2016/2017 literature review process.

The literature search found six references dated more recent than 2008 and that would not have been available for the last update of the model, and that was habitat focused. A summary of relevant habitat information from *The Birds of North America* (BNA) online account was also included because it is a good synthesis of all available habitat information for this species.

Reference – Vierling, Kerri T., Victoria A. Saab and Bret W. Tobalske. (2013). Lewis's Woodpecker (*Melanerpes lewis*), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/lewwoo DOI: 10.2173/bna.284. Accessed on March 31, 2017.

The following excerpts from the BNA online account are pertinent to this update:

May prefer ponderosa pine forests at medium to high elevations (up to 2,800 m in Arizona, 900 m in British Columbia), and open riparian forests at low elevations (Bock 1970a; Diem and Zeveloff 1980; Siddle and Davidson 1991; Tashiro-Vierling 1994; Vierling 1997). Breeding distribution is widely associated with the distribution of ponderosa pine in w. North America (see Diem and Zeveloff 1980). When using burned forests for breeding, birds may move to unburned forest after young fledge (Block and Brennan 1987). Open stands near water are preferred habitat in the Blue Mtns. of the Pacific Northwest (Thomas et al. 1979a).

Often classified as a specialist in burned pine forest habitat, although the suitability of burned areas as habitat may vary with postfire age, size and intensity of burn, and geographic region (Bock 1970a; Raphael and White 1984; Block and Brennan 1987; Linder 1994; Saab and Dudley 1996 unpubl. data).

12.8.1 Nesting

In burned forests of Idaho, 68% of nests were placed in ponderosa pine and 32% in other coniferous trees, primarily Douglas-fir (*n* = 353; Saab et al. 2009). In aspen forests of central Idaho, 57% of nests placed in aspen and the remaining primarily in black cottonwood (*Populus balsamifera*) (*n* = 76; Newlon and Saab 2011).

Nest sites associated with presence of abundant free-living insects, **open-canopy forest** or tree clusters, standing dead trees (snags), and dense ground cover in the form of downed material, grasses, and shrubs (Bock 1970a; Linder 1994; Tashiro-Vierling 1994; Vierling 1997).

In burned forests of Idaho, model selection was used to evaluate nest site selection at multiple spatial scales; most parsimonious model revealed that habitat characteristics at the nest plot scale (within 1 ha surrounding the nest tree) best described nest site selection, including nest snag dbh, tree species, snag densities, pre-fire vegetation type (*n* = 353, Saab et al. 2009). **Average diameter of trees at nests 50.47 cm ± 0.97 SE (20 inches) vs. 26.26 cm ± 2.45 (10 inches) at non-nest random tree**; 68% of nest trees vs. 64% of random trees were ponderosa pine; average of 107.48 ± 4.03 SE snags/ha surrounding nest trees vs. an average of 36.42 ± 6.21 SE snags/ha surrounding non-nest random trees; 41% of nest plots vs. 39% of non-nest random plots were in ponderosa pine vegetation type.

12.8.2 Management Recommendations

Post-wildfire salvage logging designed to **retain >50% of the snags >23 cm (9 inches) in diameter** helps retain suitable nesting habitat during the decade following fire (Saab et al 2007); similar pattern was noted by Haggard and Gaines (2001)

In aspen forests, values of overall nest survival are similar to those reported for burned pine habitats (Saab et al. 2007, 2011) and nearly twice those reported for cottonwood riparian habitats (Saab and Vierling 2001).

Open cottonwood habitat with mature trees is used for breeding and overwintering (Bock 1970a; Hadow 1973; Tashiro-Vierling 1994; Vierling 1997).

Reference – Saab, V. A., R. E. Russell, and J. G. Dudley. 2009. Nest-site selection by cavity-nesting birds in relation to postfire salvage logging. Forest Ecology and Management 257:151–159.

This study looked at how several species of woodpecker, including Lewis's, selected nest sites within large wildfires that had salvage logged areas. The study reported that nest site selection by LEWOs was consistently associated with higher snag densities and larger diameters, that they selected for the more open canopied areas that had been salvaged logged, and that they selected large snags that occurred within a clump of snags. The study didn't report on canopy cover, as it was conducted within burned areas, but did show that LEWOs selected snags with a mean DBH of around 50 cm (**20 inches**) compared to much smaller snags (mean DBH of 10 inches) that were available (Figure 1, pg. 155).

Reference – Saab, V.A., R.E. Russel, J. Rotella, J. G. Dudley. 2011. Modeling nest survival of cavity-nesting birds in relation to postfire salvage logging. Journ. of Wildl. Mgmt. 75(4):794-804.

This emphasis of this study was on nest survival of six cavity-nesting species, including Lewis's woodpecker, and how salvage logging may or may not impact nest survival. The paper didn't really go into TSC or TCCC specifics as it was more focused on the survival numbers and other parameters such as temperature, age of fire, tree height, distance to unburned habitat, and whether stands were harvested or not. It used the same study area as Saab et al. (2009) did for their work. It also stated that the salvage logging that occurred in the study area "was designed to maintain a portion of large diameter snags, those >23 cm diameter at breast height with an average density of 45.0 $\pm$ 5.1 snags/ha, that appeared to provide adequate nesting substrate without apparent effects on survival of most cavity-nesting birds." Other than that there was no useful information on TSC and TCCC that would inform this model update.

Reference – Newlon, K.R., and V.A. Saab. 2011. Nest-site selection and nest survival of Lewis's woodpecker in aspen riparian woodlands. The Condor. 113()1):183-193.

This study monitored 76 nest sites in aspen-riparian woodland habitat in south central Idaho in order to assess habitat selection and how that may or may not affect young survival. The study found that LEWOs selected nest trees that were larger than random trees within the study area. Only DBH was included as a variable for the models; canopy cover was not. Mean DBH of nest trees was found to be 41.3 cm + (**16 inches**). Even though this study looked at only aspen habitat, it still shows the LEWO's preference for the largest trees available within a given habitat type.

Reference – Vierling, K.T., D.J. Gentry, A.M. Haines. 2009. Nest Niche Partitioning of Lewis's and Red-headed Woodpeckers in Burned Pine Forests. The Wilson Journal of Ornithology. (121(1):89-96.

The emphasis of this study was to assess potential habitat differences between two overlapping woodpecker species, Lewis's and red-headed, in the Black Hills, South Dakota. Vegetation variables in the modeling did not include canopy cover but did include DBH. The mean DBH of nest trees n=46) was 38.2 $\pm$ 1.09 (**15 inches**) versus 31.1 $\pm$ 1.07 (12 inches) at random sites. LEWOs preferred trees or snags that were larger and taller than available at random. The study suggested that there was no meaningful competition between the species because both had nest success over 90 percent.

Reference – Vande Voort, Amy M., "Habitat Characteristics and Occupancy Rates of Lewis's Woodpecker in Aspen" (2011). *All Graduate Theses and Dissertations.* Paper 922.

This study compared habitat characteristics to occupancy rates in aspen habitat types for nesting LEWOs. The study reported a mean nest tree DBH of 35.79 + 5.89 cm (**14 inches**) and a percent canopy cover of **29 percent**. The logistic models showed that crown cover was negatively associated with nest occurrence, indicating that less crown cover is favorable. Average DBH was also positively associated indicating that LEWOs select for larger diameter trees for their nesting areas. The results indicated that LEWO selects large diameter trees in areas with **<30 percent canopy cover**. While this study was solely in aspen types and maybe not completely comparable to habitat on the Boise National Forest, the parameters provided still have some merit in that they selected the largest trees available with relatively low canopy cover.

Reference – Vierling, K. T., L. B. Lentile, and N. Nielsen-Pincus. 2008. Preburn characteristics and woodpecker use of burned coniferous forests. Journal of Wildlife Management 72:422–427.

This study compared woodpecker use of burned forests to preborn vegetative characteristics. The density of LEWOs was relatively low compared to other studies in Idaho, potentially due to the general lack of large diameter trees. Of 6 LEWO nests, 4 were located in areas that had Low (<40%) pre-fire canopy cover, and two were located in areas that had Medium (40-70%) pre-fire canopy cover. The paper listed

mean DBH of nest tree and canopy cover at nest sites for all species except LEWO because of the small sample size (6 total nests) compared to other species (all other species had 17 or greater nest sites).

The following reference from 2002 was also used to inform this model update but was not referenced in the original 2008 model, even though it would have been available at the time.

Reference - Saab, V., R. Brannon, J. Dudley, L. Donohoo, D. Vanderzanden, V. Johnson, H. Lachowski. 2002. Selection of fire-created snags at two spatial scales by cavity-nesting birds. USDA Forest Service Gen. Tech. Rep. PSW-GTR-181.

This study occurred on the Boise National Forest from 1994 through 1998 in the Foothills and Star Gulch fire perimeters. The study specifically looked at the use of snags in both logged and unlogged stands by seven species of cavity-nesting birds, including Lewis's woodpecker. They looked at two spatial scales; microhabitat and landscape.

The study reported that Lewis's woodpeckers selected nest sites with moderate densities of large diameter snags. While this study occurred in burned habitat and not in live forested stands which is the focus of this habitat model, it still offered information on preferred snag size which was used to inform the tree size class portion of this model update. The mean diameter of nest tree in this Idaho study was cm $\pm$ 1.1 cm SD (n=115), or **18.5 inches** DBH. For canopy cover, LEWOs selected stands that before fire were **moderate crown closure** stands of ponderosa pine and Douglas-fir, and that post burn were moderately dense stands of snags with relatively large diameters. This characterized nest-site selection by Lewis's woodpecker at the microhabitat and landscape scales.

Burned landscapes used by nesting Lewis's woodpeckers were primarily composed of closely distributed, small to medium-sized stands of ponderosa pine/moderate crown closure (pre-fire).

Regardless of cover type or treatment, moderate crown closure in a burned condition was the most important characteristic of a landscape feature in predicting the presence of a Lewis's woodpecker nest.

13.0 MOUNTAIN QUAIL

Mid-scale Modeling Update or the Mountain Quail
April 1, 2019 Payette National Forest
Joe Foust, District Wildlife Biologist, Cascade RD, BNF, on Detail to the PNF

The purpose of this document is to update the Mountain Quail Mid-scale Habitat Model developed for the Boise National Forest in 2008 (Geier-Hayes and Nutt 2008), which is being used as the base habitat model for the 2019 Payette National Forest Baseline Habitat Modeling Update. This mid-scale model was developed for use at the scale of the entire Forest but is useful for habitat patch and pattern information at the scale of the fifth hydrologic unit code. It has been eleven years since the original mid- scale species model for the Boise National Forest's modeling effort was created. In order to complete the 2019 Payette National Forest Baseline Habitat Modeling Update effort, there was a need to update three key components of the modeling process, including the new existing vegetation layer that had different canopy cover and tree size classes, the new 5th HUC boundaries, and the most up to date fire data. For the vegetation portion, in order to run the mid-scale habitat model with this new data a crosswalk that linked the old breakdown classes to the new breakdowns was needed, which is the focus of this document. This

model update effort also offered an opportunity to review any new literature published since the original 2008 model was created and validate selected habitat parameters.

13.1 Review of New Species Literature Since 2008

The Boise NF mid-scale habitat model for the Mountain Quail (MOQU) was created in 2005 and last revised in 2008 (Geier-Hayes and Nutt 2008). This literature review of published information between 2008 and 2017 was conducted to validate whether model parameters from 2008 are still consistent with the literature for this species. Any references that had relevant habitat information pertaining to tree size class (TSC) and shrub or shrub/tree canopy cover class were listed in the Crosswalk tables in the Forest Habitats and Non-forest Habitats sections. All new literature reviewed for this 2019 Mountain Quail Mid-scale Model Update, including those references that did not provide relevant habitat information regarding TSC or canopy cover, are listed and briefly summarized at the end of this document. It should be noted that the literature review for this update was completed in 2017; however, the actual review of this document and subsequent update of the model did not occur until 2019.

13.2 Application of Mid-Scale Species Habitat Parameters to New Vegetation Structure Classes

A new existing vegetation map was completed for the mid-scale in 2012 using imagery acquired from 2008 and field data collected from 2007 through 2011. The data represent conditions across the Forest through the fall of 2008. This map was updated for the Payette National Forest in 2016 and called the "Forest Derived Product." Forest Derived Products are Forest-level updates of the contractor provided maps that better facilitate Forest-level data needs. These can be added to or updated as emerging Forest-level needs arise. This included post-processing of polygon delineations to reduce the noise of many small polygons by aggregating these to produce polygons that more adequately represent a larger

unit on the ground (i.e. "stands"), to meet the minimum map unit of 5 acres for most polygons, and to reduce the overall number of polygons for processing. Size class polygons were then reattributed utilizing the same imagery used by the original mapping product and newer imagery as it became available. The original contractor mapping process generalized much of the size class polygons into the medium size class (10.0-19.9" DBH). The hand-edits of the size class attributes helped to spread the distribution of size classes into the seedling, sapling, small and large tree classes and more closely mirror Forest Inventory data. Secondly, the canopy cover map needed to be updated to incorporate changes due to recent fires. Rule sets utilizing post-fire vegetation condition were developed to adjust canopy cover changes where necessary, and reviewed with newer imagery. No changes were made to the dominance type map and all changes made to the size class and canopy cover class were made to nest into the correct corresponding dominance types in that map, so that the map integrity between the three layers was maintained. An update to the accuracy assessment was also completed for the Forest Derived Products.

Although there was no change to the Potential Vegetation Group (PVG), this new existing vegetation product created new categories for tree size class and canopy cover class. The final dominance type map units, size classes and canopy cover classes conform to the mid-level mapping standards referenced in the Existing Vegetation Classification and Mapping Technical Guide Version 1.0 (Brohman and Bryant 2005). This existing vegetation map provides the Payette National Forest with a new baseline of current condition. However, the classification for the components of this vegetation map are different than the classifications used in previous vegetation mapping efforts used for the Payette National Forest Land and

Resource Management Plan (LRMP) (USDA Forest Service 2003a; Redmond et al. 1998). Therefore, crosswalks needed to be developed to translate the categories for size class and canopy cover classes used for the 2008 model in order to run the models on the new existing vegetation product. The following documentation explains how the parameters were cross-walked from the 2008 model into the 2019 model.

13.3 Parameter Review Discussion for Forest Habitats

13.3.1 Outline for Parameter Review Discussion

This species is primarily associated with shrub communities that may or may not occur within or adjacent to forested habitats. Therefore, this literature review and model update will address mid-scale habitat parameters for both Forest and Non-Forest habitats to account for the entire range of source habitat.

13.3.2 PVG Discussion

No new information was found during the literature review on potential vegetation group (PVG) preferences for the mountain quail. No change is recommended.

13.3.3 Tree Size Class Discussion

Tree Size Class classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 13-1**.

Table 13-1 Tree Size Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer

2003 Forest Plan Appendix A	New Vegetation Layer (2011)	Changed or New Classification?
Grass/Forb/Shrub/Seedling (GFSS) (<4.5' tall)	Seedling (<4.5' tall)	change in name only
Sapling (0.1 – 4.9" DBH)	Sapling (0.1 – 4.9" DBH)	
Small (5.0 – 12.0" DBH)	Small (5 – 9.9" DBH)	change
Medium (12.1 – 20" DBH)	Medium (10 – 19.9" DBH)	change
Large (>20.0" DBH)	Large (20 – 29.9" DBH)	change
	Very Large (≥ 30" DBH)	new

Quantitative descriptions of tree size classes used by MOQU are lacking in the literature. Most describe forested source habitat in broad terms, and only one reference could be found that actually reported on sizes of the forested overstory used by MOQU. Therefore, most of the habitat descriptions used in this discussion, and listed in the parameter crosswalk
(**Table K-2-39**), were chosen primarily to establish that MOQU use forested habitats.

Wisdom et al. (2000) describes forest habitat associations for this species as all forested vegetation stages except stem exclusion in Interior Douglas-fir, Interior Ponderosa Pine, and Western Larch cover types. In Idaho, Herman et al. (2002, *in* Vogel and Reese 2002), Reese et al. (1999, *in* Vogel and Reese 2002), and Vogel and Reese (1995), all describe use of conifer shrub or riparian shrub communities that have a

forested component by mountain quail. In a study in west-central Idaho, Reese et al. (2005) reported that 71 percent of nests and 44 percent of broods were located in conifer shrub cover types. They also reported a mean DBH of trees at quail nest sites to be 9.4 inches and 6.5 inches in different years, indicating that MOQU were using habitat with a forested canopy and in the Small Tree Canopy Cover class. Other studies broadly described MOQU habitat as having open or partially open (forest) canopies (Nelson and Douglas 2006) or occurring within mixed forests (Brennan et al. 1987).

Because the mix of forest/shrub vegetative communities described in the literature is not dependent on the size of the overstory, but rather is related to the shrub understories, source habitat can occur in any tree size class. As a result, all growth stages can provide habitat and should be included in the model.

Table 13-2 shows the crosswalk between Tree Size class parameters found in the literature and the new recommended Tree Size classes, and lists the references that supported the rationale for the final selection of habitat parameters.

It is recommended that Seedling (<4.5" tall), Sapling (0.1-4.9" DBH), Small (5-9.9" DBH), Medium (10-19.9" DBH), Large (20-29.9" DBH) and Very Large (>30" DBH) Tree Size classes be used to model source habitat for the mountain quail for all forested habitats.

Table 13-2 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Size Class Parameters

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendell.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad- scale Trends and Management Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW-GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol. (Quigley, Thomas M., tech. ed.: Interior Columbia Basin Ecosystem Management Project: scientific assessment).	Source habitat includes **all forested vegetation stages** except stem exclusion in the following covertypes: **Interior Douglas-fir, Interior Ponderosa pine, and Western Larch**; all stages in Chokecherry-serviceberry-rose. Source Habitat from Appendix 1, Volume 3, Table 1, pages 437-440 Cover types/structural stage for summer: Interior Douglas-fir, Interior Ponderosa pine/old multi-story, old single-story, unmanaged young multi-story, managed young multi-story, understory re-initiation, stand initiation. Chokecherry-serviceberry-rose/open tall shrub, open low-medium shrub, closed low-medium shrub. Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	All Size Classes
Vogel, C.A; Reese, K.P. 1995. Habitat Conservation Assessment for Mountain Quail (*Oreortyx pictus*). Prepared for: Idaho State Conservation Effort, Idaho Dept. of Fish and Game, Boise, ID. 68 pages (ID, OR, CA, WA, NV)	In Idaho, mountain quail distribution is closely associated with riparian shrub habitats that **may or may not have a forest canopy** (Ormiston 1966, Brennan 1989) that occur along waterways and secondary drainages within a few hundred meters of water. Habitat is confined to corridors of vegetation along breaks and secondary drainages of the Snake, Salmon, and Clearwater Rivers (Ormiston 1966). Remaining habitat covers steep, dissected slopes with	All Size Classes

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
	ridges, gulches, and outcrops of basalt. South-facing slopes are arid and dominated by grasses such as bluebunch wheatgrass and Idaho fescue together with several species of forbs. In draws or on north facing slopes, serviceberry, hawthorn, ninebark, snowberry, and wild rose are common. Moist sites are elderberry, alder, red-osier dogwood, and cottonwood. **Higher elevation sites include ponderosa pine and Douglas-fir**.	
Vogel, C.A; Reese, K.P. 2002. Mountain quail (*Oreortyx pictus*)	This document summarizes reports and publications on mountain quail distribution,	All Size Classes
distribution and conservation in the eastern portion of their range. Prepared for: Idaho State Conservation Effort, Idaho Department of Fish and Game, Boise, ID. 59 pages	status, biology, ecology, and management through the eastern portion of their range (including western Idaho). *Idaho Spring and Summer Habitats*: The majority of 1,072 mountain quail locations in the Herman et al. (2002) study in west-central Idaho were in riparian shrub (29%), **conifer shrub (27%)**, and mountain shrub (22.4%). The remaining locations were in grass, agriculture and residential garden habitats (21.6%). *Idaho Fall and Winter Habitats*: Reese et al. (1999) found mtn quail in the Little Salmon River area were most often in **conifer/shrub (37% in 1994/1995; 33% in 1995-96)** and grass/scattered shrub (15% in 1994-95; 40% in 1995-96) cover types. Remaining locations were divided among **riparian/tree/shrub**, riparian/shrub, residential garden, and mountain/shrub cover types, predominantly. Road and grass cover types were used infrequently; agriculture cover type least of all. Reese et al (1999) found covey sites were at lower elevations, had taller shrubs, more visual obstructions, less snow depth, greater vegetative canopy cover, **smaller trees**, and were closer to water compared to independent sites. Nocturnally 34% (n=35) of locations were in conifer/shrub in 1994-5 while 50% occurred in grass/scattered shrub in 1995-6.	
Reese, K.P., J.L. Beck, P. Zager, P.E. Heekin. 2005. Nest brood site characteristic of mountain quail in west-central Idaho. NW Science. Col. 79, No. 4. (west-central Idaho)	**Fifteen (71%) nests were located in conifer- shrub**, 4 (19%) in mountain-shrub, and 2 (10%) in riparian-shrub. **Seven (44%) broods were located in conifer-shrub cover**, 5 (31%) in mountain shrub, 3 (19%) in grass-scattered shrub, and 1 (6%) in riparian-shrub (pg. 258) Mean DBH of trees at quail nest sites was 23.9 cm (**9.4 inches**) in 1992 and 16.4 cm (**6.5 inches**) in 1995 (Table 1, pg. 259) as measured for microhabitat portion of study.	All Size Classes

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Nelson, Jamie and Douglas Robinson. 2006. Mountain quail translocations in eastern Oregon, Project Report 2006. Dept. of Fisheries and Wildlife, Oregon State University. Corvallis, OR. 20 p. (eastern Oregon)	Nest sites were often in areas with generally **open or partially open canopies** and limited shrub cover. Forest types in the study area included ponderosa pine, Douglas-fir, white fir and grand fir.	All Size Classes
Brennan, L.A.; Block, W.M.; Gutierrez, R.J. 1987. Habitat use by mountain quail in northern California. The Condor, 89: 66-74 (California)	Macrohabitats used: **mixed forest**, mixed brush, oak woodland, pine-juniper, and shrub-steppe.	All Size Classes

DBH = diameter at breast height

13.3.4 Tree Canopy Cover Discussion

Tree Canopy Cover classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 13-3**.

Table 13-3 Tree Canopy Cover Class Differences Between the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer

Tree Canopy Cover Class		
2003 Forest Plan Appendix A	**New Vegetation Layer (2011)**	**Changed or New Classification?**
10 – 40% Low	10 – 19% (Low Tree Canopy)	change
	20 – 29% (Low-Medium Tree Canopy)	change
	30 – 44% (Medium Tree Canopy)	change
41 – 70% Moderate	45 – 59% (Medium-High Tree Canopy)	change
71 - 100% High	60% (High Tree Canopy)	change

Similar to the tree size class discussion, information on tree canopy cover class for MOQU habitats is scarce. The shrub component is the most critical part of MOQU source habitat as it affords MOQU security, thermal cover, food, and shade, and it, along with ground cover, is typically what is described in most habitat accounts. Tree canopy cover is secondary in importance and is likely why most sources describe tree overstory at MOQU nest/brood sites in general terms, such as within ‘open canopy ponderosa pine’ (Reese et al. 2005) or ‘open or partially open canopies’ (Nelson and Robinson 2006).

These broad descriptions probably fall within the Low and Low-Medium Tree Canopy Cover classes the best. Reese et al. (2005) measured canopy covers at nest and brood sites and reported fairly high canopy covers, however, their canopy cover value was a combination of both tree and shrub overstory. They

reported mean overstory canopy covers of 62 percent for nest sites and 43 percent for brood sites in the first year of the study, and 46 percent for nest sites and 33 percent for brood sites in the second year. Because habitat was described as occurring within areas of dense shrub cover, the actual canopy cover for the tree overstory by itself was likely minimal. Nelson (2007) similarly described mean canopy cover at nest sites at 28 percent that was again a combination of shrubs and trees.

In general as conifer density increases, shrub coverage generally declines. This is particularly true for seral shrubs though climax species such as ninebark and snowberry also reach higher coverages in less

shaded areas. Because dense shrub communities are most likely to develop under relatively low tree canopy cover, only the Low and Low-Medium Tree Canopy Cover classes are recommended. Inclusion of the Medium Tree Canopy Cover class and above would not likely generate the shrub densities preferred by this species and are not recommended for inclusion in the model.

Table 13-4 shows the crosswalk between parameters (or qualitative descriptions) found in the literature and the new tree canopy cover classes, and lists the references that supported the rationale for the final selection of habitat parameters.

Selecting forested stands in the Low (11-19%) and Low-Medium (20-29%) Tree Canopy Cover classes is recommended for modeling mountain quail source habitat.

Table 13-4 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Canopy Cover Class Parameters

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TCCC Breakouts
Reese, K.P., J.L. Beck, P. Zager, P.E. Heekin. 2005. Nest brood site characteristic of mountain quail in west-central Idaho. NW Science. Col. 79, No. 4. (west-central Idaho)	Mountain quail typically nested in **open-canopy** ponderosa pine with a ninebark understory (pg. 261). From Table 1 (pg. 259) mean overstory canopy closure for year 1992 was 62 ± 8 percent at nests and 43 ± 9 at brood locations. For year 1995 it was 46 ± 5 percent for nesting and 33 ± 8 for brood sites. However, these mean canopy closures included both tree and shrub overstories.	Low (10-19%) Low-Medium (20-29%)
Nelson, Jamie and Douglas Robinson. 2006. Mountain quail translocations in eastern Oregon, Project Report 2006. Dept. of Fisheries and Wildlife, Oregon State University. Corvallis, OR. 20 p. (eastern Oregon)	Nest sites were often in areas with generally **open or partially open canopies** and limited shrub cover.	Low (10-19%) Low-Medium (20-29%)
Gutiérrez, R. J. and David J. Delehanty. (1999). Mountain Quail (*Oreortyx pictus*), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/mouqua DOI: 10.2173/bna.457	On ground, usually very dense overhead cover of shrubs or tree bough (Bent 1932), near protective cover, highly concealed, requiring view from <0.5 m to see eggs (DJD). Nests observed under **short (1 m) pine saplings**, under piñon boughs at trunk, under shrubs (DJD). Often nests on steep hillside or adjacent to steep bank in **second-growth forest** or shrub-	Nothing described or defined enough to assign a Tree Canopy Cover Class

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TCCC Breakouts
Accessed March 15, 2017.	dominated communities, usually under or against protective cover. Studied in detail by Gutiérrez (Gutiérrez 1977 , Gutiérrez 1980). Forages in shrub	
	and **forest communities** under canopy and at edge of these habitats... Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	
Nelson, Jamie N. 2007. Survival and nest site characteristics of translocated mountain quail on Steens Mountain, Oregon. Thesis. Oregon State University. 54 pgs. (Oregon)	Mean canopy cover for nest sites in study was 28%, includes both shrubs and trees. (western juniper dominant tree sp.)	Low (10-19%) Low-Medium (20-29%)
Vogel, C.A; Reese, K.P. 1995. Habitat Conservation Assessment for Mountain Quail (*Oreortyx pictus*). Prepared for: Idaho State Conservation Effort, Idaho Dept. of Fish and Game, Boise, ID. 68 pages (ID, OR, CA, WA, NV)	**Thick, closed-canopy forests support few mountain quail** and periodic fires or logging in, these areas may improve habitat conditions and result in higher densities of birds.	NOT Medium (30-44%), Medium-High (45-59%), or High (≥ 60%)

13.4 Parameter Review Discussion for Non-Forest Habitats

This species is primarily associated with shrub communities that border forested habitats. While the Existing Vegetation Map data includes a Shrub Life Form Group, complimentary to the Forest Life Form Group above, the Boise National Forest decided to use LANDFIRE Environmental Site Potential (ESP) and Existing Vegetation Type (EVT) classifications as a surrogate for the vegetation refresh non-forest PVGs. This was because LANDFIRE classifications were felt to better represent the non-forested landscape.

Therefore, the LANDFIRE ESPs and EVTs were used in development of this mid-scale model. There are no size class associations for the LANDFIRE vegetation stages, therefore no recommendations for size classes will be made for the non-forest LANDFIRE vegetation stages (Shrub and Forest) used in this model update. LANDFIRE does, however, define canopy cover classes for its vegetation stages, which are listed below in **Table K-2-42**.

The LANDFIRE ESP, EVT, and canopy cover classifications were not part of the forest vegetation layer update and therefore did not change. As a result, the model parameters pertaining to LANDFIRE classifications used in the *2008 Mountain Quail Documentation of Modeling Parameters for Use in Mid- and Fine-Scale Habitat Models* (Geier-Hayes and Nutt 2008) were carried over verbatim to this model update document. The only change to this section is that additional rationale was added in support of the LANDFIRE model parameters chosen back in 2008.

13.4.1 Environmental Site Potential (ESP) Discussion

The literature mentions low sagebrush, mountain big sagebrush, and shrubland communities that border conifers (Wisdom et al. 2000; Brennan et al. 1987; Nelson and Douglas 2006; Vogel and Reese 2002). Recommend including Low Sagebrush, Mountain and Wyoming Big Sagebrush, and Shrub- Forest Transition in the model (this discussion taken verbatim from *Mountain Quail Documentation of Modeling Parameters for Use in Mid- and Fine-Scale Models* [Geier-Hayes and Nutt 2008]).

13.4.2 Existing Vegetation Type (EVT) Discussion

Shrub and Forest EVTs were mentioned in the various studies. Un-vegetated, grass dominated, exotics, developed, and agricultural lands were mentioned as not providing source habitat (Vogel and Reese 2002). Therefore, recommend including Shrub and Forest EVTs only [this discussion taken verbatim from *Mountain Quail Documentation of Modeling Parameters for Use in Mid- and Fine-Scale Models* (Geier- Hayes and Nutt 2008)].

13.4.3 Non-forest Canopy Cover Discussion

LANDFIRE canopy cover classifications for SHRUB and FOREST EVTs are listed below in **Table 13-5**.

Table 13-5 LANDFIRE Canopy Cover Classes for the SHRUB and FOREST EVTs

LANDFIRE Canopy Cover Classes	
<10 percent (sparsely vegetated)	Unvegetated
10-20 %	Very Low
20-30 %	Low
30-40 %	Moderate
40-60 %	High
>60 %	Very High

Nelson and Robinson (2006) generally described MOQU source habitat as open canopied with limited shrub cover. Such communities generally develop with lower canopy cover of the tallest life-form that can occupy the site. Wisdom et al. (2000) describes source habitat as open tall shrub, open low-medium shrub, and closed low-medium shrub habitats; shrub communities with canopy cover predominantly below 15 percent. Other studies from Oregon and California reported shrub canopy covers that ranged from 28 percent (Nelson 2007) to 36 percent (Vogel and Reese 1995). A 2-year study by Reese et al. (2005) in west central Idaho reported mean overstories of 62 and 43 percent for nest sites and 43 and 33 percent for brood sites; however, these values were for both tree and shrub so the actual shrub percentage was likely much less. The one outlier was the Brennan et al. (1987) work that reported a mean shrub canopy cover averaged across four study areas of 46 percent, within the lower end of the High Canopy Cover class. Because the majority of the literature described MOQU use of shrub habitats with canopy cover below the 35 percent threshold, and when trees and shrubs were mixed the canopy covers were somewhat higher, it is recommended that the Very Low and Low Canopy Cover classes for the SHRUB EVT and Very Low, Low, and Moderate Canopy Cover classes for the FOREST EVT be used to model source habitat for this species.

Table 13-6 shows the crosswalk between the relative shrub canopy cover parameters found in the literature and the LANDFIRE SHRUB and FOREST EVT canopy cover classifications, and lists the references that support the rationale for the final selection of habitat parameters.

It is recommended that Very Low (10-20%) and Low (20-30%) Canopy Cover classes for the SHRUB EVT and Very Low (10-20%), Low (20-30%), and Moderate (30-40%) for the FOREST EVT be used to model non-forest source habitat for the Mountain Quail.

Table 13-6 Table Showing Crosswalk Between Parameters Found in the Literature and LANDFIRE Canopy Cover Classes for SHRUB and FOREST EVTs

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and LANDFIRE Classes
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendell.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-scale Trends and Management Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW-GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol. (Quigley, Thomas M., tech. ed.: Interior Columbia Basin Ecosystem Management Project: scientific assessment).	Source habitat includes all stages in Chokecherry-serviceberry-rose. Mountain quail are most often found in areas with high abundance of shrubs Source Habitat from Appendix 1, Volume 3, Table 1, pages 437-440 Chokecherry-serviceberry-rose/open tall shrub, open low-medium shrub, closed low-medium shrub (Definitions from Vol. 1, Table 4, pg. 26) Open tall shrub = a canopy of tall (2-5 m) shrubs with **≤66% canopy cover**; tree cover <10% Open low-medium shrub = a canopy of low (<50 cm) or medium-sized (50cm – 2 m) shrubs with **≤66% canopy cover**; tree cover <10% Closed low-medium shrub = a canopy of low (<50 cm) or medium-sized (50 cm - 2 m) shrubs with **≥66% canopy cover**; tree cover <10% **Note:** The author(s) explained that due to the method of measurement technique for canopy cover, 66% shrub canopy cover listed above (taken at a scale of 1:12,000) would equal approx. 15 percent using fine-scale (1:1) on the ground methods. Even though this information is to inform the selection of parameters for a mid-scale model, the parameter information from typical field study references would typically report with data collected using more site-specific (1:1) canopy cover measurement techniques. Therefore the 66% referred to in the above definitions is actually more like 15% for the purposes of this model update and for this particular reference. Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	Very Low (10-20%)
Vogel, C.A; Reese, K.P. 1995. Habitat Conservation Assessment for Mountain Quail (*Oreortyx pictus*). Prepared for: Idaho State Conservation	At the· micro habitat level, Edminster (1954) found that mountain quail used **shrub cover** for nesting and brood rearing **that shades 25 - 50%** of the ground. An open forest with a shrub understory may	Very Low (10-20%) Low (20-30%) Moderate (30-40%)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and LANDFIRE Classes
Effort, Idaho Dept. of Fish and Game, Boise, ID. 68 pages (ID, OR, CA, WA, NV)	be the most desirable composition because the resulting shrub layer is more open and allows the quail to move through the habitat more easily (Johnsgard 1973). Gutierrez (1977:39) found that this quail uses habitat with **36% ground cover** (percent shrub cover and dead material).	
Reese, K.P., J.L. Beck, P. Zager, P.E. Heekin. 2005. Nest brood site characteristic of mountain quail in west-central Idaho. NW Science. Col. 79, No. 4. (west-central Idaho)	From Table 1 (pg. 259) mean overstory canopy closure for year 1992 was **62 ± 8 percent** at nests and **43 ± 9** at brood locations. For year 1995 it was **46 ± 5** percent for nesting and **33** **+ 8** for brood sites. However, these mean canopy closures included both tree and shrub overstories.	Low (20-30%) Moderate (30-40%)
Brennan, L.A.; Block, W.M.; Gutierrez, R.J. 1987. Habitat use by mountain quail in northern California. The Condor, 89: 66-74 (California)	Mean shrub canopy cover for four study areas was **37.1%, 48.8%, 41.8%, and 50.6%**. Overall mean percent shrub canopy cover for all four study areas was **45.8%** (SE=2.3) (n=114).	Moderate (30-40%) High (40-60%)
Nelson, Jamie N. 2007. Survival and nest site characteristics of translocated mountain quail on Steens Mountain, Oregon. Thesis. Oregon State University. 54 pgs. (Oregon)	Perimeter shrub height (shrub height 8 m from the nest center) was the habitat characteristic most predictive of Mountain Quail nest site selection. As perimeter shrub height increased, the odds of a site being selected as a nest site also increased. Mean canopy cover for nest sites in study was 28%, includes both shrubs and trees. (western juniper dominant tree sp.)	Very Low (10-20%) Low (20-30%)
Nelson, Jamie and Douglas Robinson. 2006. Mountain quail translocations in eastern Oregon, Project Report 2006. Dept. of Fisheries and Wildlife, Oregon State University. Corvallis, OR. 20 p. (eastern Oregon)	Nest sites were often in areas with generally open or partially open canopies and **limited shrub cover.** JF – "Limited shrub cover" would suggest relatively low shrub canopy cover, likely in the Very Low and Low canopy cover classes.	Very Low (10-20%) Low (20-30%)

13.4.4 Source Habitat Conditions When Outside HRV Discussion

None.

13.5 Additional Modeling Parameters

This species requires dense shrubby conditions in close proximity (within 100 to 200 meters [300-650 feet]) to live water. Vogel and Reese (1995) state that it is restricted to the breaks and secondary drainages of the Snake and Salmon Rivers but does not describe the extent of these secondary drainages. Much of the habitat is likely beyond of the boundary of the Forest at lower elevations. The mid/fine-scale model cannot take this into account and therefore will overestimate the amount of suitable habitat for this species.

13.6 Model Limitations

This species requires dense shrubby conditions in close proximity (within 100 to 200 meters [300-650 feet]) to live water. Vogel and Reese (1995) state that it is restricted to the breaks and secondary drainages of the Snake and Salmon Rivers but does not describe the extent of these secondary drainages. Much of the habitat is likely beyond of the boundary of the Forest at lower elevations. The mid/fine-scale model cannot take this into account and therefore will overestimate the amount of suitable habitat for this species.

13.7 Updated Forest Modeling Parameters for Mountain Quail Source Habitat

The updated mid-scale habitat parameters for the Mountain Quail are as follows:

Summary of Forest Modeling Parameters for Mountain Quail Source Habitat

PVGs: 1, 2, 4, 5, 7 and 11

Tree Size Class: Seedling, Sapling, Small, Medium, Large, and Very Large

Tree Canopy Cover Class: For Sapling, Small, Medium, Large, and Very Large: Low and Low-Medium

(*the Seedling TSC does not have an associated canopy cover*)

Summary of Non-Forest Modeling Parameters for Mountain Quail Source Habitat ESPs: Low Sagebrush, Mountain and Wyoming Big Sagebrush, Shrub-Forest Transition EVTs**:** SHRUB and FOREST

Canopy Cover Class: For SHRUB: Very Low and Low For FOREST: Very Low, Low and Moderate

Model Limitations**:** This species requires dense shrubby conditions in close proximity (within 100 to 200 meters [300-650 feet]) to live water. Vogel and Reese (1995) state that it is restricted to the breaks and secondary drainages of the Snake and Salmon Rivers but does not describe the extent of these secondary drainages. Much of the habitat is likely beyond of the boundary of the Forest at lower elevations. The mid/fine-scale model cannot take this into account and therefore will overestimate the amount of suitable habitat for this species.

Source habitat is defined by those characteristics of macrovegetation that contribute to stationary or positive population growth.

13.8 New Literature Sources Reviewed for this Update

Below is a list of all new literature reviewed for this 2017 Mountain Quail Mid-scale Modeling Update, including those references that did not provide relevant habitat information regarding tree size class or tree/shrub canopy cover class parameters. This list was compiled to both inform the next literature review and/or model update of what references were reviewed and to document the entire 2016/2017 literature review process.

The literature search found only two references dated more recent than 2008 and that would not have been available for the last update of the model, and that was habitat focused. A summary of relevant habitat information from *The Birds of North America* online account was also included because it is a

good synthesis of all available habitat information for this species, although the species account has not been updated since 1999.

Reference – Gutiérrez, R. J. and David J. Delehanty. (1999). Mountain Quail (*Oreortyx pictus*), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/mouqua DOI: 10.2173/bna.457

Accessed March 15, 2017.

The following excerpts from the BNA online account are pertinent to this update:

Shrub-dominated communities. These include chaparral, mixed desert scrub of Mojave Desert, early-successional-stage shrub vegetation following fire, logging, or other disturbance. Also, mixed evergreen-hardwood, **mixed conifer**, redwood (*Sequoia sempervirens*), **pine** (*Pinus* spp.), **montane conifer**, white fir (*Abies concolor*), and red fir (*Abies magnifica*) forests; piñon-juniper (*Pinus* spp.- *Juniperus* spp.), occasionally foothill woodland if shrubs present; high-elevation aspen (*Populus tremuloides*) stands surrounded by sagebrush (*Artemesia* spp.), and **riparian habitats associated with these forests** and woodlands (Grinnell and Miller 1944; Miller 1950; Ormiston 1966; Gutiérrez Gutiérrez 1977; Gutiérrez 1980; Brennan et al. 1987; RJG).

Forest habitats used by Mountain Quail usually have a significant shrub component (Miller 1950; Gutiérrez 1980; Brennan 1984). These habitats occur over wide altitudinal (sea level to >3,000 m) and moisture gradients.

13.8.1 Nesting

On ground, usually very dense overhead cover of shrubs or tree bough (Bent 1932), near protective cover, highly concealed, requiring view from <0.5 m to see eggs (DJD). Nests observed under short (1 m) pine saplings, under piñon boughs at trunk, under shrubs (DJD). Often nests on steep hillside or adjacent to steep bank in second-growth forest or shrub-dominated communities, usually under or against protective cover.

13.8.2 Foraging

Studied in detail by Gutiérrez (Gutiérrez 1977; Gutiérrez 1980). Forages in shrub and forest communities under canopy and at edge of these habitats, rarely venturing far from cover but at greater distance than when not foraging.

Reference – Stephenson, J., K. P. Reese, P. Zager, P. E. Heekin, P. J. Nelle, and A. Martens. 2011. Factors influencing survival of native and translocated mountain quail in Idaho and Washington. Journal of Wildlife Management 75:1315–1323.

This study looked at survival of native and translocated mountain quail in order to help managers design more effective recovery programs. The study really didn't assess vegetative habitat characteristics or use vegetative parameters in their survival rates. Instead, they used age, sex, native vs. translocated, movement rates, time, as well as precipitation and temperature. There were no useful habitat information for this model update.

Reference – Zornes, M, and R. A. Bishop. 2009. Western Quail Conservation Plan. Association of Fish and Wildlife Agencies. Washington, DC. 92 pages.

This document is a comprehensive quail management plan for the western states that include Oregon, Idaho, California, Utah, Nevada, Oklahoma, Colorado, Washington, Texas, Kansas, and New Mexico.

Habitat descriptions for the mountain quail were very general and didn't mention Idaho. Did describe habitat in eastern Oregon in Hells Canyon as "most often with overstories dominated by mixed hardwoods or with conifers that contained a healthy shrub understory, such as an overstory of black cottonwood and a snowberry understory." There were no parameters or additional information not already included in the original literature review for this species.

Note: There were three other references that pertained to Idaho that I could not find a copy of on line and would probably need ordered or found in a library. They are listed below.

- Heekin, P.E., K.P Reese, and P. Zaeger. 1993. Movements, habitat use, and population characteristics of Mountain quail in west-central Idaho. Annual Report. University of Idaho, ID.
- Pope, M.D., Hansen, M., Crawford, J.A. 2004. Habitat associations of translocated and native mountain quail in Oregon. Northwest Science. 78 (3): 242-249
- Heekin, P.E., C.A. Vogel, and K.P. Reese. 1994. Uncovering the elusive habits of Mountain Quail in Idaho. Quail Unlimited 12(2):8-11

The following references were also used to inform this model update but were not referenced in the original 2008 model, even though they would have been available at the time.

Reference - Reese, K.P., J.L. Beck, P. Zager, P.E. Heekin. 2005. Nest brood site characteristic of mountain quail in west-central Idaho. NW Science. Col. 79, No. 4.

This study investigated nest and brood-rearing habitats used by mountain quail in the Little Salmon River drainage in west-central Idaho during 1992 and 1995. Habitat components at the micro- and macro-habitat scales were measured. At the macrohabitat scale, 71% of nests were found in open- canopied, conifer shrub cover types and broods were observed in a wider variety of shrub types. At microhabitat scale, mallow ninebark, black hawthorn, common snowberry, Saskatoon serviceberry, and wild rose were important shrub species in both nest and brood habitats.

The study reported fifteen (71%) nests were located in conifer-shrub, 4 (19%) in mountain-shrub, and 2 (10%) in riparian-shrub. Seven (44%) broods were located in conifer-shrub cover, 5 (31%) in mountain shrub, 3 (19%) in grass-scattered shrub, and 1 (6%) in riparian-shrub (pg. 258)**.** Mean DBH of trees at quail nest sites was 23.9 cm (**9.4 inches**) in 1992 and 16.4 cm (**6.5 inches**) in 1995 (Table 1, pg. 259) as measured for microhabitat portion of study.

Reference - Nelson, Jamie N. 2007. Survival and nest site characteristics of translocated mountain quail on Steens Mountain, Oregon. Thesis. Oregon State University. 54 pgs.

This study looked at habitat preferences on a translocated population in the Steens Mountain area in Oregon. They translocated 217 wild quail from southwestern Oregon to the Steens area. They measured habitat characteristics at 45 nest sites and compared to 90 random sites to identify nest site habitat preferences. Findings were canopy cover of shrubs, trees, and rocks, and shrub height 8 meters from the nest were the two most important habitat variables that influence nest site selection. Mean shrub height at nest sites was about 1 meter tall and **mean canopy cover was 28%**, includes both shrubs and trees (western juniper dominant tree sp.).

14.0 NORTHERN GOSHAWK (SUMMER)

Mid-scale Modeling Update for the Northern Goshawk (Summer)
March 22, 2019 Payette National Forest
Joe Foust, District Wildlife Biologist, Cascade RD, BNF, on Detail to the PNF

The purpose of this document is to update the Northern Goshawk Mid-scale Habitat Model developed for the Boise National Forest in 2009 (Nutt et al. 2009), which is being used as the base habitat model for the 2019 Payette National Forest Baseline Habitat Modeling Update. This mid-scale model was developed for use at the scale of the entire Forest but is useful for habitat patch and pattern information at the scale of the fifth hydrologic unit code. It has been ten years since the original mid- scale species model for the Boise National Forest's modeling effort was created. In order to complete the 2019 Payette National Forest Baseline Habitat Modeling Update effort, there was a need to update three key components of the modeling process, including the new existing vegetation layer that had different canopy cover and tree size classes, the new 5th HUC boundaries, and the most up to date fire data. For the vegetation portion, in order to run the mid-scale habitat model with this new data a crosswalk that linked the old breakdown classes to the new breakdowns was needed, which is the focus of this document. This model update effort also offered an opportunity to review any new literature published since the original 2009 model was created and validate selected habitat parameters.

14.1 Review of New Species Literature since 2010

The Boise NF mid-scale habitat model for the Northern Goshawk (Summer) was created in 2005 and revised in 2009 (Nutt et al. 2009). This literature review of published information between 2009 and 2016 was conducted to validate whether model parameters from 2009 are still consistent with the literature for this species. Any references that had relevant habitat information pertaining to tree size class (TSC) and canopy cover class (CCC) were listed in the Crosswalk tables in the TSC and CCC sections. All new literature reviewed for this 2019 Northern Goshawk (Summer) Mid-scale Model Update, including those references that did not provide relevant habitat information regarding TSC or CCC, are listed and briefly summarized at the end of this document. It should be noted that the literature review for this update was completed in 2016; however, the actual review of this document and subsequent update of the model did not occur until 2019.

14.2 Application of Mid-scale Species Habitat Parameters to New Vegetation Structure Classes

A new existing vegetation map was completed for the mid-scale in 2012 using imagery acquired from 2008 and field data collected from 2007 through 2011. The data represent conditions across the Forest through the fall of 2008. This map was updated for the Payette National Forest in 2016 and called the "Forest Derived Product." Forest Derived Products are Forest-level updates of the contractor provided maps that better facilitate Forest-level data needs. These can be added to or updated as emerging Forest-level needs arise. This included post-processing of polygon delineations to reduce the noise of many small polygons by aggregating these to produce polygons that more adequately represent a larger unit on the ground (i.e., "stands"), to meet the minimum map unit of 5 acres for most polygons, and to reduce the overall number of polygons for processing. Size class polygons were then reattributed utilizing the same imagery used by the original mapping product and newer imagery as it became available. The original

contractor mapping process generalized much of the size class polygons into the medium size class (10.0-19.9" DBH). The hand-edits of the size class attributes helped to spread the distribution of size classes into the seedling, sapling, small and large tree classes and more closely mirror Forest Inventory data. Secondly, the canopy cover map needed to be updated to incorporate changes due to recent fires. Rule sets utilizing post-fire vegetation condition were developed to adjust canopy cover changes where necessary, and reviewed with newer imagery. No changes were made to the dominance type map and all changes made to the size class and canopy cover class were made to nest into the correct corresponding dominance types in that map, so that the map integrity between the three layers was maintained. An update to the accuracy assessment was also completed for the Forest Derived Products.

Although there was no change to the Potential Vegetation Group (PVG), this new existing vegetation product created new categories for tree size class and canopy cover class. The final dominance type map units, size classes and canopy cover classes conform to the mid-level mapping standards referenced in the Existing Vegetation Classification and Mapping Technical Guide Version 1.0 (Brohman and Bryant 2005). This existing vegetation map provides the Payette National Forest with a new baseline of current condition. However, the classification for the components of this vegetation map are different than the classifications used in previous vegetation mapping efforts used for the Payette National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service 2003a; Redmond et al. 1998). Therefore, crosswalks needed to be developed to translate the categories for size class and canopy cover classes used for the 2009 model in order to run the models on the new existing vegetation product. The following documentation explains how the parameters were cross-walked from the 2009 model into the 2019 model.

14.3 Parameter Review Discussion

The following parameter review discussion describes the vegetation parameters used to model source habitat when under historic range of variability (HRV) conditions.

14.3.1 PVG Discussion

No new information was found during the literature review on potential vegetation group (PVG) preferences for the northern goshawk. No change is recommended.

14.3.2 Tree Size Class Discussion

Tree Size Class (TSC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 14-1**.

Table 14-1 Tree Size Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer

2003 Forest Plan Appendix A	New Vegetation Layer (2011)	Changed or New Classification
Grass/Forb/Shrub/Seedling (GFSS) (<4.5' tall)	Seedling (<4.5' tall)	change in name only
Sapling (1.0 – 4.9 " DBH)	Sapling (0.1 – 4.9" DBH)	
Small (5.0 – 12.0" DBH)	Small (5 – 9.9" DBH)	change
Medium (12.1 – 20" DBH)	Medium (10 – 19.9" DBH)	change

2003 Forest Plan Appendix A	New Vegetation Layer (2011)	Changed or New Classification
Large (>20.0" DBH)	Large (20 – 29.9" DBH)	change
	Very Large (≥ 30" DBH)	new

For modeling nesting habitat, the majority of literature sources support selecting the Medium (10-19.9" DBH), Large (20 – 29.9" DBH) and Very Large (>= 30" DBH) Tree Size classes (Patla 1991; Hayward 1997; Hayward and Escano 1989; Siders and Kennedy 1994; Moser and Garton 2009; Desimone and DeStephano 2005).

Quantitative information for tree size parameters within forage habitat was limited in the literature, however, as most descriptions of foraging habitat were qualitative in nature. Only two literature sources described tree size characteristics for goshawk forage habitat; Beier and Drennan 1997 and Reynolds et al. 1992. Beier and Drennan (1997) reported that goshawks selected foraging sites that had a greater density in trees greater than 40.6 cm (16") DBH than on contrast plots. Management guidelines in Reynolds et al. (1992) recommend managing for
3-5 mature or old live trees per acre within ponderosa pine forest types and a minimum of one group of six mature or old live trees per acre within mixed conifer forest types to meet the needs of various goshawk prey species, and identified live trees greater than 18" DHB as important features of prey habitat. While goshawk forage habitat can vary widely within a given territory with the use of openings, edge habitat, young forests, and various forest structures (Austin 1993; Hargis et al 1994), the large tree component within mature or older forested stands remains an important habitat factor for both post-fledgling areas (PFA) and forage habitat (Reynolds et al. 1992; Beier and Drennan 1997). Large trees provide hiding, feeding, denning, and nesting sites for many key prey species (squirrels and cavity nesters), hunting perches, and hiding cover for young goshawks (in the PFA). These larger tree sizes would be represented in the Medium, Large, and Very Large Tree Size classes, which are recommended for modeling goshawk forage habitat.

Table 14-2 shows the crosswalk between Tree Size class parameters found in the literature and the new recommended Tree Size class breakouts, and lists the references that supported the rationale for the final selection of habitat parameters.

It is recommended that Medium (10-19.9" DBH), Large (20-29.9" DBH), and Very Large (>30" DBH) Tree Size classes be used to model source habitat for the northern goshawk (summer).

Table 14-2 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Size Class Parameter

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Patla, Susan. 1991. Northern Goshawk Monitoring Project #2. USDA Targhee National Forest, St. Anthony. 42pp. (Idaho)	Mean DBH for 29 PSME nests was **20.5 inches** (SD = 5.1). Mean DBH for three aspen nests was 11.4 inches (SD = 0.6). Mean DBH for three lodgepole pine nests was 10.3 inches (SD = 1.4).	Medium – 10-19.9" DBH Large – 20-29.9" DBH Very Large - ≥30" DBH

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Hayward, Gregory D. 1997. Goshawk nest site characteristics on a portion of the Payette National Forest, Idaho. USDA Payette National Forest. McCall, Idaho. 30pp.	Nests were in PSME fir trees about **18 inches** in DBH.	Medium – 10-19.9" DBH
Hayward, G. D. and R.E. Escano. 1989. Goshawk nest site characteristics in western Montana and northern Idaho. *Condor 91:476-479.*	Mean nest tree DBH at 17 sites was 50 cm (± 10.57) (**20")** with a range from 25-97 cm (**10- 38"**) DBH. In the Rocky Mountain portion of the study (n = 9), only the mean was 42 (± 14.31) (**17"**) with a range from 25-79 cm (**10-31"**) DBH.	Medium – 10-19.9" DBH Large – 20-29.9" DBH Very Large - ≥30" DBH
Siders, M.S. and P.L. Kennedy. 1994. Nesting habitat of Accipiter hawks: Is body size a consistent predictor of nest habitat characteristics? Studies in Avian Biology No. 16:92-96. (north-central New Mexico)	Nest stand average tree diameters (DBH-cm) from available studies ranged from 15 – 46 [**6-** 18-inch dbh].	Medium – 10-19.9" DBH Large – 20-29.9" DBH
Moser, B.W. and E.O. Garton. 2009. Short-term effects of timber harvest and weather on northern goshawk reproduction in northern Idaho. J. Raptor Res. 43(1):1- 10.	All 21 nest areas had an overstory tree dbh of >31 cm [**12"**].	Medium – 10-19.9" DBH Large – 20-29.9" DBH Very Large - ≥30" DBH
Desimone, S.M. and DeStefano. 2005. Temporal patterns of northern goshawk nest area occupancy and habitat: A retrospective analysis. J. Raptor Res. 39(3):310-323. (south-central Oregon)	Of 38 occupied nests in 1992 to 1994, 86% (33/38) were in mid-aged or late closed structural-stage forest. Post 1992, 25 of 42 (60%) were in late closed and 11 of 42 were in mid-aged closed. Late closed = Mean stand DBH ≥53 cm **(≥21")**. Mid-aged closed = Mean stand DBH 23-53 cm (**9-21")** Recommend retaining large trees (>53 cm (**21"**) DBH) to help preserve nest site integrity, maintain closed canopies, and provide connectivity to alternative nest sites within nest areas.	Medium – 10-19.9" DBH Large – 20-29.9" DBH
Reynolds, Richard T.; Graham, Russell T.; Reiser, M. Hildegard; and others. 1992. Management recommendations for the northern goshawk in the southwestern United States. Gen. Tech. Rep. RM-217, Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 90 p.	Recommendations for PFA (for the 60% of PFA in older stand structure ages) and for the foraging Area: PP Forest Type– min of 3-5 mature/old live trees/ac. (Also leave same number within openings for reserve trees) Mixed Conifer Forest Type – min of 1 group of 6 mature and old live trees/ac. (Also leave same number within openings for reserve trees) The above recommendations for live trees/ac are the same for Foraging Area as well, for both respective Forest Types: (for the 60% of foraging area in older stand structure ages).	Medium – 10-19.9" DBH Large – 20-29.9" DBH

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
	Identified features of prey habitat in the PFA and Foraging Areas include large (**>18"** DBH)	
	live trees for squirrels, large (**>18"** DBH) snags/live trees for cavity excavation by woodpeckers, and are also used for hunting perches. The large tree component provides hiding, feeding, denning, and nesting sites for many goshawk prey species.	
Beier,P.,and J. E.Drennan. 1997. Forest structure and prey abundance in foraging areas of northern goshawks. Ecological Applications 7:564–571. (northern Arizona)	Foraging Habitat: Goshawks selected foraging sites that had a greater density of trees >40.6 cm (**16"**) DBH than on contrast plots.	Medium – 10-19.9" DBH Large – 20-29.9" DBH

DBH = diameter at breast height

14.3.3 Tree Canopy Cover Discussion

Tree Canopy Cover (TCC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in Table **14-3**.

Table 14-3 Canopy Cover Class Differences Between the 2003 Forest Plan Appendix A and New Vegetation Layer (Tree Canopy Cover Only)

Tree Canopy Cover Class		
2003 Forest Plan Appendix A	**New Vegetation Layer (2011)**	**Changed or New Classification?**
10 – 39% Low	10 – 19% (Low Tree Canopy)	change
	20 – 29% (Low-Medium Tree Canopy)	change
	30 – 44% (Medium Tree Canopy)	change
40 – 69% Moderate	45 – 59% (Medium-High Tree Canopy)	change
>70% High	60% (High Tree Canopy)	change

A review of the literature shows that there is strong support for selection of the Medium-High (45-59%) and High (>60%) Tree Canopy Cover classes. The four studies that occurred in Idaho reported mean nest site canopy covers ranging from 67 to 81 percent (Patla 1991; Hayward 1997; Moser and Garton 2009; Hayward and Escano 1989), while other studies in Oregon, Montana, and New Mexico reported nesting canopy covers from 50 to 74 percent (Reynolds et al. 1982; Siders and Kennedy 1994; Desimone and DeStephano 2005). Furthermore, Reynolds et al. (1992) recommends managing or retaining stands with 50-70 percent canopy closure for nesting habitat.

Studies that addressed post fledgling areas and forage habitat were limited in the literature, and when mentioned were usually only described in generalities. However when quantified, PFA requirements where typically reported to be similar to those of nesting habitat, with the majority of the PFA in the Medium-High (45-59%) and High (>60%) Tree Canopy Cover classes (Clough 2000, Reynolds et al. 1992), although a mix of age classes and forest seral classes were also necessary to provide habitat for a variety of prey species and hiding cover for young goshawks (Daw and Stephano 2001).

Forage habitat, while also lacking quantitative descriptions in the literature, was commonly described as stands with higher canopy cover with a high density of large trees and relatively open understory that allow goshawks to hunt (Bright-Smith and Mannan 1994, Beier and Drennan 1997, Graham et al. 1999), although other studies found goshawks to forage in a wider variety of habitats. Greenwald et al. (2005) summarized that most radio telemetry studies of goshawk home range selection conducted in the United States found that foraging goshawks selected for late succession stands with high canopy closure, large trees, and high stem densities, among other parameters, although the overall range of habitats used was quite broad. More specifically, Beier and Drennan (1997) reported a mean canopy closure of 48.3% (11) taken at foraging sites within nesting territories, and recommendations for the management of forage habitat from Reynolds et al. (1992) suggest maintaining canopy covers above 40-60 percent for stands within or larger than the 12-18” structural class in ponderosa pine, mixed species, and spruce/fir forest types. As a result, modeling for stands within the Medium-High (45-59%) and High (>60%) Tree Canopy Cover classes should reasonably identify foraging habitat for the goshawk, even though it will not account for the variety of forage habitat used. Inclusion of canopy cover classes within the next lower class of Medium (30-44%) would likely overestimate source habitat at this scale.

Expanding the range down to 30 percent would allow more source habitat to be modeled, but could result in large blocks of low canopy cover habitat being modeled that is not in proximity to higher canopy cover nesting and PFA habitat, which are generally more limiting for territory development than forage habitat. This would seemingly misrepresent goshawk source habitat across the landscape.

Selection of the Medium-High and High Tree Canopy Cover classes is expected to encompass the late succession higher canopy cover stands that are universally common to nesting, PFA, and forage habitat.

To assess source habitat, modeling would best approximate the findings of the literature by selecting for forested stands in the Medium-High (45-59%) and High (>60%) Tree Canopy Cover classes for preferred PVGs within their historic range of variability (HRV).

Table 14-4 shows the crosswalk between parameters found in the literature and the new tree canopy cover class breakouts, and lists the references that supported the rationale for the final selection of habitat parameters.

Selecting forested stands in the Medium-High (45-59%) and High (>60%) Canopy Cover classes is recommended for modeling northern goshawk (summer) source habitat.

Table 14-4 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Canopy Cover Class Parameters

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Patla, Susan. 1991. Northern Goshawk Monitoring Project #2. USDA Targhee National Forest, St. Anthony. 42pp. (Idaho)	(Nesting) Canopy cover for all nest sites ranged from **67 percent** in lodgepole to **72 percent** for aspen and PSME.	High (≥60%)
Hayward, Gregory D. 1997. Goshawk nest site characteristics on a portion of the Payette	(Nesting) Canopy cover ranged from 31 to 96 percent with a **mean of 81 percent** and a median of 85 percent (n = 30). Ninety percent of all nests occurred in stands with canopy cover greater than **63 percent**.	High (≥60%)
National Forest, Idaho. USDA Payette National Forest. McCall, Idaho. 30pp. (Idaho)		
Moser, B.W. and E.O. Garton. 2009. Short-term effects of timber harvest and weather on northern goshawk reproduction in northern Idaho. J. Raptor Res. 43(1):1-10. (Northern Idaho)	(Nesting) All 21 nest areas had **>70%** overstory tree canopy.	High (≥60%)
Hayward, G. D. and R.E. Escano. 1989. Goshawk nest site characteristics in western Montana and northern Idaho. *Condor 91:476-479.* (Idaho and Montana)	(Nesting) Mean canopy closure for this study was **80 percent ± 3 percent**.	High (≥60%)
Reynolds, R. T., E. C. Meslow and H. M. Wright. 1982. Nesting habitat of coexisting Accipiter in Oregon. J. Wildl. Manage. no. 46:124-138. (Oregon)	(Nesting) Mean canopy closure for 7 goshawk nest sites was **59.8%** (SD 20.5%).	Medium-High (45-59%) High (≥60%)
Siders, M.S. and P.L. Kennedy. 1994. Nesting habitat of Accipiter hawks: Is body size a consistent predictor of nest habitat characteristics? Studies in Avian Biology No. 16:92- 96. (northern New Mexico)	(Nesting) At 42 nest sites in PP, aspen/ mixed conifer, and mixed conifer habitat types CC was **58-74%** at the nest tree and **60-71%** for the nest site. Nest site = the area surrounding the nest tree, includes vegetation and topo features used by nesting pair during entire nesting season exclusive of foraging areas. Nest area = a defended area that may contain a cluster of nest sites that accipiters used during the breeding season.	High (≥60%)
Desimone, S.M. and DeStefano. 2005. Temporal patterns of northern goshawk nest area occupancy and habitat: A retrospective analysis. J. Raptor Res.	(Nesting) Of 38 occupied nests in 1992 to 1994, 86% (33/38) were in mid-aged or late closed structural-stage forest. Post 1992, 25 of 42 (60%) were in late closed and 11 of 42 were in mid-aged closed. Late closed = Mean stand DBH ≥53 cm, **>50% CC**, ≥15 TPH ≥53 cm DBH	Medium-High (45-59%)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
39(3):310-323. (south-central Oregon)	Mid-aged closed = Mean stand DBH 23-53 cm, <15 TPH >53 cm DBH, **>50% CC**	
Graham, Russell T., Ron L. Rodriguez, Kathleen M. Paulin, Rodney L. Player, Arlene P. Heap, and Richard Williams. 1999.	(Nesting and Forage) Nests are in mature to old forests with relatively large trees, high canopy closure (relative to surrounds), sparse ground cover, and open understories. Often positioned near bottom of moderately steep slopes, close to water and adjacent to	Did not contain specific CC values but description suggests High (≥60%) for nesting and Medium-
The Northern Goshawk in Utah: Habitat Assessment and Recommendations. Gen. Tech. Rep. RMRS-GTR –22. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 48. (Utah)	a canopy break. Important stand characteristics include multiple canopies, snags and downed woody debris. Foraging habitat consists of closed canopy forest with moderate tree densities as compared to young open forest. Note: this citation is a comprehensive summary of scientific literature and does not provide data itself. It is primarily a document providing guidance on management.	High (45-59%) and High (≥60%) for forage habitat.
Bright-Smith, D.J. and R.W. Mannan. 1994. Habitat use by breeding male northern goshawks in northeastern Arizona/ Studies in Avian Biology No. 16:58-65. (northeastern Arizona)	Average rank of relative preference of the canopy closure categories increased with increasing canopy closure. Eight of 11 birds used CC in proportion to availability, 3 birds used **>55% CC** more than expected. 4 birds used open areas less than expected. Management recommendations include maintaining **relatively high canopy closure** over a significant portion of areas managed for foraging goshawks. Harvest methods that create large open forests (<34%cc as measured from aerial photos) in more than 35% of a home range may be detrimental.	Medium-High (45-59%) High (≥60%)
Clough, Lorraine T.,	(Post Fledgling Area) On average, 68.9% of PFAs	
Nesting habitat selection	contained forest with **>50% CC** and 8.9% pf the PFAs had	
and productivity of	**25% to 50% CC**. (Note: This study occurred in a highly	
northern goshawks in west-central Montana" (2000). Theses,	managed landscape. Within the 170 ha PFA around a nest, only 11.3 ± 5.1% (19.2 ± 8.7 ha) contained mature or old growth forest. The majority of the rest of the PFA	Medium-High (45-59%) High (≥60%)
Dissertations, Professional	was dominated by small-sized trees. Regardless of the	
Papers. Paper 5828.	tree size class available, goshawks in this study still	
(west-central Montana)	preferred relatively high canopy closures in the PFA)	

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Reynolds, Richard T.; Graham, Russell T.; Reiser, M. Hildegard; and others. 1992. Management recommendations for the northern goshawk in the southwestern United States. Gen. Tech. Rep. RM-217, Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 90 p.	This reference recommends the following canopy cover values for goshawk habitat in these vegetation structural stages (VSS) 4 (12-18" DBH), 5 (18-24" DBH), and 6 (>24" DBH) *Nesting*: Canopy closure (CC) of **50-70%** for VSS 5 and VSS 6 *Post Fledgling Area*: **> 50%** CC in ponderosa pine (PP) forest types for VSS 4-6, **>60%** CC in Mixed Species (MS) for VSS 4-6, and **>70%** CC in spruce/fir (SF) for VSS 4-6 *Foraging Area (PFA)*: in PP types **>40%** in VSS 4, 5, and 6, in MS types **>40%** CC for VSS 4, **> 50%** CC for VSS 5, and **>60%** CC for VSS 6, and in SF types **>40%** CC for VSS 4, and **>60%** CC for VSS 5 and 6	Medium-High (45-59%) High (≥60%) Medium-High (45-59%) High (≥60%) Medium (30-44%) Medium-High (45-59%) High (≥60%)
	(the reference also recommends that >60% of both the PFA and foraging area in a home range is in the larger VSSs (4, 5, and 6))	
	Note: this citation is a comprehensive summary of scientific literature and does not provide data itself. It is primarily a document providing guidance on management.	
Beier,P.,and J. E.Drennan. 1997. Forest structure and prey abundance in foraging areas of northern goshawks. Ecological Applications 7:564–571. (northern Arizona)	(Forage) Mean canopy closure at 63 1.77-Ha plots used by adult goshawks was **48.3%** (11.0). (Study characterized forest structure at foraging sites within nesting territory. Study area dominated by ponderosa pine forests)	Medium-High (45-59)
Greenwald, D. Noah, D. Coleman Crocker-Bedford, Len Broberg, Kieran F. Sucling, and Timothy Tibbitts. 2005. A review of northern goshawk habitat selection in the home range and implications for forest management in the western United States. Wildlife Society Bulletin, 33(1):120-129	(Forage) Results of all 12 North American radio telemetry studies of goshawk home range habitat selection show that foraging goshawks select for late succession stands with high canopy closure, large trees, canopy layering, and abundant coarse wood, although the overall range of forest and structural types used is very broad. Note: This citation summarizes the work of others and does not provide data itself. It is primarily a document providing guidance on management.	Did not contain specific CC values but description suggests Medium-High (45-59%) and High (≥60%) for forage habitat.

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Squires, J. R., and R. T. Reynolds. 1997. Northern Goshawk (*Accipiter gentilis*). *In* The Birds of North America, No. 298 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.	High canopy closure is one of the most uniform habitat characteristics of goshawk nest stands (Hayward and Escano 1989). Goshawks nested 2.5 times more often than expected in stands with 70 to 79 percent canopy coverage and 5.8 times more often than expected in stands with 80 percent or greater canopy coverage. Canopy coverage (n = 36 stands) in stands used by this population averaged 76 percent ± 7 SD; 18 percent greater ($p <$ 0.001) than the surrounding landscape. Although high canopy cover is apparently preferred, some populations use open forests (33 percent, Reynolds et al 1982; 31 percent ± 13 SD, Hargis et al 1994)).	Medium (30-44% Medium-High (45-59%) High (≥60%)

14.4 Source Habitat Conditions When Outside HRV Discussion

Goshawks can utilize some forested conditions that are not within the historical range of variability in PVGs 2, 3, 4, 5, 6, and 7. These conditions generally consist of higher densities, greater species diversity, and more complex vegetative structure than what would have developed when stands in these PVGs were experiencing historical disturbance processes. For PVGs 3, 4, 6, and 7, when functioning outside HRV, the High canopy cover class should be included when in the Medium, Large, and Very Large tree size classes. For PVGs 2 and 5, when functioning outside HRV, the Medium-High and High canopy cover classes should be included in the model only when in the Large and Very Large size classes.

14.5 Updated Forest Modeling Parameters for Northern Goshawk (Summer) Source Habitat

The updated mid-scale habitat parameters for the northern goshawk (summer) are as follows:

Within HRV

PVGs: 3, 4, 6, 7, 8, 9, and 10

Tree Size Class: Medium, Large*, and Very Large* Canopy Cover Class: PVGs 3, 4, 6, and 7 = Medium-High

PVGs 8, 9, and 10 = Medium-High and High

* Large and very large tree size classes do not occur in PVG 10

Outside HRV

PVGs: 2, 3, 4, 5, 6, and 7

Tree Size Class: PVGs 3, 4, 6, and 7 = Medium, Large, and Very Large PVGs 2 and 5 = Large and Very Large

Canopy Cover Class: PVGs 3, 4, 6, and 7 = High

PVGs 2 and 5 = Medium-High and High

New Literature Sources Reviewed for this Update

Below is a list of all new literature reviewed for this 2019 Northern Goshawk Mid-scale Modeling Update, including those references that did not provide relevant habitat information regarding tree size class or canopy cover class parameters. This list was compiled to both inform the next literature review and/or model update of what references were reviewed and to document the entire 2016 literature review process.

The literature search found only one reference dated more recent than 2009 and that would not have been available for the last update of the model, and that was habitat focused.

Reference – Squires, John R. and Richard T. Reynolds. (1997). Northern Goshawk (*Accipiter gentilis*), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/norgos DOI: 10.2173/bna.298

Accessed in September 2016.

The species account has not been updated since 1997, implying that no significant developments in research on the species' natural history have occurred.

Reference - Reynolds, Richard T., Douglas A. Boyce Jr., and Russel T. Graham. 2012. Ponderosa Pine Forest Structure and Northern Goshawk Reproduction: Response to Beier et al. (2008).

There was nothing in this paper that spoke to new information that would change current habitat parameters for the goshawk. This paper was a rebuttal to a 2008 paper by Beier et al. that questioned the validity of the Reynolds et al. 1992 goshawk management guidelines that were incorporated into many forest plans.

15.0 PILEATED WOODPECKER

Mid-scale Modeling Update for the Pileated Woodpecker
March 28, 2019 Payette National Forest
Joe Foust, District Wildlife Biologist, Cascade RD, BNF, on Detail to the PNF

The purpose of this document is to update the Pileated Woodpecker Mid-scale Habitat Model developed for the Boise National Forest in 2009 (Nutt et al. 2009), which is being used as the base habitat model for the 2019 Payette National Forest Baseline Habitat Modeling Update. This mid-scale model was developed for use at the scale of the entire Forest but is useful for habitat patch and pattern information at the scale of the fifth hydrologic unit code. It has been ten years since the original mid- scale species model for the Boise National Forest's modeling effort was created. In order to complete the 2019 Payette National Forest Baseline Habitat Modeling Update effort, there was a need to update three key components of the modeling process, including the new existing vegetation layer that had different canopy cover and tree size classes, the new 5th HUC boundaries, and the most up to date fire data. For the vegetation portion, in order to run the mid-scale habitat model with this new data a crosswalk that linked the old breakdown classes to the new breakdowns was needed, which is the focus of this document. This model update effort also offered an opportunity to review any new literature published since the original 2009 model was created and validate selected habitat parameters.

15.1 Review of New Species Literature since 2009

The Boise NF mid-scale habitat model for the Pileated Woodpecker (PIWO) was created in 2005 and revised in 2009 (Nutt et al. 2009). This literature review of published information between 2009 and 2017 was conducted to validate whether model parameters from 2009 are still consistent with the literature for this species. Any references that had relevant habitat information pertaining to tree size class (TSC) and canopy cover class (CCC) were listed in the Crosswalk tables in the TSC and CCC sections. All new literature reviewed for this 2019 Pileated Woodpecker Mid-scale Model Update, including those references that did not provide relevant habitat information regarding TSC or CCC, are listed and briefly summarized at the end of this document. It should be noted that the literature review for this update was completed in 2017; however, the actual review of this document and subsequent update of the model did not occur until 2019.

15.2 Application of Mid-scale Species Habitat Parameters to New Vegetation Structure Classes

A new existing vegetation map was completed for the mid-scale in 2012 using imagery acquired from 2008 and field data collected from 2007 through 2011. The data represent conditions across the Forest through the fall of 2008. This map was updated for the Payette National Forest in 2016 and called the "Forest Derived Product." Forest Derived Products are Forest-level updates of the contractor provided maps that better facilitate Forest-level data needs. These can be added to or updated as emerging Forest-level needs arise. This included post-processing of polygon delineations to reduce the noise of many small polygons by aggregating these to produce polygons that more adequately represent a larger unit on the ground (i.e. "stands"), to meet the minimum map unit of 5 acres for most polygons, and to reduce the overall number of polygons for processing. Size class polygons were then reattributed utilizing the same imagery used by the original mapping product and newer imagery as it became available. The original

contractor mapping process generalized much of the size class polygons into the medium size class (10.0-19.9" DBH). The hand-edits of the size class attributes helped to spread the distribution of size classes into the seedling, sapling, small and large tree classes and more closely mirror Forest Inventory data. Secondly, the canopy cover map needed to be updated to incorporate changes due to recent fires. Rule sets utilizing post-fire vegetation condition were developed to adjust canopy cover changes where necessary, and reviewed with newer imagery. No changes were made to the dominance type map and all changes made to the size class and canopy cover class were made to nest into the correct corresponding dominance types in that map, so that the map integrity between the three layers was maintained. An update to the accuracy assessment was also completed for the Forest Derived Products.

Although there was no change to the Potential Vegetation Group (PVG), this new existing vegetation product created new categories for tree size class and canopy cover class. The final dominance type map units, size classes and canopy cover classes conform to the mid-level mapping standards referenced in the Existing Vegetation Classification and Mapping Technical Guide Version 1.0 (Brohman and Bryant, 2005). This existing vegetation map provides the Payette National Forest with a new baseline of current condition. However, the classification for the components of this vegetation map are different than the classifications used in previous vegetation mapping efforts used for the Payette National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service 2003a, Redmond et al. 1998). Therefore, crosswalks needed to be developed to translate the categories for size class and canopy cover classes used for the 2008 model in order to run the models on the new existing vegetation product. The following documentation explains how the parameters were cross-walked from the 2008 model into the 2019 model.

15.3 Parameter Review Discussion

The following parameter review discussion describes the vegetation parameters used to model source habitat when under historic range of variability (HRV) conditions.

15.3.1 PVG Discussion

No new information was found during the literature review on potential vegetation group (PVG) preferences for the pileated woodpecker. No change is recommended.

15.3.2 Tree Size Class Discussion

Tree Size Class (TSC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 15-1**.

Table 15-1 Tree Size Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer

2003 Forest Plan Appendix A	New Vegetation Layer (2011)	Changed or New Classification
Grass/Forb/Shrub/Seedling (GFSS) (<4.5' tall)	Seedling (<4.5' tall)	change in name only
Sapling (1.0 – 4.9" DBH)	Sapling (0.1 – 4.9" DBH)	
Small (5.0 – 12.0" DBH)	Small (5 – 9.9" DBH)	change
Medium (12.1 – 20" DBH)	Medium (10 – 19.9" DBH)	change

Large (>20.0” DBH)	Large (20 – 29.9” DBH)	change
	Very Large (≥ 30" DBH)	new

For modeling nesting, roosting, and forage habitat, nearly all literature sources support selecting the Large (20 – 29.9” DBH) and Very Large (>= 30" DBH) Tree Size classes (Bull and Holthausen 1993; Bull et al. 1992; Bull 1987; Bull et al. 1986; Wisdom et al. 2000; Hartwig et al. 2004). These studies overwhelmingly cite mean tree/snag DBH used for nesting, roosting, and foraging greater than or equal to 20 inches, and in some cases greater than 30 inches DBH.

There is also some support for use of the Medium Tree Size class (10-19.9” DBH) for modeling forage habitat. Bull and Holthausen (1993) in northeastern Oregon reported that over 70 percent of the average home range was made up of stands in the mature stage, while only 24 percent was comprised of stands in the old growth stage (*old growth defined as containing ≥12 trees/ha (5 trees/ac) that were* ≥51 cm DBH [**20 in**] in the grand fir type, or >8 trees/ha (3 trees/ac) ≥51 cm DBH in the ponderosa pine and Douglas-fir types; mature defined as stands with trees ≥30 cm DBH (**12 in**) but no trees ≥51 cm DBH (20 in) or did not have enough to qualify as old growth). Bull et al. (1986) also reported that 46 percent of trees used for foraging were greater than 20 inches DBH, implying that there was some percentage of trees used that were less than 20 inches. While both of these studies describe forage structure as either something less than 20 inches or within a matrix of trees less than 20 inches, neither quantify just how much smaller than 20 inches PIWOs were using, which makes it difficult to assess how important (or not) inclusion of the Medium tree size class would be. Because no references actually quantify forage habitat in stands dominated by trees less than 20 inches, and at the same time collectively report a preference for large trees and/or old growth or old forest stands for foraging (Bull and Holthausen 1993; Bull et al. 1992; Bull 1987; Bull et al. 1986; Wisdom et al. 2000), the inclination is to not include the Medium tree size class in this modeling update until more information is available, perhaps from a habitat assessment more local to the Boise National Forest. While this may under-estimate source habitat for the PIWO on the Boise National Forest, inclusion of the Medium size class could over- estimate source habitat by including stands down to the 10-inch DBH threshold. Therefore, it is recommended that only the Large and Very Large Tree size classes be used to model PIWO habitat.

Table 15-2 shows the crosswalk between Tree Size class parameters found in the literature and the new recommended Tree Size class breakouts, and lists the references that supported the rationale for the final selection of habitat parameters.

It is recommended that Large (20-29.9” DBH) and Very Large (>30” DBH) Tree Size classes be used to model source habitat for the pileated woodpecker, both for within and outside the Historical Range of Variation (HRV).

Table 15-2 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Size Class Parameter

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Bull, Evelyn L. and Jerome A. Jackson. (2011). Pileated Woodpecker (*Dryocopus pileatus*), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/pilwoo DOI: 10.2173/bna.148 Accessed March 1, 2017.	Following is a summary of relevant tree size information from The Birds of North America online: Nesting: Of 105 nest trees in northeastern Oregon, had strong selection for nest trees 54 cm (21 in) dbh; about half the nest trees had broken tops. Nest sites had taller canopies, higher stem density of live trees < 50 and ≥50 cm (20 in) dbh, higher density of snags <50 cm and ≥50 cm dbh than random plots; grand fir forest types were preferred (Bull 1987). Forage: Prefers logs ≥38 cm (15 in) in diameter and extensively decayed. Carpenter ants, the primary prey of this woodpecker in northeast Oregon, select western larch logs >25 cm (10 in) in diameter in a moderate stage of decay (Torgersen and Bull 1995.), so woodpecker preference of material probably reflects prey's preference for habitat. In closed canopy forests in western Washington favored foraging areas with high densities of large snags [> 52 cm (20 in) dbh and > 7.5 m tall; Raley and Aubry 2006]. Roosting Roost trees in northeast Oregon typically were in old-growth stands of grand fir that had old growth structural stages (Bull et al. 1992b).	Medium (10-19.9” DBH) Large (20-29.9” DBH) Very Large (>30” DBH)
Bull, Evelyn L. and Richard S. Holthausen. 1993. Habitat use and management of pileated woodpeckers in northeastern Oregon. Journal of Wildlife Mgmt. 57(2): 335 -345. (NE Oregon)	Stands with **old-growth** were used more than expected. The **mature** successional stage comprised the majority of the home range, regardless of home range size (for all pairs: 70 percent mature stage; 24 percent old growth stage; 6 percent young stage). [Old growth stands contained ≥12 trees/ha that were ≥51 cm DBH [**20 in**] in the grand fir type, or >8 trees/ha ≥51 cm DBH in the ponderosa pine and Douglas-fir types.]	Medium (10-19.9” DBH) Large (20-29.9” DBH) Very Large (>30” DBH)
	[Stands with trees ≥30 cm DBH (**12 in**) but no trees ≥51 cm DBH (20 in) or did not have enough to qualify as old growth were considered mature.] (Foraging) Extrapolating from Table 2, page 343: 92% of snags used for foraging were ≥25 cm DBH (10 in), 66% of snags used for foraging were ≥ 38 cm DBH (**15 in**), and 36% were ≥ 51	

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
	cm DBH (**20 in**). Only 41% of available snags were ≥ 25 cm DBH, 14% were ≥ 38 cm DBH (15 in), and 5% were ≥ 51 cm DBH, showing a selection for larger snags. (n = 1,030)	
Bull, Evelyn L., Richard S. Holthausen, and Mark G. Henjum. 1992. Roost trees used by pileated woodpeckers in northeastern Oregon. Journal of Wildlife Mgmt. 56(4):786-793. (NE Oregon)	(Nesting) Average DBH of 36 nest trees was 80.0 cm (SE = 0.8) [**31.4 in**]. (Roosting) Average DBH of roost trees was 71 cm [**28 in**]. Seventy-two percent of roost trees were in old-growth stands (Old Growth defined as containing ≥10 trees/ha ≥51 cm DBH [**20 in**] in the grand fir type, or >8 trees/ha ≥51 cm DBH in the ponderosa pine and Douglas-fir types)	Large (20-29.9" DBH) Very Large (>30" DBH)
Bull, Evelyn L. 1987. Ecology of the pileated woodpecker in northeastern Oregon. Journal of Wildlife Mgmt. 51(2): 472-481. (NE Oregon)	(Nesting) The DBH of 105 nest trees averaged 84 cm [**33 in**]. (Foraging) The use of large diameter trees was most pronounced, with **74 percent** of the foraging in trees >50-cm (**20 in**) DBH, 12 percent in trees 25-50-cm (10-20 in) DBH and 14 percent in trees<25 cm (10 in).	Medium (10-19.9" DBH) Large (20-29.9" DBH) Very Large (>30" DBH)
Bull, Evelyn L., S.R. Peterson, and J.W. Thomas. 1986. Resource partitioning among woodpeckers in northeastern Oregon. PNW-444 Research Note. 19 pp. (NE Oregon)	Selected the largest dead trees available to nest in (n = 62, greater than 50 percent of nests were in trees with a DBH of 50-74 cm (**20-29 in**) and the remaining 40+ percent were greater than 75 cm (**29 in**) DBH). Live trees used as foraging sites were significantly different from available live trees in DBH (and height). **Large trees** were preferred; 46 percent of the trees used for feeding were greater than 50 cm (**20 in**) DBH. **Seventy-five percent** of feeding sites were characterized by greater than 50 cm (**20 in**) DBH.	Medium (10-19.9" DBH) Large (20-29.9" DBH) Very Large (>30" DBH)
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendell.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad- scale Trends and Management Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW- GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol. (Quigley, Thomas M., tech. ed.: Interior Columbia Basin	Source habitats are old-forest single and multi-strata stages of grand-fir/white-fir, interior Douglas-fir, and western larch; and the old forest multi-strata stage of Engelmann spruce – subalpine fir. Depends on snags for nesting and roosting. Uses large (>53 cm [**21 in**] DBH) hollow, live or dead trees for roosting. Special habitat features include >53 cm DBH (**21 in**) large snags or hollow live trees for nesting, roosting, or both, and large standing dead and downed trees for foraging. Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	Large (20-29.9" DBH) Very Large (>30" DBH)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Ecosystem Management Project: scientific assessment).		
Hartwig, C. L., D. S. Eastman, and A. S. Harestad. 2004. Characteristics of pileated woodpecker (Dryocopus pileatus) cavity trees and their patches on southeastern Vancouver Island, British Columbia, Canada. Forest Ecology and Management. 187: 225-234.	Nest trees had a mean DBH of 82 cm (**32 in**) (±16 S.E.). The mean diameter of nest trees used by pileated woodpeckers in North America ranges from 40 to 100 cm [**16-39 in**] and varies with location, tree species, and forest characteristics, such as the availability of large dead trees. Although this broad range of diameters indicates flexibility in nest tree selection, in all published studies, pileated woodpeckers select the larger trees of those available, thus revealing consistent preferences for large diameter trees for nesting. Habitat patches that are more likely to provide suitable nesting habitat for pileated woodpeckers have greater densities of large snags or defective trees, are in mature structural stages and mature climax successional stages.	Medium (10-19.9" DBH) Large (20-29.9" DBH) Very Large (>30" DBH)

DBH = diameter at breast height

15.3.3 Tree Canopy Cover Discussion

Tree Canopy Cover (TCC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 15-3**.

Table 15-3 Canopy Cover Class Differences Between the 2003 Forest Plan Appendix A and New Vegetation Layer (Tree Canopy Cover Only)

Tree Canopy Cover Class		
2003 Forest Plan Appendix A	**New Vegetation Layer (2011)**	**Changed or New Classification?**
10 – 39% Low	10 – 19% (Low Tree Canopy)	change
	20 – 29% (Low-Medium Tree Canopy)	change
	30 – 44% (Medium Tree Canopy)	change
40 – 69% Moderate	45 – 59% (Medium-High Tree Canopy)	change
>70% High	60% (High Tree Canopy)	change

A review of the literature shows the PIWO is strongly associated with high canopy closures in nest stands (Bull and Holthausen 1993; Bull et al. 1992; Bull 1987; Bull et al. 2007). Studies that specifically looked at roosting habitat also reported a strong association with high canopy covers (Bull et al. 1992; Bull 1987). These characterizations for nesting and roosting habitat fit well under the Medium-High and High canopy cover classes.

While there was little quantitative information on forage habitat parameters, there were studies that looked at PIWO habitat use at the scale of the home range, which would include forage habitat. Bull and Holthausen (1993) assessed canopy cover associations in three categories: <10 percent; 10-59 percent, ≥60 percent. They found that the highest canopy cover class comprised most of the home range (51 percent) for all PIWO pairs in their study with home ranges less than 500 ha (1,235 acres), and the 10-59 percent range was the next most prevalent class. The 10-59 percent class crosses four of the five new canopy cover classes and is not all that useful in describing relevant canopy cover by itself. However, the Low, Low-Medium, and Medium classes can likely be eliminated because these classes would not tend to provide the combinations of dense stand conditions and large live and dead trees, large downed logs, and high canopy cover habitat components described in the literature as important for PIWOs.

Where quantitative parameters were not available, PIWO habitat was generally described as occurring in old growth, mature, closed canopy, old forest single and multi-strata stands (Bull and Holthausen 1993; Bull et al. 1992; Bull 1987; Bull et al. 2007; Wisdom et al. 2000; Bull et al. 1986; Groves et al. 1997). These characterizations are commonly associated with the high canopy covers and large tree/snag components that are positively associated with PIWO habitat and further supports use of the Medium-High and High canopy cover classes for the PIWO mid-scale model.

To assess source habitat, modeling would best approximate the findings of the literature by selecting for forested stands in the Medium-High (45-59%) and High (>60%) Tree Canopy Cover classes for preferred PVGs within their historic range of variability (HRV).

Table 15-4 shows the crosswalk between parameters (or qualitative descriptions) found in the literature and the new tree canopy cover class breakouts, and lists the references that supported the rationale for the final selection of habitat parameters.

Selecting forested stands in the Medium-High (45-59%) and High (>60%) Canopy Cover classes is recommended for modeling pileated woodpecker source habitat.

Table 15-4 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Canopy Cover Class Parameters

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Bull, Evelyn L. and Jerome A. Jackson. (2011). Pileated Woodpecker (Dryocopus pileatus), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/pilwoo DOI: 10.2173/bna.148 Accessed March 1, 2017.	Following is a summary of relevant canopy cover information from The Birds of North America online: Roosting Roost trees in northeast Oregon typically were in old-growth stands of grand fir that had experienced little or no logging and had >60% canopy closures; canopies may be less dense where insect outbreaks caused extensive tree mortality (Bull et al. 2007). Grand fir forest types, old growth structural stages, unlogged or high-graded stands, and denser canopy closures were favored when compared to available habitat (Bull et al. 1992b).	High (≥ 60%)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Bull, Evelyn L. and Richard S. Holthausen. 1993. Habitat use and management of pileated woodpeckers in northeastern Oregon. Journal of Wildlife Mgmt. 57(2): 335 -345. (Northeastern Oregon)	Stands with old-growth, grand-fir, no logging, and **>60 percent crown closure** were used more than expected. (Home Range) Canopy closure was divided into three classes (<10 percent; 10-59 percent, ≥60 percent), the highest crown closure class comprised most of the home range for all pairs (51 percent) and for home ranges less than 500 ha. Home ranges greater than 500 ha showed a higher percentage of area in the 10-59 percent crown closure class. The 10-59 percent canopy closure class made up the second highest proportion of the home ranges for all pairs (41 percent). Stands with less than 10 percent canopy closure were less than 8 percent of the home range.	Medium (30-44%) Medium-High (45-59%) High (≥ 60%)
Bull, Evelyn L., Richard S. Holthausen, and Mark G. Henjum.1992. Roost trees used by pileated woodpeckers in northeastern Oregon. Journal of Wildlife Mgmt. 56(4):786-793. (Northeastern Oregon)	(Roosting) Majority of roosts occurred in old-growth stands of grand-fir, with **≥60 percent** crown closure. Roost trees were surrounded by old-growth stands of grand fir. Seventy-two percent in old-growth stands, 73 percent in stands with canopy closures **≥60 percent.** Mean canopy closures at roosts were **62.5 percent** (SE = 0.32).	Medium-High (45-59%) High (≥ 60%)
	Successional stage and canopy closure of nesting habitat parameters were similar to roost sites.	
Bull, Evelyn L. 1987. Ecology of the pileated woodpecker in northeastern Oregon. Journal of Wildlife Mgmt. 51(2): 472-481. (Northeastern Oregon)	Mean nest tree canopy closure was **70 percent** (SD = 23.5) and for roost trees was **66 percent** (SD=26.3). Two-thirds of nest sites were in the grand fir type. Fifty-four percent of the nest sites were in mature stands, 21 percent in old growth stands, and 24 percent in young stands with a few large, live and dead trees.	High (≥ 60%)
Bull, E. L., N. Nielsen-Pincus, B. C. Wales, J. L. Hayes. 2007. The influence of disturbance events on pileated woodpeckers in northeastern Oregon. Forest Ecology and Management. 243: 320-329 (northeastern Oregon)	Closed canopy forests were not essential for use by pileated woodpeckers, although nest success was higher in home ranges that had greater amounts of forested habitat with ≥60% canopy closure. Canopies may be less dense where insect outbreaks caused extensive tree mortality.	Medium-High (45-59%) High (≥ 60%)
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendell.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of	Source habitats are old-forest single and multi-strata stages of grand-fir/white-fir, interior Douglas-fir, and western larch; and the old forest multi-strata stage of Engelmann spruce – subalpine fir.	N/A

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Focus in the Interior Columbia Basin: Broad-scale Trends and Management Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW-GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol. (Quigley, Thomas M., tech. ed.: Interior Columbia Basin Ecosystem Management Project: scientific assessment).	Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	
Bull, Evelyn L., S.R. Peterson, and J.W. Thomas. 1986. Resource partitioning among woodpeckers in northeastern Oregon. PNW-444 Research Note. 19 pp. (Northeastern Oregon)	In general, stands are multi-layered with numerous patches of young, even-aged trees and a few large, overmature trees.	N/A
Groves, C.R., B. Butterfield, A. Lippincott, B. Csuti, and J.M. Scott. 1997. Atlas of Idaho's Wildlife:	Found in dense, coniferous and mixed forests, open woodlands, second growth and, locally, parks and wooded residential areas of towns. Preliminary results of	N/A
Integrating Gap Analysis and Natural Heritage Information. Idaho Dept. Fish and Game, Nongame Wildlife Program. Boise, Idaho.	Montana-Idaho study of old-growth and rotation-aged Douglas-fir found pileated woodpeckers are old-growth associates.	

15.4 Source Habitat Conditions When Outside HRV Discussion

Pileated woodpeckers can utilize some forested conditions that are not within the historical range of variability under PVGs 2, 3, 5, and 6. These conditions generally consist of higher tree densities and more complex vegetative structure than what would have developed when stands in these PVGs were experiencing historical disturbance processes. These dense conditions would also make stands more susceptible to insect infestations which are important to this species. For PVGs 2 and 5, when functioning outside HRV, the Medium-High and High canopy cover class should be included when in the Large and Very Large tree size classes. For PVGs 3 and 6, when functioning outside HRV, the High canopy cover class should be included when in the Large and Very Large tree size classes.

15.5 Additional Modeling Parameters

This species is documented in the literature as being associated with large diameter (>21 inches DBH) snags or hollow trees for nesting, roosting, or both; and large standing dead and downed trees for foraging. The model cannot take these parameters into account and therefore may overestimate the amount of suitable habitat for this species

15.6 Updated Forest Modeling Parameters for Pileated Woodpecker Source Habitat

The updated mid-scale habitat parameters for the Pileated Woodpecker are as follows:

Within HRV

PVGs: 3, 6, 8, and 9

Tree Size Class: Large and Very Large

Canopy Cover Class: PVGs 3 and 6 = Medium-High

PVGs 8 and 9 = Medium-High and High

Outside HRV

PVGs: 2, 3, 5, and 6

Tree Size Class: Large and Very Large Canopy Cover Class: PVGs 3 and 6 = High

PVGs 2 and 5 = Medium-High and High

Note: This species is documented in the literature as being associated with large diameter (>21 inches DBH) snags or hollow trees for nesting, roosting, or both; and large standing dead and downed trees for foraging. The model cannot take these parameters into account and therefore may overestimate the amount of suitable habitat for this species.

15.7 New Literature Sources Reviewed for this Update

Below is a list of all new literature reviewed for this 2019 Pileated Woodpecker Mid-scale Modeling Update, including those references that did not provide relevant habitat information regarding tree size class or canopy cover class parameters. This list was compiled to both inform the next literature review and/or model update of what references were reviewed and to document the entire 2016/2017 literature review process.

The literature search found only two references dated more recent than 2009 and that would not have been available for the last update of the model, and that was habitat focused. A summary of relevant habitat information from *The Birds of North America* online account was also included because it was a good synthesis of all available habitat information for this species.

Reference – Bull, Evelyn L. and Jerome A. Jackson. (2011). Pileated Woodpecker (*Dryocopus pileatus*), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/pilwoo DOI: 10.2173/bna.148 Accessed March 1, 2017.

The following excerpts from the BNA online account are pertinent to this update:

Prefer late successional stages of coniferous or deciduous forest, but also younger forests that have scattered, large, dead trees.

In northeast Oregon, selected unlogged stands of old-growth (i.e., late successional) grand fir (*Abies grandis*) with closed canopies (Bull and Holthausen 1993). In western Oregon, densities were greater in forests >80 yr old than in younger ones (Nelson 1989d). Also in western Oregon, preferred forests >40 yr

old and riparian habitats for foraging, forest stands >70 yr old for nesting and roosting (Mellen et al. 1992).

15.7.1 Nesting

Nest trees are typically in dead or deteriorating live trees and within a mature or late- successional stand of coniferous (McClelland 1977, ELB), deciduous trees, or mixed trees. May be in relict dead trees in younger forests or even in cities (particularly in eastern U.S.; Bull 1974).

Of 105 nest trees in northeastern Oregon, had strong selection for nest trees > 54 cm dbh; about half the nest trees had broken tops. Nest sites had taller canopies, higher stem density of live trees < 50 and ≥50 cm dbh, higher density of snags <50 cm and ≥50 cm dbh than random plots; grand fir forest types were preferred (Bull 1987).

15.7.2 Forage

Prefers logs ≥38 cm in diameter and extensively decayed. Carpenter ants, the primary prey of this woodpecker in northeast Oregon, select western larch logs >25 cm in diameter in a moderate stage of decay (Torgersen and Bull 1995.), so woodpecker preference of material probably reflects prey's preference for habitat.

In closed canopy forests in western Washington favored foraging areas with high densities of large snags (> 52 cm dbh and > 7.5 m tall; Raley and Aubry 2006).

15.7.3 Roosting

Roost trees in northeast Oregon typically were in old-growth stands of grand fir that had experienced little or no logging and had >60% canopy closures; canopies may be less dense where insect outbreaks caused extensive tree mortality (Bull et al. 2007). Grand fir forest types, old growth structural stages, unlogged or high-graded stands, and denser canopy closures were favored when compared to available habitat (Bull et al. 1992).

Reference - Drever, M.C. and K. Martin. 2010. Response of woodpeckers to changes in forest health and harvest: Implications for conservation of avian biodiversity. Forest Ecology and Management. 259 (210) 958-966.

This was a study that looked at correlations between species richness in forest woodpeckers and species richness of all other forest birds, theorizing that management practices that maintained or improved species richness for one group would also improve it for the other. The variables they looked at were primarily tree species and beetle-killed pine, along with harvest. These variables were fairly broad scale and the study didn't offer any nesting or forage-specific vegetation parameters that could be used for this modeling update.

Reference – Edworthy, A. B., M. C. Drever, and K. Martin. 2011. Woodpeckers increase in abundance but maintain fecundity in response to an outbreak of mountain pine beetles. Forest Ecology and Management. 261: 203-210

This study looked at whether increased food availability, in this case after a mountain pine beetle outbreak, led to a response in fecundity for six species of woodpeckers, including PIWO. Results showed that there was an increase in population densities but not in clutch size or fledgling rates. The study

measured some vegetative characteristics, mainly to assess beetle presence and impacts of the infestation on stands. No relevant tree size or canopy cover class parameters were described.

The following references were also used to inform this model update but were not referenced in the original 2008 model, even though they would have been available at the time.

Reference - Bull, E. L., N. Nielsen-Pincus, B. C. Wales, J. L. Hayes. 2007. The influence of disturbance events on pileated woodpeckers in northeastern Oregon. Forest Ecology and Management. 243: 320- 329.

This study compared the effects of natural and human-caused disturbances on density of nesting pairs, reproductive success, and home ranges using 30 years of data in two areas and 15 years of data in five other areas. The study found that nesting density was positively associated with the amount of habitat in late structural stages, and was negatively associated with both the area in regeneration harvests and ponderosa pine forest types. Nest success was positively associated with the amount of unharvested stands and closed canopy stands within a given home range, whereas the amount of harvested stands was negatively correlated with nest success. The study also found that while closed canopy forests were not essential for use, nest success was higher in those home ranges that had more forested habitat **≥60 percent** canopy closure.

Reference - Hartwig, C. L., D. S. Eastman, and A. S. Harestad. 2004. Characteristics of pileated woodpecker (*Dryocopus pileatus*) cavity trees and their patches on southeastern Vancouver Island, British Columbia, Canada. Forest Ecology and Management. 187: 225-234. This study occurred on Vancouver Island, BC, during 1996 and 1997. The study located cavity trees used by pileated woodpeckers and measured nest tree and some stand characteristics. Pileateds that had active nests and/or pileated cavities were found to be larger than trees without cavities. Seven nests were located. Three were in grand fir, two were in Douglas-fir, and two were in red alder. These nest trees had a mean diameter of 32 inches DBH and a mean height of 72 feet.

The study also described other North American pileated woodpecker studies collectively with the following summary:

"The mean diameter of nest trees used by pileated woodpeckers in North America ranges from 40 to 100 cm [**16-39 in**] and varies with location, tree species, and forest characteristics, such as the availability of large dead trees. Although this broad range of diameters indicates flexibility in nest tree

selection, in all published studies, pileated woodpeckers select the larger trees of those available, thus revealing consistent preferences for large diameter trees for nesting."

The study also noted that habitat patches that are more likely to provide suitable nesting habitat for pileated woodpeckers have greater densities of large snags or defective trees, are in mature structural stages and mature climax successional stages.

16.0 SILVER-HAIRED BAT

Mid-scale Modeling Update for the Silver-haired Bat
March 28, 2019 Payette National Forest
Joe Foust, District Wildlife Biologist, Cascade RD, BNF, on Detail to the PNF

The purpose of this document is to update the Silver-haired Bat Mid-scale Habitat Model developed for the Boise National Forest in 2008 (Nutt and Geier-Hayes 2008), which is being used as the base habitat model for the 2019 Payette National Forest Baseline Habitat Modeling Update. This mid-scale model was developed for use at the scale of the entire Forest but is useful for habitat patch and pattern information at the scale of the fifth hydrologic unit code. It has been eleven years since the original mid- scale species model for the Boise National Forest's modeling effort was created. In order to complete the 2019 Payette National Forest Baseline Habitat Modeling Update effort, there was a need to update three key components of the modeling process, including the new existing vegetation layer that had different canopy cover and tree size classes, the new 5th HUC boundaries, and the most up to date fire data. For the vegetation portion, in order to run the mid-scale habitat model with this new data a crosswalk that linked the old breakdown classes to the new breakdowns was needed, which is the focus of this document. This model update effort also offered an opportunity to review any new literature published since the original 2008 model was created and validate selected habitat parameters.

16.1 Review of New Species Literature since 2008

The Boise NF mid-scale habitat model for the Silver-haired Bat was created in 2005 and most recently revised in 2008 (Nutt and Geier-Hayes 2008). This literature review of published information between 2008 and 2017 was conducted to validate whether model parameters from 2008 are still consistent with the literature for this species. Any references that had relevant habitat information pertaining to tree size class (TSC) and tree canopy cover class (TCCC) were listed in the Crosswalk tables in the TSC and TCCC sections. All new literature reviewed for this 2019 Silver-haired Bat Mid-scale Model Update, including those references that did not provide relevant habitat information regarding TSC or TCCC, are listed and briefly summarized at the end of this document. It should be noted that the literature review for this update was completed in 2017; however, the actual review of this document and subsequent update of the model did not occur until 2019.

16.2 Application of Mid-scale Species Habitat Parameters to New Vegetation Structure Classes

A new existing vegetation map was completed for the mid-scale in 2012 using imagery acquired from 2008 and field data collected from 2007 through 2011. The data represent conditions across the Forest through the fall of 2008. This map was updated for the Payette National Forest in 2016 and called the "Forest Derived Product." Forest Derived Products are Forest-level updates of the contractor provided maps that better facilitate Forest-level data needs. These can be added to or updated as emerging Forest-level needs arise. This included post-processing of polygon delineations to reduce the noise of many small polygons by aggregating these to produce polygons that more adequately represent a larger unit on the ground (i.e., "stands"), to meet the minimum map unit of 5 acres for most polygons, and to reduce the overall number of polygons for processing. Size class polygons were then reattributed utilizing the same imagery used by the original mapping product and newer imagery as it became available. The original contractor mapping process generalized much of the size class polygons into the medium size class (10.0-19.9" DBH). The hand-edits of the size class attributes helped to spread the distribution of size classes into the seedling, sapling, small and large tree classes and more closely mirror Forest Inventory data. Secondly, the canopy cover map needed to be updated to incorporate changes due to recent fires. Rule sets utilizing post-fire vegetation condition were developed to adjust canopy cover changes where necessary, and reviewed with newer imagery. No changes were made to the dominance type map and all

changes made to the size class and canopy cover class were made to nest into the correct corresponding dominance types in that map, so that the map integrity between the three layers was maintained. An update to the accuracy assessment was also completed for the Forest Derived Products.

Although there was no change to the Potential Vegetation Group (PVG), this new existing vegetation product created new categories for tree size class and canopy cover class. The final dominance type map units, size classes and canopy cover classes conform to the mid-level mapping standards referenced in the Existing Vegetation Classification and Mapping Technical Guide Version 1.0 (Brohman and Bryant, 2005). This existing vegetation map provides the Payette National Forest with a new baseline of current condition. However, the classification for the components of this vegetation map are different than the classifications used in previous vegetation mapping efforts used for the Payette National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service 2003a, Redmond et al. 1998). Therefore, crosswalks needed to be developed to translate the categories for size class and canopy cover classes used for the 2008 model in order to run the models on the new existing vegetation product. The following documentation explains how the parameters were cross-walked from the 2008 model into the 2019 model.

16.3 Parameter Review Discussion

16.3.1 PVG Discussion

No new information was found during the literature review on potential vegetation group (PVG) preferences for the Silver-haired Bat. No change is recommended.

16.3.2 Tree Size Class Discussion

Tree Size Class classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 16-1**.

Table 16-1 Tree Size Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer

2003 Forest Plan Appendix A	New Vegetation Layer (2011)	Changed or New Classification?
Grass/Forb/Shrub/Seedling (GFSS) (<4.5’ tall)	Seedling (<4.5’ tall)	change in name only
Sapling (0.1 – 4.9 “ DBH)	Sapling (0.1 – 4.9” DBH)	
Small (5.0 – 12.0” DBH)	Small (5 – 9.9” DBH)	change
Medium (12.1 – 20” DBH)	Medium (10 – 19.9” DBH)	change
Large (>20.0” DBH)	Large (20 – 29.9” DBH)	change
	Very Large (≥ 30" DBH)	new

Studies by Hayes and Adam (1996) and Erickson and West (1996) found that silver-haired bats (SIHB) prefer foraging in open habitats, including recently harvested riparian areas. Erickson and West (1996) also reported that silver-haired bats foraged in clear cuts and pre-commercially thinned units but were absent from young, unthinned stands and mature forest. These openings within the larger forested

landscape would be represented by the Seedling Tree Size Class, which is the recommended tree size class for modeling foraging habitat.

Most studies that described roost tree characteristics noted that roost trees generally were the largest trees available in the stand (Mattson et al. 1996; Betts 1998; Vonhof 1996). The study by Campbell et al. (1996) reported on ranges of roost tree sizes by species;

- Grand fir – average of 21 inches DBH
- Western larch – range of 12-25 inches, average of 18.9 inches DBH
- Lodgepole pine – range of 8-12 inches, average of 10.2 inches DBH
- Ponderosa pine – range of 13-29 inches, average of 19.3 inches DBH
- Douglas fir – average of 14 inches DBH

The lower end of these size ranges falls within the Medium Tree size class, while the high end for grand fir, western larch, and ponderosa pine are within the Large Tree size class. In an Oregon study, Betts (1998) reported an average diameter of 23.5 inches for roost trees used by maternity colonies. Mattson et al. (1996) reported an average DBH of 15 inches for roost trees in a study in South Dakota. Because all reported mean diameters of roost trees from the literature ranged from 10.2 to 23.5 inches DBH, it is recommended that the Medium, Large, and Very Large tree size classes be used to model roost habitat for the silver-haired bat.

To model the full range of source habitat for this species, which consists of both forage and roosting habitat, it is recommended that the Seedling, Medium, Large, and Very Large Tree size classes be included in the model.

Table 16-2 shows the crosswalk between Tree Size class parameters found in the literature and the new recommended Tree Size classes, and lists the references that supported the rationale for the final selection of habitat parameters.

It is recommended that Seedling (<4.5’ tall), Medium (10-19.9” DBH), Large (20-29.9” DBH), and Very Large (> 30” DBH) Tree Size classes be used to model source habitat for the Silver-haired Bat.

Table 16-2 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Size Class Parameters

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Erickson, J.L.; West, S.D. 1996. Managed forests in the western Cascade: the effects of seral stage on	(Foraging) Silver-haired bats were found predominately in **clearcut areas** and a few were found in the **pre-commercial thin**	Seedling (<4.5’ tall) Sapling (0.1-4.9” DBH)
bat habitat use patterns. IN: Barclay, R.M.R.; Brigham, R.M. (editors). Bats and Forests Symposium, October 19- 21, 1995, Victoria, British Columbia, Canada. Res. Br., B.C. Min. For., Victoria, B.C. Work. Pap. 23/1996	areas. No silver-haired bats were found in the young, un-thinned or mature forest areas. Authors noted the lack of silver-haired bats in the mature forest. Stated that large trees and snags, “roost-type” trees were available, but conjectured that the conditions may not have been those needed for roosting. The paper did not	

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
	characterize average stand conditions for each of the managed forest types.	
Hayes, J.P.; Adam, M.D. 1996. The influence of logging riparian areas on habitat utilization by bats in western Oregon. IN: Barclay, R.M.R.; Brigham, R.M. (editors). Bats and Forests Symposium, October 19-21, 1995, Victoria, British Columbia, Canada. Res. Br., B.C. Min. For., Victoria, B.C. Work. Pap. 23/1996. (Oregon)	(Foraging) Study was conducted in logged and unlogged riparian areas. Silver-haired bats appeared to be more prevalent in the logged areas compared to the unlogged. The authors speculated that silver-haired bats are able to forage more effectively in the **open habitat** created by the harvesting than in the "cluttered" densely forested riparian as they are larger- bodied than the *Myotis* species that used the unlogged areas. ("Open" suggests seedling and/or sapling stages)	Seedling (<4.5' tall) Sapling (0.1-4.9" DBH)
Mattson, Todd A., Steven W. Buskirk, and Nancy L. Stanton. 1996. Roost sites of the silver-haired bat (*Lasionycteris noctivagans*) in the Black Hills, South Dakota. Great Basin Naturalist 56(3). 247-253 p. (South Dakota)	(Roosting) Located 39 roosts, 10 of which were maternity roosts containing 6-55 bats. 38 of 39 roosts (97%) were in PIPO snags averaging 39 cm ±1 SD [**15 inches** ±1 SD] DBH. One roost was in aspen. Roost plots had more **large trees** and a corresponding higher basal area than surrounding plots. Roost trees were larger than average in diameter.	Medium (10-19.9" DBH)
Campbell, L.A.; Hallett, J.G.; O'Connell, M.A. 1996. Conservation of bats in managed forests: use of roosts by *Lasionycteris noctivagans*. Journal of Mammalogy 77(4): 976-984	(Roosting) Monitored 15 roost trees. All but one were snags. The non-snag was a dying western red cedar. Sizes of roost trees: grand fir=21.3 inches western larch=range **12 to 25 inches**, average 18.9 inches lodgepole pine=range **8 to 12 inches**, average 10.2 inches ponderosa pine=range **13 to 29 inches**, average 19.3 inches Douglas-fir=**14 inches**	Medium (10-19.9" DBH) Large (20-29.9" DBH) Very Large (≥30" DBH)
Betts, B.J. 1998. Roosts used by maternity colonies of silver-haired bats in northeastern Oregon. Journal of Mammalogy 79(2): 643-650 (Oregon)	(Roosting) There were no significant differences in diameters of roost and available trees. Average diameter of roost trees was 59.8 cm (**23.5 inches**) and average diameter of available trees was 51.5 cm (20.2 inches).	Large (20-29.9" DBH) Very Large (≥30" DBH)
Christy, R.E.; West, S.D. 1993. Biology of bats in Douglas-fir forests. Gen. Tech. Rep. PNW-GTR-308. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 28 pages.	In Oregon, silver-haired bats were found to prefer Douglas-fir/western hemlock forests more than **200 years old** over other forest types and ages (Perkins and Cross 1988).	Large (20-29.9" DBH) Very Large (≥30" DBH)
Vonhof, M. 1996. Roost-site preferences of big brown bats (*Eptesicus fuscus*) and	(Roosting) Tree size was a primary discriminator of roost trees from available trees. The silver-	----

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
silver-haired bats (*Lasionycteris noctivagans*) in the Pend d'Oreille Valley in southern British Columbia. IN: Barclay, R.M.R.; Brigham, R.M. (editors). Bats and Forests Symposium, October 19-21, 1995, Victoria, British Columbia, Canada. Res. Br., B.C. Min. For., Victoria, B.C. Work. Pap. 23/1996 (British Columbia)	haired bat's roost trees tend to have greater diameters than available trees in the stand.	
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendell.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-scale Trends and Management Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW-GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol. (Quigley, Thomas M., tech. ed.: Interior Columbia Basin Ecosystem Management Project: scientific assessment).	Source habitat for resident silver-haired bats is in forested and woodland areas. Source habitat is generally late seral stages of subalpine, montane, lower montane, and riparian woodland community groups. Snags are also a special habitat feature for silver-haired bats. They roost in trees, snags, mines, caves, crevices, and buildings. Day roost trees are usually characterized as large (>53 cm [**21 inch**]) DBH, dead or live with some defect, with loose bark and cracks. Silver-haired bats were found roosting in live western larch and ponderosa pine, and grand fir and ponderosa pine snags in Oregon. The average diameter of these roost trees was 59.6 cm (**23.5 inches**). These roost trees were generally located on densely forested slopes. Source Habitat from Appendix 1, Volume 3, Table 1, pages 437-440	Large (20-29.9" DBH) Very Large (≥30" DBH)
	Cover types/structural stage: Interior Douglas-fir, Western Larch, Lodgepole pine, Grand fir-white fir, Interior Ponderosa pine/old multi-story and old single-story. Aspen, Cottonwood-willow/old multi- story. Note: this citation is a comprehensive summary of scientific literature and does notprovide data itself.	

DBH = diameter at breast height

16.3.3 Tree Canopy Cover Discussion

Tree Canopy Cover classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 16-3**.

Table 16-3 Tree Canopy Cover Class Differences Between the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer

Tree Canopy Cover Class		
2003 Forest Plan Appendix A	**New Vegetation Layer (2011)**	**Changed or New Classification?**
10 – 39% Low	10 – 19% (Low Tree Canopy)	change

Tree Canopy Cover Class		
2003 Forest Plan Appendix A	**New Vegetation Layer (2011)**	**Changed or New Classification?**
	20 – 29% (Low-Medium Tree Canopy)	change
	30 – 44% (Medium Tree Canopy)	change
40 – 69% Moderate	45 – 59% (Medium-High Tree Canopy)	change
>70% High	60% (High Tree Canopy)	change

Many references describe this species as a contrast species that requires a closed canopy forest that provides high snag densities for roosting structure but that also has small openings or edge habitat necessary for forage (Wisdom et al. 2000; Campbell et al. 1996; Bat Conservation International 2017). Erickson and West (1996) was the exception; they found that SIHBs used clear cut areas most of the time and did not use young, unthinned or mature forests, even though potential roost trees were available in the mature forest.

Forage habitat is generally described as being open, occurring in habitats such as natural openings, waterways or waterbodies, open riparian habitat, or in clear cuts or other harvested areas with reduced tree densities (Hayes and Adam 1996; Bat Conservation International 2017; Wisdom et al. 2000). These descriptions likely fall within the Low and Low-Medium Tree Canopy Cover classes where there would be minimal overstory that would allow for unimpeded foraging activity.

While the literature is in general agreement about forage habitat it is not very definitive in describing the canopy cover attributes of roosting habitat. Some studies reported that canopy cover immediately surrounding the roost tree was lower than random plots (Mattson et al. 1996; Campbell et al. 1996). However, very few reported actual canopy cover values. Other studies generally described roost habitat as occurring within “dense” or close-canopied forests. Campbell et al. (1996) reported roost tree vegetation plots as having less canopy cover than plots without roost trees, but also that roost trees were located in gaps in an otherwise close-canopied stand. Christy and West (1993) noted that SIHBs prefer Douglas fir/western hemlock forests more than 200 years in age more than other forest types and ages; stands 200 years or older could be described as having a closed canopy. Wisdom et al. (2000) generally described roost habitat as occurring on “densely forested slopes.” All of these references describe roost habitat as occurring within a dense or close-canopied forest, but do not quantify what exactly close-canopied or dense means.

From the above discussion potential roosting habitat could be characterized as occurring in small openings surrounded by an older forested component. This is consistent with Vonhof (1996) who described “older-aged” stands as being important for the SIHB because they provide a greater abundance of large snags with a variety of decay classes (Cline et al. 1980), and are characterized by reduced tree densities, more openings in the canopy, and less canopy “clutter” (Franklin et al. 1981). Older, decedent stands with these later successional qualities would likely fall within the Medium Tree Canopy Cover class. In addition, the only reference that reported actual canopy cover percentages was Betts (1998), who measured 0.1-acre plots centered on roost trees and reported a mean canopy cover of 41.5 percent, which falls within the Medium class. As a result, the Medium Tree Canopy Cover class is recommended for modeling source habitat for the SIHB. Higher density classes (greater than 44 percent) would not

generally contain the pockets of low canopy cover where large snags are used for roosting or openings that provide forage habitat. Lower classes (<30 percent) would not likely contain the high snag densities used for roost structure, although the Low and Low-Medium classes are also recommended in the model to represent forage habitat.

To assess source habitat, modeling would best approximate the findings of the literature by selecting for forested stands in the Low (10-19%), Low-Medium (20-29%), and Medium (30-44%) Tree Canopy Cover classes for preferred PVGs within their historic range of variability (HRV).

Table 16-4 shows the crosswalk between parameters (or qualitative descriptions) found in the literature and the new tree canopy cover class breakouts, and lists the references that supported the rationale for the final selection of habitat parameters.

Selecting forested stands in the Low (10-19%), Low-Medium (20-29%), and Medium (30-44%) Tree Canopy Cover classes is recommended for modeling Silver-haired Bat source habitat.

Table 16-4 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Canopy Cover Class Parameters

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TCCC Breakouts
Mattson, Todd A., Steven W. Buskirk, and Nancy L. Stanton. 1996. Roost sites of the silver-haired bat (*Lasionycteris noctivagans*) in the Black Hills,	(Roosting) Roost plots had more large trees and a corresponding higher basal area than surrounding plots.	(Too general to make a tree canopy cover class association)
South Dakota. Great Basin Naturalist 56(3). 247-253 p. (South Dakota)		
Christy, Robin E.; Stephen D. West. 1993. Biology of bats in Douglas-fir forests. Gen. Tech. Rep. PNW-GTR-308. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 28 p. (Huff, Mark H.; Holthausen, Richard M.; Aubry, Keith B., Tech. coords. Biology and management of old-growth forests).	(Roosting) In Oregon, it has been determined that silver-haired bats prefer Douglas fir/ western hemlock forests more than **200 years old** over other forest types and ages (Perkins and Cross 1988).	Medium (30-44%) Medium-High (45-59%) High (≥60%)
Campbell, L.A.; Hallett, J.G.; O'Connell, M.A. 1996. Conservation of bats in managed forests: use of roosts by *asionycteris noctivagans*. Journal of Mammalogy 77(4): 976-984. (northeastern Washington)	(Roosting) Plots containing roost trees had significantly less canopy cover, shorter understory, and less vegetative cover than plots without roost trees. Authors speculated that this is advantageous as it would allow for unimpeded flight, particularly for young. However, all but one of the roost sites were located in gaps in otherwise closed-canopy patches (typically >30 and <80 years old). The exception was a Douglas fir snag located in a clump of trees on the edge of a large, partial clear cut. Overall, plots with roosts exhibited significantly less canopy closure than random plots.	Low (10-19%) Low-Medium 20-29%) Medium (30-44%)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TCCC Breakouts
Betts, B.J. 1998. Roosts used by maternity colonies of silver- haired bats in northeastern Oregon. Journal of Mammalogy 79(2): 643-650. (northeastern Oregon)	(Roosting) In 0.1 acre plots centered on a roost mean tree canopy cover was **41.5%** ± 11.9 vs 45.3% ± 13.8 for available trees.	Medium (30-44%)
Erickson, J.L.; West, S.D. 1996. Managed forests in the western Cascade: the effects of seral stage on bat habitat use patterns. IN: Barclay, R.M.R.; Brigham, R.M. (editors). Bats and Forests Symposium, October 19-21, 1995, Victoria, British Columbia, Canada. Res. Br., B.C. Min. For., Victoria, B.C. Work. Pap. 23/1996	Measured bat activity in four types of managed forests: clearcut (2-3 years old), pre-commercial thin (12-20 years old), young-unthinned (30-40 years old), and mature (50-70 years old) Silver-haired bats were found predominately in clearcut areas and a few were found in the pre- commercial thin areas. No silver-haired bats were found in the young, unthinned or mature forest areas, even though potential roost trees were available in the mature forest.	Low (10-19%) Low-Medium (20-29%) Medium (30-44%)
Vonhof, M. 1996. Roost-site preferences of big brown bats (*Eptesicus fuscus*) and silver- haired bats (*Lasionycteris noctivagans*) in the Pend d'Oreille Valley in southern British Columbia. IN: Barclay, R.M.R.; Brigham, R.M. (editors). Bats and Forests Symposium, October 19-21, 1995, Victoria, British Columbia, Canada. Res. Br., B.C. Min. For., Victoria, B.C. Work. Pap. 23/1996	Forest harvesting practices that result in relatively large cutblocks separated by small strips of forest removes large portions of the available roosting habitat, and because older-aged stands are most often targeted in forest-harvesting operations, the remaining forested areas are often deficient of suitable roosting habitat. Older-aged stands contain a greater abundance of large snags in a variety of decay classes (Cline et al. 1980) and are characterized by reduced tree densities, more canopy gaps, and less clutter (Franklin et al. 1981). Thomas (1988) found that bat activity was high in old-aged forest stands in Oregon for the first fifteen minutes after sunset, and suggested that bats use older stands for roosting. However, similar conditions to older-aged stands may be provided in second-growth stands in which large trees were retained, and bats in this study roosted equally often in large trees in older-aged stands or in remnant trees in second-growth stands.	Medium (30-44%)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TCCC Breakouts
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee, Danny C.; Hann, Wendell.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-scale Trends and Management Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW-GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol. (Quigley, Thomas M., tech. ed.: Interior Columbia Basin Ecosystem Management Project: scientific assessment).	Silver-haired bats use contrasting forested areas for roosting and open areas for foraging. Roost trees were generally located on **densely forested** slopes.	Low (10-19%) Low-Medium (20-29%) Medium (30-44%) Medium-High (45-59%)
Hayes, J.P.; Adam, M.D. 1996. The influence of logging riparian areas on habitat utilization by bats in western Oregon. IN: Barclay, R.M.R.; Brigham, R.M. (editors). Bats and Forests Symposium, October 19-21, 1995, Victoria, British Columbia, Canada. Res. Br., B.C. Min. For., Victoria, B.C. Work. Pap. 23/1996. (British Columbia)	Study was conducted in logged and unlogged riparian areas. Silver-haired bats appeared to be more prevalent in the logged areas compared to the unlogged. The authors speculated that silver-haired bats are able to forage more effectively in the **open habitat** created by the harvesting than in the "cluttered" densely forested riparian as they are larger-bodied than the *Myotis* species that used the unlogged areas.	Low (10-19%) Low-Medium (20-29%) Medium (30-44%)
Bat Conservation International Website Species Profile for *Lasionycteris noctivagans* Accessed 5/5/2017	Most closely associated with coniferous or mixed coniferous and deciduous forest types, especially in areas of Old Growth. It is estimated that these bats require snag densities of at least 21 per hectare. Even though they are highly dependent upon Old Growth forest areas for roosts, silver-haired bats feed predominantly in disturbed areas, sometimes at tree-top level, but often in small clearings and along roadways or water courses.	(Too general to make a tree canopy cover class association)

16.4 Source Habitat Conditions When Outside HRV Discussion

None.

16.5 Additional Modeling Parameters

None.

16.6 Model Limitations

This species is documented in the literature as being a contrast species, requiring the juxtaposition of habitats used for foraging and roosting. They also require large, tall snags with natural or cavities excavated by primary cavity nesters for maternity roosts and access to open water for drinking. The model cannot take this need for juxtaposed habitats, snags, or distance to open water into account and therefore will overestimate the amount of suitable habitat for this species.

16.7 Updated Forest Modeling Parameters for Silver-haired Bat Source Habitat

The updated mid-scale habitat parameters for the Silver-haired Bat are as follows:

Within HRV

PVGs: 1, 2, 3, 4, 5, 6, and 7

Climax Aspen is also source habitat for silver-haired bats.

Tree Size Class: Seedling, Medium, Large, and Very Large Tree Canopy Cover Class: Low, Low-Medium, and Medium

Model Limitations: This species is documented in the literature as being a contrast species, requiring the juxtaposition of habitats used for foraging and roosting. They also require large, tall snags with natural or cavities excavated by primary cavity nesters for maternity roosts and access to open water for drinking. The model cannot take this need for juxtaposed habitats, snags, or distance to open water into account and therefore will overestimate the amount of suitable habitat for this species.

Source habitat is defined by those characteristics of macro-vegetation that contribute to stationary or positive population growth.

16.8 New Literature Sources Reviewed for this Update

Below is a list of all new literature reviewed for this 2019 Silver-haired Bat Mid-scale Modeling Update, including those references that did not provide relevant habitat information regarding tree size class or tree canopy cover class parameters. This list was compiled to both inform the next literature review and/or model update of what references were reviewed and to document the entire 2016/2017 literature review process.

The literature search resulted in a limited number of new (2008 and newer) references that looked at habitat preferences in the western United States.

Reference – Jantzen, M.K., and M.B. Fenton. 2013. The depth of edge influence among insectivorous bats at forest-field interfaces. Can. J. Zool. 91: 287-292.

Study in Ontario, Canada, that looked at how variations in wing morphology and echolocation call characteristics affects the type of habitat used for foraging activities for 5 bat species, including silver-haired bat. While this study looked at three broad habitat types, open, cluttered, and edge, it didn't look specifically at tree size or canopy cover parameters that would help inform this model update.

Reference – Lacki, M.J., J.S. Johnson, L.E. Dodd, M.D. Baker. 2007. Prey consumption of insectivorous bats in coniferous forests of north-central Idaho. Northwest Science, 81(3):199-205.

Study looked at insect prey consumed by 5 species of bat (including silver-haired) that inhabited actively managed forests near Elk River, Idaho. Found that these species consumed a variety of prey species but that Lepidoptera (moths) was relied upon by four of the five bats species, suggesting competition between species. Could not, however, determine whether inter-specific partitioning of food resources was occurring. Study did not offer any information on habitat parameters for foraging.

Reference – Reimer, J.P., E.F. Baerwald, R.M. Barclay. 2010. Diet of hoary (*Lasiurus cinereus*) and silver- haired (*Lasionycteris noctivagans*) bats while migrating through southwestern Alberta in late summer and autumn. A. Midl. Nat. 164:230-237.

Once again, this study only reported on diet of these bats species and didn't include any discussion of a forage habitat component. Not useful for this mid-scale model update.

Reference - C.C. Voigt and T. Kingston (eds.), *Bats in the Anthropocene: Conservation of Bats in a Changing World*, DOI 10.1007/978-3-319-25220-9

This reference is a comprehensive report on bats at a world view. It did have one chapter that spoke to habitat requirements of bats and how silviculture/timber production may be impacting bats, but did not include specific habitat parameter discussions for the silver-haired bat that would be useful for this model update. A very nice publication none-the-less.

Reference – Vonhof, M.J., and B.J. Betts. 2010. Nocturnal activity patters of lactating silver-haired bats (*Lasionycteris noctivagans*): the influence of roost-switching behavior. Acta Chiropterologica. 12(2):283-291.

This study tracked lactating females from roost to roost and assessed how those movements may impact foraging activity for those females. This was more of a behavioral study and didn't describe roost habitat like I thought it might.

Reference - Bat Conservation International Website Species Profile for *Lasionycteris noctivagans*

Accessed 5/5/2017

I accessed the species profile for silver-haired bat on the Bat Conservation International website to see what information this group may have. There wasn't much that spoke to actual habitat parameters that would be useful to this update, although it did have snag density numbers and some general information about forest types and preferred forage habitat.

Most closely associated with coniferous or mixed coniferous and deciduous forest types, especially in areas of Old Growth. It is estimated that these bats require snag densities of at least 21 per hectare. Even though they are highly dependent upon Old Growth forest areas for roosts, silver-haired bats feed predominantly in disturbed areas, sometimes at tree-top level, but often in small clearings and along roadways or water courses.

17.0 AMERICAN THREE-TOED WOODPECKER

Mid-scale Modeling Update for the American Three-toed Woodpecker
March 26, 2019 Payette National Forest
Joe Foust, District Wildlife Biologist, Cascade RD, BNF, on Detail to the PNF

The purpose of this document is to update the Three-toed Woodpecker Mid-scale Habitat Model developed for the Boise National Forest in 2008 (Nutt et al. 2008), which is being used as the base habitat model for the 2019 Payette National Forest Baseline Habitat Modeling Update. This mid-scale model was developed for use at the scale of the entire Forest but is useful for habitat patch and pattern information at the scale of the fifth hydrologic unit code. It has been eleven years since the original mid- scale species model for the Boise National Forest's modeling effort was created. In order to complete the 2019 Payette National Forest Baseline Habitat Modeling Update effort, there was a need to update three key components of the modeling process, including the new existing vegetation layer that had different canopy cover and tree size classes, the new 5th HUC boundaries, and the most up to date fire data. For the vegetation portion, in order to run the mid-scale habitat model with this new data a crosswalk that linked the old breakdown classes to the new breakdowns was needed, which is the focus of this document. This model update effort also offered an opportunity to review any new literature published since the original 2008 model was created and validate selected habitat parameters.

17.1 Review of New Species Literature since 2008

The BNF mid-scale habitat model for the Three-toed Woodpecker (TTWO) was created in 2005 and most recently revised in 2008 (Nutt et al. 2008). This literature review of published information between 2008 and 2017 was conducted to validate whether model parameters from 2008 are still consistent with the literature for this species. Any references that had relevant habitat information pertaining to tree size class (TSC) and tree canopy cover class (TCCC) were listed in the Crosswalk tables in the TSC and TCCC sections. All new literature reviewed for this 2019 American Three-toed Woodpecker Mid-scale Model Update, including those references that did not provide relevant habitat information regarding TSC or TCCC, are listed and briefly summarized at the end of this document. It should be noted that the literature review for this update was completed in 2017; however, the actual review of this document and subsequent update of the model did not occur until 2019.

17.2 Application of Mid-scale Species Habitat Parameters to New Vegetation Structure Classes

A new existing vegetation map was completed for the mid-scale in 2012 using imagery acquired from 2008 and field data collected from 2007 through 2011. The data represent conditions across the Forest through the fall of 2008. This map was updated for the Payette National Forest in 2016 and called the "Forest Derived Product." Forest Derived Products are Forest-level updates of the contractor provided maps that better facilitate Forest-level data needs. These can be added to or updated as emerging Forest-level needs arise. This included post-processing of polygon delineations to reduce the noise of many small polygons by aggregating these to produce polygons that more adequately represent a larger unit on the ground (i.e., "stands"), to meet the minimum map unit of 5 acres for most polygons, and to reduce the overall number of polygons for processing. Size class polygons were then reattributed utilizing the same imagery used by the original mapping product and newer imagery as it became available. The original

contractor mapping process generalized much of the size class polygons into the medium size class (10.0-19.9" DBH). The hand-edits of the size class attributes helped to spread the distribution of size classes into the seedling, sapling, small and large tree classes and more closely mirror Forest Inventory data. Secondly, the canopy cover map needed to be updated to incorporate changes due to recent fires. Rule sets utilizing post-fire vegetation condition were developed to adjust canopy cover changes where necessary, and reviewed with newer imagery. No changes were made to the dominance type map and all changes made to the size class and canopy cover class were made to nest into the correct corresponding dominance types in that map, so that the map integrity between the three layers was maintained. An update to the accuracy assessment was also completed for the Forest Derived Products.

Although there was no change to the Potential Vegetation Group (PVG), this new existing vegetation product created new categories for tree size class and canopy cover class. The final dominance type map units, size classes and canopy cover classes conform to the mid-level mapping standards referenced in the Existing Vegetation Classification and Mapping Technical Guide Version 1.0 (Brohman and Bryant 2005). This existing vegetation map provides the Payette National Forest with a new baseline of current condition. However, the classification for the components of this vegetation map are different than the classifications used in previous vegetation mapping efforts used for the Payette National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service 2003a; Redmond et al. 1998). Therefore, crosswalks needed to be developed to translate the categories for size class and canopy cover classes used for the 2008 model in order to run the models on the new existing vegetation product. The following documentation explains how the parameters were cross-walked from the 2008 model into the 2019 model.

17.3 Parameter Review Discussion

The following parameter review discussion describes the vegetation parameters used to model source habitat when under historic range of variability (HRV) conditions.

17.3.1 PVG Discussion

No new information was found during the literature review on potential vegetation group (PVG) preferences for the three-toed woodpecker. No change is recommended.

17.3.2 Tree Size Class Discussion

Tree Size Class classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 17-1**.

Table 17-1 Tree Size Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer

2003 Forest Plan Appendix A	New Vegetation Layer (2011)	Changed or New Classification?
Grass/Forb/Shrub/Seedling (GFSS) (<4.5' tall)	Seedling (<4.5' tall)	change in name only
Sapling (0.1 – 4.9" DBH)	Sapling (0.1 – 4.9" DBH)	
Small (5.0 – 12.0" DBH)	Small (5 – 9.9" DBH)	change
Medium (12.1 – 20" DBH)	Medium (10 – 19.9" DBH)	change

2003 Forest Plan Appendix A	New Vegetation Layer (2011)	Changed or New Classification?
Large (>20.0" DBH)	Large (20 – 29.9" DBH)	change
	Very Large (> 30" DBH)	new

Although lacking local references, the literature describes nesting habitat to be within the lower half of the Medium (10-19.9" DBH) tree size class and the very upper edge of the Small (5-9.9" DBH) tree size class. The mean DBH of nest trees was reported to be 11 inches by Goggans et al. (1989) in central Oregon, 12.4 inches by Lester (1980) in northwestern Montana, and 10 inches by Steeger and Dulisse (1997) in British Columbia. Goggans et al. (1989) also found that the stand surrounding the nest tree averaged 8 inches DBH.

The mean DBH of foraging trees was found to be 15.5 inches by Goggans et al. (1989), 9 inches by Steeger and Dulisse (1997), and 9.4 inches by Bull et al. (1986). Murphy and Lehnhausen reported that in fire-damaged spruce forest in Alaska TTWO males foraged on trees that averaged 16.5 inches DBH while females used trees averaging 13.6 inches DBH. Only one reference, Goggans et al. (1989), looked at roosting habitat, reporting that TTWOs roosted trees with a mean DBH of 12 inches and within stands that averaged 9 inches DBH.

Most of the above references indicate that TTWOs utilize nesting, forage, and roosting structure firmly within the Medium tree size class, although at the lower half of the classes' range. The new Medium Tree Size Class goes down to 10 inches DBH, two inches smaller than what the lower threshold for the Medium Classification was for the 2010 Forest Plan Amendment (12 inches DBH). This is perhaps a better fit for this species as most mean diameters were in the 10 to 16-inch range. There were some studies that reported mean DBH below 10 inches, which fall within the Low tree size class. This occurred where mean DBHs were around 10 or 11 inches and some values in the study's range of diameters fell below 10 inches, and also under Goggans et al. (1989) where stands surrounding the nest, roost, or forage tree were measured. This would seem to indicate that TTWOs were selecting stands with an abundance of small trees. However, many of the same studies reported that in the larger context of the landscape, TTWOs were selecting for mature or overmature stands (Goggans et al. 1989; Toone 1992; Wisdom et al. 2000; Hoffman 1997) and in some cases were selecting against young, multi-storied, or harvested stands (Goggans et al. (1989). It is unlikely that a stand in the Low size class could be considered a mature or over mature stand. Mature and overmature stands would more likely equate to Medium, Large, or Very Large stands. Therefore, based on the literature it appears three-toed woodpeckers need a small diameter tree component but those trees need to be within a matrix of stands with medium and large trees such that the stand as a whole would be classed as mature or over- mature. Therefore, it is recommended that the Medium, Large, and Very Large Tree size classes be used to model TTWO habitat.

Table 17-2 shows the crosswalk between Tree Size class parameters found in the literature and the new recommended Tree Size class breakouts, and lists the references that supported the rationale for the final selection of habitat parameters.

It is recommended that Medium (10-19.9" DBH), Large (20-29.9" DBH), and Very Large (>30" DBH) Tree Size classes be used to model source habitat for the American three-toed woodpecker, both for within and outside the Historical Range of Variation (HRV).

Table 17-2 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Size Class Parameter

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
(This study has two separate reports that give the same parameter information) Goggans, Rebecca, Rita D. Dixon, and L.Claire Seminara. 1989. Habitat use by three-toed and black-backed woodpeckers, Deschutes National Forest, Oregon. Oregon Dept. Fish and Wildlife and USDA Forest Service. Nongame Wildlife Program. Technical Report #87-3-02. 44 pp. And Goggans, Rebecca, Rita D. Dixon, and L.Claire Seminara. 1988. Habitat use by three-toed and black-backed woodpeckers, Deschutes National Forest, Oregon. Oregon Dept. Fish and Wildlife and USDA Forest Service. Nongame Project No. 87-3- 02. 103 pp. (Oregon)	Habitat selection for mature and overmature forest stands and against younger stands and logged areas was documented for three-toed woodpeckers in 16 nests, 493 forage bouts, and 16 roosts. (Nesting, pg. 17) Mean stem size at nests was 8.0 inches DBH. All nest trees were lodgepole. Mean DBH for nest trees was 11 inches (SD=20.7, range=7- 17, n=20). (Roosting, pg. 20) Mature and overmature stands were selected for roosts; young stands (seedlings, saplings, poles), multi- storied, or logged areas were avoided. Mean DBH of roost stands was 9.0 inches. Mean DBH of roosts trees was 12.0 inches. (Forage, pg. 18) Mature and overmature stands were selected for foraging; younger stands and logged areas were avoided. Mean DBH of all trees used for foraging 15.5 in (SD=5.9, range = 2-34, n=429), and mean DBH of all lodgepole pine trees used for foraging was 11.5 inches. Mean DBH for forage stands was 10.0 inches.	Medium (10-19.9” DBH)
Lester, Amy N. 1980. Numerical response of woodpeckers and their effect on mortality of mountain pine beetles in lodgepole pine in northwestern Montana. Master of Science Thesis. University of Montana. 103 pp. (Montana)	(Nesting) The average nest tree DBH was 12.4 inches (n = 11, range = 8.6 -17.2).	Medium (10-19.9” DBH)
Steeger, C. and J. Dulisse. 1997. Ecological interrelationships of three-toed woodpeckers with bark beetles and pine trees. Forest Sciences in Tremblay, J. A., D. L. Leonard Jr., and L. Imbeau (2018). American Three-toed Woodpecker	(Nesting) Mean DBH 26.1 cm ± 6.9 SD [10 inches $\pm$ 2.7]. (Forage) Mean DBH 23.1 cm ± 4.5 SD [9.0 inches $\pm$ 1.8].	Medium (10-19.9” DBH)
(Picoides dorsalis), version 2.0. In The Birds of North America (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.attwoo 1.02 Accessed 3/25/2019 (British Columbia)		
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab, Victoria A.; Lee,	Special habitat features include snags, which are used for nesting and foraging. Nest trees generally	Medium (10-19.9” DBH)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Danny C.; Hann, Wendell.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-scale Trends and Management Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW-GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol. (Quigley, Thomas M., tech. ed.: Interior Columbia Basin Ecosystem Management Project: scientific assessment).	are within the diameter range of 22-50 cm (9 to 20 inches) (Bull 1980, Lester 1980). Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	
Bull, Evelyn L., S.R. Peterson, and J.W. Thomas. 1986. Resource partitioning among woodpeckers in northeastern Oregon. PNW-444 Research Note. 19 pp. (Oregon)	(Forage) Three-toed woodpeckers scaled dead trees that averaged 24 cm DBH [9.4 inches].	Medium (10-19.9” DBH)
Murphy, Edward C. and W.A. Lehnhausen. 1998. Density and foraging ecology of woodpeckers following a stand-replacement fire. J. Wildl. Manage. 62(4):1359-1372. (Alaska)	(Forage) In a fire-damaged spruce forest in central Alaska. Mean circumference of trees used by males 133.4 cm ± 3.7 SE (n = 80) [42 cm or 16.5 inches DBH] and 108.8 cm ± 12.3 SE (n = 12) [34.6 cm or 13.6 inches DBH] for females.	Medium (10-19.9” DBH)
Toone, Robin A. 1992. General Inventory for Northern Three-toed Woodpeckers (Picoides tridactylus dorsalis) on the Wasatch Plateau, Ferron, and Price Ranger Districts, Manti-La Sal National Forest, Utah. Cooperative Challenge Cost Share Project. Utah Department of Natural Resources. 23 pp. (Utah)	A total of 15 three-toed woodpeckers were detected in the study. These birds were using the insect-infested, mature Engelmann spruce stands and the mature mixed conifer and aspen stands with burned trees.	----
Hoffman, Nancy. 1997. Distribution of Picoides woodpeckers in relation to habitat disturbance within the Yellowstone area. Thesis. Montana State University. 85 pgs. (Idaho/Wyoming)	Three-toed woodpeckers nested on sites with higher densities of solid, naturally fallen down woody debris (i.e., >24 cm in diameter) and lower densities of small- diameter down woody debris than did Hairy Woodpeckers. These results provide further evidence that Three-toed are more likely to use mature/overmature forest habitat. Mature/overmature forests may provide several features (large trees and dead, dying, and down wood) that Three-toed woodpeckers use for nesting and foraging (Goggans et al. 1987, Marshall 1992, Angelstam and Mikusirisld 1994).	----

DBH = diameter at breast height

17.3.3 Tree Canopy Cover Discussion

Tree Canopy Cover classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 17-3**.

Table 17-3 Tree Canopy Cover Class Differences Between the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer

Tree Canopy Cover Class		
2003 Forest Plan Appendix A	**New Vegetation Layer (2011)**	**Changed or New Classification?**
10 – 39% Low	10 – 19% (Low Tree Canopy)	change
	20 – 29% (Low-Medium Tree Canopy)	change
	30 – 44% (Medium Tree Canopy)	change
40 – 69% Moderate	45 – 59% (Medium-High Tree Canopy)	change
>70% High	60% (High Tree Canopy)	change

Similar to the black-backed woodpecker, the three-toed woodpecker is associated with disturbance events such as mountain pine beetle infestations and wildfire that create areas with high densities of snags and insect prey (Leonard 2001, Wisdom et al. 2000, Toone 1992, Hoffman 1997). Quantitative descriptions of canopy cover were very limited in the literature. As a result, canopy cover parameters were largely determined using Goggans et al. (1989), the only reference that offered quantitative measures regarding canopy cover for this species.

Goggans et al. (1989) reported a mean canopy cover of 27 percent in uncut stands used for nesting, and also found that percent canopy cover at the nest tree was less than 60 percent for 19 nests (95% of nests). These nesting habitat parameters fall within the low-medium, medium, and medium-high classes. The same study reported foraging canopy cover was less than 60 percent in 58 percent of the stands, and greater than 60 percent in 42 percent of the stands, which fall within the medium, medium- high, and high classes. Canopy cover in stands used for roosting was described as less than 60 percent in 53 percent of the stands measured with a mean canopy cover of 44 percent. This would fall within the medium and medium-high classes. The above parameters for nesting, foraging, and roost habitat indicate that TTWOs can utilize a wide range of canopy covers that fall within the Low-Medium, Medium, Medium-High, and High tree canopy cover classifications, with the Medium and Medium-High classes common across all three habitat functions.

Inclusion of the Medium-High and High tree canopy cover classes is also supported in the literature by references that qualitatively describe preference for mature or over-mature stands (Goggans et al. 1989; Leonard 2001; Wisdom et al. 2000; Toone 1992; Hoffman 1997; Hoyt and Hannon 2002). Hoyt and Hannon (2002) showed a preference for “old growth” forest but not for “mature” forest, the later somewhat of an anomaly in the literature (mature forest was defined as less than 100 years old). In general, mature and overmature stands would be expected to have canopy cover in the upper range of classes.

While TTWO use of canopy cover in the Low-Medium and Medium class seems to be supported in the literature, it may be somewhat of a misrepresentation of what live stand structure the species actually uses. The beetle-infested stands where the Goggans et al. (1989) study occurred were a result of stands developing dense conditions, which would then cause tree mortality and eventually lead to an outbreak (or wildfire) event that attracted TTWOs. The mortality in those unburned stands would likely cause canopy cover measurements to be less than what the pre-infested stand originally had, and is likely this study reported canopy covers that fall within the low-medium and medium classes. Selection of the Low-Medium and Medium tree canopy cover classes would have the potential to include stands with lower canopy covers that are within their historical range of variation that wouldn't necessarily be susceptible to MPB outbreaks or stand-replacing fire, and would likely result in over-estimation of source habitat. To avoid this, the Low-Medium and Medium tree canopy cover classes are not recommended for inclusion in the mid-scale model for three-toed woodpecker.

To assess source habitat, modeling would best approximate the findings of the literature by selecting for forested stands in the Medium-High (45-59%) and High (>60%) Tree Canopy Cover classes for preferred PVGs within their historic range of variability (HRV).

Table 17-4 shows the crosswalk between parameters (or qualitative descriptions) found in the literature and the new tree canopy cover class breakouts, and lists the references that supported the rationale for the final selection of habitat parameters.

Selecting forested stands in the Medium-High (45-59%) and High (>60%) Tree Canopy Cover classes is recommended for modeling American three-toed woodpecker source habitat.

Table 17-4 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Canopy Cover Class Parameters

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TCCC Breakouts
Goggans, Rebecca, Rita D. Dixon, and L.Claire Seminara. 1989. Habitat use by three-toed and black-backed woodpeckers, Deschutes National Forest, Oregon. Oregon Dept. Fish and Wildlife and USDA Forest Service. Nongame Wildlife Program. Technical Report #87- 3-02. 44 pp. And Goggans, Rebecca, Rita D. Dixon, and L.Claire Seminara. 1988. Habitat use by three-toed and black-backed woodpeckers, Deschutes National Forest, Oregon. Oregon Dept. Fish and Wildlife and USDA Forest Service. Nongame Project No. 87-3-02. 103 pp. (Oregon)	(Nesting) Habitat selection for mature and overmature forest stands and against younger stands and logged areas was documented for three-toed woodpeckers in 16 nests, 493 forage bouts, and 16 roosts. Percent canopy closure at the nest tree was estimated at **less than 60 percent for 19 nests** (95 percent). Mean canopy closure for nests in uncut stands was **27 percent** (SD=14.4, range 8- 61, n=14), and for nests in cut stands was 18 percent (SD=14.4, range=0-35, n=5). Fourteen of 19 nests were in unlogged stands. (Forage) Mature and overmature stands were selected for foraging; younger stands and logged areas were avoided. Canopy closure in foraging habitat was less than 60 percent in 58 percent of the stands, and greater than 60 percent in 42 percent. (Roosting) Mature and overmature stands were selected for roosts; young stands (seedlings, saplings, poles), multi-storied, or logged areas were avoided.	Low-Medium (20-29%) Medium (30-44%) Medium-High (45-59%)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TCCC Breakouts
	Mean canopy closure was **44 percent** (SD=35, range=2-93, n=15) **(<60 percent in 8 of 15** stands; >60 percent in 7 stands).	
Leonard Jr., David L. (2001). American Three-toed Woodpecker (*Picoides dorsalis*), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/attwoo1 DOI: 10.2173/bna.588. Accessed February 26, 2017.	Mature or old-growth coniferous forests with an abundance of insect-infested snags or dying trees (Goggans et al. 1988 , Virkkala et al. 1994 , Murphy and Lehnhausen 1998 , Imbeau et al. 1999). Prefers denser forests than does the Black- backed Woodpecker (Short 1974b , Goggans et al. 1988). Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	----
Wisdom, Michael J.; Holthausen, Richard S.; Wales, Barbara C.; Hargis, Christina D.; Saab,	Specific habitats used by three-toed woodpeckers are **mature and overmature** stands with bark beetles, disease, and heart rot	----
Victoria A.; Lee, Danny C.; Hann, Wendell.; Rich, Terrell D.; Rowland, Mary M.; Murphy, Wally J.; Eames, Michelle R. 2000. Source Habitats for Terrestrial Vertebrates of Focus in the Interior Columbia Basin: Broad-scale Trends and Management Implications. Volume 2 - Group Level Results. Gen Tech. Rep. PNW-GTR-485, Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3 vol. (Quigley, Thomas M., tech. ed.: Interior Columbia Basin Ecosystem Management Project: scientific assessment).	(Goggans et al. 1988) and recent stand-replacing burns with abundant wood-boring insects (Caton 1996, Hutto, 1995) Note: this citation is a comprehensive summary of scientific literature and does not provide data itself.	
Toone, Robin A. 1992. General Inventory for Northern Three- toed Woodpeckers (Picoides tridactylus dorsalis) on the Wasatch Plateau, Ferron, and Price Ranger Districts, Manti-La Sal National Forest, Utah. Cooperative Challenge Cost Share Project. Utah Department of Natural Resources. 23 pp. (Utah)	A total of 15 three-toed woodpeckers were detected in the study. These birds were using the insect-infested, **mature** Engelmann spruce stands and the **mature** mixed conifer and aspen stands with burned trees.	----

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TCCC Breakouts
Hoffman, Nancy. 1997. Distribution of Picoides woodpeckers in relation to habitat disturbance within the Yellowstone area. Thesis. Montana State University. 85 pgs. (Idaho/Wyoming)	Three-toed woodpeckers nested on sites with higher densities of solid, naturally fallen down woody debris (i.e., >24 cm in diameter) and lower densities of small-diameter down woody debris than did Hairy Woodpeckers. These results provide further evidence that Three-toed are more likely to use **mature/overmature forest** habitat. **Mature/overmature forests** may provide several features (large trees and dead, dying, and down wood) that Three-toed woodpeckers use for nesting and foraging (Goggans et al. 1987, Marshall 1992, Angelstam and Mikusirisld 1994).	----
Hoyt, J.S. and S.J. Hannon. 2002. Habitat associations of black-backed and three-toed woodpeckers in the boreal forest of Alberta. Can. J. For. Res. 32: 1881-1888. (Alberta)	Detected three-toed woodpeckers only in stands in the 2-year burn and **old-growth forest**; none were detected in mature conifer stands.	----

17.3.4 Source Habitat Conditions When Outside HRV Discussion

Three-toed woodpeckers can utilize some forested conditions that are not within the historical range of variability under PVGs 5 and 11. These conditions generally consist of higher tree densities and more complex vegetative structure than what would have developed when stands in these PVGs were experiencing historical disturbance processes. These dense conditions would also make stands more susceptible to insect infestations or stand-replacing wildfire which are important to this disturbance-dependent species. For PVG 5, when functioning outside HRV, the Medium-High and High tree canopy cover class should be included when in the Medium, Large, and Very Large tree size classes. For PVG 11, when functioning outside HRV, the High tree canopy cover class should be included when in the Medium, Large, and Very Large tree size classes.

17.4 Additional Modeling Parameters

This species is documented in the literature as being associated with burn areas less than 5 years post-fire; burned areas of light to moderate intensity (Murphy and Lehnhausen 1998; Toone 1992); and often in higher elevations, such as above 4,500 feet (Goggans et al. 1987). Therefore, the recommendation is to include areas that have burned within the last 5 years that are greater than 528 acres (Wisdom et al. 2000) and above 4,500 feet elevation as additional modeling parameters to portray three-toed woodpecker source habitat.

17.5 Model Limitations

Adequate numbers of snags 9-20 inches DBH for nesting and foraging habitat is a key habitat component that the mid/fine-scale model is unable to take into account.

17.6 Updated Forest Modeling Parameters for American Three-toed Woodpecker Source Habitat

The updated mid-scale habitat parameters for the three-toed woodpecker are as follows:

Within HRV

PVGs: 8, 9, 10, and 11

Tree Size Class: Medium, Large*, and Very Large*

Tree Canopy Cover Class: PVGs 8, 9, 10 = Medium-High and High

PVG 11 = Medium-High

* Large and very large tree size classes do not occur in PVG 10

Outside HRV

PVGs: 5 and 11

Tree Size Class: Medium, Large, and Very Large

Tree Canopy Cover Class: PVG 5 = Medium-High and High

PVG 11 = High

Additional Modeling Parameters

In addition to the vegetative parameters above, include all burn areas less than 5 years post-fire, above 4,500 feet in elevation, and equal to or greater than 528 acres in size.

Model Limitations: Adequate numbers of snags 9-20 inches DBH for nesting and foraging habitat is a key habitat component that the mid/fine-scale model is unable to take into account.

Source habitat is defined by those characteristics of macrovegetation that contribute to stationary or positive population growth.

17.7 New Literature Sources Reviewed for this Update

Below is a list of all new literature reviewed for this 2019 American Three-toed Woodpecker Mid-scale Modeling Update, including those references that did not provide relevant habitat information regarding tree size class or tree canopy cover class parameters. This list was compiled to both inform the next literature review and/or model update of what references were reviewed and to document the entire 2016/2017 literature review process.

The literature search found only two references dated more recent than 2008 that would not have been available for the last update of the model and that were habitat focused.

Reference – Tremblay, J. A., D. L. Leonard Jr., and L. Imbeau (2018). American Three-toed Woodpecker (*Picoides dorsalis*), version 2.0. *In* The Birds of North America (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.attwoo1.02 Accessed March 25, 2019.

This species account is a comprehensive summary of scientific literature and does not provide original data itself. However, the Birds of North America species accounts do provide a collection of what is considered the most recent and relevant information on a given species. Any pertinent habitat information for tree size and canopy cover is summarized below.

From Nest Site - Microhabitat and Site Characteristics section:

Goggans et al. 1989 - Of 20 nests (15 Lodgepole Pine snags and 5 living Lodgepole Pines) in central Oregon, heartrot was verified in 14 and assumed in remainder based on physical characteristics of trees. Nest trees averaged 27.9 cm ± 6.35 SD in DBH, 23.1 m ± 6.4 SD in height, and cavity height averaged 7.7 m ± 3.4 SD S. Hejl and M. McFadzen, unpublished data - In Idaho and Montana, 59 of 61 nests were in snags and 84% occurred in unlogged study plots. Tree species included: Subalpine Fir (*n* = 24), Lodgepole Pine (*n* = 15), Douglas-fir (*n* = 15), and other species (*n* = 7).

Steeger and Dulisse 1997 - In British Columbia, mean nest-tree height 21.0 m ± 8.1 SD (*n* = 13), mean nest height 5.2 m ± 2.7 SD, and mean DBH 26.1 cm ± 6.9 SD, and mean nest-tree DBH 29.0 (*n* = 7) in partial cutting. Tree species used included Lodgepole Pine (*n* = 5), Western Larch (*n* = 3), Douglas-fir (*n* = 2), Quaking Aspen (*n* = 2), and Western Redcedar (*n* = 1).

A. Nappi and JAT, unpublished data and C. Craig, unpublished data - In Québec (*n* = 8;) and New Brunswick (*n* = 10;), nest trees averaged 24.4 cm ± 5.1 SD in DBH, 7.9 m ± 3.2 SD in height, and cavity height averaged 4.4 m ± 2.1 SD.

From Diet and Foraging – Microhabitat for Foraging section:

Murphy and Lehnhausen 1998 - In a fire-damaged spruce forest in central Alaska, males selected lightly to moderately burned trees, whereas Hairy Woodpecker and Black-backed Woodpecker foraged on heavily charred trees; females rarely occurred in the burn area. For males, 91% of 81 observations were on White Spruce; females (*n* = 12) were restricted to White Spruce. Mean circumference of trees used by males 133.4 cm ± 3.7 SE (*n* = 80) and 108.8 cm ± 12.3 SE (*n* = 12) for females.

Short 1974 - In an unburned spruce bog in New York, American Three-toed Woodpeckers foraged high on live spruce trunks in dense stands

Villard 1994 - In Manitoba, American Three-toed Woodpeckers fed high on trunks of dead Spruce (95% of observations), followed by American Larch and Jack Pine S. Hejl and M. McFadzen, unpublished data - In Idaho and Montana, 94% of foraging observations were on snags; tree species used included Douglas-fir (30.9%), Lodgepole Pine (29.3%), Ponderosa Pine (19.1%), Subalpine Fir (*Abies lasiocarpa*; 14.2%), and other species (6.5% of 257 observations).

Bull et al. 1986 - During 86 min of observations in northeastern Oregon, Lodgepole Pine trees located on flat terrain were used exclusively, 78% of which were recently killed (< 3 yr); mean foraging height was 19 m ± 4.5 SD and mean diameter-at breast-height (DBH) of trees used for foraging was 24 cm ± 6.7 SD (*n* = 58).

Goggans et al. 1989 - In central Oregon from late April to mid-September, 63% of foraging observations were on Lodgepole Pine and 25% on Engelmann Spruce (used trunks of standing trees 90% of observations and logs 7%). Snags (77% recently dead) were used 88% of the time and were most likely used in a greater proportion than available. Mean DBH of all forage trees was 37.2 cm ± 13.4 SD (range 5–82, n = 429); mean foraging height 9.1 m ± 5.8 SD (range 0–27, n = 446).

Steeger and Dulisse 1997 - From May to August in British Columbia, Lodgepole Pine were selected for foraging in 217 of 275 (79%) observations; mean DBH 23.1 cm ± 4.5 SD. Other trees used included Douglas-fir, hybrid spruce, Western Larch, Western White Pine (*Pinus monticola*), and Western Hemlock (*Tsuga heterophylla*).

Reference - Drever, M.C. and K. Martin. 2009. Response of woodpeckers to changes in forest health and harvest: Implications for conservation of avian biodiversity. Forest Ecology and Management. 259 (210) 958-966.

This was a study that looked at correlations between species richness in forest woodpeckers and species richness of all other forest birds, theorizing that management practices that maintained or improved species richness for one group would also improve it for the other. The variables they looked at were primarily tree species and beetle-killed pine, along with harvest. These variables were fairly broad scale and the study didn't offer any nesting or forage-specific vegetation parameters that could be used for this modeling update.

Reference - Kotliar, N.B., E.W. Reynolds, and D.H. Deutschman. 2008. American three-toed woodpecker response to burn severity and prey availability at multiple spatial scales. Fire Ecology 4(2): 26-45.

This study looked at three-toed woodpecker response to burn severity and prey availability at the home range (36 ha), foraging patch 1 ha), and single tree scales. Birds established territories in moderately burned areas with live and dead tree patches. TTWOs also foraged in patches with high proportions of severely burned trees in moderately burned areas, but rarely foraged in severely burned patches in severely burned areas. While vegetation data such as canopy cover and tree size was collected, it wasn't reported in terms useful for this model update. The emphasis of the study was on the burn severity anyway.

18.0 WHITE-HEADED WOODPECKER

Mid-scale Modeling Update for the White-headed Woodpecker
March 21, 2019 Payette National Forest
Joe Foust, District Wildlife Biologist, Cascade RD, BNF, on Detail to the PNF

The purpose of this document is to update the White-headed Woodpecker Mid-scale Habitat Model developed for the Boise National Forest in 2008 (Nutt et al. 2008), which is being used as the base habitat model for the 2019 Payette National Forest Baseline Habitat Modeling Update. This mid-scale model was developed for use at the scale of the entire Forest but is useful for habitat patch and pattern information at the scale of the fifth hydrologic unit code. It has been eleven years since the original mid- scale species model for the Boise National Forest's modeling effort was created. In order to complete the 2019 Payette National Forest Baseline Habitat Modeling Update effort, there was a need to update three key components of the modeling process, including the new existing vegetation layer that had different

canopy cover and tree size classes, the new 5th HUC boundaries, and the most up to date fire data. For the vegetation portion, in order to run the mid-scale habitat model with this new data a crosswalk that linked the old breakdown classes to the new breakdowns was needed, which is the focus of this document. This model update effort also offered an opportunity to review any new literature published since the original 2008 model was created and validate selected habitat parameters.

18.1 Review of New Species Literature since 2010

The Boise NF mid-scale habitat model for the White-headed Woodpecker (WHWO) was created in 2008 (Nutt et al. 2008). This literature review of published information between 2010 and 2016 was conducted to validate whether model parameters from 2010 are still consistent with the literature for this species. Any references that had relevant habitat information pertaining to tree size class (TSC) and canopy cover class (CCC) were listed in the Crosswalk tables in the TSC and CCC sections. All new literature reviewed for this 2019 White-headed Woodpecker Mid-scale Model Update, including those references that did not provide relevant habitat information regarding TSC or CCC, are listed and briefly summarized at the end of this document. It should be noted that the literature review for this update was completed in 2016; however, the actual review of this document and subsequent update of the model did not occur until 2019.

18.2 Application of Mid-scale Species Habitat Parameters to New Vegetation Structure Classes

A new existing vegetation map was completed for the mid-scale in 2012 using imagery acquired from 2008 and field data collected from 2007 through 2011. The data represent conditions across the Forest through the fall of 2008. This map was updated for the Payette National Forest in 2016 and called the "Forest Derived Product." Forest Derived Products are Forest-level updates of the contractor provided maps that better facilitate Forest-level data needs. These can be added to or updated as emerging Forest-level needs arise. This included post-processing of polygon delineations to reduce the noise of many small polygons by aggregating these to produce polygons that more adequately represent a larger unit on the ground (i.e., "stands"), to meet the minimum map unit of 5 acres for most polygons, and to

reduce the overall number of polygons for processing. Size class polygons were then reattributed utilizing the same imagery used by the original mapping product and newer imagery as it became available. The original contractor mapping process generalized much of the size class polygons into the medium size class (10.0-19.9" DBH). The hand-edits of the size class attributes helped to spread the distribution of size classes into the seedling, sapling, small and large tree classes and more closely mirror Forest Inventory data. Secondly, the canopy cover map needed to be updated to incorporate changes due to recent fires. Rule sets utilizing post-fire vegetation condition were developed to adjust canopy cover changes where necessary, and reviewed with newer imagery. No changes were made to the dominance type map and all changes made to the size class and canopy cover class were made to nest into the correct corresponding dominance types in that map, so that the map integrity between the three layers was maintained. An update to the accuracy assessment was also completed for the Forest Derived Products.

Although there was no change to the Potential Vegetation Group (PVG), this new existing vegetation product created new categories for tree size class and canopy cover class. The final dominance type map units, size classes and canopy cover classes conform to the mid-level mapping standards referenced in the Existing Vegetation Classification and Mapping Technical Guide Version 1.0 (Brohman and Bryant 2005). This existing vegetation map provides the Payette National Forest with a new baseline of current

condition. However, the classification for the components of this vegetation map are different than the classifications used in previous vegetation mapping efforts used for the Payette National Forest Land and Resource Management Plan (LRMP) (USDA Forest Service 2003a, Redmond et al. 1998). Therefore, crosswalks needed to be developed to translate the categories for size class and canopy cover classes used for the 2009 model in order to run the models on the new existing vegetation product. The following documentation explains how the parameters were cross-walked from the 2009 model into the 2019 model.

18.3 Parameter Review Discussion

18.3.1 PVG Discussion

No new information was found during the literature review on potential vegetation group (PVG) preferences for the white-headed woodpecker. No change is recommended.

18.3.2 Tree Size Class Discussion

Tree Size Class (TSC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 18-1**.

Table 18-1 Tree Size Class Differences Between 2003 Forest Plan Appendix A and New Vegetation Layer

2003 Forest Plan Appendix A	New Vegetation Layer (2011)	Changed or New Classification
Grass/Forb/Shrub/Seedling (GFSS) (<4.5' tall)	Seedling (<4.5' tall)	change in name only
Sapling (1.0 – 4.9" DBH)	Sapling (0.1 – 4.9" DBH)	
Small (5.0 – 12.0" DBH)	Small (5 – 9.9" DBH)	change
Medium (12.1 – 20" DBH)	Medium (10 – 19.9" DBH)	change
Large (>20.0" DBH)	Large (20 – 29.9" DBH)	change
	Very Large (> 30" DBH)	new

For modeling both nesting and forage habitat, the majority of literature sources support selecting the Large (20 – 29.9" DBH) and Very Large (>= 30" DBH) Tree Size classes (Frederick and Moore 1991; Blair and Servheen 1995; Dixon 1995a,b; Bull et al. 1986). Most references specific to nesting habitat were firmly within the Large Tree Size class (Frederick and Moore 1991; Dixon 1995a,b), while foraging habitat parameters were generally larger and sometimes spilled into the Very Large size class (Frederick and Moore 1991; Blair and Servheen 1995; Dixon 1995a). Larger live trees have more surface area and deep fissured bark for insect gleaning in the summer, and would be regular seed producers which provide a winter food source.

There is also some support for the Medium Tree Size class (10-19.9" DBH), including the most recent body of research by J. Kozma (Bull et al. 1986; Kozma 2011, 2012). However, Kozma and Kroll (2012) conducted a population source/sink analysis for essentially the same study area as the one used in both Kozma 2011 and Kozma 2012. The source/sink analysis concluded that the study area comprised of either

managed or burned stands was likely a sink for the white-headed woodpecker population, even though the species could successfully breed in this habitat. As a result, it is likely premature to consider smaller trees in the Medium Tree Size class as providing sufficient nesting and forage habitat for the white-headed woodpecker.

Table 18-2 shows the crosswalk between Tree Size class parameters found in the literature and the new recommended Tree Size class breakouts.

It is recommended that both Large (20-29.9" DBH) and Very Large (> 30" DBH) Tree Size classes be used to model source habitat for the white-headed woodpecker.

Table 18-2 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Size Class Parameter

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Frederick, Glen P. and Teresa L. Moore. 1991. Distribution and habitat of white-headed woodpeckers (*Picoides albolarvatus*) in west- central Idaho. Idaho Dept. Fish and Game, Boise. 32pp. (Idaho)	Nesting Habitat - dead trees in moderate to late stages of decay, average dbh. = 56 cm **(22 inches).** Table 5. Characteristics of habitats sampled using five 0.04 ha subplots located within a 3.1 ha (7.7 ac.) area and centered on whwo nest sites = average for 6 study sites was **17.3" (± 5.5") dbh**. Nest stands were mature to old, open-canopied, sparsely stocked. Foraging – Detected whwo on transects with a mean dbh of 32 cm (**12.6"**), but birds were commonly observed foraging on much larger trees. Mean dbh of 8 pines on which foraging was observed was 70 cm (+25), **or 27.6" (+9.8)**	Medium – 10-19.9" DBH Large – 20-29.9" DBH Very Large - ≥30" DBH
Blair, Steve and Greg Servheen. 1995. A Species Conservation Assessment and Strategy for White-Headed Woodpecker (*Picoides*	Recommendations for Management based on literature and species expert review include: Favor late-seral PIPO stands with >10 tpa >21 inches dbh, >2tpa >31 in dbh. Mean d.b.h. of retained snags = **27-31 inches.**	Large – 20-29.9" DBH Very Large - ≥30" DBH
albolarvatus) *draft February 1995.* Idaho Dept. of Fish and Game, Boise, 21pp. (Idaho)		
Dixon, R.D. 1995a. Density, nest-site and roost-site characteristics, home-range, habitat-use, and behavior of White- headed Woodpeckers: Deschutes and Winema National Forests, Oregon. Oregon Dept. Fish and Wildl. Nongame Rep. 93- 3-01. (Oregon)	Mean dbh of nest trees was 80 ± 8 cm (**31"**) Mean dbh of roost trees was 60 ± 3 cm (**24"**) Mean dbh of trees surrounding nest tree was 55 cm ±3 (**21.7" ± 1"**) Mean dbh of trees surrounding roost tree was 51 cm ± 1 (**20" ± 0.4"**) Mean dbh of trees surrounding foraging (mostly forage sites but included other daily activities) sites was 57 ± 0.6 cm (**22.4" ± 0.2"**)	Large – 20-29.9" DBH Very Large - ≥30" DBH

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
	Selected home ranges were dominated by old- growth PIPO. Foraging occurred on large diameter live PIPO (x=68cm (**27 inches**)).	
Dixon, R.D. 1995b. Ecology of White-headed Woodpeckers in the Central Oregon Cascades. Master's thesis, Univ. of Idaho, Moscow. (Oregon)	Mean dbh of nest trees was 65 ± 4 cm (**25.6" ± 1.6**) (p.36). Mean dbh of roost trees was 61 cm (**24"**) (p. 23) Whwo used large-diameter (>53 cm d.b.h. (**21 inches**)) snag classes for nesting and roosting in greater proportion than available (p. 24)	Large – 20-29.9" DBH
Bull, Evelyn L., S.R. Peterson, and J.W. Thomas. 1986. Resource partitioning among woodpeckers in northeastern Oregon. PNW-444 Research Note. 19 pp. (Oregon)	Preferred trees greater than 25 cm **(10")** dbh.	Medium – 10-19.9" DBH Large – 20-29.9" DBH Very Large - ≥30" DBH
Kozma, J. M. 2011. Composition of forest stands used by Whiteheaded Woodpeckers for nesting in Washington. Western North American Naturalist 71:1–9. (Washington)	In 16 forest stands (all managed or burned) that contained whwo nests, PP was most common species in all but 3 stands, and mean density of PP was greatest in 20.3-30.5 cm (**8-12"**) and 30.6-40.6 (**12-16"**) dbh size class and lowest in 50.8-61.0 cm (20-23.6") and > 61.0 cm (24") size classes. Also, mean dbh of PP was **13" dbh** and ranged from **10.3" to 19.8" dbh**.	Medium – 10-19.9" DBH
Kozma, J. M. 2012. Nest-site character-istics of three wood-pecker species in managed ponderosa pine forests of	Essentially the same study area as Kozma 2011. Mean dbh of nest substrates used by whwo was 43.1 cm (17") in burned stands and 38.1 cm (15") in unburned stands.	Medium – 10-19.9" DBH
the eastern Cascade Range. Northwestern Naturalist 93:111–119. (Washington)		
Kozma, J. M., and A. J. Kroll. 2012. Woodpecker nest survival in burned and unburned managed ponderosa pine forests of the northwestern United States. Condor 114:1–13. (Washington)	No new parameters to add but this study completed a population source/sink analysis and determined that the study area could be a sink. This is pertinent to this update because the other Kozma studies (2011 and 2012 listed above) showed use of stands with somewhat smaller mean dbh preferences that dipped into the Medium TSC, likely because that's what was available due to substantial management within this study area.	----

dbh = diameter at breast height

18.3.3 Tree Canopy Cover Discussion

Tree Canopy Cover (TCC) classifications for both the 2003 Forest Plan Appendix A and New 2011 Vegetation Layer are compared below in **Table 18-3**.

Table 18-3 Canopy Cover Class Differences Between the 2003 Forest Plan Appendix A and New Vegetation Layer (Tree Canopy Cover Only)

Tree Canopy Cover Class		
2003 Forest Plan Appendix A	**New Vegetation Layer (2011)**	**Changed or New Classification?**
10 – 39% Low	10 – 19% (Low Tree Canopy)	change
	20 – 29% (Low-Medium Tree Canopy)	change
	30 – 44% (Medium Tree Canopy)	change
40 – 69% Moderate	45 – 59% (Medium-High Tree Canopy)	change
>70% High	60% (High Tree Canopy)	change

A review of the literature shows that there is strong support for selection of the Low (10-29%) and Low-Medium (20-29%) Tree Canopy Cover classes as the majority of literature sources reported canopy covers for nesting sites and/or nesting habitat below 30 percent (Frederick and Moore 1991; Blair and Servheen 1995; Dixon 1995a).

While parameters in the literature for nesting habitat fell firmly within the Low and Low-Medium Tree Canopy Cover classes, white-headed woodpeckers were found to be using habitat with higher canopy covers for roosting and foraging. Dixon (1995a) reported mean canopy cover at roost sites to be 44 percent, while mean canopy cover around foraging sites was 54 percent. Similarly Dixon (1995b) reported mean canopy cover at roost sites to be 57 percent and described foraging stands to be multi-

storied with an average canopy cover of 65 percent. Including the Medium Tree Canopy Cover class would represent this higher range of canopy cover use for roost and forage habitat within the model, as this canopy cover class could still provide the open-canopied structure preferred by this species.

Inclusion of anything higher than the Medium Tree Canopy Class would likely substantially overestimate source habitat for this species because large blocks of modeled habitat with more than 45 percent canopy cover wouldn't necessarily contain the important openings and lower tree densities associated with nesting habitat.

Table 18-4 shows the crosswalk between parameters found in the literature and the new tree canopy cover class breakouts.

Selecting forested stands in the Low (10-19%), Low-Medium (20-29%), and Medium (30-44%) Canopy Cover classes is recommended for modeling white-headed woodpecker source habitat.

Table 18-4 Table Showing Crosswalk Between Parameters Found in the Literature and New Tree Canopy Cover Class Parameters

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Frederick, Glen P. and Teresa L. Moore. 1991. Distribution and habitat of white-headed woodpeckers (*Picoides albolarvatus*) in west-central Idaho. Idaho Dept. Fish and Game, Boise. 32pp. (Idaho)	Located 6 nest sites. Did not nest in stands with **>26%** CC. Table 5. Characteristics of habitats surrounding nest sites: sampled using five 0.04 ha subplots located within a 3.1 ha (7.7 ac.) area and centered on whwo nest sites = average for 6 study sites was **27% ± 7** Conducted line transects through study area (where observations were recorded from) with sampling points spaced 160m apart. Veg data was taken at sampling points. Mean canopy "closure" on transects with unsolicited responses was **56%** for all 6 study sites	Low (10-19%) Low-Medium (20-29%) Medium (30-44%)
Blair, Steve and Greg Servheen. 1995. A Species Conservation Assessment and Strategy for White-Headed Woodpecker (*Picoides albolarvatus*) *draft February 1995.* Idaho Dept. of Fish and Game, Boise, 21pp. (Idaho)	Recommendations for Management based on literature and species expert review: target canopy between **20 and 26%.**	Low (10-19%) Low-Medium (20-29%)
Dixon, R.D. 1995a. Density, nest-site and roost-site characteristics, home-range, habitat-use, and behavior of White-headed Woodpeckers: Deschutes and Winema National Forests, Oregon. Oregon Dept. Fish and Wildl.	Mean canopy closure was **24 ± 4% at nests** (n=16) and 44 ± 2% at roosts. Mean canopy "closure" at foraging sites was **54% ± 1**. Mean canopy closure around these sites was **57% ± 0.6**.	Low (10-19%) Low-Medium (20-29%) Medium (30-44%) Medium-High (45-59)
Nongame Rep. 93-3-01. (Oregon)		
Dixon, R.D. 1995b. Ecology of White-headed Woodpeckers in the Central Oregon Cascades. Master's thesis, Univ. of Idaho, Moscow. (Oregon)	The majority (40) of nests and all roosts were in ponderosa pine forest types with **57%** canopy closure (p. 23). Canopy closure at nest sites averaged **41 ± 4%** (p. 38). Canopy closure at roost trees averaged **57.4 ± 2%** (p. 41). In foraging section of thesis, stands used for foraging were typically multi-storied with average canopy closure of **65%**(p. 131 and 141).	Medium (30-44%) Medium-High (45-59)

Parameter Reference in Literature	Parameter Descriptions	Crosswalk Between Parameter in Literature and New TSC Breakouts
Lorenz, T. J., K. T. Vierling, J. M. Kozma, J. E. Millard, and <. G. Raphael. 2015. Space Use by White-Headed Woodpeckers and Selection for Recent Forest Disturbances. The Journal of Wildlife Management 79(8):1286-1297. DOI: 10.1002/jwmg.957 (Central Washington)	Home Ranges in this study had 42.86% ± 11.83 canopy cover during nesting season, and 42.08 ± 13.83 in post-nesting season	Medium (30-44%)

18.4 Updated Forest Modeling Parameters for White-headed Woodpecker Source Habitat

The updated mid-scale habitat parameters for the white-headed woodpecker are as follows:

PVGs: 1, 2, 3, 5, and 6

Tree Size Class: Large and Very Large

Canopy Cover Class: Low, Low-Medium, and Medium

18.5 New Literature Sources

Below is a list of all new literature reviewed for this 2019 white-headed woodpecker (WHWO) mid-scale model update, including those references that did not provide relevant habitat information regarding tree size class or canopy cover class parameters. This list was compiled to both inform the next literature review and/or model update of what references were reviewed and to document the entire 2016 literature review process.

Reference – Garrett, Kimball L., Martin G. Raphael and Rita D. Dixon. (1996). White-headed Woodpecker (*Picoides albolarvatus*), The Birds of North America (P. G. Rodewald, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America: https://birdsna.org/Species-Account/bna/species/whhwoo DOI: 10.2173/bna.252. Accessed September 2016.

The species account had not been updated since 1996, implying that no significant developments in research on the species' natural history or habitat requirements have occurred.

Reference - Hollenbeck, J. P., V. A. Saab, and R. W. Frenzel. 2011. Habitat suitability and nest survival of White-headed Woodpeckers in unburned forests of central Oregon. Journal of Wildlife Management. 75:1061–1071.

This work compared multiple habitat suitability models in an effort to evaluate habitat suitability and nest survival for breeding WHWO. Key finding was that a mix of low and high canopy cover of ponderosa pine was important for nest suitability. Can be used as a predictive model for land managers. Didn't go into specifics of habitat characteristics for the species though.

Reference – Kozma, J. M. 2011. Composition of forest stands used by Whiteheaded Woodpeckers for nesting in Washington. Western North American Naturalist 71:1–9.

This study examined the composition of ponderosa pine forests that had a history of management and fire that were being used by nesting WHWO. Mean dbh of PP was 13" dbh and ranged from 10.3" to 19.8" dbh. Important to note that tree densities were up to 5.3 times greater than what's typically found in the literature for areas pre-fire suppression. Take-away from this study is that WHWO

may be more adaptable to using smaller diameter PP (and DF) than previously thought. However, it still doesn't change the preferred stand parameters that we are using to model source habitat; it just shows that they can tolerate, and even reproduce successfully, within lesser quality habitat). Another important point of this study was that there were some large diameter PP and DF in the overstory that were still contributing to large snag recruitment. The author highlighted the importance of land managers to retain these large live and dead PP and DF on the landscape to retain nesting opportunities for WHWO and to reduce competition with other cavity excavators.

Reference – Kozma, J. M. 2012. Nest-site characteristics of three woodpecker species in managed ponderosa pine forests of the eastern Cascade Range. Northwestern Naturalist 93:111–119.

This study compared use of nesting substrate in three woodpecker species, flicker, WHWO, and hairy woodpecker, in managed stands. The report offered up some good comparisons between the species' preferences. Didn't offer any specifics about canopy cover class but did report tree size characteristics for the study (see Crossover Table 2). Made some general recommendation for snag retention but didn't quantify anything.

Reference – Kozma, J. M., and A. J. Kroll. 2012. Woodpecker nest survival in burned and unburned managed ponderosa pine forests of the northwestern United States. Condor 114:1–13.

This study expands on Kozma's other studies using this same study area, with the same site characteristics as documented in previous papers. This paper was more about nest survival rates and not habitat, which was the focus on the first of this author's papers (Kozma 2011). Something of note from this paper though was that WHWO nest survival was negatively associated with shrub cover, as nest predator (chipmunks, squirrels) populations increased with increases in shrub cover. It also mentioned that nest survival for this area was comparable to other sites in the literature, but then followed that up with suggesting that their study site was acting as a sink. This is pertinent to this update because the other Kozma studies (2011 and 2012 listed above) showed use of stands with somewhat smaller mean dbh preferences that dipped into the Medium TSC, potentially because that's what was available due to substantial management within this study area.

Reference – Latif, Q. S., V. A. Saab, K. Mellen-McLean, and J. G. Dudley. 2015. Evaluating Habitat Suitability Models for Nesting White-Headed Woodpeckers in Unburned Forest. The Journal of Wildlife Management 79(2):263-273; 2015; DOI: 10.1002/jwmg.842.

This study refined and evaluated presence-only habitat suitability models for nesting white-headed woodpeckers. They developed (2) models from nest location datasets from eastside of the Cascade Mtn. Range in Oregon, (1) from 1997-2004 and 2010-2011. Consistent with known ecology of WHWO, both HSI models related positively with percent Ponderosa pine, moderate levels of canopy cover (approx. 40%) and moderate-to-high levels of heterogeneity in forest structure.

Reference – Linden, Daniel W. and Gary J. Roloff. 2015. Improving inferences from short-term ecological studies with Bayesian hierarchical modeling: white-headed woodpeckers in managed forests. Ecology and Evolution. 5(16): 3378-3388.

This was another paper on predictive modeling for nesting WHWOs within a highly managed landscape. Again, there were no quantitative habitat parameters to take away from this work, but their results did support snag retention within harvest units of >2 snags/ha (for snags greater than 25 cm dbh), as stands that retained snags at this rate had relatively high nest persistence probabilities.

Reference – Lorenz, T. J., K. T. Vierling, J. M. Kozma, J. E. Millard, and <. G. Raphael. 2015. Space Use by White-Headed Woodpeckers and Selection for Recent Forest Disturbances. The Journal of Wildlife Management 79(8):1286-1297. DOI: 10.1002/jwmg.957

This study in Central Washington documented selection by nesting WHWOs for forested patches that had undergone some type of disturbance when setting up their home ranges. Disturbed could mean burned, diseased and dying stands, or thinned stands. Burns were mixed severity and averaged 4.8 ha (12 acres). They suggested that this behavior was in response to limited nest site availability within unburned portions of their home ranges, as much of existing standing dead in the study area was likely too hard for excavation by WHWOs.

One important finding was that large home ranges do not always signify bad habitat for this species, which is a commonly used relationship with most terrestrial species.

Also, WHWOs can occur and successfully breed in areas with little to no "old growth" habitat. Suggested that mixed-severity prescribed fire could be an important tool for creating WHWO habitat.

The tables and data were hard to decipher because of the complicated model vernacular, but a takeaway parameter was:

- Used Home Ranges had 42.86% $\pm$ 11.83 canopy cover during nesting season, and 42.08 $\pm$ 13.83 in post-nesting season.

Reference – Mellen-McLean, Kim, Barbara Wales, and Barbara Bresson. 2013. A conservation assessment for the white-headed woodpecker (*Picoides albolarvatus*). USDA Forest Service, Region 6, and USDI Bureau of Land Management, OR and WA. 48 p.

This is a very thorough conservation assessment. While the document does not provide any new research or other new information regarding species biology, ecology, and habitat use by itself, it does nicely summarize existing data and research up to the most current available. Especially useful are the tables that summarize nesting habitat parameters by reference.

Reference - Wightman, C. S., V. A. Saab, C. Forristal, K. Mellen-Mclean, and A. Markus. 2010. White-headed Woodpecker nesting ecology after wildfire. Journal of Wildlife Management 74:1098–1106.

This study developed predictive models for WHWO nesting habitat in post-fire habitat in south-central Oregon based on 45 WHWO nest locations. The study found that open-canopied PP forests pre-fire and mosaic burn severities post-fire characterized habitat 1 km surrounding nests in the study area. Also, habitats with large, more decayed snags and fewer live trees characterized habitat within 1 ha of the nest site. However, neither of these habitat features influenced nest survival. Models indicated that open canopies with mature, cone-producing trees remain important for WHWO after wildfire, which is consistent with the literature. A mosaic of burn severities may improve habitat by opening up canopies

while retaining decayed snags, in areas adjacent to unburned areas that provide live cone-producing trees. Therefore, managing for habitats that will burn with mixed severity is ideal.

Authors recommended opening forest canopy within stands containing medium and larger diameter (>23 cm [9 inch]) mature trees and snags and retaining large snags that were there before the fire as these snags are softer and will be more valuable to WHWO in early years following the fire.

Appendix B
Additional Information for Impacted Species and Life Histories for Special Status Species

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Appendix B - Additional Information for Impacted Species and Life Histories for Special Status Species

1.0 INTRODUCTION

This appendix to the Wildlife and Wildlife Habitat Specialist Report provides additional information about wildlife species that may be affected by the Perpetua Resources Idaho Inc., (Perpetua) Stibnite Gold Project (SGP). It also includes life histories for the threatened, endangered, proposed, candidate, sensitive, or management indicator species discussed in the Wildlife and Wildlife Habitat Specialist Report.

2.0 THREATENED, ENDANGERED, PROPOSED, AND CANDIDATE SPECIES

This section contains additional information about the threatened, endangered, proposed, and candidate species presented and analyzed in the Wildlife and Wildlife Habitat Specialist Report. All information regarding the wolverine, Northern Idaho Ground Squirrel (NIDGS) and Monarch butterfly is presented in Section 6.0 of the Wildlife and Wildlife Habitat Specialist Report.

2.1 Canada Lynx

There are 16 records of Canada lynx (*Lynx canadensis*) in the Payette National Forest (PNF) in the Idaho Fish and Wildlife Information System database through 2017. Eight are potential sightings, one record is of a tagged pelt, and seven are records of tracks observed. Ten of these records were digitized from a report titled *Canada Lynx in Idaho: Past, Present and Future* (Terra-Berns et al. 1998). Many of the records are documented as anecdotal, incomplete, or have not been verified. The most complete and verifiable records of lynx comprise a sighting in 1957 in the headwaters of the Little Salmon River (Lewis and Wenger 1998; Strobilus Environmental 2017) and a pelt (trapped) in Fall Creek in 1964. Further review found that the 1957 sighting, verified by the Idaho Department of Fish and Game (IDFG), occurred in the Mill Creek–Council Mountain area of the PNF West Zone, which is west of Lake Cascade. The last documented occurrence of Canada lynx in the Cascade Ranger District and nearest sighting to the Project area was a trapped individual near Warm Lake in 1978 (United States Forest Service [Forest Service] 2018; Terra-Berns et al. 1998), which is approximately 25 miles southwest of the mine site and adjacent to the access route. Lynx also have been observed approximately 35 miles north of the Project area in the Frank Church-River of No Return Wilderness (Forest Service 2015). Canada lynx were recorded in the Disappointment-Little Squaw, Chamberlain, Cabin Canyon, and Upper North Fork Payette Lynx Analysis Units (LAUs; Forest Service 2008); none were recorded in LAUs in the Canada lynx analysis area.

The Natural Resource Manager (NRM) WILDLIFE database maintains observations and survey records for the Forest Service, which contains five records for lynx through 2017. Only one record in NRM is complete and verifiable: a sighting in 2012 near Price Valley in the vicinity of the Wesley Fire, which is located northwest of McCall. Of the remaining four sightings, there are two in the Wilderness (Chamberlain, East Zone) and two between Ladder and Mann Creeks (i.e., Cuprum, West Zone). Recent

surveys (2010-2017), associated with winter carnivore studies on the PNF, included baited camera hair-snare and monitoring stations located in suitable habitat cells across the Forest. During a winter carnivore survey for Canada lynx, wolverine (*Gulo gulo*), and fisher (*Martes pennanti*) in February and March of 2013 (Strobilus Environmental 2017), Garcia and Associates placed 27 survey sets and one motion-sensor game camera-only site in the Canada lynx analysis area. Although most stations were set up to assess for wolverine occupancy, several stations also included components to measure potential lynx presence. The cameras did not capture photographs of lynx and did not obtain lynx hair samples. Surveyors also did not observe lynx tracks during placement, servicing, or removal of the camera stations. No lynx were detected during additional winter carnivore surveys conducted in the Stibnite, Lower East Fork of the South Fork of the Salmon River (EFSFSR), and Upper Big Creek LAUs in 2013-2014.

3.0 GENERAL WILDLIFE SPECIES

Numerous general wildlife species (game and non-game species) are known or assumed to occur in the general Project area (Table 2 below). While sensitive species and general wildlife species are discussed in Section 3.13, additional information about some of these species and others is presented below.

Of the general wildlife species, Perpetua staff and consultants have documented incidental sightings (unverified) of black bear (*Ursus americanus*), gray wolf (*Canus lupus*), moose (*Alces americanus*), and mountain lion (*Puma concolor*) in the general wildlife analysis area during exploration activities (Table 1). Additional information regarding these species is provided below.

Table 1 Large Mammal Observations in Project Area

Species (Common Name)	Number of Individuals	Location	Date
Black bear	1 immature	Stibnite Road	August 18, 2015
Black bear	1 adult	Stibnite Road	August 19, 2015
Black bear	1 adult	Stibnite Road	August 27, 2015
Gray wolf	1 adult	Stibnite Road	April 24, 2014
Gray wolf	4 adults	Soda pile	July 25, 2014
Gray wolf	1 adult	Stibnite airstrip	June 26, 2015
Gray wolf	2 adults	Airstrip at Hangar Flats	June 26, 2016
Gray wolf	1 adult	West End Pit	July 11, 2016
Moose	1 adult, 1 calf	Stibnite Road	May 3, 2015
Moose	1 adult	Stibnite Road	June 20, 2015
Moose	1 adult	Stibnite Road	February 14, 2017
Mountain lion	1 adult, 2 cubs	Stibnite Road	October 16, 2016

Source: Strobilus Environmental 2017

Gray wolf. The gray wolf is a Region 4 sensitive species. The general wildlife analysis area is within the McCall-Weiser wolf management zone.

Black bear. Black bear typically occupy riparian habitats and mixed conifer-hardwood forests with fallen logs and standing snag trees. They primarily den under fallen trees or within tree cavities. Due to wildfires, there is a large amount of tree snags and downed logs in the general wildlife analysis area that could serve as potential denning habitat. They are known to occur within the general wildlife analysis area; multiple black bears have been observed by Perpetua staff and consultants, primarily along roadsides and in riparian areas of the EFSFSR. Home ranges in Idaho range from 1,660 to 13,030 hectares (NatureServe 2017). Portions of the general wildlife analysis area are within legal black bear hunting units.

Moose. Moose are the largest members of the deer family, and their population is secure in Idaho (NatureServe 2017). Like elk, they may make short elevational migrations between summer and winter ranges depending on depth of snow (NatureServe 2017). Moose require waterbodies for foraging in summer; summer habitat includes riparian areas, forested wetlands, shrub thickets, and bogs. Winter habitat usually includes mixed hardwood-conifer forests and old growth forests for thermal cover. Several moose have been observed within the general wildlife analysis area, mainly along roadsides during winter or crossing the road near riparian areas of the EFSFSR. Portions of the general wildlife analysis area are within legal moose hunting units.

Mountain lion. Mountain lion, also called pumas or cougars, have been observed within the general wildlife analysis area by Perpetua staff. They have been seen along roadsides and near riparian areas of the EFSFSR. They are unlikely to den within the general wildlife analysis area due to lack of suitable terrain, but they probably hunt on the property. The property is in the McCall and Warren mountain lion data analysis units. Portions of the general wildlife analysis area are within legal mountain lion hunting units.

4.0 BIG GAME SPECIES

Big game species (as defined by PNF and BNF Forest Plans) that are expected to be present and have habitat within the Project area include Rocky Mountain elk (*Cervus canadensis*), mule deer (*Odocoileus hemionus*), and white-tailed deer (*Odocoileus virginianus*).

Rocky Mountain elk. Rocky Mountain elk are found year-round within the Project area and use a variety of habitats. Some basic habitat components, such as the availability of food and water, are important throughout the year, and others are seasonally important. During temperature extremes, thermal cover or vegetation modifying the effects of temperature may be important. Habitats located on gentle terrain and providing a mix of lush vegetation and adjacent cover are important during the calving period. Elk also use wallow areas (typically wet meadows, stream headwater areas, and seepage areas) prior to and during the autumn breeding season. Damp soils near wallows also may contain an abundance of natural minerals and may serve as lick sites for elk in the spring and summer months. Security areas (i.e., dense vegetation and screening cover) become increasingly important during the hunting season, providing some escape from the pressures and stress of hunting season (Forest Service 2017c). Mixed aspen-conifer stands are important for calving and security cover (IDFG 2014), although there is little aspen forest in the general

wildlife analysis area. Rowland et al. (2005) analyzed several research papers on elk security cover and found that in Montana, elk security areas should be at least 250 acres in size and located more than 0.5 mile away from roadways to provide a reasonable level of survival.

Food habits of elk are variable and depend on the plant species available in the habitat they are occupying. Forage preferences vary between seasons and years and appear to be strongly related to availability and phenology of plants, both of which are influenced by weather conditions. When both grasses and shrubs are available, elk usually prefer grasses. When grasses are not available, shrubs are used, and conifers and arboreal lichens may be consumed on forested winter ranges during deep snow periods. Grass comprises a high component of spring and summer diets following green-up. As grasses dry and mature, elk use shifts to forbs and woody plants. In the PNF, vegetative communities that could provide potential habitat conditions include all forest, woodland, and non-forested vegetation types (Forest Service 2017c).

Mule deer. Key forage species for mule deer are provided by early-seral plant communities where a variety of forage is available to meet energy demands throughout the year. The window of forage production typically follows a disturbance event (e.g., logging, fire, grazing, and insect/disease) by 3 to 10 years. Mule deer are primarily browsers, feeding on leaves, stems, and shoots of woody plants throughout the year. They are frequently viewed as a shrub-dependent species; however, shrub habitats do not provide the full spectrum of plants needed to support the species. Forbs and grasses are sought out during the spring green-up, a period when winter-stressed deer need good forage as soon as possible (Forest Service 2017c).

White-tailed deer. White-tailed deer are a big game species of low population densities in the PNF. White-tailed deer are habitat generalists and are expected to occur in the general wildlife analysis area as they have suitable habitat. Key forage for white-tailed deer is provided by early- seral plant communities where a variety of forage is available to meet the energy demands throughout the year. White-tailed deer are primarily browsers feeding on leaves, stems, and shoots of woody plants throughout the year; however, forbs and grasses are consumed during the spring green-up. Portions of the general wildlife analysis area are within legal white-tailed deer hunting units. The general wildlife analysis area is located in Big Game Management Units 24 and 25.

Table 2 General Wildlife Species Potentially Present in the General Wildlife Analysis Area

MAMMALS				REPTILES		AMPHIBIANS	
Scientific Name	**Common Name**	**Scientific Name**	**Common Name**	**Scientific Name**	**Common Name**	**Scientific Name**	**Common Name**
Antrozous pallidus	Pallid bat	*Myotis volans*	Long-legged myotis	*Charina bottae*	Rubber boa	*Ambystoma macrodactylum*	Long-toed salamander
Callospermophilus lateralis	Golden-mantled ground squirrel	*Myotis yumanensis*	Yuma myotis	*Crotalus viridis*	Prairie rattlesnake	*Anaxyrus boreas*	Western toad
Eptesicus fuscus	Big brown bat	*Neotoma cinerea*	Bushy-tailed wood rat	*Pituophis catenifer*	Gopher snake	*Ascaphus montanus*	Rocky Mountain tailed frog
Erethizon dorsatum	Porcupine	*Ochotona princeps*	American pika	*Plestiodon skiltonianus*	Western skink	*Dicamptodon aterrimus*	Idaho giant salamander
Glaucomys sabrinus	Flying squirrel	*Ondatra zibethicus*	Muskrat	*Thamnophis elegans*	Terrestrial garter snake	*Pseudacris maculata*	Boreal chorus frog
Lasionycteris noctivagans	Silver-haired bat	*Peromyscus maniculatus*	Deer mouse	*Thamnophis sirtalis*	Common garter snake		
Lasiurus cinereus	Hoary bat	*Phenacomys intermedius*	Heather vole				
Lepus americanus	Snowshoe hare	*Procyon lotor*	Raccoon				
Lepus townsendii	White-tailed jackrabbit	*Sorex monticolus*	Dusky shrew				
Lontra canadensis	River otter	*Sorex vagrans*	Vagrant shrew				
Marmota flaviventris	Yellow-bellied marmot	*Spilogale gracilis*	Western spotted skunk				
Martes americana	American marten	*Sylvilagus nuttallii*	Mountain cottontail				
Mephitis	Striped skunk	*Tamias amoenus*	Yellow-pine chipmunk				
Microtus longicaudus	Long-tailed vole	*Tamiascurus hudsonicus*	Red squirrel				
Microtus montanus	Montane vole	*Taxidea taxus*	American badger				
Myodes gapperi	Southern red-backed vole	*Thomomys talpoides*	Northern pocket gopher				
Myotis evotis	Long-eared myotis	*Urocitellus columbianus*	Columbian ground squirrel				
Myotis lucifugus	Little brown bat	*Vulpes*	Red fox				
Myotis thysanodes	Fringed myotis	*Zapus princeps*	Western jumping mouse				

BIRDS							
Scientific Name	**Common Name**	**Scientific Name**	**Common Name**	**Scientific Name**	**Common Name**	**Scientific Name**	**Common Name**
Accipiter cooperii	Cooper's hawk	*Colaptes auratus*	Northern flicker	*Melospiza melodia*	Song sparrow	*Setophaga petechia*	Yellow warbler
Accipiter striatus	Sharp-shinned hawk	*Columba livia*	Rock dove	*Myadesites townsendi*	Townsend's solitaire	*Setophaga townsendi*	Townsend's warbler
Aegolius acadicus	Northern saw-whet owl	*Contopus cooperi*	Olive-sided flycatcher	*Nucifraga columbiana*	Clark’s nutcracker	*Sialia currucoides*	Mountain bluebird
Aeronautes saxatalis	White-throated swift	*Contopus sordidulus*	Western wood-pewee	*Oporornis agilis*	Connecticut warbler	*Sialia mexicana*	Western bluebird
Anas crecca	Green-winged teal	*Corvus corax*	Common raven	*Oreothlypis celata*	Orange-crowned warbler	*Sitta canadensis*	Red-breasted nuthatch
Anas discors	Blue-winged teal	*Cyanocitta stelleri*	Steller's jay	*Oreothlypis ruficapilla*	Nashville warbler	*Sitta carolinensis*	White-breasted nuthatch
Anas platyrhynchos	Mallard	*Dendragapus obscurus*	Dusky grouse	*Passerella iliaca*	Fox sparrow	*Sitta pygmaea*	Pygmy nuthatch
Anas strepera	Gadwall	*Empidonax hammondii*	Hammond's flycatcher	*Perisoreus canadensis*	Gray jay	*Sphyrapicus nuchalis*	Red-naped sapsucker
Asio flammeus	Short-eared owl	*Empidonax oberholseri*	Dusky flycatcher	*Pheucticus melanocephalus*	Black-headed grosbeak	*Sphyrapicus thyroideus*	Williamson's sapsucker
Asio otus	Long-eared owl	*Empidonax occidentalis*	Cordilleran flycatcher	*Picoides arcticus*	Black-backed woodpecker	*Spinus pinus*	Pine siskin
Bombycilla cedrorum	Cedar waxwing	*Empidonax traillii*	Willow flycatcher	*Picoides pubescens*	Downy woodpecker	*Spinus tristis*	American goldfinch
Bonasa umbellus	Ruffed grouse	*Falcipennis canadensis*	Spruce grouse	*Picoides villosus*	Hairy woodpecker	*Spizella breweri*	Brewer's sparrow
Bubo virginianus	Great horned owl	*Glaucidium gnoma*	Northern pygmy-owl	*Pinicola enucleator*	Pine grosbeak	*Spizella passerina*	Chipping sparrow
Buteo jamaicensis	Red-tailed hawk	*Haemorhous cassinii*	Cassin's finch	*Pipilo maculatus*	Spotted towhee	*Strix varia*	Barred owl
Cathartes aura	Turkey vulture	*Ixoreus naevius*	Varied thrush	*Piranga ludoviciana*	Western tanager	*Tachycineta bicolor*	Tree swallow
Catharus fuscescens	Veery	*Junco hyemalis*	Dark-eyed junco	*Poecile atricapillus*	Black-capped chickadee	*Tachycineta thalassina*	Violet-green swallow
Catharus guttatus	Hermit thrush	*Loxia curvirostra*	Red crossbill	*Poecile gambeli*	Mountain chickadee	*Troglodytes aedon*	House wren
Catharus ustulatus	Swainson's thrush	*Loxia leucoptera*	White-winged crossbill	*Regulus calendula*	Ruby-crowned kinglet	*Turdus migratorius*	American robin
Certhia americana	Brown creeper	*Megaceryle alcyon*	Belted kingfisher	*Regulus satrapa*	Golden-crowned kinglet	*Vireo cassinii*	Cassin's vireo
Chaetura vauxi	Vaux's swift	*Megascops kennicottii*	Western screech-owl	*Selasphorus calliope*	Calliope hummingbird	*Vireo gilvus*	Warbling vireo
Chordeiles minor	Common nighthawk	*Melanerpes lewis*	Lewis's woodpecker	*Selasphorus rufus*	Rufous hummingbird	*Vireo olivaceus*	Red-eyed vireo
Cinclus mexicanus	American dipper	*Meleagris gallopavo*	Wild turkey	*Setophaga coronata*	Yellow-rumped warbler	*Zonotrichia leucophrys*	White-crowned sparrow
Coccothraustes vespertinus	Evening grosbeak	*Melospiza lincolnii*	Lincoln's sparrow				

Source: IDFG 2017a

5.0 LIFE HISTORY AND HABITAT DESCRIPTIONS

The species in **Table 3** are listed by the PNF and BNF as threatened (T), endangered (E), proposed (P), candidate (C), Regional Forester's Sensitive Species (S); Management Indicator Species (MIS); or Big Game (BG).

Table 3 Listed and Sensitive Wildlife Species in Project Area

Scientific Name	Common Name	Status on PNF	Status on BNF	Source Habitat Family	Analyzed in the Wildlife and Wildlife Habitat Specialist Report
Picoides albolarvatus	White-headed woodpecker	S/MIS	S/MIS	Family 1 – Low Elevation Old Forest	Yes
Picoides tridactylus	American three-toed woodpecker	S	S	Family 2 – Broad Elevation Old Forest	Yes
Aegolius funereus	Boreal owl	S	S	Family 2 – Broad Elevation Old Forest	Yes
Martes pennanti	Fisher	S	S	Family 2 – Broad Elevation Old Forest	Yes
Otis flammeolus	Flammulated owl	S	S	Family 2 – Broad Elevation Old Forest	Yes
Strix nebulosa	Great gray owl	S	S	Family 2 – Broad Elevation Old Forest	Yes
Accpiter gentilis	Northern goshawk	S	S	Family 2 – Broad Elevation Old Forest	Yes
Dryocopus pileatus	Pileated woodpecker	MIS	MIS	Family 2 – Broad Elevation Old Forest	Yes
Picoides arcticus	Black-backed woodpecker	N/A	MIS	Family 2 – Broad Elevation Old Forest	Yes
Lynx canadensis	Canada lynx	T	T	Family 3 – Forest Mosaic	Yes
Gulo	Wolverine	P	P	Family 3 – Forest Mosaic	Yes
Oreortyx pictus	Mountain quail	S	S	Family 3 – Forest Mosaic	Yes
Passerina amoena	Lazuli bunting	N/A	N/A	Family 4 – Early-seral Montane and Lower Montane	Not in Project area
Canis lupus	Gray wolf	S	S	Family 5 – Forest and Range Mosaic	Yes
Falco peregrinus	Peregrine falcon	S	S	Family 5 – Forest and Range Mosaic	Yes
Ovis canadensis	Rocky Mountain bighorn sheep	S	S	Family 5 – Forest and Range Mosaic	Yes

Scientific Name	Common Name	Status on PNF	Status on BNF	Source Habitat Family	Analyzed in the Wildlife and Wildlife Habitat Specialist Report
Cervus canadensis	Rocky Mountain elk	BG	Listed / no designation	Family 5 – Forest and Range Mosaic	Yes
Odocoileus hemionus	Mule deer	BG	Listed / no designation	Family 5 – Forest and Range Mosaic	Yes
Euderma maculatum	Spotted bat	S	S	Family 7 – Forests, Woodlands, and Sagebrush	Yes
Corynorhinus townsendii	Townsend's big-eared bat	S	S	Family 7 – Forests, Woodlands, and Sagebrush	Yes
Danaus plexippus	Monarch butterfly	C	C	Family 7 – Forests, Woodlands, and Sagebrush	Yes
Sialia mexicana	Western bluebird	N/A	N/A	Family 8 – Rangeland and Early- and Late-Seral Forest	Not in Project area
Centrocercus urophasianus	Greater sage-grouse	S	S	Family 11 – Sagebrush	Not in Project area
Urocitellus brunneus	Northern Idaho ground squirrel	T	T	Family 12 – Grassland and Open-canopy Sagebrush	Yes
Urocitellus endemicus	Southern Idaho ground squirrel	S	S	Family 12 – Grassland and Open-canopy Sagebrush	Not in Project area
Tympanuchus phasianellus	Columbian sharp-tailed grouse	S	S	Family 12 – Grassland and Open-canopy Sagebrush	Not in Project area
Haliaeetus leucocephalus	Bald eagle	S	S	Family 13 – Riverine Riparian and Wetland	Yes
Rana luteiventris	Columbia spotted frog	S	S	Family 13 – Riverine Riparian and Wetland	Yes
Coccyzus americanus	Yellow-billed cuckoo	T	T	Family 13 – Riverine Riparian and Wetland	Not in Project area
Histrionicus histrionicus	Harlequin duck	S	N/A	Family 13 – Riverine Riparian and Wetland	Not in Project area
Gavia immer	Common loon	S	S	Family 14 – Non-riverine Riparian and Wetland	Not in Project area

The life histories and habitat descriptions for each species are organized by Source Habitat Family in the following subsections.

5.1 Family 1 – Low Elevation Old Forest

Species within Family 1 depend on late-seral multi- and single-storied lower montane forests as source habitat and require large diameter (≥21 inches diameter at breast height [dbh]) snags or trees with cavities for nesting or foraging (Wisdom et al. 2000). Habitat is generally depicted as relatively homogeneous

patches of predominantly large trees in lower canopy cover conditions dominated by ponderosa pine (Forest Service 2010, Appendix E). Family 1 source habitat occurs in potential vegetation groups (PVGs) 1, 2, and 5 and those drier habitat types of PVGs 3 and 6 where ponderosa pine is a major seral species (Nutt et al. 2010). Historically, these types were maintained in a relatively open condition by frequent, nonlethal fire.

5.1.1 White-headed Woodpecker (Sensitive/Management Indicator Species)

In Idaho, white-headed woodpeckers are found mainly in open and mature ponderosa pine and mixed ponderosa pine/Douglas-fir forests (Moore and Frederick 1991, Wisdom et al. 2000). A strong correlation exists between white-headed woodpecker presence and large diameter (≥20 inches dbh) live and dead ponderosa pines (i.e., snags) (Blair and Servheen 1995; Dixon 1995a, 1995b, 1998; Moore and Frederick 1991). Densities of white-headed woodpeckers have been shown to increase as old forest ponderosa pine habitat increases (Dixon 1995b). Important source habitat components are an abundance of large diameter ponderosa pine trees with prolific seed production, a relatively open canopy, and availability of snags for nest cavities (Garrett et al. 1996).

On the Forests, vegetative communities that could provide source habitat conditions include PVGs 1, 2, 3, 5, and 6 (Nutt et al. 2010). While the drier habitat types in PVGs 3 and 6 can develop cover types with ponderosa pine in the larger size classes and open canopies, these conditions are not found as commonly as in PVGs 1, 2, and 5. Large diameter snags are an essential habitat feature for white-headed woodpecker.

White-headed woodpecker large tree and old forest source habitat patches should be relatively homogenous with inclusions of smaller tree size classes generally <1 acre in nonlethal fire regimes or inclusions ranging from 1 to 600 acres in mixed1 fire regimes. The amount of area required to support white-headed woodpeckers in fragmented landscape patches is larger than in landscapes with contiguous habitat patches (Dixon 1995a). Median sizes of home ranges in fragmented mixed-conifer habitat have been documented as 845 acres, compared with 523 acres in contiguous ponderosa pine habitat (ibid).

Risks to the species include changes in ecological processes; the loss of live and dead large diameter (>20 inches dbh) ponderosa pine trees and snags; and high road densities. Changes in ecological processes through fire suppression and forest fragmentation of late-seral or old forest stands has resulted in both direct and indirect loss of habitat. Fire suppression encourages the seral replacement of ponderosa pine forests often by Douglas-fir, leading to dense, closed-canopy forest stands avoided by white-headed woodpeckers. Fire suppression also increases the risk of stand-replacing fires that eliminate source habitat. Large diameter live and dead ponderosa pine tree losses are primarily from regeneration harvest methods, uncharacteristic fires, and snag removal. Timber harvest can also fragment source habitat patches (size, distribution, and juxtaposition), diminishing their value to white-headed woodpeckers and potentially isolating populations (Ritter 2000). Lastly, high road densities facilitate human access into forest stands and increase the risk of losing snags for fuelwood (Wisdom et al. 2000). Often, these roads were constructed to facilitate timber harvest, which may have already reduced the densities of large diameter live and dead ponderosa pine trees in these areas.

5.2 Family 2 – Broad Elevation Old Forest

Species in Family 2 use late-seral, multi-, and single-layered stages of the montane community as source habitats (Wisdom et al. 2000). Source habitats for some species also include late-seral stages of the subalpine community or the lower montane community, or both. Source habitat for Family 2 overlaps Family 1 but encompasses a broader array of cover types and elevations than habitats for Family 1 (Wisdom et al. 2000). Family 2 source habitat occurs primarily in PVGs 3 through 11 (Forest Service 2010a, Appendix E), although some species use lower elevation types. Historical fire regimes in Family 2 vary by PVG but are dominated by mixed severity and lethal regimes (Forest Service 2010a, Appendix A). Many species within Family 2, including pileated woodpeckers and northern goshawks, are able to take advantage of departed conditions (Nutt et al. 2010).

Species that comprise Family 2 tend to be habitat generalists that use a wide range of conditions. Many are associated with both the large and medium tree size class forests in moderate- to high-stand canopy conditions. Some Family 2 species can take advantage of PVGs that exhibit uncharacteristically high tree densities and amounts of shade-tolerant tree species that have resulted from fire suppression and/or past management activities. In contrast to Family 1 species, as forest conditions increase in density and shade-tolerant species become more common throughout the landscape, either from suppression of fire or past vegetation management, the quantity and interconnectedness of Family 2 habitat increases.

Source habitats for Family 2 occur in all watersheds on the Forest (Nutt et al. 2010). While there have been declining source habitat trends for some Family 2 focal species assessed at the scale of the Forest, quantities of source habitat have stayed primarily within the historical range of variability. Declining source habitat trends of individual focal species assessed at the Forest scale are attributed in part to management practices that favored removing larger diameter trees (Nutt et al. 2010). Restoration of fire disturbance regimes, natural and managed development of the large tree size class, and management to retain large diameter snags and coarse woody debris would provide for the maintenance and, as needed, restoration of source habitat conditions.

5.2.1 American Three-toed Woodpecker (Sensitive)

American three-toed woodpeckers inhabit mature and overmature stands containing bark beetles, disease, and heart rot (Goggans et al. 1987), and recent stand-replacing burns with abundant woodboring insects (Caton 1996, ; Hutto 1995). Trees with heart rot may be necessary for nest sites (Lester 1980), and the presence of trees affected by insects and diseases is important for a sufficient prey base (Goggans et al. 1987). Foraging has been described on dead trees averaging 9 inches dbh (Bull et al. 1986) and 15.5 inches dbh (Goggans et al. 1989). Although these tree sizes are not the larger diameter classes typically found in late-seral old forests, studies have found that use of these 9- to 15-inch-diameter trees for nesting and foraging is not occurring in mid-seral stands consisting of mostly trees in this size range but rather in late-seral forest where dead and dying trees in the 9- to 15-inch range occur within a matrix of larger, dense trees. Late-seral old forest would be expected to have higher incidences of heart rot or disease or to have the early stages of decay present (Goggans et al. 1989; Bull et al. 1986). Three-toed woodpecker populations typically peak during the first 3 to 5 years after a fire. Home range size for this species is highly variable (Leonard 2001); three radio-tagged birds in central Oregon had home ranges of 131, 363, and 751 acres (Goggans et al. 1987). An average of these documented home range sizes, 415 acres, was used for this analysis.

On the Forests, vegetative communities that could provide source habitat conditions include PVGs 8, 9, 10, and 11 in the medium and large tree size classes and with moderate or high canopy cover (Nutt et al. 2010). PVG 5 can also provide source habitat when outside of the HRV. Mountain pine beetle infestations and/or high intensity fire events are primary recycling agents in these PVGs; both are disturbances associated with three-toed woodpecker habitat and population irruptions. Snags are a special habitat feature for three-toed woodpeckers and provide nesting and foraging opportunities.

5.2.2 Boreal Owl (Sensitive)

Source habitat for boreal owls includes old forest and unmanaged young-forest stages of subalpine and montane forests and riparian woodlands (Wisdom et al. 2000). Specific cover types and structural stages that provide source habitat are the old forest, multi-story stages of Engelmann spruce–subalpine fir, Pacific silver fir–mountain hemlock, and aspen and the old forest single- and multi-story stages of interior Douglas-fir, western larch, and lodgepole pine. Unmanaged young-forest stages of all these cover types and of grand fir–white fir also serve as source habitats if suitable large-diameter snags are present. Source habitats typically support abundant lichens and fungal sporocarps, which provide important foods for southern red-backed voles, the principal prey of boreal owls (Hayward 1994). These lichens and fungi are associated with coarse woody debris. Boreal owls are secondary cavity nesters and readily use artificial nest boxes and structures. The nesting period for boreal owl is March through mid-July (Hayward et al. 1993). Home ranges average 3,586 acres in size (Hayward and Hayward 1993).

On the Forests, PVGs 3, 4, 7, 8, 9, and 11 in the medium and large tree size classes and moderate or high canopy cover classes could provide source habitat conditions (Nutt et al. 2010). These types are capable of exhibiting tree species compositions and structural characteristics consistent with descriptions of boreal owl nesting habitat in literature. Snags and down wood, for nest sites and prey habitat, are special habitat features for the boreal owl. In Idaho, occupied forests are generally located above 5,000 feet in elevation.

5.2.3 Fisher (Sensitive)

The diverse diet of the fisher probably requires a mix of forest habitat types to provide optimal foraging conditions (Arthur et al. 1989). In the Rocky Mountains, fishers show a preference for late-seral coniferous forests (Jones and Garton 1994). Late-seral forests are used preferentially during summer months while early- or late-seral forests may be used in winter (Jones 1991). In Idaho and Montana, mesic forest habitats at low or mid elevations are important fisher habitat (Heinemeyer 1993; Jones 1991). Deep snow accumulation appears to limit fisher movements and distribution (Arthur et al. 1989; Aubry and Houston 1992; Heinemeyer 1993). Fisher tend to select forested stands with relatively high canopy cover, although tree cover may be discontinuous (Aubry and Houston 1992; Buskirk and Powell 1994). Riparian corridors provide important travel routes and prey patches for fisher. The high canopy cover and structural complexity of riparian habitat support relatively abundant and diverse populations of prey (small mammals and birds). The fisher denning period typically occurs from March through early-to-mid June, during which the kits are moved from the natal to a maternal den site (Powell and Zielinski 1994). Fisher home ranges in Idaho average 20,400 acres for males (range of 7,140–29,500 acres) and 10,100 acres for females (range of 1,260–10,100 acres) (Jones 1991; Heinemeyer 1993).

On the Forests, vegetative communities that could provide source habitat conditions include PVGs 3, 6, 8, 9, and 10 in medium and large tree size classes and moderate or high canopy cover classes (Nutt et al.

2010). These PVGs have the capability to develop mesic, old forest, multi-layer conditions with moderate and high canopy closures that would provide for the structural diversity that is characteristic of fisher source habitat. Special habitat features include riparian corridors (travel, prey patches), down logs (resting and den sites), and snags (resting and den sites).

5.2.4 Flammulated Owl (Sensitive)

Breeding habitat for flammulated owls combines open, mature montane pine forests for nesting, scattered thickets of saplings or shrubs for roosting and calling, and grassland edge habitat for foraging (IDFG 2005; Reynolds and Linkhart 1987; Goggans 1986), which are all necessary across multiple spatial scales (e.g., microhabitat, home range, landscape) (Wright 1996). In Idaho, flammulated owls were documented occupying mid-elevation, old forest or mature stands of open ponderosa pine, Douglas-fir, or stands codominated by both species (Groves et al. 1997). Old forests of ponderosa pine and Douglas-fir are key components of home ranges for flammulated owl (Reynolds and Linkhart 1992), as these forest types apparently support a particular abundance of favored lepidopteran prey (McCallum 1994). Flammulated owls nest in cavities that have been previously excavated in snags and live, large diameter trees (Bull et al. 1990, McCallum and Gehlback 1988). Habitat for flammulated owls is strongly associated with the upper slopes or ridges (Groves et al. 1997; Bull et al. 1990, Barnes 2007). Flammulated owls are obligate cavity nesters (IDFG 2005) and can take advantage of insect irruptions, such as spruce budworm outbreaks (McCallum 1994; O'Neil et al. 2001; Marcot 1997). Home ranges average 31 acres in size (Barnes 2007).

On the Forests, vegetative communities that could provide source habitat conditions include PVGs 2, 3, 5, and 6 in the medium and large tree size classes and moderate canopy cover class (Nutt et al. 2010). These types are most likely to have the habitat types that develop late-seral stages of open forest with stands dominated by ponderosa pine or Douglas-fir, or codominated by both. Historical fire regimes in these PVGs include nonlethal, mixed1, and mixed2 (Forest Plan 2010, Appendix A). Snags are a special habitat feature for flammulated owls and provide nesting sites.

5.2.5 Great Gray Owl (Sensitive)

Great gray owls are year-round residents of the Interior Columbia Basin and occupy source habitats in subalpine and montane forest and woodlands (Wisdom et al. 2000). Great gray owl is a contrast species that requires the juxtaposition of open habitats for foraging with forested habitats for roosting and nesting. They are associated with forested habitats that are near meadows, marshes, bogs, open forests, and herbaceous habitats (Duncan and Hayward 1994). Key forested features include remnant giant- to medium-size trees and snags (15–30 inches dbh) (O'Neil et al. 2001; Marcot 1997; Wisdom et al. 2000). Juvenile great gray owls are flightless and depend on leaning and deformed trees to navigate from forest floors to tree canopies (Bull et al. 1988; Franklin 1988). Great gray owls rely on existing stick nests built by other large birds, natural platforms formed by dwarf mistletoe brooms, broken-topped snags, stumps, and artificial boxes for nesting (Marcot 1997; O'Neil et al. 2001; Duncan and Hayward 1994). The nesting period for the great gray owl is March through mid-July (Munts and Powers 1991). Average winter home range size for this species is 16,630 acres, which includes summer ranges (Bull et al. 1988).

On the Forests, vegetative communities that could provide source habitat conditions include PVGs 3, 7, 8, 9, 10, and 11 in the medium and large tree size classes and low, moderate, or high canopy cover classes

(Nutt et al. 2010). These vegetative communities are capable of developing stand characteristics compatible with great gray owl needs. Historical fire regimes for these PVGs include mixed2 and lethal and can create the juxtaposition of open and forested habitats used by the owls. Snags are a special habitat feature for the species.

5.2.6 Northern Goshawk (Sensitive)

Northern goshawks use a variety of forest ages, structural conditions, and successional stages (Griffith 1993) and are associated with shrubland and grassland habitats. Nest sites are typically located next to the trunk of large diameter trees and in older stands where trees are widely spaced (Hayward and Escano 1989). Deformities (multiple trunks and mistletoe), especially in smaller diameter trees, are used as nest site substrates. Snags are often used as plucking posts. Northern goshawks prefer transitional zones for hunting. Mosaics of forested and open areas and riparian zones are equally important (Griffith 1993). This species is an opportunist and kills a wide diversity of prey, depending on region, season, vulnerability, and availability. Main foods include ground and tree squirrels, rabbits and hares, large passerines, woodpeckers, game birds, and corvids and occasionally reptiles and insects. Prey can be taken in the air or on the ground. The typical nesting home range for northern goshawks is estimated at 5,931 acres and includes three components: nesting, foraging, and post-fledging family areas (Reynolds et al. 1992). Aspect and slope have been found to be important microsite factors for goshawk nesting habitat, as nests are commonly found within northern or eastern aspects and moderate slopes (Reynolds et al. 1982; Hayward and Escano 1989; Moore and Henny 1983; all in Kennedy et al. 2003). The nesting period for the goshawk occurs from late March through early-August (Squires and Reynolds 1997).

On the Forests, source habitat for northern goshawks occurs in all PVGs except 1 and 11 in the medium and large tree size classes and moderate and high canopy cover class (Nutt et al. 2010). PVGs 2 through 9 are capable of developing multi-layered, mature, and late-seral stands with a dense canopy. For some PVGs, such as PVG 6, these conditions occur under historical fire regimes, while other PVGs, such as PVGs 2 and 5, develop these conditions from fire suppression and altered fire regimes. No special habitat features have been identified for northern goshawk.

5.2.7 Pileated Woodpecker (Management Indicator Species)

The pileated woodpecker is a Forest Plan management indicator species (Forest Plan 2010, Appendix E). The species serves a variety of functional roles within the community and is associated with habitat elements used by other species in the family.

Pileated woodpeckers occupy dense deciduous, coniferous, or mixed forests; open woodlands; second-growth forests; and parks and wooded residential areas of towns (NatureServe 2012b). The species prefers habitats with tall, closed canopies and high basal areas. General characteristics of habitat provide opportunities for nesting, roosting, and foraging and include the presence of large diameter trees and snags, multiple canopy layers, decaying wood on the forest floor, and a somewhat moist environment that promotes fungal decay, and ant, termite, and beetle populations to forage upon (NatureServe 2012b). Source habitats for pileated woodpeckers are typically late-seral stages of subalpine and montane community types. Home ranges average 1,006 acres (Bull and Jackson 2011).

On the Forests, vegetative communities that could provide source habitat conditions include PVGs 2, 3, 5, 6, 8, and 9 in the large tree size classes and moderate and high canopy cover class (Nutt et al. 2010). Some PVGs are capable of providing source habitat conditions under historical fire regimes while others do so because of altered fire regimes (i.e., PVGs 2 and 5). Special habitat features for pileated woodpecker include large diameter (>21 inches dbh) snags and hollow live trees for nesting and roosting, and large standing dead and downed trees for foraging.

5.2.8 Black-backed Woodpecker (Management Indicator Species)

Black-backed woodpecker is a Forest Plan management indicator species (Forest Plan 2010, Appendix E). The species was included in this analysis to facilitate Forest Plan monitoring of management indicator species. In addition, the species serves a variety of functional roles within the community and is associated with habitat elements used by other species in the family.

Black-backed woodpeckers are associated with mature, late-seral boreal and montane coniferous forests (NatureServe 2012a). This species is a year-round resident in the Interior Columbia Basin (Wisdom et al. 2000). Source habitats of the black-backed woodpecker include old forest stages of subalpine, montane, and lower montane forest and riparian woodlands (Wisdom et al. 2000). Both managed and unmanaged young-forest stages of lodgepole pine also provide source habitat (Wisdom et al. 2000). Burned conifer forests (Saab and Dudley 1998; Hoffman 1997; Caton 1996; Hutto 1995; Marshall 1992) and other insect-infested forests (Goggans et al. 1988) provide key conditions necessary for both nesting and foraging. Habitat requirements for nesting include mature and old trees affected by disease and heart rot or in early stages of decay (Goggans et al. 1988). This species forages almost exclusive on the larvae of bark beetles and wood-boring beetles (Marshall 1992). Black-backed woodpecker home ranges are approximately 72-131 hectares (175-324 acres) (Dudley and Saab 2007).

On the BNF, vegetative communities that could provide source habitat conditions include PVGs 3, 4, 6, 7, 8, 9, and 10 (Nutt et al. 2010). Historical fire regimes within these PVGs range from mixed to lethal, creating a variety of patch sizes depending on the fire regime (Forest Plan 2010, Appendix A). Source habitat can also occur in recent burned areas (<5 years). Snags are a special habitat feature for black-backed woodpecker. Adequate numbers of snags < 20 inches dbh for nesting and foraging habitat is a key habitat component (Nutt et al. 2010).

5.3 Family 3 – Forest Mosaic

Species within this family tend to be habitat generalists in montane forests. Most species also use subalpine forests, lower montane forests, or riparian woodlands as source habitats. A few species use upland shrub and upland herb communities. Source habitat occurs across all PVGs and structural stages.

The Wildlife Conservation Strategy assessed the condition of source habitats for Family 3 on the BNF. Historically, source habitat occurred in 64 watersheds. Current source habitat estimates indicate that source habitat has declined in 72 percent of watersheds, increased in 5 percent of watersheds, and remained neutral in 23 percent of watersheds. Decreasing trends are tied primarily to the reduction in forests dominated by large trees. Neutral and increasing trends appear to be largely tied to increased stand densities as a result of departed landscapes. Family 3 has been identified as a family of greatest concern due to the effects of negative human interactions.

5.3.1 Canada Lynx (Threatened)

Lynx are typically associated with large tracts of higher elevation boreal or coniferous forest that are often interspersed with rock outcrops, bogs, and thickets. In Idaho, Canada lynx typically inhabit montane and subalpine coniferous forests above 4,000 feet (McKelvey et al. 2000; Ruediger et al. 2000). In central Idaho, primary habitat has been identified as lodgepole pine, subalpine fir, and Engelmann spruce habitat types (Ruediger et al. 2000). Cool, moist Douglas-fir, where interspersed with subalpine forest, also provides habitat (Ruediger et al. 2000).

Source habitats for lynx are provided by most of the coniferous forest structural stages with the exception of old forest, single-storied stands. Riparian woodlands and shrublands are also source habitats. Key components of lynx habitat include denning, foraging, and travel corridors provided by a mosaic of forest habitats (Ruggiero et al. 1994).

Late-seral forests are used for denning and rearing young and for hunting alternative sources of prey (Ruggiero et al. 1999). Relatively small patches of old forest are required for dens, although these areas must be near and connected to high-quality foraging habitat (Koehler and Brittell 1990). Denning habitat is used during parturition and rearing of young until they are mobile. The common component appears to be large amounts of coarse woody debris, either down logs or root wads, which provide escape and thermal cover for kittens. Denning habitat may be found either in older mature forest of conifer or mixed conifer-deciduous types, or in regenerating stands older than 20 years. Denning habitat must be located within daily travel distance of foraging habitat (Ruediger et al. 2000). Habitat quality, as measured by the availability of alternate den sites, appears to be an important factor in kitten survival when disturbance occurs (Ruggiero et al. 1994). Den sites occur primarily on north-to-northeast aspect slopes in mature forest types and are often in large hollow logs, beneath windfall or upturned roots, or in brush piles in dense thickets. Optimal denning stands have minimal human disturbance, are in proximity to foraging areas, and are at least 2.4 acres in size. Late-successional stands also provide refuge from inclement winter weather and drought (Terra-Berns et al. 1998). Denning activities typically occur from early to mid-March through June (Ruggiero et al. 1994).

Foraging habitat supports primary prey (snowshoe hare) and/or important alternate prey (especially red squirrels) that are available to lynx. Lynx primarily forage in early-seral forests and in some mid-seral forests that support high numbers of prey. The highest quality snowshoe hare habitats are those that support a high density of young trees or shrubs (4,500 stems or branches per acre), especially with branches that protrude above the snow levels. These conditions may occur in early successional stands following some type of disturbance or in older forests with a substantial understory of shrubs and young conifer trees. Red squirrel densities tend to be highest in mature cone-bearing forests with substantial quantities of coarse woody debris (Ruediger et al. 2000). Although snowshoe hares are the primary food of lynx throughout its range, they also rely on mice, squirrels, and grouse, especially during summer months (Ruggiero et al. 1994).

Lynx are known to move long distances, but open areas, whether natural or artificial, will discourage use by lynx and disrupt their movements (Ruggiero et al. 1994). Although they will cross openings less than 330 feet wide, they do not hunt in these areas. Travel cover allows for movement of lynx within their home ranges and provides access to denning sites and foraging habitats. In general, suitable travel cover

consists of coniferous or deciduous vegetation 2 feet taller than the average snowfall with a closed canopy that is adjacent to foraging habitat. Most successional stages serve as travel cover, provided they offer vegetative cover in sufficient quantity and arrangement to allow for the movement of lynx. Narrow forested mountain ridges or plateaus may provide a linkage between more extensive areas of lynx habitat. Wooded riparian communities may provide travel cover across otherwise open valley floors between mountain ranges. Linkages may be provided by forest stringers that connect large, forested areas or by low, forested passes that connect subalpine forests on opposite sides of a mountain range (Ruediger et al. 2000).

Home range size varies considerably and usually depends on prey base availability. Typical home range territories across southern Canada and the lower 48 states vary between 15 to 147 square miles (Ruediger et al. 2000). Lynx movement and dispersal distances vary greatly. Documented daily movement distances have varied from 1.6 to 3.2 miles, depending upon prey densities. Exploratory movements, usually in the summer and outside of identified home range boundaries, have varied between 9 and 25 miles. Both adult and sub-adults have been documented making long-distance movements during periods of prey scarcity. Recorded distances have been up to 600 miles (Ruediger et al. 2000).

Existing information on the behavioral responses of lynx toward humans shows that lynx "can tolerate human disturbance and even continued presence" (Ruggiero et al. 1999, p. 280). Other anecdotal reports also suggest that lynx are not displaced by human presence, including moderate levels of snowmobile traffic and ski area activities (Ruediger et al. 2000, pp. 1–13). To date, most investigations of lynx have not shown human presence to influence how lynx use the landscape, but further research is needed on this topic (Ruediger et al. 2000, pp. 2–8).

On the Forests, vegetative communities that could provide source habitat conditions include PVGs 3, 7, 8, 9, 10, and 11 (Nutt et al. 2010). These are the PVGs capable of developing characteristics of source habitat as described in the literature. Down logs and root wads are a special habitat feature for lynx (Wisdom et al. 2000; Ruggiero et al. 1999; Koehler 1990) and provide important natal and maternal denning sites.

5.3.2 Wolverine (Proposed)

Source habitats for wolverine include alpine tundra and all subalpine and montane forests. Within forest types, all structural stages except the closed canopy stem exclusion stage provide source habitat (Wisdom et al. 2000). Primary habitat during winter is mid-elevation conifer forest; summer habitat is subalpine areas associated with high-elevation cirques (Copeland 1996). Summer use of high-elevation habitats is related to the availability of prey and den sites and possibly human avoidance. Lower-elevation forests likely contain the greatest amount of ungulate carrion in winter (Copeland 1996).

Spring snow cover (April 15 to May 14) is the best overall predictor of wolverine occurrence (Aubry et al. 2007). Snow cover during the denning period is essential for successful wolverine reproduction range-wide (Hatler 1989; Magoun and Copeland 1998; Inman et al. 2007). Wolverine dens tend to be in areas of high structural diversity such as logs and boulders with deep snow (Magoun and Copeland 1998; Inman et al. 2007). Reproductive females dig deep snow tunnels to reach the protective structure of logs and boulders where they produce offspring. This behavior presumably protects the vulnerable kits from predation by large carnivores, including other wolverines (Pulliainen 1968, p. 342; Zyryanov 1989, pp. 3-

12), but may also have physiological benefits for kits by buffering them from extreme cold, wind, and desiccation (Pulliainen 1968). All of the areas in the lower 48 states for which good evidence of persistent wolverine populations exists (i.e., Cascades, Sierra Nevada, northern and southern Rockies) contain large and well-distributed areas with deep snow cover that persists through the wolverine denning period (Brock et al. 2007; Aubry et al. 2007).

On the Forests, vegetative communities that could provide source habitat conditions include PVGs 7, 8, 9, 10, and 11 (Nutt et al. 2010). Persistent snow data were used to model wolverine source habitat (Nutt et al. 2010). Special habitat features include deep persistent snow above timberline and den sites (talus slopes, boulder fields, beaver lodges, old bear dens, fallen logs, root wads of fallen trees, large cavities). Denning habitat may be a factor limiting distribution and abundance (Copeland 1996), and wolverines may abandon dens in response to disturbance (Copeland 1996; Magoun and Copeland 1998).

5.3.3 Mountain Quail (Sensitive)

Source habitats for mountain quail include all structural stages, except stem exclusion, of interior Douglas-fir, Sierra Nevada mixed conifer, ponderosa pine (Pacific and interior), and chokecherry-serviceberry-rose (Wisdom et al. 2000). Habitat is characterized by brushy slopes and shrub-dominated communities ranging in elevation from 2,300 to more than 9,850 feet. Mountain quail are most often associated with steep slopes or rugged terrain but this is not always present in occupied habitat (Brennan et al. 1987). Breeding often occurs at high elevations during spring and summer, with migrations to lower elevations generally occurring prior to snowfall. High elevation aspen stands surrounded by sagebrush and riparian habitats associated with forest habitats that have a significant shrub component are also used (Brennan et al. 1987). Fires in source habitat can have a short-term negative impact on source habitat but can promote long-term growth and development of shrub habitats (Gutierrez and Delehanty 1999).

In Idaho, mountain quail distribution appears to be closely associated with riparian shrub habitats (Vogel and Reese 1995). These areas may or may not have a forest canopy associated with them and typically occur along waterways and secondary drainages that are within a few hundred meters of water (Vogel and Reese 1995). Mountain quail require drinking water during hot weather, and juveniles must drink soon after hatching to survive (Brennan et al. 1987). South-facing slopes are arid and dominated by grasses such as bluebunch wheatgrass and Idaho fescue together with several species of forbs. In draws or on north-facing slopes, serviceberry, hawthorn, ninebark, snowberry, and wild rose are common. Moist sites have elderberry, alder, red-osier dogwood, and cottonwood, and higher elevation sites contain ponderosa pine and Douglas-fir (Vogel and Reese 1995).

On the Forests, vegetative communities that could provide source habitat conditions include PVGs 1, 2, 4, 5, 7, and 11 (Nutt et al. 2010). Historical fire regimes are nonlethal in low elevation types (PVGs 1, 2, and 5) and mixed1 or mixed2 in other PVGs. Riparian shrubland is a special habitat feature. In the Interior Columbia Basin, mountain quail are usually found within 100 to 200 meters (328 to 656 feet) of a water source (Brennan 1989).

5.4 Family 4 – Early-seral Montane and Lower Montane

Lazuli bunting is the only member of this family. Lazuli bunting was assigned a separate family because of its unique dependence on early-seral, shrub-dominated conditions in forested environment. Source habitat for the family includes the stand initiation stages of subalpine, montane, lower montane, and riparian woodland communities (Wisdom et al. 2000). Most cover types that serve as source habitat are in the montane community. Source habitat occurs in PVGs 1 through 6 (Nutt et al. 2010). Historical fire regime varies by type and includes nonlethal, mixed1, and mixed2 (Forest Plan 2010, Appendix A). Source habitat also occurs in shrub and grassland communities (ESPs): mountain and Wyoming big sagebrush and montane shrub.

Historically, 60 watersheds supported source habitat for Family 4. These watersheds are broadly distributed across all districts and have a dominant increasing trend (historical to current). This is due to the past timber harvesting in combination with the large-scale stand-replacing wildfires that have occurred over the past three decades. Though these disturbances create growth stages suitable for lazuli bunting, landscape patterns and shrub-herb communities are likely altered from historical conditions.

5.5 Family 5 – Forest and Range Mosaic

Family 5 species use a broad range of forest, woodlands, and rangelands as source habitat (Wisdom et al. 2000). Source habitats occur in all PVGs and structural types, as well as woodland and non-forested types. Human disturbance is a primary factor affecting some species as is altered fire regimes (Wisdom et al. 2000).

5.5.1 Gray Wolf (Sensitive)

The species was recently removed from the list of endangered and threatened species and is currently managed as a big game species in Idaho and is Region 4 Sensitive species for the Forest. Gray wolves utilize a wide array of forested and non-forested habitats. They have large home ranges and make seasonal movements in pursuit of their primary prey (ungulates). The primary threat to wolves is human-caused mortality. Human factors have been the greatest source of documented mortality for wolves in Idaho (Nadeau et al. 2009). Roads, trails, and their associated human use and development increase the potential for human-wolf conflict as does the presence of livestock.

Wolves typically breed during January through March, after which pups are born from March to May. After about 6 to 10 weeks, in late May to early July, the pack leaves the den for rendezvous sites, often meadows adjacent to timbered hillsides (Spahr et al. 1991).

On the Forests, vegetative communities that could provide source habitat conditions include all forest, woodland, and non-forested vegetation types. All structural conditions are used (Nutt et al. 2010). Key features of habitat include sufficient ungulate prey and limited human conflict.

5.5.2 Peregrine Falcon (Sensitive)

Peregrine falcons have historically been cliff nesters in the Interior Columbia River Basin (Pagel 1995), using cliffs from 30 to 400 meters (98 to 1,312 feet) high. Habitat surrounding the cliffs may be variable, ranging from old forests to second growth and sagebrush steppe environments. Common features of nesting habitat include proximity (1,312 to 2,953 feet) to water, abundant avian prey, and lack of human disturbance during the breeding season (Pagel 1995). Although greater distances may be traveled, peregrines usually hunt within 10 miles of their nests with 80 percent of foraging occurring within 1 mile. Major threats that continue to limit populations include eggshell thinning from pesticide contamination and human disturbance at nesting sites that lower reproduction.

Peregrines were once listed as endangered under the Endangered Species Act but were removed from the list in 1999. Pagel (1995) reviewed the status of peregrines in the Columbia River Basin. Major and minor potential threats to peregrines were identified. Major threats were described as continuing concerns to the short- and long-term viability of the population. These included contaminants and disturbance near nest sites. Minor threats were described as potential problems that at the time of the review did not appear to be limiting population recovery. Weather, predation, competition, disease, accidents, falconry, shooting, and prey population declines were identified as minor threats.

On the Forests, vegetative communities that could provide source habitat conditions include all forest and non-forest vegetation types (Miller et al. 2008a). These types provide source habitat when located within 10 miles of suitable cliffs.

5.5.3 Rocky Mountain Bighorn Sheep (Sensitive)

Early explorers and settlers reported that bighorn sheep were quite abundant in Idaho during the 1800s and early 1900s (Smith 1954). Abundant species included both California (*O. c. californiana*) and Rocky Mountain bighorn sheep (*O. c. canadensis*). Human settlement of Idaho in the mid-1800s increased harvest of bighorn sheep and introduced domestic sheep, resulting in a major loss of the species. Disease transmission from domestic sheep to bighorn sheep have resulted in substantial die-offs dating back to the 1870s in the Salmon River Mountains (Smith 1954). Current estimates place bighorn sheep numbers at 10 percent or less of the historical population levels.

Bighorn sheep occupy rugged canyons, foothills, and mountainous terrain at elevations ranging from 1,450 to 10,500 feet and slopes of 45 percent or greater. Key habitat features include steep, rugged escape terrain, such as cliffs and rock slides; grasses and forbs for forage; and limited amount of tall vegetation. Wisdom et al. (2000) describe source habitats for bighorn sheep in alpine, subalpine, upland shrubland, and upland herbland community groups. Alpine and subalpine community groups are primarily summer range and upland herbland and shrubland are used in both seasons, depending on elevation (Wisdom et al. 2000).

On the Forests, PVGs 1, 2, 4, 5, 7, 9, 10, and 11 in all tree size classes and with a low canopy cover provide summer source habitat when this habitat is within 2 miles of rock, cliff, or talus slopes with greater than 27 percent gradient. Winter source habitat is composed of numerous sagebrush-dominated cover types when the canopy cover class is low and these cover types are within 2 miles of rock, cliff, or talus slopes with greater than 27 percent gradient.

5.5.4 Rocky Mountain Elk (Big Game)

Elk were once distributed across most of North America and inhabited all of the major forest and plains plant communities, except the western deserts and the humid ecosystems of the southeastern United States (Skovlin et al. 2002). Elk are considered habitat generalists and are found across the Forests in a variety of habitats. Habitat use and distribution change seasonally and can be generalized by seasonal movements. During the winter, snow forces elk to move to lower elevation winter ranges. Winter ranges are often of mixed ownership and include portions of the Forests as well as other public and private lands. As snows recede, elk follow the spring green-up back to mid- and high-elevation summer ranges located on the Forests.

5.5.5 Mule Deer (Big Game)

Mule deer were described by Christensen et al. (1995) as one of the greatest habitat generalists known to game managers. Mule deer occupy almost every habitat within the Columbia River Basin from agricultural to shrub steppe and virtually every forest type. The same general statement may be made for their occupation of habitats on the forest.

Habitat use and mule deer distribution varies seasonally. Mule deer are migratory and commonly travel distances of 20 to 100 miles from summer to winter range. Winter range is a critical component of mule deer habitat and occurs on the forest primarily in the South Fork Payette and South Fork Boise River drainages. Use of these winter ranges may vary from year to year depending on snow depth and conditions. Snow depths of 18-20 inches will push mule deer to lower elevation ranges, the majority of which are located off forest. Habitats on the forest are most likely occupied by mule deer during the summer months, although some spring and fall transitional ranges also occur on the forest. Spring range is a key component of year-round habitat, and the quality of forage available on these transitional ranges affects production and fawn survival. Summer and fall habitats are important, as this is where deer build up the fat reserves that carry them through the winter months.

On the PNF and BNF, vegetative communities that could provide source habitat conditions include all forest, woodland, and non-forested vegetation types.

5.6 Family 7 – Forests, Woodlands, and Sagebrush

Species in Family 7 use a complex pattern of forest, woodlands, and sagebrush cover types (Wisdom et al. 2000). A distinguishing feature of the family is that most species have specialized requirements for nesting and roosting, which often limits population size and distribution.

5.6.1 Spotted Bat (Sensitive)

Spotted bats are found in a variety of habitats, ranging from desert scrub to montane coniferous forests (IDFG 1995). These bats forage for moths in open habitats. Their distribution appears to be patchy and limited to areas with suitable roost sites. Spotted bats roost predominantly in small crevices in substantial cliff faces (IDFG 1995). Loss of suitable roost sites pose a threat to spotted bats, as does human disturbance at roost sites. Populations are small and are often geographically isolated, which places individual populations at risk of extirpation from human-caused or natural events. The spotted bat has

been known to travel up to 6 miles to forage (Wisdom et al. 2000). It is unknown whether spotted bats are migratory in the Interior Columbia River Basin.

On the Forests, vegetative communities that could provide source habitat conditions include PVGs 1, 2, and 5 and the following non-forest vegetation types: perennial grass slopes, perennial grass montane, mountain and Wyoming big sagebrush, low sagebrush, montane shrub, and shrub-forest transition (Miller et al. 2008b). These types provide source habitat when located within 6 miles of roost sites (cliffs and canyons).

5.6.2 Townsend's Big-eared Bat (Sensitive)

The Townsend's big-eared bat is a year-round resident of the Interior Columbia River Basin and is considered a forest generalist within the subalpine, montane, upland woodland, and riparian woodland community groups (Wisdom et al. 2000). This species uses caves, mines, and buildings for roosting where they aggregate in large colonies. Townsend's big-eared bats forage for moths in sagebrush, bitterbrush, and open ponderosa pine forests. The distribution of this species is patchy due to its specialized roosting requirements. Primary threats are related to human disturbance at, and loss of, roost sites and hibernacula. Townsend's big-eared bats are negatively affected by the presence of roads at roosting sites and hibernacula because of increased potential for harassment of bats (Wisdom et al. 2000). Use of pesticides that would impact Lepidoptera populations can also affect this species by reducing food availability.

On the Forests, vegetative communities that could provide source habitat conditions include PVGs 1, 2, 3, 4, 5, 6, and 7 in all size classes and the low canopy cover class and the following non-forest vegetation types: low sagebrush, mountain and Wyoming big sagebrush, montane shrub, and shrub-forest transition in all size classes and canopy cover classes (Geier-Hayes and Nutt 2008c). These types provide source habitat when located within the maximum foraging distance (15 miles) from roost (caves, mines, and other suitable structures) locations.

5.6.3 Monarch Butterfly (Candidate)

The monarch butterfly is a candidate for listing under the ESA with a wide range across the U.S. In the west each spring, monarchs migrate to the north and east from coastal California toward the Rocky Mountains and Pacific Northwest (USFWS 2020a). This migration may span several generations of monarchs and the Project vicinity is considered part of the species' summer breeding range. While seasonally occupying the area, monarchs often remain near water resources (particularly in arid climates) and are largely dependent on milkweed (*Asclepias spp.*) for reproduction. Western monarchs migrate back to coastal California each fall to overwinter. These populations overwinter in coastal groves of blue gum eucalyptus (*Eucalyptus globulus*), Monterey pine (*Pinus radiata*), and Monterey cypress (*Hesperocyparis macrocarpa*) (USFWS 2020a).

Range-wide, limited monitoring of the monarch butterfly began in the 1980's, although large-scale yearly assessments did not begin until 1997. Since 1997, population counts have generally been declining every year (IDFG 2017a). The primary threats impacting monarchs are habitat loss and fragmentation, loss of milkweed, and intensified weather events that impact monarch populations. Surveys for the monarch butterfly have historically focused on locations of milkweed. Milkweed typically occurs in non-forested

openings along waterways. Monarch and milkweed suitability models have been recently published by the Xerces society (Xerces Society for Invertebrate Conservation 2018). Areas mapped as 'Low Suitability' are typically excluded from project analysis. Floral resources used by monarch butterflies for migration can occur in a broader range of habitats and are not restricted to non-forested vegetation along waterways.

Existing habitat for monarchs on the PNF occurs primarily on the Council and Weiser Ranger Districts, along waterways and where soils are wet, such as wet meadows and ditches. Monarchs only breed where milkweed is present, but they depend on the nectar from various floral resources during migration. It is suspected that monarch presence on the Payette is more closely associated with migration than with breeding, but more data collection and habitat assessment is needed.

While the entirety of wildlife analysis area is within the species range, most milkweeds in Idaho are in the southern portion of the state between Boise and Twin Falls along the Snake River (Waterbury et. al. 2019). Surveys have not occurred in the wildlife analysis area for this species, however, according to the USFWS Monarch Conservation Database, only one acre of milkweed with 21 individual plants has been mapped in Valley County, Idaho where the Project occurs (USFWS 2020b).

5.7 Family 8 – Rangeland and Early- and Late-Seral Forest

The western bluebird is the sole member of this family because its source habitats are a unique combination of woodlands, shrublands, grasslands, and early- and late-seral forests (Wisdom et al. 2000). Source habitats for Family 8 are early-seral and late-seral single-storied montane and lower montane forests, riparian and upland woodlands, and upland shrub and herblands. Burned areas likely also provide source habitat. The juxtaposition of open areas and forests is a necessary component of source habitat. Snags less than 21 inches are a special habitat feature and are used for nesting. Source habitat occurs in PVGs 1, 2, 3, 4, 5, and 6 and in the following ESPs: perennial grass slopes, perennial grass montane, montane shrub, mountain and Wyoming big sagebrush and shrub-forest transition (Miller et al. 2008c).

5.8 Family 11 – Sagebrush

Species in Family 11 use open and closed stages of big sagebrush, low sage, and mountain big sagebrush (Wisdom et al. 2000). Some species also use herbaceous wetlands, antelope bitterbrush-bluebunch wheatgrass, upland woodlands, and salt desert shrub.

5.8.1 Greater Sage-Grouse (Sensitive)

The greater sage-grouse is dependent on sagebrush-grassland vegetation to meet its habitat requirements. Some populations migrate long distances and others do not. Despite wide-ranging annual movements, greater sage-grouse have high fidelity to seasonal ranges for both nesting and wintering, and birds need extensive areas of native sagebrush-grassland year-round. Abundant native grass-forb composition appears to be important within the sagebrush-grassland communities during all life stages in the snow-free season. In summer, shrubs are used for cover, and grass and forbs are used as food along with insects. Forbs and insects are essential nutritional components for chicks. Therefore, early brood-rearing habitat must provide adequate cover adjacent to areas rich in forbs and insects to assure chick survival during this period (mid-May to mid-June) (Connelly et al. 2004). During winter, sagebrush increases in importance

because it protrudes above the snow in wintering areas, and sagebrush leaves are used exclusively as food during the winter and early spring.

On the BNF, vegetative communities that could provide source habitat conditions include mountain and Wyoming big sagebrush, and low sagebrush (Miller et al. 2008d). Special habitat features include native herbaceous understory, access to succulent forbs, large landscape areas, and juxtaposition of habitat (Miller et al. 2008d). Special habitat features include native herbaceous understory, access to succulent forbs, large landscape areas, and juxtaposition of habitat. Greater sage-grouse habitat occurs only at the southern end of the BNF (USDA FS 2010d).

5.9 Family 12 – Grassland and Open-canopy Sagebrush

Species in Family 12 are closely associated with fescue-bunchgrass herblands (Wisdom et al. 2000). Many species also use open-canopied sagebrush communities, with a few using other shrub- and herbland types. Only the northern Idaho ground squirrel occurs on the Cascade Ranger District.

5.9.1 Northern Idaho Ground Squirrel (Threatened)

Northern Idaho ground squirrels are known to occur in shallow, dry, rocky meadows usually associated with deeper, well-drained soils and surrounded by ponderosa pine and Douglas-fir forests at elevations of about 3,000 to 7,500 feet (Evans Mack 2006). Consequently, ponderosa pine/shrub-steppe habitat associated with south-facing slopes less than 30 percent at elevations below 6,000 feet is considered to be potentially suitable habitat (Evans Mack 2006). This species typically emerges in late March or early April (USDI FWS 2003).

The northern Idaho ground squirrel is confined to a small area of Adams and adjacent Valley County, Idaho, and occurs no place else in the world. Most known populations are critically low in numbers and distribution. Evidence suggests that where Columbian ground squirrels exist, northern Idaho ground squirrels have been out-competed (Yensen and Sherman 1997). The replacement of open, park-like forests with dense stands of younger trees has greatly reduced the amount of forage species such as grasses and other forbs. Thus, the current rarity of the northern Idaho ground squirrel is likely a result of limited available sites stemming from both habitat loss from fire exclusion and competition with Columbian ground squirrels (Yensen and Sherman 1997). These factors have isolated northern Idaho ground squirrel to a few meadows that have not yet filled in with trees (Yensen 1991).

Historical population sites (no longer occupied) on or near the BNF include Woods (in Round Valley, approximately 15 miles south of Cascade, Idaho), Cabarton, and Van Wyck (now underneath Cascade Reservoir). The nearest known active population of northern Idaho ground squirrel is a population in Round Valley. The Round Valley population occurs on private land and is considered to be one of the largest currently known populations and the most isolated of populations.

Many active populations of northern Idaho ground squirrel also exist on the PNF. A population was discovered in July 2005 near the Lick Creek Lookout at an elevation of around 7,500 feet, more than 2,000 feet higher than known existing populations. This finding resulted in a broader approach to identifying northern Idaho ground squirrel habitat, and subsequently other small populations were found at higher elevations in the Lick Creek Lookout area.

On the Forests, vegetative communities that could provide source habitat conditions include those associated with grass, forb, and shrub dominated communities in addition to low-density aspen, ponderosa pine, Douglas-fir, and riparian cover types (Nutt and Crist 2008). These vegetative communities provide source habitat when they coincide with slopes <15 percent, aspects between 90 and 290 degrees, and specific soil types (ibid). The northern Idaho ground squirrel habitat model (NIDGS Habitat Model) (ibid) uses 15 cover types and 50 land types in addition to slope and aspect parameters to model potential habitat. This model was used to identify potential source habitat within the Project area.

5.9.2 Southern Idaho Ground Squirrel (Sensitive)

Southern Idaho ground squirrels are found in the lower elevation shrub-steppe habitat of the Weiser River Basin. Adults have a relatively short above-ground active season, lasting only 4 to 5 months (USDI FWS 2002). They inhabit areas dominated by big sagebrush, bitterbrush, and a variety of native forbs and bunchgrasses (Yensen 1991). Southern Idaho ground squirrels prefer areas with a high percentage of native cover types; however, some non-native features may enhance their survival as well, specifically alfalfa fields, haystacks, or fence lines (Prescott and Yensen 1999). On the Forests, habitat (current and historical) occurs only on the Emmett Ranger District.

5.9.3 Columbian Sharp-tailed Grouse (Sensitive)

The Columbian sharp-tailed grouse inhabits sagebrush-grassland and mountain shrub habitats within the Columbia Plateau and Great Basin (Connelly et al. 1998). Breeding habitat consists of dense herbaceous cover and shrubs that allows concealment during activities at lek sites. Food items consist of forbs and grasses, insects, fruits, and flowers during the spring and summer and buds, seeds, herbaceous matter, and fruits during winter. Breeding season occurs from March through July, depending on geographic area.

5.10 Family 13 – Riverine Riparian and Wetland

Source habitat for species in Family 13 occurs in conjunction with riverine riparian and wetland areas. Some species within the family also use non-riverine riparian and wetland habitats. Adjacent forests and woodlands provide nesting sites for some species.

5.10.1 Bald Eagle (Sensitive)

Two key habitats have been identified for bald eagles: the nesting territory and wintering habitat. Nesting territories are typically associated with large rivers, lakes, reservoirs, or ponds that produce fish (Marcot et al. 1997; Buehler 2000). Territories are used in successive years and may include more than one nest site. In the Interior Columbia River Basin Ecosystem Area, nest stands consist primarily of conifer stands with large trees. Bald eagles nest relatively close to water (1.25 miles) with suitable foraging opportunities (Buehler 2000). The majority of nest sites are located within one-half mile of a major stream or water body (USFWS 1986).

Wintering habitat is also typically associated with aquatic habitats with some open water for foraging (Buehler 2000). Winter habitat suitability is defined by food availability, the presence of roost sites that provide protection from inclement weather, and the absence of human disturbance (Buehler 2000). Winter food sources (fish, waterfowl, and ungulate carrion) and their availability varies across bald eagle winter

range. Bald eagles scavenging on carcasses off highways are susceptible to motor-vehicle impact injuries. Bald eagles will tolerate some level of human activity in areas of high prey availability.

Key features of source habitat for the bald eagle include available food resources and suitable sites for nesting and roosting. These features can be correlated with watershed pathways used to assess the conditions of the watershed. The pathways that have relevance to the bald eagle include watershed condition, water quality, channel conditions and dynamics, and flow/hydrology.

5.10.2 Columbia Spotted Frog (Sensitive)

Columbia spotted frogs are aquatic and typically occur in or near permanent bodies of water, such as lakes, ponds, slow-moving streams, and marshes (Gomez 1994). The frogs generally occur along the marshy edges of such sites where emergent vegetation (e.g., grasses, sedges, cattails) is fairly thick and where an ample amount of dead and decaying vegetation exists. Some occupied sites may also have a layer of algae or small vegetation (e.g., duckweed) on the surface of the water. During summer, they may travel away from breeding sites but are still typically associated with aquatic sites with vegetated margins (Gomez 1994). Given the altitudinal range of the species, occupied aquatic sites may be surrounded by a wide variety of terrestrial vegetation, including mixed coniferous and subalpine forests, grasslands, and shrub-steppe communities.

Patla and Keinath (2005) describe three seasonally occupied habitats: breeding, foraging, and over-wintering. Breeding sites are used for egg deposition and larval development. These sites consist of stagnant or slow-moving water with some shallow (3.9 to 7.9 inches deep) water available. Emergent vegetation (sedges) is usually present. Foraging habitat is used by all post-larval stages of frogs for prey acquisition. These sites can occur as ephemeral pools in forests and meadows, intermittent and perennial streams, edges of rivers, riparian zones, and lake margins and marshes. Over-wintering sites provide wet, well-oxygenated habitat that is protected from freezing temperatures. While some sites may be suitable for all three habitats, in many areas, these sites are spatially separated, requiring frogs to migrate between sites within the course of a year.

Key features of source habitat for the Columbia spotted frog include the aquatic site itself, its banks and bank-side vegetation, and the conditions of the surrounding uplands. These features can be correlated with watershed pathways used to assess the conditions of the watershed. The pathways that have relevance to the Columbia spotted frog include watershed condition, water quality, channel conditions and dynamics, and flow/hydrology. No special habitat features have been identified for the Columbia spotted frog.

5.10.3 Yellow-billed Cuckoo (Threatened)

The yellow-billed cuckoo is a rare visitor and breeder in Idaho. The species is associated with large blocks of riparian habitat dominated by an overstory of tall deciduous trees like cottonwoods or within willows adjacent to tall deciduous trees. Fragmentation and loss of this breeding habitat have contributed to the yellow-billed cuckoo's decline, but loss of wintering habitat might also contribute to their diminishing abundance (USFWS 2002). This species is a neotropical migrant that overwinters from Columbia and Venezuela south to northern Argentina. Their breeding season occurs between May and August. In Idaho, they have been sighted primarily in the Snake River Valley (USFWS 2002).

Riparian vegetation is a key feature of source habitat for yellow-billed cuckoos. This feature can be correlated with watershed pathways used to assess the conditions of the watershed. The pathways that have relevance to the yellow-billed cuckoo include channel condition and dynamics, flow/hydrology, and watershed conditions.

5.11 Family 14 – Non-riverine Riparian and Wetland

Source habitat for species in Family 14 occurs in conjunction with non-riverine riparian and wetland areas. Some species within the family also use riverine riparian and wetland areas.

5.11.1 Common Loon (Sensitive)

Common loons breed in clear, oligotrophic (with fish) lakes with forested, tundra, or rocky shorelines, bays, islands, and floating bogs (McIntyre and Barr 1997). Lakes are usually larger than 22 acres in size and below 5,905 feet elevation and support adequate prey fish populations and nesting and nursery habitat. Nest sites are selected that provide shelter from wind, adequate cover, and views of open water. They typically are located near a drop-off steep enough to allow for underwater approaches. Islands, floating bogs, marshes, tops of muskrat houses, logs, and artificial nest platforms are all used for nest sites. The common loon is usually found on large, open lakes where it feeds primarily on live fish that it catches by diving from the surface, routinely to depths of 15 feet and more.

Key features of source habitat for the common loon include the aquatic site itself, its banks and bank-side vegetation, and the conditions of the surrounding uplands (because aquatic site conditions are often correlated with upland conditions). These features can be correlated with watershed pathways used to assess the conditions of the watershed. The pathways that have relevance to the common loon include watershed condition, water quality, channel conditions and dynamics, and flow/hydrology.

Appendix C
Canada Lynx LAU Information

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APPENDIX C - CANADA LYNX LAU INFORMATION

1.0 INTRODUCTION

This appendix provides additional information about the Lynx Analysis Units (LAUs) analyzed for the Midas Gold Idaho, Inc. (Midas Gold) Stibnite Gold Project. USFS identified LAUs through consultation with U.S. Fish and Wildlife Service and they are used to evaluate lynx habitat and effects to lynx within various national forests. An LAU is a subdivision of a national forest, usually based on watersheds, that is used for analysis and management of habitat for Canada lynx (*Lynx canadensis*). LAUs were delineated across the Payette and Boise National Forests (PNF and BNF, respectively) using fifth-level hydrologic unit boundaries, with some using sixth-level hydrologic unit boundaries, where applicable. **Figure C-1** shows the Canada lynx analysis area, which includes approximately 656,493 acres that are defined by the seven LAUs (i.e., Stibnite, Yellowpine, Burntlog, Landmark, Warm Lake, East Mountain, and West Mountain). Each of the LAUs in the Canada lynx analysis area are described in further detail below.

Payette National Forest
Valley County
Adams County
Payette Lake
Little Payette Lake
LICK CREEK RD
Lardo
McCall
55
Lake Fork
Donnelly
Roseberry
Payette National Forest
Boise National Forest
Payette National Forest
Boise National Forest
Lake Cascade
WEST MTN LAU
Adams County
Cascade
Gem County
Valley County
East Fork South Fork Salmon River
Yellow Pine
STIBNITE RD
EAST FORK RD
50674
STIBNITE LAU
YELLOWPINE LAU
Riordan Lake
JOHNSON CREEK RD
440
South Fork Salmon River
Johnson Creek
474
487
BURNTLOG LAU
Warm Lake
WARM LAKE RD
Warm Lake
WARM LAKE RD
WARM LAKE LAU
EAST MTN LAU
Horsethief Reservoir
LANDMARK LAU
447
579
Boise National Forest
Salmon-Challis National Forest
Payette National Forest
50375
51290
Salmon-Challis National Forest
Frank Church-River of No Return Wilderness
Valley County
Custer County

Project Area

LEGEND

Lynx Analysis Unit
- Burntlog LAU
- East Mountain LAU
- Landmark LAU
- Stibnite LAU
- Warm Lake LAU
- West Mountain LAU
- Yellowpine LAU

Other Features
- U.S. Forest Service
- Wilderness
- Stibnite Historic Disturbance
- County
- City/Town
- Railroad
- Highway
- Road
- Stream/River
- Lake/Reservoir

Note:
The McCall – Stibnite Road (CR 50-412) consists of Lick Creek Road, East Fork South Fork Salmon River Road (East Fork Road) and Stibnite Road.

0 2.5 5 Miles
1 inch = 4.5 miles when printed at 11x17

Figure C-1
Canada Lynx Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); Boise National Forest; Payette National Forest; USGS

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2.0 PAYETTE NATIONAL FOREST LAUS

The only LAU within the PNF is the Stibnite LAU. The habitat types within the LAU are described by potential vegetable groups (PVGs). Additionally, USFS identifies suitable habitat and unsuitable habitat for Canada lynx within each LAU, based on habitat types, forest age and structure, and other habitat features.

2.1 STIBNITE LAU

The Stibnite LAU contains 39,678 acres of source habitat capacity, of which 23,880 acres are currently in a suitable condition for lynx (**Table 1; Figure C-2**). The majority of the LAU consists of subalpine fir, lodgepole pine, Douglas-fir, and ponderosa pine. Foraging opportunities are found primarily in mature, multi-storied stands with brush and young trees in the understory. Mature forests with abundant down wood or pockets of down wood provide potential denning habitat.

Multiple fires have burned within the LAU over the past 30 years, which have affected suitable lynx habitat. Burned areas are not expected to provide source habitat for three or more decades post-fire or until regeneration reaches heights and densities to provide cover and food for prey during the winter.

The Stibnite Road and a system of smaller access roads currently occur within the LAU. Roads provide access for a variety of motorized vehicles and human uses during the summer and fall months. Additionally, off-highway vehicle (OHV) routes occur within the LAU, which are popular for winter recreationists participating in both motorized and non-motorized activities.

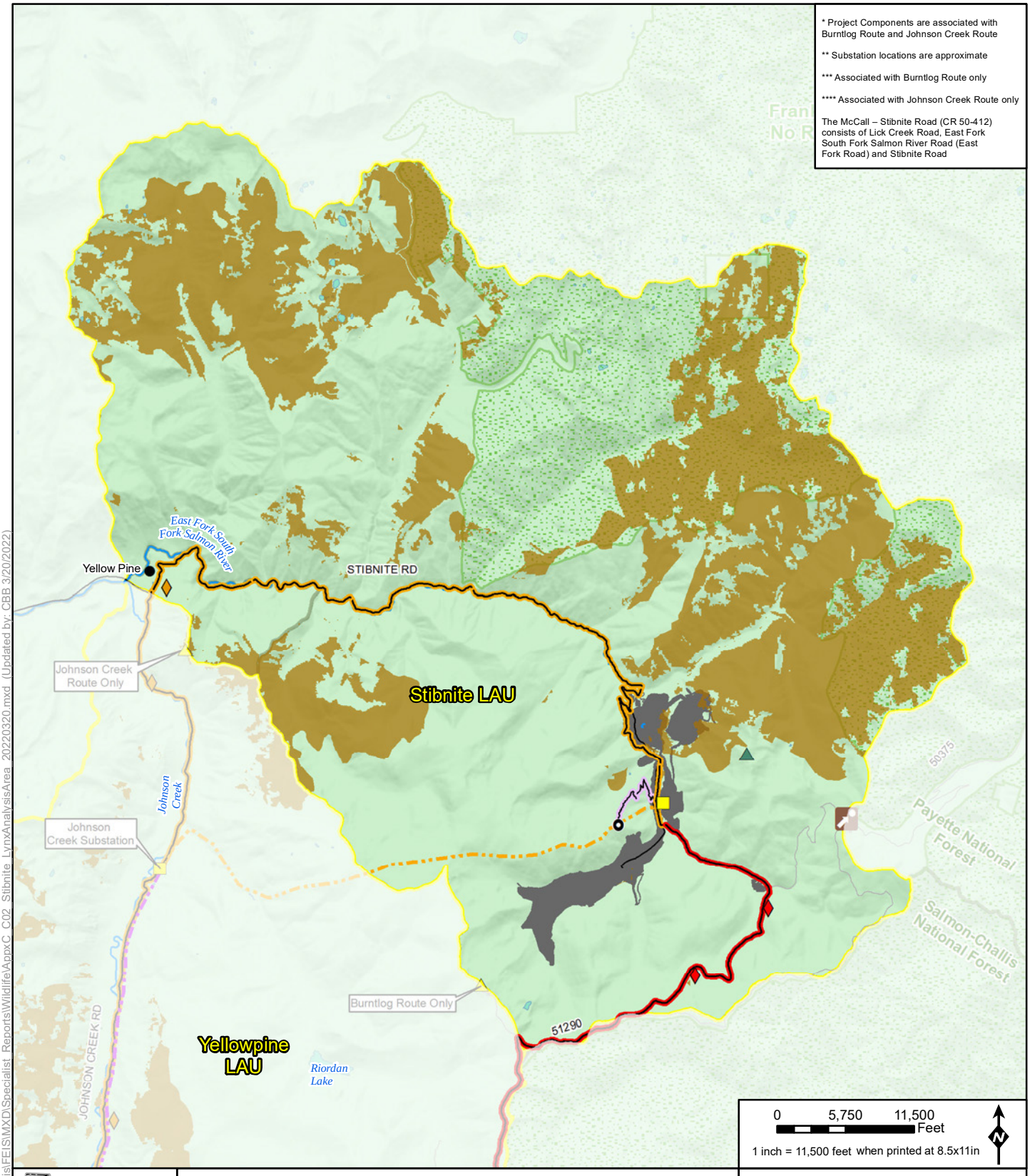
Table 1 Summary of Lynx Habitat for Stibnite LAU

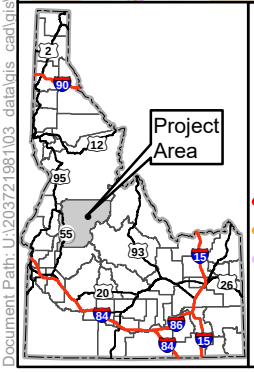
LAU Name	Source Habitat Capacity[1] (acres)	Source Habitat[2] (acres)	Percent Suitable[2]	Percent Unsuitable[2]	Meets Desired Condition[3] Percent Unsuitable is ≤30%
Stibnite	39,678	23,880	60.2%	39.8%	No

[1] Source Habitat Capacity is used interchangeably with 'potential' lynx habitat. This represents the potential vegetation groups (PVGs) that could at some point in successional development provide suitable habitat conditions for Canada lynx.

[2] Based on mid-scale vegetation data updated in July 2017. Source habitat is used interchangeably with 'current' lynx habitat as shown on Figure C-2.

[3] Forest Plan Standard TEST15: Unless a broad-scale assessment has been completed that substantiates different historical levels of unsuitable habitat, limit disturbance within each LAU as follows: If more than 30 percent of lynx habitat within a LAU is currently in unsuitable condition, no additional habitat may be changed to unsuitable habitat as a result of vegetative management projects. Fire use, or fire hazard reduction and associated vegetation management activities within the wildland urban interface watersheds, that develop or maintain fuel profiles needed to reduce the risk of wildfire threats to the wildland urban interface areas, are NOT bound by this standard.





LEGEND

- Current Lynx Modeled Habitat
- Lynx Analysis Unit

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Cell Tower Access Road
- Groomed OSV Route
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities

- New Transmission Line
- Upgraded Transmission Line
- New Substation **
- New Repeater Site
- Existing Communication Tower
- New Cell Tower

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Monumental Summit
- Access Road
- Road
- Stream/River
- Lake/Reservoir

Figure C-2
Stibnite Lynx Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); USGS; Boise National Forest; Payette National Forest

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3.0 BOISE NATIONAL FOREST LAUS

Several LAUs occur within the BNF, which are described in more detail below. The habitats within each LAU are described by PVGs, suitable habitat, and unsuitable habitat for Canada lynx, based on habitat types, forest age and structure, and other habitat features.

3.1 YELLOWPINE LAU

The Yellowpine LAU contains 30,817 acres of source habitat capacity, of which 9,107 acres are currently in a suitable condition for lynx (**Table 2; Figure C-3**). PVGs located along Johnson Creek Road include Douglas-fir and ponderosa pine, while subalpine fir and lodgepole pine occur further away from the roadway. Foraging opportunities are found primarily in mature, multi-storied stands with brush and young trees in the understory. Mature forests with abundant down wood or pockets of down wood provide potential denning habitat.

Currently, 70.5% of the source habitat capacity in the LAU is in an unsuitable habitat condition (**Table 2; Figure C-3**). Multiple fires have burned within the LAU over the past 30 years, which have affected suitable lynx habitat. Burned areas are not expected to provide source habitat for three or more decades post-fire or until regeneration reaches heights and densities to provide cover and food for prey during the winter. As is, the Yellowpine LAU does not meet the desired condition of less than or equal to 30% unsuitable habitat in Forest Plan Standard TEST15.

Johnson Creek Road and Old Thunder Mountain Road are the primary roadways within the LAU. Roads provide access for a variety of motorized vehicles and human uses during the summer and fall months. Additionally, off-highway vehicle (OHV) routes occur within the LAU, which are popular for winter recreationists participating in both motorized and non-motorized activities.

Table 2 Summary of Lynx Habitat for Yellowpine LAU

LAU Name	Source Habitat Capacity[1] (acres)	Source Habitat[2] (acres)	Percent Suitable[2]	Percent Unsuitable[2]	Meets Desired Condition[3] Percent Unsuitable is ≤30%
Yellowpine	30,817	9,107	29.5%	70.5%	No

[1] Source Habitat Capacity is used interchangeably with 'potential' lynx habitat. This represents the potential vegetation groups (PVGs) that could at some point in successional development provide suitable habitat conditions for Canada lynx.

[2] Based on mid-scale vegetation data updated in July 2017. Source habitat is used interchangeably with 'current' lynx habitat as shown on Figure C-3.

[3] Forest Plan Standard TEST15: Unless a broad-scale assessment has been completed that substantiates different historical levels of unsuitable habitat, limit disturbance within each LAU as follows: If more than 30 percent of lynx habitat within a LAU is currently in unsuitable condition, no additional habitat may be changed to unsuitable habitat as a result of vegetative management projects. Fire use, or fire hazard reduction and associated vegetation management activities within the wildland urban interface watersheds, that develop or maintain fuel profiles needed to reduce the risk of wildfire threats to the wildland urban interface areas, are NOT bound by this standard.

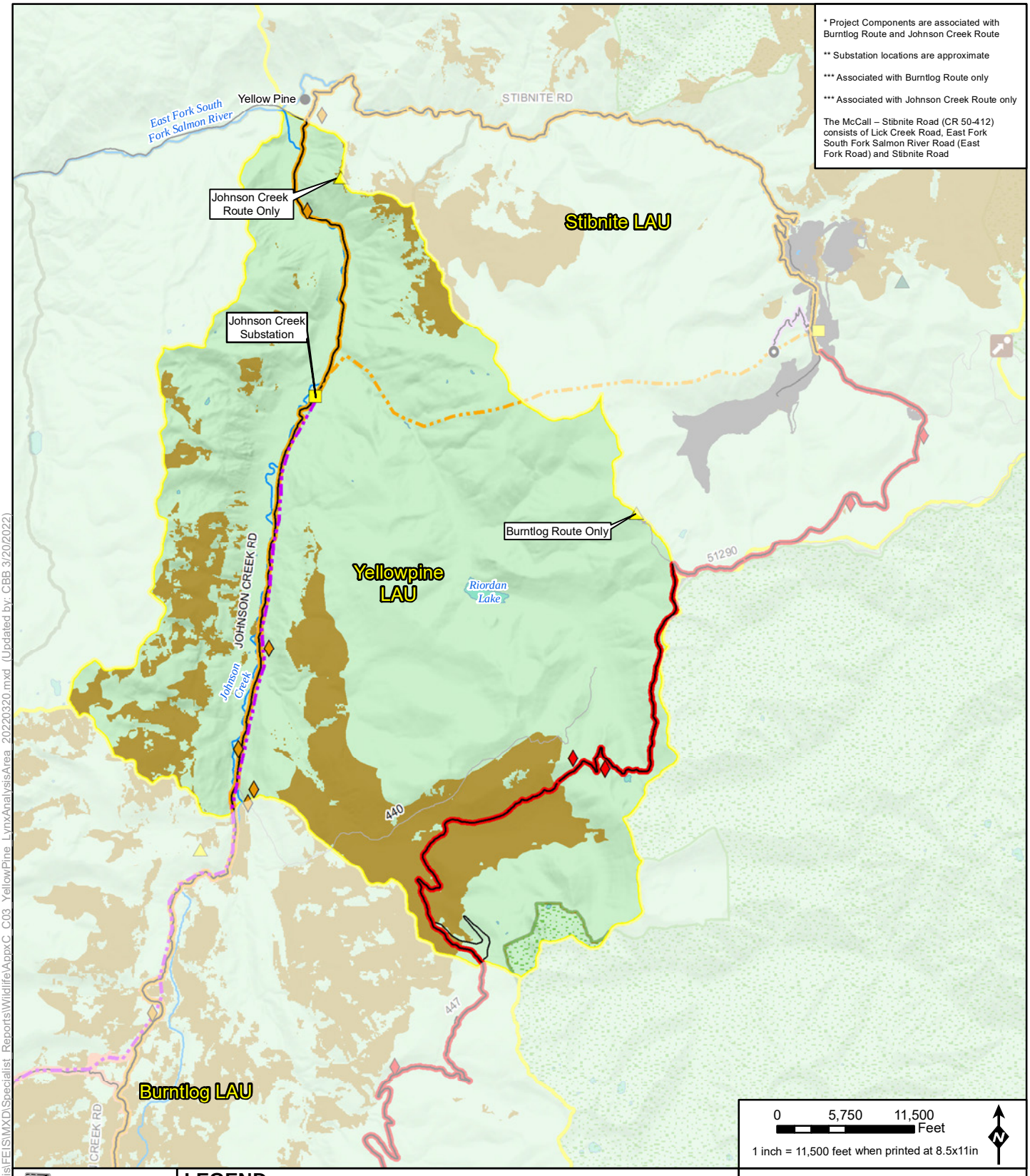

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Figure C-3
Yellowpine Lynx Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); USGS; Boise National Forest; Payette National Forest

3.2 BURNTLOG LAU

The Burntlog LAU contains 34,487 acres of source habitat capacity, of which 15,507 acres are currently in a suitable condition for lynx (**Table 3; Figure C-4**). The majority of the LAU consists of subalpine fir, lodgepole pine, Douglas-fir, ponderosa pine, grand fir, and non-vegetated or non-forested areas. Foraging opportunities are found primarily in mature, multi-storied stands with brush and young trees in the understory. Mature forests with abundant down wood or pockets of down wood provide potential denning habitat.

Currently, 55.0% of the source habitat capacity in the LAU is in an unsuitable habitat condition (**Table 3; Figure C-4**). Multiple fires have burned within the LAU over the past 30 years, which have affected suitable lynx habitat. Burned areas are not expected to provide source habitat for three or more decades post-fire or until regeneration reaches heights and densities to provide cover and food for prey during the winter. As is, the Burntlog LAU does not meet the desired condition of less than or equal to 30% unsuitable habitat in Forest Plan Standard TEST15.

Johnson Creek Road, Old Thunder Mountain Road, and Burntlog Road are the primary roadways within the LAU. Roads provide access for a variety of motorized vehicles and human uses during the summer and fall months. Additionally, groomed oversnow vehicle (OSV) routes occur within the LAU, which are popular for winter recreationists participating in both motorized and non-motorized activities.

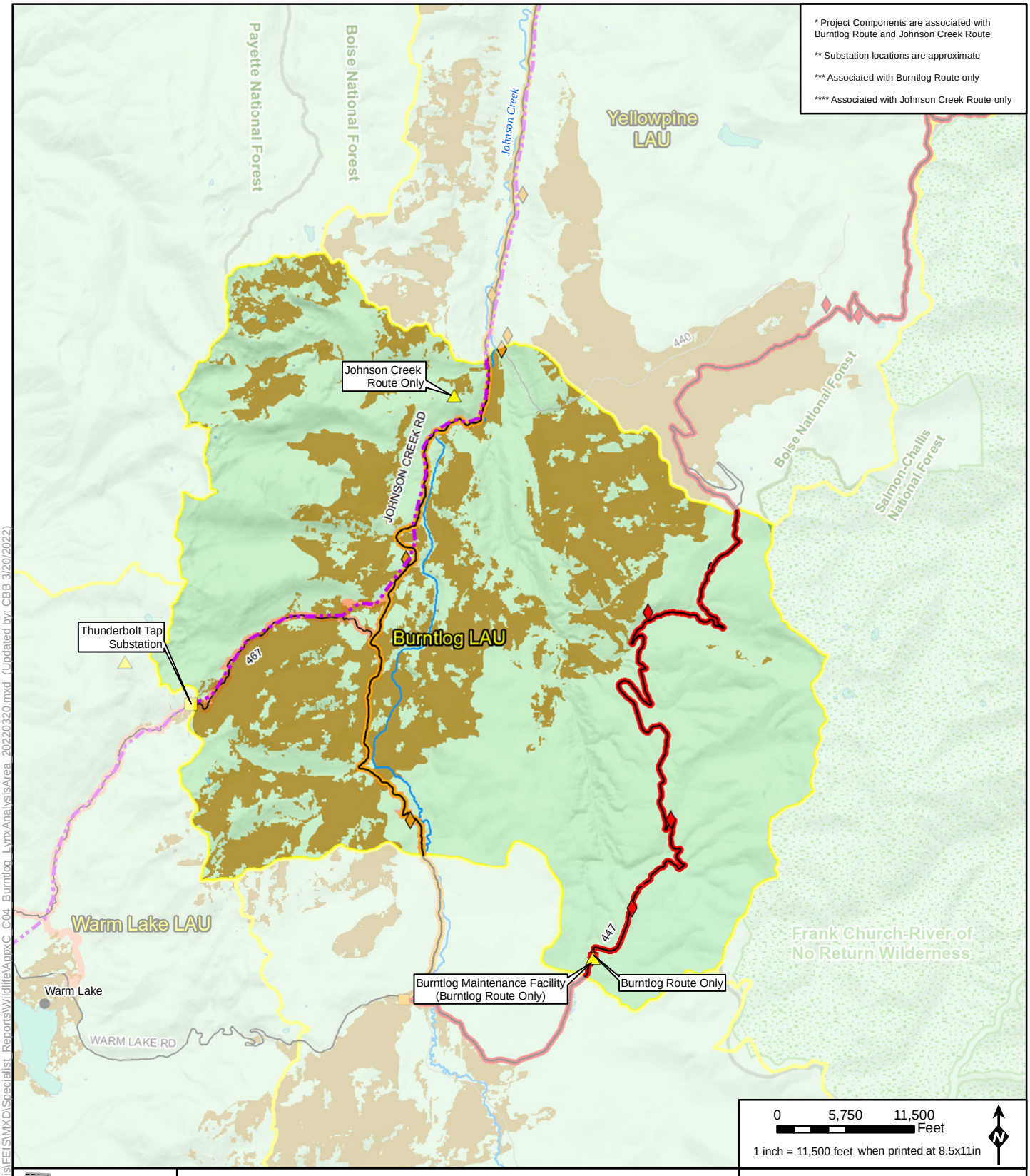
Table 3 Summary of Lynx Habitat for Burntlog LAU

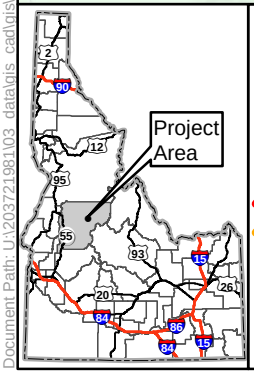
LAU Name	Source Habitat Capacity[1] (acres)	Source Habitat[2] (acres)	Percent Suitable[2]	Percent Unsuitable[2]	Meets Desired Condition[3] Percent Unsuitable is ≤30%
Burntlog	34,487	15,507	45.0%	55.0%	No

[1] Source Habitat Capacity is used interchangeably with 'potential' lynx habitat. This represents the potential vegetation groups (PVGs) that could at some point in successional development provide suitable habitat conditions for Canada lynx.

[2] Based on mid-scale vegetation data updated in July 2017. Source habitat is used interchangeably with 'current' lynx habitat as shown on Figure C-4.

[3] Forest Plan Standard TEST15: Unless a broad-scale assessment has been completed that substantiates different historical levels of unsuitable habitat, limit disturbance within each LAU as follows: If more than 30 percent of lynx habitat within a LAU is currently in unsuitable condition, no additional habitat may be changed to unsuitable habitat as a result of vegetative management projects. Fire use, or fire hazard reduction and associated vegetation management activities within the wildland urban interface watersheds, that develop or maintain fuel profiles needed to reduce the risk of wildfire threats to the wildland urban interface areas, are NOT bound by this standard.





LEGEND

- Current Lynx Modeled Habitat
- Lynx Analysis Unit

Project Components *

- SGP Features

Access Roads & Trail System

- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities

- Upgraded Transmission Line
- New Substation **
- New Repeater Site

Offsite Facilities

- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features

- U.S. Forest Service
- Wilderness
- County
- City/Town
- Access Road
- Road
- Stream/River
- Lake/Reservoir

Figure C-4
Burntlog Lynx Analysis Unit (LAU)
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Midas Gold; State of Idaho Geospatial Gateway (INSIDE Idaho); USGS; Boise National Forest; Payette National Forest

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3.3 LANDMARK LAU

The Landmark LAU contains 35,106 acres of source habitat capacity, of which 7,560 acres are currently in a suitable condition for lynx (**Table 4; Figure C-5**). The northwestern half of the LAU consists of subalpine fir, Douglas-fir, and lodgepole pine, and the southeast half consists of subalpine fir, Douglas-fir, grand fir, and water features. The southeast corner contains the Frank Church River of No Return Wilderness. Foraging opportunities are found primarily in mature, multi-storied stands with brush and young trees in the understory. Mature forests with abundant down wood or pockets of down wood provide potential denning habitat.

Currently, 78.5% of the source habitat capacity in the LAU is in an unsuitable habitat condition (**Table 4; Figure C-5**). Multiple fires have burned within the LAU over the past 30 years, which have affected suitable lynx habitat. Burned areas are not expected to provide source habitat for three or more decades post-fire or until regeneration reaches heights and densities to provide cover and food for prey during the winter. As is, the Landmark LAU does not meet the desired condition of less than or equal to 30% unsuitable habitat in Forest Plan Standard TEST15.

Johnson Creek Road, Burntlog Road, and smaller road systems are the primary roadways within the LAU. Roads provide access for a variety of motorized vehicles and human uses during the summer and fall months. Additionally, groomed oversnow vehicle (OSV) routes occur within the LAU, which are popular for winter recreationists participating in both motorized and non-motorized activities.

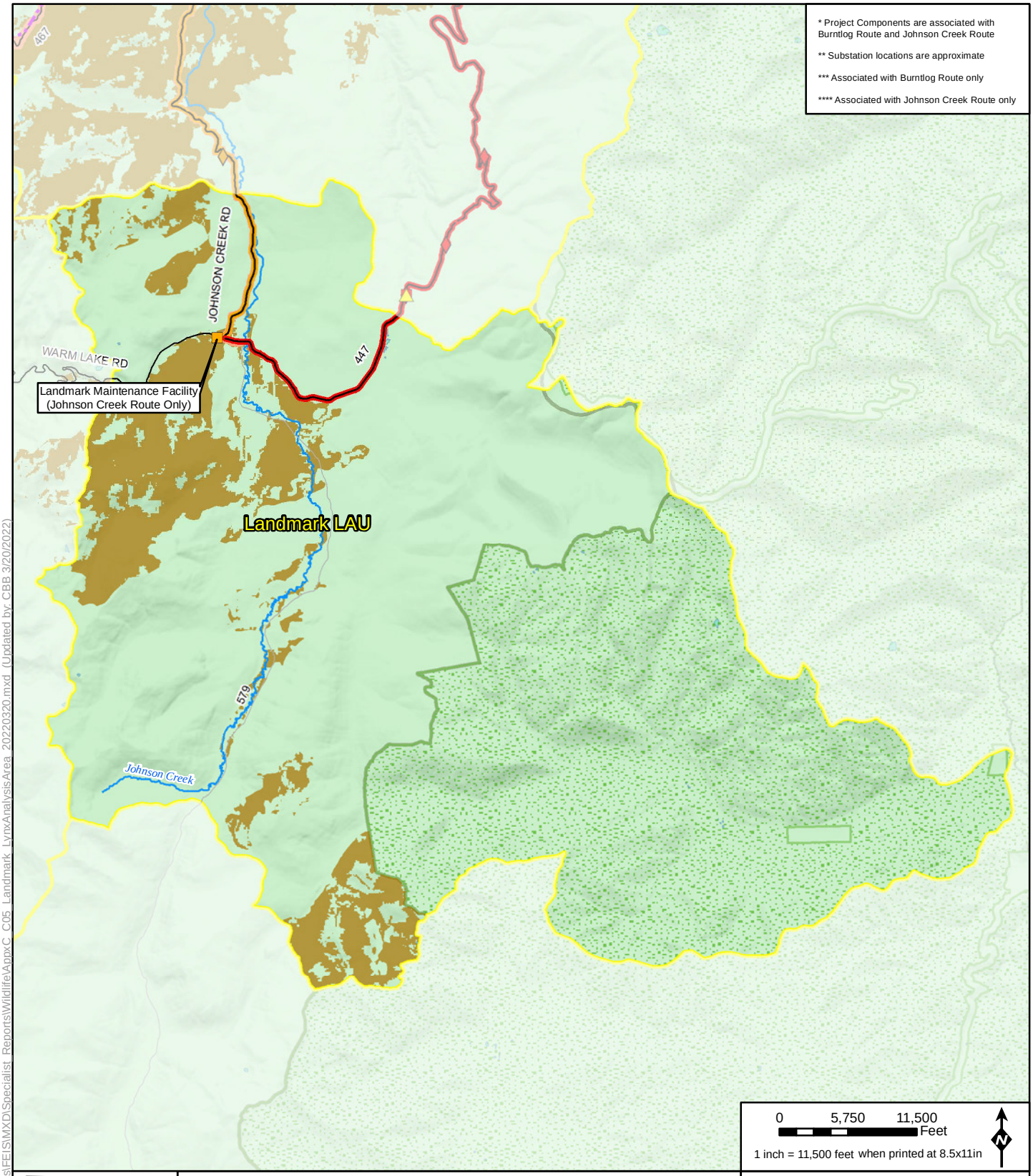
Table 4 Summary of Lynx Habitat for Landmark LAU

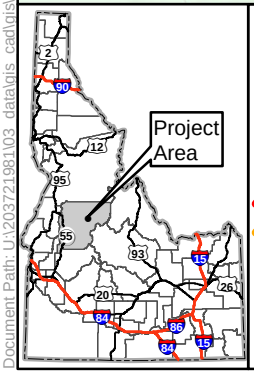
LAU Name	Source Habitat Capacity[1] (acres)	Source Habitat[2] (acres)	Percent Suitable[2]	Percent Unsuitable[2]	Meets Desired Condition[3] Percent Unsuitable is ≤30%
Landmark	35,106	7,560	21.5%	78.5%	No

[1] Source Habitat Capacity is used interchangeably with 'potential' lynx habitat. This represents the potential vegetation groups (PVGs) that could at some point in successional development provide suitable habitat conditions for Canada lynx.

[2] Based on mid-scale vegetation data updated in July 2017. Source habitat is used interchangeably with 'current' lynx habitat as shown on Figure C-5.

[3] Forest Plan Standard TEST15: Unless a broad-scale assessment has been completed that substantiates different historical levels of unsuitable habitat, limit disturbance within each LAU as follows: If more than 30 percent of lynx habitat within a LAU is currently in unsuitable condition, no additional habitat may be changed to unsuitable habitat as a result of vegetative management projects. Fire use, or fire hazard reduction and associated vegetation management activities within the wildland urban interface watersheds, that develop or maintain fuel profiles needed to reduce the risk of wildfire threats to the wildland urban interface areas, are NOT bound by this standard.





LEGEND

- Current Lynx Modeled Habitat
- Lynx Analysis Unit

Project Components *
- SGP Features

Access Roads & Trail System
- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities
- Upgraded Transmission Line
- New Repeater Site
- Existing Communication Tower

Offsite Facilities
- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features
- U.S. Forest Service
- Wilderness
- County
- Access Road
- Road
- Stream/River
- Lake/Reservoir

Figure C-5
Landmark Lynx Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); USGS; Boise National Forest; Payette National Forest

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3.4 WARM LAKE LAU

The Warm Lake LAU contains 32,095 acres of source habitat capacity, of which 1,887 acres are currently in a suitable condition for lynx (**Table 5; Figure C-6**). Lodgepole pine, grand fir, Douglas-fir, and ponderosa pine occur along the South Fork of the Salmon River and South Fork Road, while the remainder of the LAU consists of subalpine fir, lodgepole pine, Douglas-fir, and non-vegetated areas. Foraging opportunities are found primarily in mature, multi-storied stands with brush and young trees in the understory. Mature forests with abundant down wood or pockets of down wood provide potential denning habitat.

Currently, 94.1% of the source habitat capacity in the LAU is in an unsuitable habitat condition (**Table 5; Figure C-6**). Multiple fires have burned within the LAU over the past 30 years, which have affected suitable lynx habitat. Burned areas are not expected to provide source habitat for three or more decades post-fire or until regeneration reaches heights and densities to provide cover and food for prey during the winter. As is, the Warm Lake LAU does not meet the desired condition of less than or equal to 30% unsuitable habitat in Forest Plan Standard TEST15.

South Fork Road, Cabin Creek Road, and smaller road systems are the primary roadways within the LAU. Roads provide access for a variety of motorized vehicles and human uses during the summer and fall months. Additionally, groomed oversnow vehicle (OSV) routes occur within the LAU along Cabin Creek Road, which are popular for winter recreationists participating in both motorized and non-motorized activities.

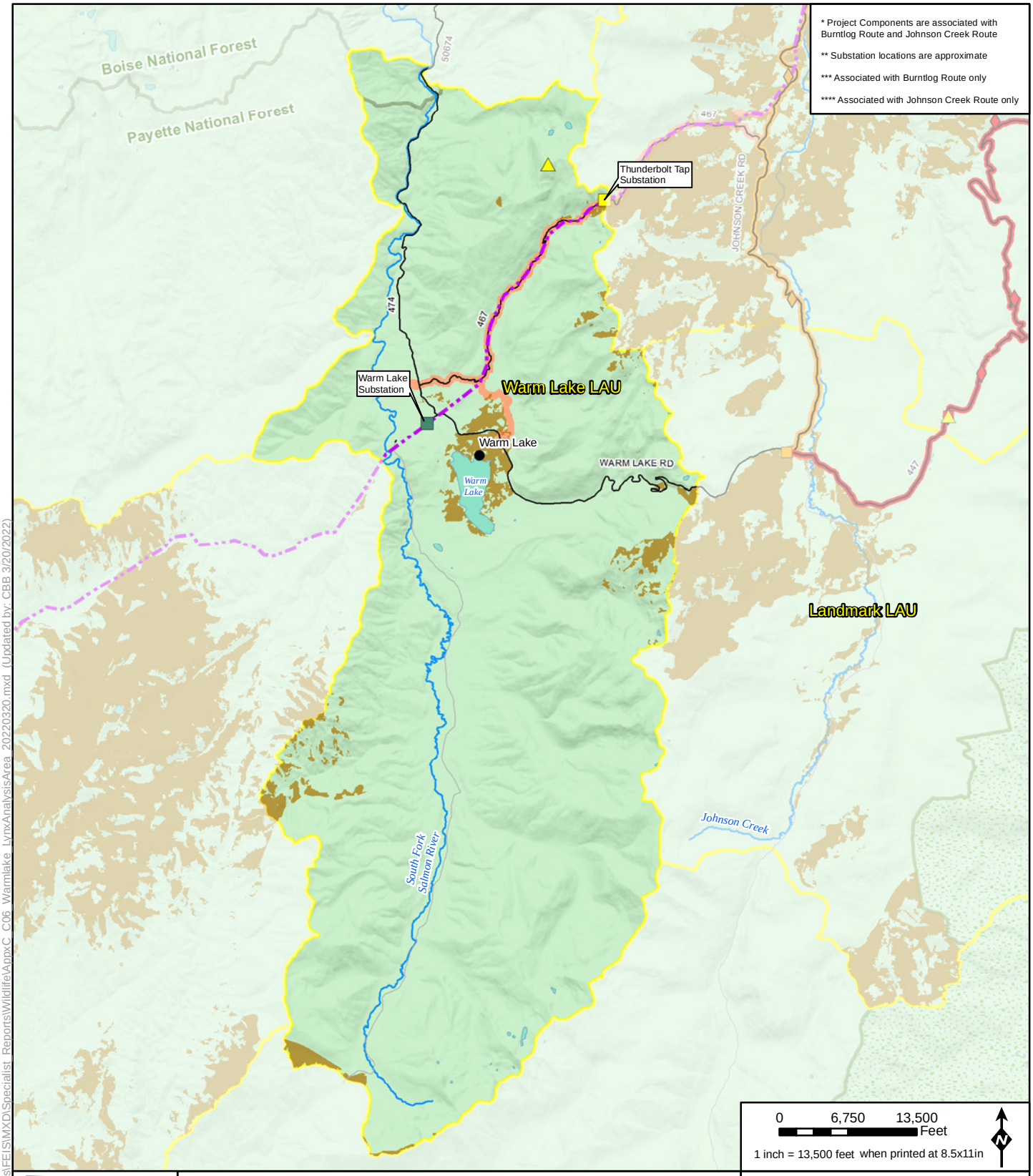
Table 5 Summary of Lynx Habitat for Warm Lake LAU

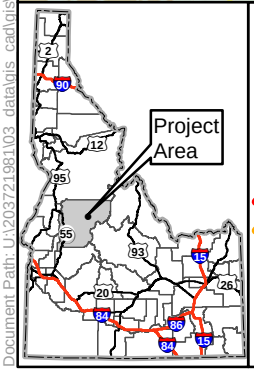
LAU Name	Source Habitat Capacity[1] (acres)	Source Habitat[2] (acres)	Percent Suitable[2]	Percent Unsuitable[2]	Meets Desired Condition[3] Percent Unsuitable is ≤30%
Warm Lake	32,095	1,887	5.9%	94.1%	No

[1] Source Habitat Capacity is used interchangeably with 'potential' lynx habitat. This represents the potential vegetation groups (PVGs) that could at some point in successional development provide suitable habitat conditions for Canada lynx.

[2] Based on mid-scale vegetation data updated in July 2017. Source habitat is used interchangeably with 'current' lynx habitat as shown on Figure C-6.

[3] Forest Plan Standard TEST15: Unless a broad-scale assessment has been completed that substantiates different historical levels of unsuitable habitat, limit disturbance within each LAU as follows: If more than 30 percent of lynx habitat within a LAU is currently in unsuitable condition, no additional habitat may be changed to unsuitable habitat as a result of vegetative management projects. Fire use, or fire hazard reduction and associated vegetation management activities within the wildland urban interface watersheds, that develop or maintain fuel profiles needed to reduce the risk of wildfire threats to the wildland urban interface areas, are NOT bound by this standard.





LEGEND

- Current Lynx Modeled Habitat
- Lynx Analysis Unit

Project Components *
- SGP Features

Access Roads & Trail System
- Burntlog Route ***
- Johnson Creek Route
- Groomed OSV Route
- Burntlog Route Borrow Source ***
- Johnson Creek Route Source ****

Utilities
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site

Offsite Facilities
- Burntlog Maintenance Facility ***
- Landmark Maintenance Facility ****

Other Features
- U.S. Forest Service
- Wilderness
- County
- City/Town
- Access Road
- Road
- Stream/River
- Lake/Reservoir

Figure C-6
Warm Lake Lynx Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); USGS; Boise National Forest; Payette National Forest

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3.5 EAST MOUNTAIN LAU

The East Mountain LAU contains 28,832 acres of source habitat capacity, of which 25,254 acres are currently in a suitable condition for lynx (**Table 6; Figure C-7**). The majority of the LAU consists of subalpine fir, lodgepole pine, Douglas-fir, ponderosa pine, and grand fir. Foraging opportunities are found primarily in mature, multi-storied stands with brush and young trees in the understory. Mature forests with abundant down wood or pockets of down wood provide potential denning habitat.

Currently, 12.4% of the source habitat capacity in the LAU is in an unsuitable habitat condition (**Table 6; Figure C-7**). Fewer fires have burned within the LAU over the past 30 years, which has resulted in additional suitable lynx habitat. As is, the East Mountain LAU currently meets the desired condition of less than or equal to 30% unsuitable habitat in Forest Plan Standard TEST15.

Warm Lake Road and smaller road systems are the primary roadways within the LAU. Roads provide access for a variety of motorized vehicles and human uses during the summer and fall months.

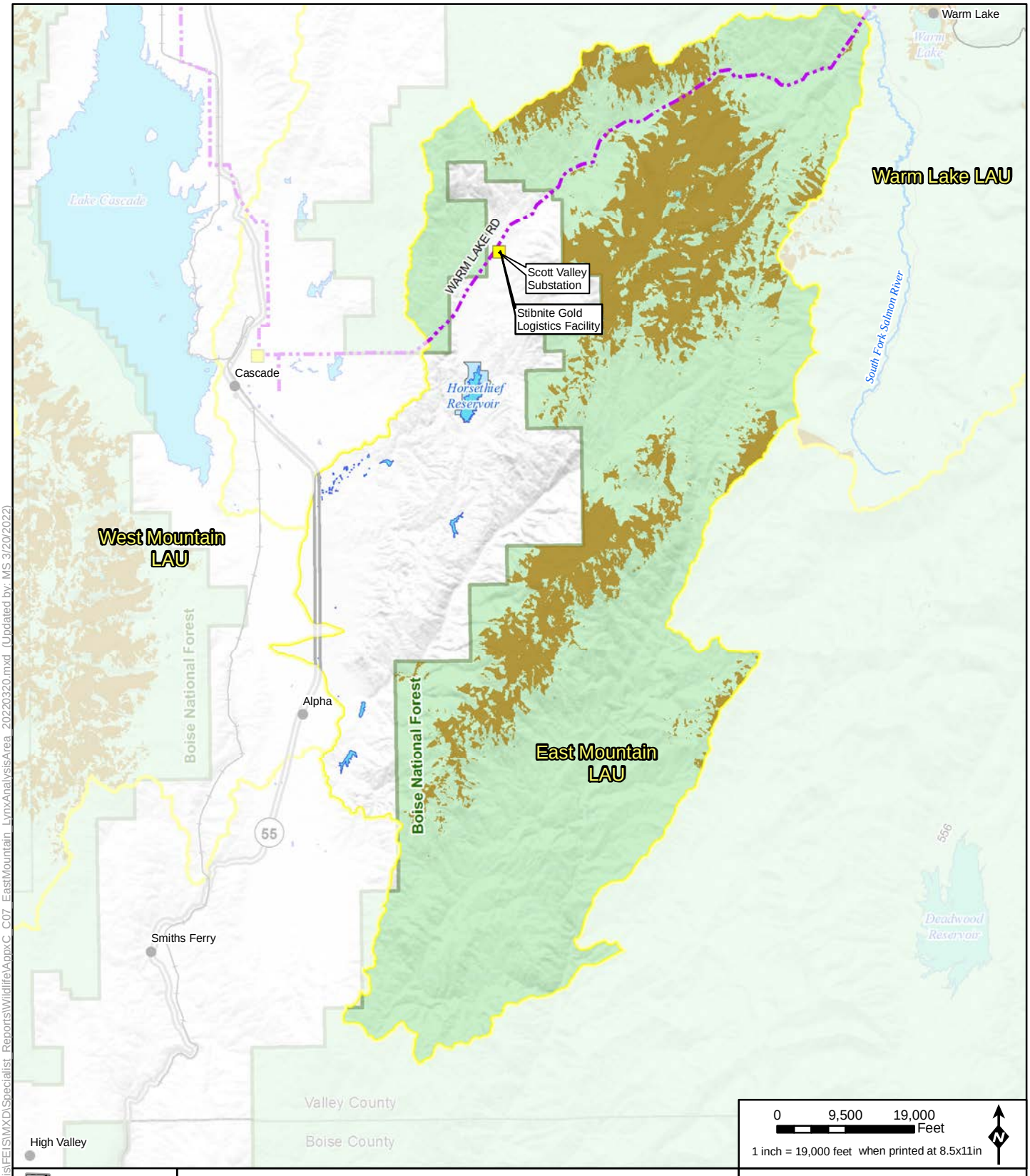
Table 6 Summary of Lynx Habitat for East Mountain LAU

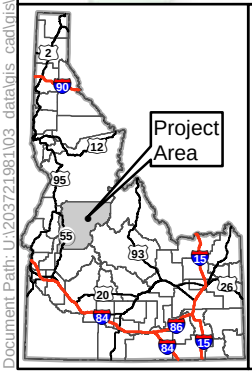
LAU Name	Source Habitat Capacity[1] (acres)	Source Habitat[2] (acres)	Percent Suitable[2]	Percent Unsuitable[2]	Meets Desired Condition[3] Percent Unsuitable is ≤30%
East Mountain	28,832	25,254	87.6%	12.4%	Yes

[1] Source Habitat Capacity is used interchangeably with 'potential' lynx habitat. This represents the potential vegetation groups (PVGs) that could at some point in successional development provide suitable habitat conditions for Canada lynx.

[2] Based on mid-scale vegetation data updated in July 2017. Source habitat is used interchangeably with 'current' lynx habitat as shown on Figure C-7.

[3] Forest Plan Standard TEST15: Unless a broad-scale assessment has been completed that substantiates different historical levels of unsuitable habitat, limit disturbance within each LAU as follows: If more than 30 percent of lynx habitat within a LAU is currently in unsuitable condition, no additional habitat may be changed to unsuitable habitat as a result of vegetative management projects. Fire use, or fire hazard reduction and associated vegetation management activities within the wildland urban interface watersheds, that develop or maintain fuel profiles needed to reduce the risk of wildfire threats to the wildland urban interface areas, are NOT bound by this standard.





LEGEND

- Current Lynx Modeled Habitat
- Lynx Analysis Unit

Project Components *
- SGP Features

Utilities
- Upgraded Transmission Line
- New Substation **

Other Features
- U.S. Forest Service
- County
- City/Town
- Railroad
- State Highway
- Access Road
- Road
- Stream/River
- Lake/Reservoir
- Groomed OSV Route

* Project Components are associated with Burntlog Route and Johnson Creek Route

** Substation locations are approximate

Figure C-7
East Mountain Lynx Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USFS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); USGS; Boise National Forest; Payette National Forest

PAYETTE NATIONAL FOREST

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

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3.6 WEST MOUNTAIN LAU

The West Mountain LAU contains 19,246 acres of source habitat capacity, of which 18,953 acres are currently in a suitable condition for lynx (**Table 7; Figure C-8**). This LAU includes Lake Cascade and many private parcels off of the Forest Service lands, so PVGs are not mapped throughout the LAU. Common PVGs within the LAU consist of subalpine fir, lodgepole pine, Douglas-fir, ponderosa pine, and grand fir. Foraging opportunities are found primarily in mature, multi-storied stands with brush and young trees in the understory. Mature forests with abundant down wood or pockets of down wood provide potential denning habitat.

Currently, 1.5% of the source habitat capacity in the LAU is in an unsuitable habitat condition (**Table 7; Figure C-8**). Fewer fires have burned within the LAU over the past 30 years, which has resulted in additional suitable lynx habitat. As is, the West Mountain LAU currently meets the desired condition of less than or equal to 30% unsuitable habitat in Forest Plan Standard TEST15.

State Highway 55 and many other road systems around Lake Cascade and within the city of Cascade are the primary roadways within the LAU.

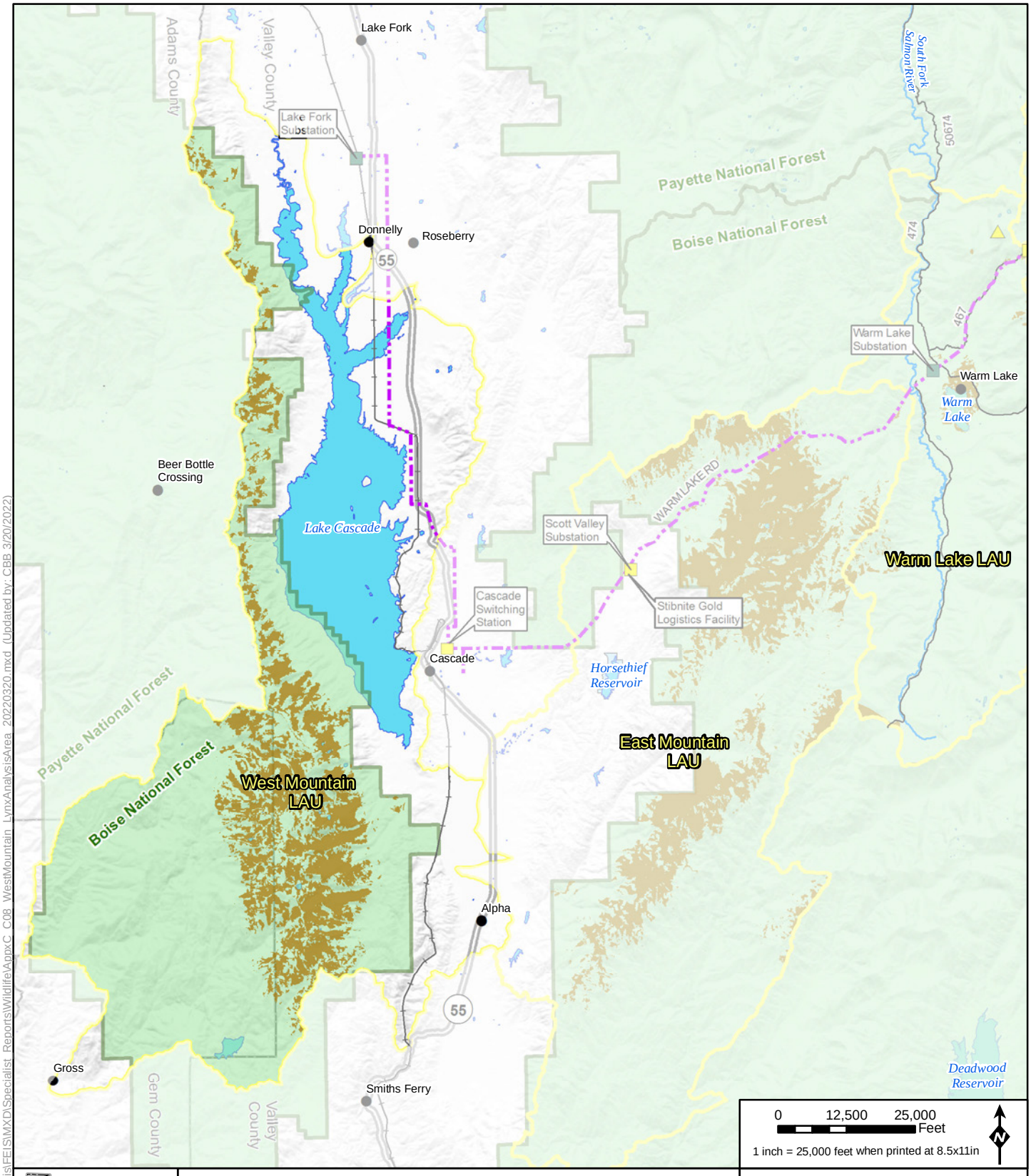
Table 7 Summary of Lynx Habitat for West Mountain LAU

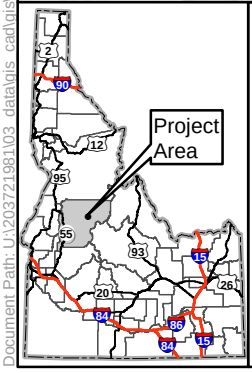
LAU Name	Source Habitat Capacity[1] (acres)	Source Habitat[2] (acres)	Percent Suitable[2]	Percent Unsuitable[2]	Meets Desired Condition[3] Percent Unsuitable is ≤30%
West Mountain	19,246	18,953	98.5%	1.5%	Yes

[1] Source Habitat Capacity is used interchangeably with 'potential' lynx habitat. This represents the potential vegetation groups (PVGs) that could at some point in successional development provide suitable habitat conditions for Canada lynx.

[2] Based on mid-scale vegetation data updated in July 2017. Source habitat is used interchangeably with 'current' lynx habitat as shown on Figure C-8.

[3] Forest Plan Standard TEST15: Unless a broad-scale assessment has been completed that substantiates different historical levels of unsuitable habitat, limit disturbance within each LAU as follows: If more than 30 percent of lynx habitat within a LAU is currently in unsuitable condition, no additional habitat may be changed to unsuitable habitat as a result of vegetative management projects. Fire use, or fire hazard reduction and associated vegetation management activities within the wildland urban interface watersheds, that develop or maintain fuel profiles needed to reduce the risk of wildfire threats to the wildland urban interface areas, are NOT bound by this standard.





LEGEND

- Current Lynx Modeled Habitat
- Lynx Analysis Unit

Project Components *
- SGP Features

Utilities
- Upgraded Transmission Line
- New Substation **
- Existing Substation **
- New Repeater Site

Other Features
- U.S. Forest Service
- County
- City/Town
- Railroad
- State Highway
- Road
- Stream/River
- Lake/Reservoir

* Project Components are associated with Burntlog Route and Johnson Creek Route

** Substation locations are approximate

Figure C-8
West Mountain Lynx Analysis Area
Stibnite Gold Project
Stibnite, ID

Base Layer: USGS Shaded Relief Service
Other Data Sources: Perpetua; State of Idaho Geospatial Gateway (INSIDE Idaho); USGS; Boise National Forest; Payette National Forest

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