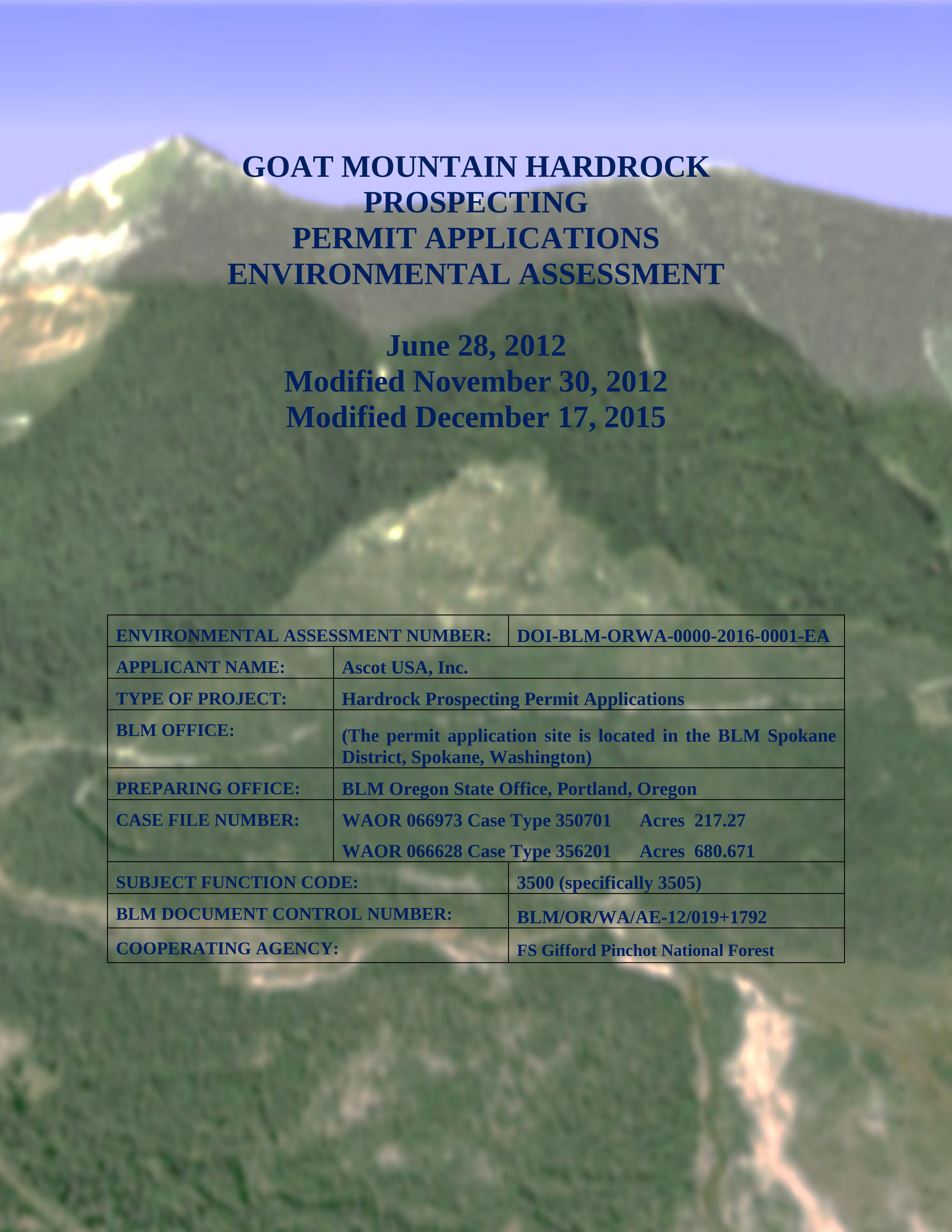


GOAT MOUNTAIN HARDROCK PROSPECTING PERMIT APPLICATIONS ENVIRONMENTAL ASSESSMENT

June 28, 2012
Modified November 30, 2012
Modified December 17, 2015

ENVIRONMENTAL ASSESSMENT NUMBER:	DOI-BLM-ORWA-0000-2016-0001-EA
APPLICANT NAME:	Ascot USA, Inc.
TYPE OF PROJECT:	Hardrock Prospecting Permit Applications
BLM OFFICE:	(The permit application site is located in the BLM Spokane District, Spokane, Washington)
PREPARING OFFICE:	BLM Oregon State Office, Portland, Oregon
CASE FILE NUMBER:	WAOR 066973 Case Type 350701 Acres 217.27 WAOR 066628 Case Type 356201 Acres 680.671
SUBJECT FUNCTION CODE:	3500 (specifically 3505)
BLM DOCUMENT CONTROL NUMBER:	BLM/OR/WA/AE-12/019+1792
COOPERATING AGENCY:	FS Gifford Pinchot National Forest

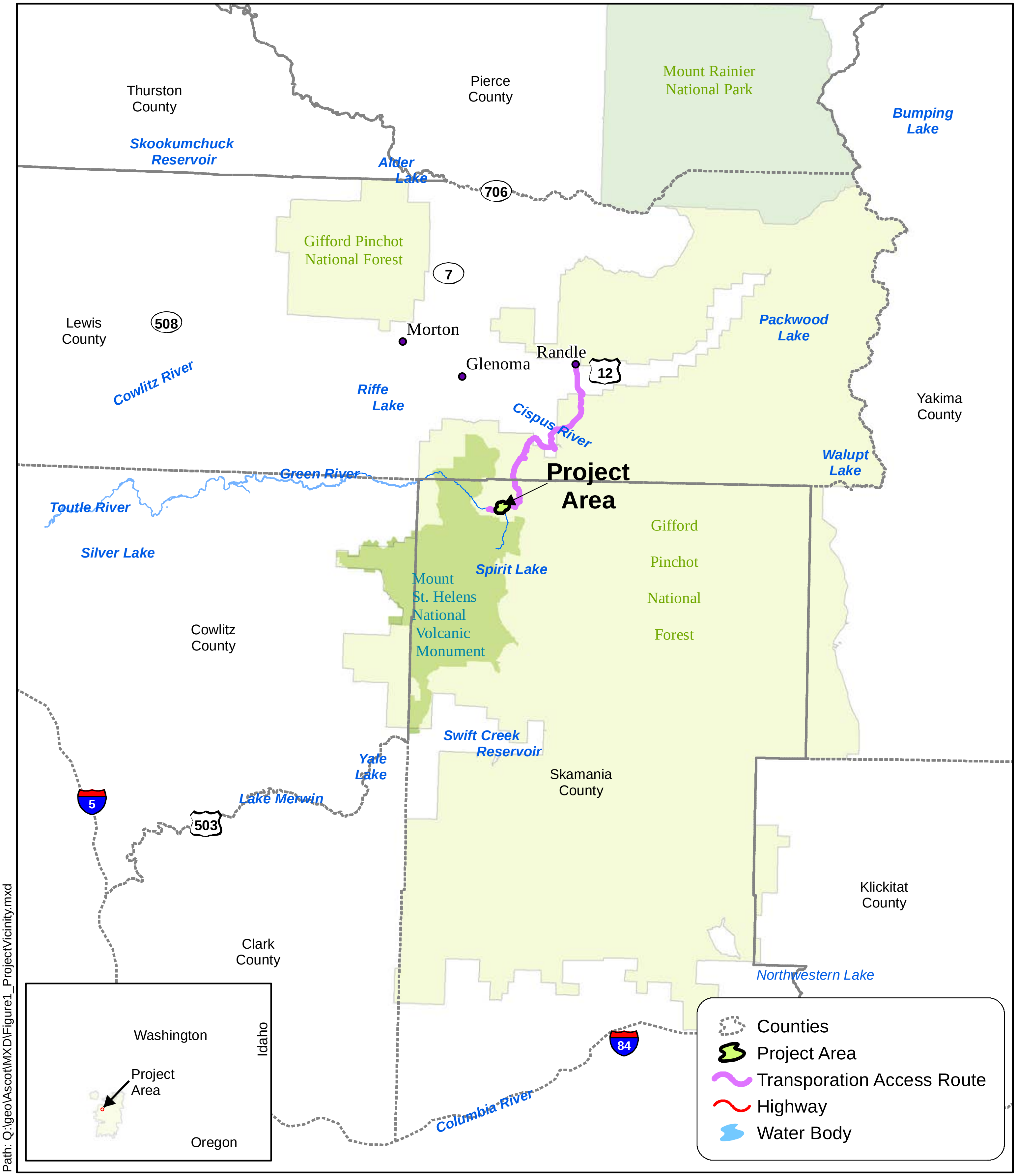


Figure 1
Project Vicinity

URS

N

0 5 10
Scale In Miles

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

SOURCE: USDA Forest Service

Table of Contents

List of Appendices

List of Tables

List of Figures (*included in Appendix A, unless otherwise noted*)

GLOSSARY

The following terms, denoted by *italicized* text, have the meaning stated below throughout this Environmental Assessment (EA):

- *Acquired Lands* means lands or interest in lands, including mineral estates, which the United States obtained through purchase, gift, or condemnation. It includes all lands BLM administers for hardrock mineral leasing other than public domain lands (43 CFR 3501.5). Acquired lands are leasable under the Mineral Leasing Act for Acquired Lands of 1947, as amended. This Act generally provides that no [permit or] lease may be issued except with the consent of the head of the executive department having jurisdiction over the lands and subject to such conditions as that official may prescribe to ensure the adequate utilization of the lands for the primary purposes for which they have been acquired. Authorities for management of acquired land mineral resources are provided at 43 CFR 3501.1(a)(2).
- *Action Area* is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 Code of Federal Regulations [CFR] §402-02).
- *Adits* are nearly horizontal drifts, tunnels, or passages from the surface excavated into and sometime through a hillside.
- *Agencies* refers collectively to the U.S. Department of the Interior – Bureau of Land Management (BLM) and the U.S. Department of Agriculture – Forest Service (FS).
- *Ascot* refers to Ascot USA, Inc., with certificate of incorporation issued by the State of Washington on March 8, 2010.
- *Baffles* are portable insulated screens that are set up around drill pad platforms to help attenuate noise and light, protect operators from weather, and help maintain safety.
- *Casual Use* means activities that ordinarily result in no or negligible disturbance of the public lands or resources, such as rock-hounding.
- *Cumulative Effects* are defined by regulations of the Council for Environmental Quality (CEQ) as, "…the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions…" (40 CFR 1508.7). Reasonably foreseeable future actions are those for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends.
- *Effect* is synonymous with "impact." Direct effects are those effects, "…which are caused by the action and occur at the same time and place" (40 CFR 1508.8(a)). Indirect effects are those effects, "…which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable" (40 CFR 1508.8(b)).
- *Exploration Plan* is a plan submitted by the permittee showing in detail the proposed exploration, prospecting, and testing to be conducted consistent with

and responsive to the requirements of the permit for the protection of nonmineral resources and for the reclamation of the surface of the lands affected by the operations.

- *Forest Plan* relates to the Gifford Pinchot National Forest (GPNF) Land and Resource Management Plan and is a different document than the U.S. Department of Agriculture Forest Service 1994 Northwest Forest Plan (NWFP).
- <u>Forest Road or Trail</u> refers to a road or trail wholly or partly within or adjacent to and serving the National Forest System that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources. (36 CFR Subpart A at 212.1). In this EA "active" or "existing" Forest Roads indicates roads currently shown on the Gifford Pinchot National Forest Motor Vehicle Use Map (MVUM).
- *Fractional Interest Lease or Permit* is issued where the United States owns less than 100 percent of the mineral interests, and where it has been determined to be "in the public interest" by the BLM (43 CFR 3515.16) and with the consent of the surface managing agency. Although the criterion at 3515.16 is directed at mineral lease exchange, they are encompassed by the scope of this EA.
- *Full Fee* implies a simple 100 percent undivided ownership of both the surface and mineral estates in the specified parcel of land.
- *General Forest* means National Forest lands not categorized as developed recreation sites, trails, or wilderness. It can be a logical working area, typically containing a wide spectrum of settings, opportunities, facilities, and sites.
- *Hardrock Minerals* include solid minerals, as distinguished from oil and gas, such as base metals, precious metals, industrial minerals, and precious or semi-precious gemstones, except commodities that the government sells such as common varieties of sand, gravel, stone, pumice, or cinders. Authorities for their disposal are provided at 43 CFR 3501.1(b).
- *Inventoried Roadless Areas* are areas subject to the road construction/reconstruction prohibitions of 36 CFR 294 that exhibit features such as high quality or undisturbed soil, water, and/or sources of public drinking water; diversity of plant and animal communities; habitat for threatened and endangered species; primitive or semi-primitive features; non-motorized dispersed recreation; landscape with high scenic quality; and other locally identified unique characteristics (36 CFR §294 - Special Areas).
- *Kelley Humps* are water bars built or created on sloping trails or roads for erosion control. The bar is usually set diagonally across the feature to divert the water off the trail or road, thus reducing the flow of water and subsequent erosion.
- *Late Successional Reserves* objective is to protect and enhance conditions of late successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth-related species, including the northern spotted owl.

- *Lode* is a deposit of metalliferous ore that fills or is embedded in a fissure (or crack) in a rock formation or in a vein that is deposited or embedded between or across layers of rock.
- *Make water* is when a drill boring might encounter an artesian condition.
- *Matrix Lands* mean federal lands within the range of the northern spotted owl, allocated by the Northwest Forest Management Plan for multiple uses, including timber harvest and other silvicultural activities.
- *Mineral Survey* is an official survey of a mining claim executed by a U.S. Mineral Surveyor under the direction of a BLM Cadastral Chief in the jurisdiction where the mining claim lies or is located and can be the basis of a mineral patent.
- *No Action Alternative* is not approving the Proposed Action and/or denying the proponent's applications.
-
- *Partial Retention* is an area where management activities remain visually subordinate to the valued characteristic landscape. Scenery management refers to this as "high" appearing unaltered.
- *Permit Applications Area (Permit Area)* is the area shown in Figure 1 encompassed by the five parcels of Mineral Survey lands designated MS-708, -774, -779, -1329, and -1330.
- *Project Area* (also referred to as the *Project* or *Proposed Work Area*) is the area shown in Figure 4 wherein the mineral exploration encompassed by the Proposed Project would be carried out.
- *Project Record* is the assembled collection of documents and public comments used in preparation of this EA and maintained by the BLM.
- *Project Site* generally refers to the specific drill pad sites and immediate area surrounding the pad location.
- *Proposed Action* is that described in the Exploration Plan submitted together with the Prospecting Permit Applications.
- *Proposed Project* is that described in the Goat Mountain Mineral Exploration Permit Applications and associated Exploration Plan.
- *Prospecting Permit* is an instrument issued by the BLM that grants exclusive rights to prospect on and explore lands to determine if a valuable deposit exists of specified minerals, including hardrock minerals on acquired lands (43 CFR 3505).
- *Reasonably Foreseeable Future Action (RFFA)* is when a "future action" becomes "reasonably foreseeable" once it is "proposed"; until then it is "speculative" and need not be accounted for in the cumulative effects analysis in an EA or Environmental Impact Statement (EIS) (*Jones v. Nat'l Marine Fisheries Serv.*, 741 F.3d 989, 1000-01 [9th Cir. 2013]; *Wilderness Workshop v. U.S. Bureau of Land Management*, 531 F.3d 1220, 1229 [10th Cir. 2008]).

- *Riparian Reserves* are portions of watersheds required to maintain the hydrologic, geomorphic, and ecologic processes that directly affect standing and flowing water bodies where dependent resources receive primary emphasis and are regulated by special *standards and guidelines* which limit activities that would retard or prevent attainment of the Northwest Forest Plan's Aquatic Conservation Strategy. Related habitat conservation areas may extend outward to the extent necessary to achieve conservation objectives.
- *Roaded Natural* is an area characterized by predominantly natural appearing environments with moderate evidences of the sights and sounds of man. Opportunity for motorized and non-motorized forms of recreation is possible.
- *Sensitive Species* are those plants and animals identified by a Regional Forester for which population viability is a concern as evidenced by predicted downward trends in population or habitat capability.
- *Seral* or *sere* is an intermediate stage plant community found in ecological succession in an ecosystem advancing toward its climax community. In many cases, more than one seral stage evolves until climax conditions are attained. A *prisere* is a collection of seres making up the development of an area from non-vegetated surfaces to a climax community. A *seral community* is the name given to each group of plants within the succession.
- *Surface Managing Agency* refers to the FS, and more specifically the Gifford Pinchot National Forest for purposes of this EA.
- *Survey and Manage Species* include those that occur within or near the Northwest Forest Management Plan (NWFP) area closely associated with late-successional or old-growth forests that are not provided a reasonable assurance of persistence by the NWFP.
- *Temporary Road or Trail* refers to a road or trail necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a forest road or trail and that is not included in a forest transportation atlas. (36 CFR Subpart A at 212.1). In this EA “former temporary roads” are those temporary or non-system roads previously used for logging or other Forest activities which have been naturally closed by non-use or by mechanical ripping and/or placement of physical barriers.
- *Unroaded Recreation Without Timber Harvest UD* - “U” represents the Management Area Category (Retention) and “D” represents the Visual Quality Objectives and Recreation Opportunity Spectrum classes (e.g., Semi-primitive/Non-Motorized).
- *Valuable Deposit* means an occurrence of minerals of such character that a person of ordinary prudence would be justified in the further expenditure of labor and means with a reasonable prospect of success in developing a profitable mine (43 CFR 3501.5).
- *Water Bars* are built or created on sloping trails or roads for erosion control. The bar is usually set diagonally across the trail to divert the water off the trail, thus reducing the flow of water and subsequent erosion (also known as *Kelly Humps*).

- *Wetlands* are lands where saturation with water either permanently or seasonally is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface (Cowardin et al. 1979). Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mudflats, and natural ponds.

ACRONYM AND ABBREVIATION LIST

°F	degrees Fahrenheit
ACS	Aquatic Conservation Strategy (also known as ACS)
ADT	Average Daily Traffic
amsl	above mean sea level
ANSI	American National Standards Institute
APE	Area of Potential Effect
ARD	Acid Rock Drainage
Ascot	Ascot USA, Inc. (Incorporated in Washington State)
ATV	all-terrain vehicle
BLM	U.S. Department of the Interior - Bureau of Land Management
BMP	Best Management Practice
CEQ	Council on Environmental Quality
CESA	Cumulative Effects Study Area
CFR	Code of Federal Regulations
cfs	cubic feet per second
cm	centimeter
cm/s	centimeters per second
CO	Carbon Monoxide
CO_2	carbon dioxide
Court	U.S. District Court of Oregon
CVRD	Cowlitz Valley Ranger District (FS)
dB	decibel
dbh	diameter-at-breast-height, in inches (for tree measurement)
DN	Decision Notice (FS)
DR	Decision Record (BLM)
E.O.	Executive Order
EA	Environmental Assessment
Ecology	Washington State Department of Ecology
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
FS	U.S. Department of Agriculture – Forest Service
FSM	Forest Service Manual
GHG	greenhouse gas
GIS	geographic information system
GLO	General Land Office
gpd	gallons per day
gpm	gallons per minute
GPNF	Gifford Pinchot National Forest
H.R.	House Report
H2S	Hydrogen Sulfide
hp	horse power

HPA	Hydraulic Permit Approval
HQ	3.5-inch diameter drill rod; 3.78-inch diameter hole (outside)
HUC	Hydrologic Unit Code
HUD	United States Department of Housing and Urban Development
I-5	Interstate 5
IGMI	Idaho General Mines, Inc.
IRA	Inventoried Roadless Area
LCR	Lower Columbia River
LRMP	Land and Resource Management Plan or "Forest Plan" for the Gifford Pinchot National Forest; (this document is different from the U.S. Department of Agriculture Forest Service 1994 Northwest Forest Plan)
LSR	Late -Successional Reserves
LWCF	Land and Water Conservation Fund
LWM	Large Woody Material
MBTA	Migratory Bird Treaty Act
MIS	Management Indicator Species (FS)
mm	millimeter
MOA	Memorandum of Agreement
MS	Mineral Survey
MSDS	Material Safety Data Sheets
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act (FS)
NFS	National Forest System
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act
NOx	Oxides of Nitrogen
Np	Non-fish Perennial
NQ	2.75-inch diameter drillhole (outside); 2.5-inch core (inside)
NRCS	Natural Resources Conservation Service
NRF	Nesting, Roosting, and Foraging
NRHP	National Register of Historic Places
Ns	Non-fish Seasonal
NWFP	Northwest Forest (Management) Plan
OHWL	Ordinary High Water Level
PCE	Primary constituent elements
P.L.	Public Law
PAOT	Persons at One Time
PHS	Priority Habitats and Species
PM-10	Particulate Matter less than 10 microns in diameter
RARE	Roadless Area Review and Evaluation
RCW	Revised Code of Washington
RFFA	Reasonably Foreseeable Future Action
RM	River Mile
ROD	Record of Decision
S&M	Survey and Manage Species (FS)

SHPO	State Historic Preservation Office(r)
SO2	Sulfur Dioxide
SOx	Sulfur Oxides
SPCC	Spill Prevention Control and Countermeasures
SR	State Route
SWCAA	Southwest Clean Air Agency
t/d	tons per day
TCP	Traditional Cultural Property
TPL	Trust for Public Lands
U.S.C.	United States Code
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VQO	Visual Quality Objective
WAC	Washington Administrative Code
WC	Washington State Watercourse Hydrography
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WNHP	Washington Natural Heritage Program
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation
WSNWCB	Washington State Noxious Weed Control Board

1 INTRODUCTION

The focus of this National Environmental Policy Act (NEPA) Environmental Assessment (EA) is the evaluation, documentation, and disclosure of the effects of the requisite United States Department of the Interior's (USDI) Bureau of Land Management (BLM) and U.S. Department of Agriculture's (USDA) Forest Service (FS) administrative actions in response to two applications for hardrock mineral prospecting permits (WAOR 066628 and 066973), also referred to as the Goat Mountain Hardrock Prospecting Permits, submitted by Ascot USA, Inc. (Ascot). The Prospecting Permit Applications involve acquired National Forest System (NFS) lands administered by the Gifford Pinchot National Forest (GPNF). The BLM is also considering approval of an Exploration Plan submitted by Ascot for conducting mineral exploration on the prospecting permits, should they be issued.

This EA was originally completed inclusive of revisions based on scoping comments on November 30, 2012. It was utilized by the FS and the BLM as the basis for their decisions and Findings of No Significant Impact (FONSI) issued in December 2012. The Agencies' decisions, but not the EA, were subsequently vacated in a civil action before the U.S. District Court of Oregon (Court) in August 2014. At issue were the Court's findings, identified in its Opinion and Order dated July 3, 2014, that the FS and/or BLM erred by:

- Not identifying outdoor recreation as a primary purpose for which lands in Mineral Survey (MS) parcels MS-1329 and-1330 were acquired utilizing Land Water Conservation Funds, and failing to make an express determination that the Project is not inconsistent with the purpose of outdoor recreation.
- Not interpreting the definition of "support facilities" within the GPNF Aquatic Conservation Strategy Standards and Guidelines MM-2 Standard to include drill shacks and sumps.
- Not including in the EA a baseline groundwater analysis for the Project Area prior to Project approval in support of the EA's analysis of impacts (including cumulative impacts) on groundwater.
- Not addressing in the EA the effectiveness of all mitigation measures (design features) that would be implemented to avoid or minimize impacts of the Project.
- Not analyzing an alternative in the EA that would keep all roads, structures, and support facilities out of the Riparian Reserve.

To comply with the Court's direction, the Agencies used the 2012 EA to prepare a modified document that addresses each of the above concerns. In addition, the Agencies modified the EA to:

- Provide mandatory disclosures required by FS regulations for prime farmlands, rangelands and forest lands, floodplains, wetlands, energy, consumers, civil rights, minority groups, and environmental justice.
- Clearly state that the FS consent decision is part of the permitting process prerequisite to the BLM's legal authority to issue the permits.

- Indicate that the BLM will utilize the EA as a basis for its administrative action on the requisite exploration and operating plan (43 Code of Federal Regulations [CFR] 3505.40 and .45 – What is an Exploration Plan, and 3592.1 – Operating Plans).
- Clarify that all issues raised during scoping were addressed.
- Reflect the latest revision of designated Critical Habitat for northern spotted owls and to provide rationale for not conducting owl surveys.
- Provide clarification to the discussion of the analysis for lichen and bryophyte, and for invasive plant species.
- Expand the discussion of the Green River as an eligible Wild and Scenic River.
- Include discussion of two traditional cultural properties recently identified by the Cowlitz Indian Tribe.
- More clearly state the BLM and FS roles and actions under consideration.
- Clearly identify the consistency of each alternative with the Aquatic Conservation Strategy Objectives.
- Enhance discussion regarding consistency with plans, policies, or other jurisdictions such as environmental justice, treaty resources and reserved Indian rights, wetlands and floodplains, unique characteristics of the area, etc.

In the process, many of the 2012 EA sections were also edited to improve readability. However, none of the modifications, edits, or supplemental reports appended to the EA changed the original purpose of this assessment.

Within the Permit Applications Area, the FS manages the surface of the lands and resources thereon; the BLM manages the below ground resources (mineral estate), including hardrock minerals. The administrative actions incumbent on the Agencies are described in Section 1.2, *Decision Framework*. The BLM must have the FS consent, including any conditions for the use and protection of surface resources, before determining whether to issue the prospecting permits. In turn, the BLM must make a decision whether to approve the mineral Exploration Plan. If both Agencies' decisions support issuing the permits, it would then be up to the applicant to accept the permits and associated terms and conditions and to agree to conduct its operations consistent therewith. Subsequently, the Agencies would routinely monitor the exploration operations to ensure compliance.

The Project Area is shown in Figure 1 (Note – all full-page EA figures [i.e., non-photograph figures] are presented in Appendix A). The Permit Applications Area is located approximately 15 miles south of Randle, Washington near the northwest corner of Skamania County. Issuance of the prospecting permits would result in the conveyance of exclusive rights to the applicant to conduct exploration operations within the Permit Areas. Approval of the Exploration Plan could result in the drilling of 63 small diameter core holes from 23 sites as shown in Figure 3 in order to collect rock core samples for analysis to obtain geotechnical and mineralogical information. Exploration activities would have to be conducted consistent with the terms and conditions in the prospecting permits. Potential on-the-ground activities could include the following:

- Exploratory drilling within MS-708, -774, -779, -1329, and -1330 adjacent to former temporary roads.
- When necessary for access, reactivation of former temporary roads, including removal of trees and other vegetation that have sprouted on the roads since closure. Approximately 1.69 miles (about 3.07 acres) of temporary roads would be used for access. This includes 1.35 miles (2.45 acres) of roads reactivated for the 2010 drilling program, and an additional 0.34 miles (0.62 acre) of former temporary roads that would also be temporarily reactivated.
- Implementation of runoff and sediment controls.
- Installation of drill pads.
- Installation of temporary sumps to contain drilling fluids.
- Use of drilling fluids that contain water and additives.
- Removal of rock core samples for off-site analysis.
- Drillhole and site reclamation.

Information collected as part of the Proposed Action is essential to determining whether or not a mineral deposit exists of such a character that it would meet the criteria for a valuable deposit as defined by regulations at 43 CFR Subpart 3501.5. EA Chapter 2 provides a description of the Proposed Action and Alternatives.

This EA provides an assessment of the Permit Area, and a discussion of the Proposed Action and its purpose and need; including logical alternatives; an evaluation of their associated environmental effects; and a listing of agencies and contacts consulted in preparation of this evaluation. The original EA for scoping was released for an extended 45-day public comment period on June 29, 2012. Scoping formally concluded at midnight on August 15, 2012. Written comments received during that period were given standing and made part of the Project Record. Comments received after August 2012 were also included in the Project Record without standing. The record is available for inspection in the Public Room at the BLM's Oregon and Washington State Office, 1220 SW 3rd Avenue, Portland, Oregon, during normal weekday business hours (11^{th} floor of the Edith Green-Wendall Wyatt Federal Building).

Comments that demonstrated a direct relationship to the scope and substance of the Proposed Action and included associated reasons for the responsible official to consider (36 CFR 218.2) were evaluated, as documented in Appendix C, *Public Scoping Comment Summary Matrix*. The scoping EA was revised accordingly to provide requisite information and clarification, and was readied for agency decisions at the end of November 2012. The basic nature of the revisions is summarized in Section 1.8, *Scoping and Public Involvement*. As previously noted, the EA has now been modified to also address the 2014 Opinion and Order of the U.S. District Court of Oregon.

1.1 BACKGROUND

1.1.1 Location

The Permit Applications Area (Permit Area) is situated within portions of Sections 7, 8, 9, 16, 17, 18, and 19 of Township 10 North, Range 6 East, Willamette Meridian, Skamania County, Washington (Figure 1, *Project Vicinity*; Table 2.1-1, *Parcels Included in Prospecting Permit Applications*). The smaller Project Area is located on and adjacent to the generally south-facing slope of Goat Mountain. These lands are next to and extend northeast from the boundary of the 110,300-acre Mount St. Helens National Volcanic Monument. The Permit Area is approximately 12 miles northeast of the volcanic crater on the edge of the 1980 eruption blast zone (Figure 2, *Mount St. Helens Blast Zone)*.

The Permit Area can be accessed from east-west Highway US-12, from Randle, Washington located approximately mid-way between Interstate 5 (I-5) and Yakima, Washington (Figure 3, *Project Area*). To reach the site from Randle, proceed south on State Route (SR)-131, continue southwest onto FS Road 25 until it intersects with FS Road 26, then south along improved FS Road 26 (adjacent to Quartz Creek) to Ryan Lake, then turn west on FS Road 2612, terminating at the Project Area near the Green River Horse Camp.

1.1.2 History

The Permit Area has experienced human activity for over 100 years. Dominant land uses have included logging and silvicultural activity, recreation, mineral prospecting, and limited mineral development. The Project Area lies within the Saint Helens Mining District originally organized in 1892. Figure 4, *Mineral Survey Limits*, presents patented mining claims in the Ryan Lake area of the Saint Helens Mining District. Mineralization of interest was discovered near the end of the 1800s, with the first mining claim locations being filed between 1901 and 1904. Sporadic development then occurred resulting in various surface and subsurface workings. Adits, shafts, cuts, trenches, cabins, powder magazines, and machinery were used to support these activities. MS-774 was conveyed as a mineral patent (Number 43189) under the General Mining Law of 1872, as amended, to Germania Mining and Milling on November 20, 1905. This patent was followed by MS-779 on March 8, 1906 (Patent Number 43393), and MS-708 on March 3, 1910 (Patent Number 114944). Duval Corporation (Duval) acquired the mineral patents in 1969 and located additional mining claims for which mineral Patent Number 46820016 was issued on August 6, 1982, including MS-1329 and MS-1330 (Patent Number 46820017).

Based on available information, the Permit Area that encompasses these MS lands appears to include a large portion of what is often referred to as the undeveloped "Margaret Deposit." Existing reports suggest that this occurrence might be a porphyritic calc-silicate system of Miocene age containing copper, molybdenum, silver, gold, and associated mineralization. After acquisition of the subject lands by Duval in 1969, limited exploration programs and mine/metallurgical studies were conducted including diamond core drilling and surface sampling. Fieldwork was halted following the 1980 eruption of Mount St. Helens. Cessation of fieldwork, however, occurred before an understanding of the Margaret Deposit sufficient for current economic resource evaluation was developed. Identified data gaps include the following:

- The geology of the porphyry system, controls on mineralization, and alteration patterns are not sufficiently well understood for modeling the quantity, grade, and mineralogy of the deposit. Without this understanding, defensible prediction of the limits and controls on mineralization, alteration and geologic controls is not possible.

- The limits of the porphyry system were not adequately defined and internal drilling density was not sufficient for currently accepted reserve and resource classifications.
- Cores from pre-1980 exploration activities have been lost and are not available for confirmatory analysis using modern quality assurance and controls.

Following acquisition by Pennzoil, Duval divested its hardrock mineral holdings in 1984. Most of the subject lands were subsequently acquired by the FS in June 1986 through donation and purchase, mostly from the Trust for Public Lands (TPL), with the exception of the privately held undivided 50 percent mineral rights in MS-708 (Figure 4, *Mineral Survey Limits*). In 1970, the surface estate of approximately 220 acres within MS-708 was acquired by the United States subject to a severed private mineral interest. In the 1980s, the FS was approached by some of the land and mineral owners in the Goat Mountain area about the possible federal acquisition of their interests. The FS pursued these offers to sell and/or donate certain interests. One such offer was a donation of a portion of the private mineral estate beneath MS-708. Federal ownership of the surface estate along with a portion of the mineral interest would still give the United States an advantage over private purchasers in the event the owner of the remaining severed and private mineral interest decided to sell at some time in the future.[1] The United States, at such time, could then consider purchasing the remaining private interests in the mineral estate in order to attain full-fee title. At this time, the United States owns fee title to all the surface and mineral interests encompassed by the two Prospecting Permit Applications, except for the remaining private fractional mineral rights beneath MS-708.

Via quit claim deed dated September 28, 2004, Idaho General Mines, Inc. (IGMI)[2] obtained property title to the 50 percent undivided private mineral interests on the lands within MS-708 from the previous owner (Duval). The United States owns the other 50 percent interest in the mineral estate on this parcel and the entire surface estate, as well as 100 percent (i.e., full fee) of both the surface and mineral interests in the other MS lands included in Ascot's Prospecting Permit Applications. In March 2010, Ascot announced the signing of an Option Agreement to purchase IGMI's 50 percent private interest in the mineral estate within MS-708 (now consummated).

On April 7, 2010, along with clarifying documents and modifications submitted on June 13, 2010, and July 16, 2010, Ascot submitted a proposal to the FS to drill up to 14 exploration core holes to assess the undivided private mineral estate within MS-708. In coordination with the Cowlitz Valley Ranger District of the GPNF, Ascot included within their Exploration Plan environmental protection measures to safeguard NFS surface

[1] April 20, 2006 FS Forest Supervisor Letter to Regional Forester R-6, Compatibility of GPNF LRMP to the IGMI Lease Application. Lavendel; and, subsequent letter of May 2, 2006 Bown (FS Director of Lands and Minerals) to Mottice (Deputy State Director to BLM). FS letter to BLM Deputy State Director; File Code 2820.

[2] On October 5, 2007 Idaho General Mines, Inc. was reincorporated as a Delaware corporation and changed its name to General Moly, Inc.

resources. In a letter dated August 6, 2010, the FS provided concurrence with Ascot's drilling proposal. Following FS concurrence in 2010, Ascot completed 11 exploratory drillholes.

On March 1, 2011, Ascot submitted a Prospecting Permit Application, including an Exploration Plan, to the BLM that projected completion of 38 exploratory core holes from 13 drill pad sites within MS-774, -779, -1329, and -1330. In addition, on March 18, 2011, Ascot submitted a proposal to the FS to conduct a second phase of exploration in MS-708 that included drilling 30 exploratory holes using 12 drill pads. In a May 5, 2011 letter, the FS concurred with Ascot's plan for the additional exploration contingent upon implementation of additional environmental design features related to control of stormwater and noxious weeds.

On April 11, 2011, the BLM provided Ascot with a completeness review of their Prospecting Permit Application, including indication of needed revisions to the Exploration Plan. On May 26, 2011, Ascot responded with a Revised Exploration Plan. Then on October 7, 2011, Ascot withdrew the original second phase Exploration Plan for MS-708, and amended their Prospecting Permit Application on November 29, 2011, by submitting a second Prospecting Permit Application to the BLM for the additional drilling on MS-708 combining all proposed exploration operations into one Revised Exploration Plan dated October 5, 2011. The combined plan projected drilling 63 NQ (2.75-inch diameter) core holes with HQ diameter casing (3.78 inches), as needed, from 23 pad sites.

To process the Prospecting Permit Applications, the BLM and the FS jointly prepared the November 2012 EA consistent with the December 2011, Memorandum of Agreement (MOA) in which Ascot, the FS, and the BLM defined the procedures and responsibilities for completing the assessment. The MOA was renewed on March 9, 2015, pursuant to Ascot's November 4, 2014, request for the Agencies to proceed with necessary actions to modify the 2012 EA (formally DOI-BLM-OR-934-2012-0001-EA) for the two pending hardrock Prospecting Permit Applications consistent with the July 3, 2014, Opinion and Order of the U.S. District Court of Oregon in civil case 3:13-cv-00810-HZ. The EA has now been modified to address the specific findings of the Court and redesignated as DOI-BLM-ORWA-0000-2016-0001-EA. Minor edits were also made throughout the EA to improve clarity and readability.

1.2 DECISION FRAMEWORK

The authority to grant the prospecting permits and approve exploration operations lies with the BLM (Lead Agency). Where NFS lands are involved, the BLM must first obtain the consent of the FS in order to grant the prospecting permits. The BLM and the FS worked cooperatively to evaluate the Project Area and environmental impacts associated with the Proposed Action consistent with NEPA and its implementing regulations. The BLM prepared this EA based on Ascot's two Prospecting Permit Applications, their proposed Exploration Plan, and comments from public scoping. The FS participated as a Cooperating Agency throughout the process.

The BLM has the responsibility for management of the federal mineral estate, as well as the obligation to implement regulations for public domain minerals available and subject to prospecting and exploration (43 CFR 3505). A BLM decision to issue the prospecting permits for NFS lands is based on the following factors: (1) consent of the FS with associated conditions; (2) compliance with requirements at 43 CFR 3505 – Prospecting Permits, and 3590 – Solid Minerals (Other than Coal) Exploration and Mining Operations; (3) consistency with applicable environmental requirements; and (4) determination that issuance is in the public interest. The BLM's decision will be documented in a Decision Record (DR) and a FONSI. The BLM will also utilize this EA to address whether to approve the site-specific Exploration Plan. BLM's decision to issue the permits and approve the plan is dependent on the applicant's acceptance of the terms and conditions derived largely from this EA and as otherwise specified by the Agencies for the protection and management of involved resources. (See Appendix B for a sample of the Prospecting Permit form.)

As noted, the FS must first decide whether or not to consent to the BLM's issuance of the two prospecting permits WAOR-066628 and 066973, respectively encompassing 680.671 and 217.273 (897.944 total) acres of acquired NFS lands for the exploration of hardrock minerals including copper, molybdenum, silver, gold, and associated minerals. If consent is given, the FS will also specify conditions within their legal authority for the use and protection of the NFS lands. The FS decision will be documented in a Decision Notice (DN) and a FONSI.

Both Agencies will base their respective decisions primarily on the information and effects analysis presented in this EA. As the surface management agency, the FS will use this analysis to also determine if issuance of the prospecting permits and authorization of the envisioned exploration activity would interfere with the primary purposes for which the lands were acquired. The proposed activity must also be found to be consistent with the GPNF Land and Resource Management Plan (LRMP), as amended.

1.3 Relationship to Federal, State, and Local Regulations, Plans, and Policies

In accordance with NEPA, this EA analyzes potential impacts that would result from agency decisions regarding the Proposed Action within the Goat Mountain Project Area. Other authorities with procedural requirements that pertain to the treatment of elements of the environment when the BLM and the FS are considering a federal action, and where additional consultation or regulatory compliance may be required, are listed in Table 1.3-1. (See Appendix B for a summary explanation of each statute.) The last column in Table 1.3-1 provides a quick reference for identifying any areas where the Project may result in the potential for significant impacts.

Table 1.3-1. Supplemental Authorities Consulted

Element	Authority	Addressed in the following EA document Sections:	Effects Y/N
Air Quality	The Clean Air Act as amended (42 United States Code [U.S.C.] 7401 et seq.)	Section 3.10, *Air Quality*	No
Cultural Resources	National Historic Preservation Act, as amended (16 U.S.C. 470)	Section 3.8, *Heritage and Cultural Resources*	No
Environmental Justice	Executive Order (E.O.) 12898, Environmental Justice, February 11, 1994	Section 3.13, *Socioeconomics*	No
Fish Habitat	Fish Habitat Magnuson-Stevens Act Provision: Essential Fish Habitat (EFH): Final Rule (50 CFR Part 600; 67 FR 2376)	Section 3.6, *Fisheries*; 3.3, *Hydrology/Hydrogeology*	No
Floodplains	E.O. 11988, as amended, Floodplain Management, 5/24/77	Section 3.3.1.1, *Mapped Waters, Wetlands, Floodplains, and Riparian Reserves*	No
Migratory Birds	E.O. 131186, Responsibilities of Federal Agencies to Protect Migratory Birds, January 10, 2001	Section 3.5, *Wildlife*	No
Migratory Birds	Migratory Bird Treaty Act of 1918, amended (16 U.SC. 703 et seq.)	Section 3.5, *Wildlife*	No
Native American Religious Concerns	American Indian Religious Freedom Act of 1978 (42 U.SC. 1996a)	Sections 3.8.1.4, *American Indian Consultation*; and 3.7.1.4 and 3.7.2.2, *Plants of Cultural Importance*	No
Threatened or Endangered Species	Endangered Species Act of 1983, as amended (16 U.S.C. 1531)	Sections 3.5.1.3, *Wildlife Species*; 3.6.1.3, *Special Status Fish Species*; and 3.7.1.2 and 3.7.2.2.1.2, *Special Status Plant Species*	No
Wastes, Hazardous or Solid	Resource Conservation and Recovery Act of 1976 (43 U.S.C. 6901 et seq.) Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (43 U.S.C. 9615)	N/A – There are no federal hazardous or state dangerous wastes that would be generated from this Proposed Action	No
Water Quality Drinking; and Ground	Safe Drinking Water Act, as amended (43 U.S.C. 300f et seq.), Clean Water Act of 1977 (33 U.S.C. 1251 et seq.)	Section 3.3, *Hydrology/ Hydrogeology*	No
Wetlands-Riparian Zones	E.O. 11990, Protection of Wetlands 5/24/77	Section 3.3, *Hydrology/ Hydrogeology*	No
Wild and Scenic Rivers	Wild and Scenic Rivers Act, as amended (16 U.S.C. 1271)	Section 3.12, *Recreation*	No
Wilderness	Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 et seq.); Wilderness Act of 1964 (16 U.S.C. 1131 et seq.)	Section 1.5, *Activities within Inventoried Roadless Areas*	No
Mineral Policy	Mining and Minerals Policy Act (1970), (30 U.S.C. §21a)	Section 1.3.1.9, *Conformance with FS Land and Resource Management Plan*; Section 1.6, *Federal Authority and Regulatory Context*	No

National Environmental Policy Act Handbook - Appendix 1-140 H-1790-1 – BLM Manual Rel. 1-1710 Supersedes Rel. 1-1547 01/30/2008.

1.3.1 Consistency with Plans, Policies, or Other Jurisdictions

This section addresses those effects for which disclosure is required by NEPA, BLM and FS policy or regulation, Executive Order (E.O.), or other laws and direction covering environmental analysis and documentation. In some cases, the information found here is also located elsewhere in this document.

The Proposed Action would not conflict with any plans or policies of other jurisdictions, including Tribes and neighboring public and private landowners. Furthermore, it would not conflict with other policies, regulations, or laws, including the Clean Water Act, Endangered Species Act, National Historic Preservation Act, Magnuson-Stevenson Fishery Conservation and Management Act, or Clean Air Act. Other potential conflicts with plans, policies, or other jurisdictions are described below.

1.3.1.1 Environmental Justice

E.O. 12898 (February 11, 1994) directs federal agencies to focus attention on the human health and environmental condition in minority and low-income communities. The purpose of the Executive Order is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations. While the proposed Project would create limited employment opportunities, none of the alternatives would have disproportionately high or adverse human health or environmental effects on minority and low-income populations. The Proposed Action may provide an increased benefit to diverse public entities and businesses. How it relates to environmental justice is addressed in Section 3.13, *Socioeconomics*.

1.3.1.2 Treaty Resources and Reserved Indian Rights

No impacts on American Indian social, economic, or subsistence rights are anticipated, nor are impacts anticipated related to the American Indian Religious Freedom Act. The FS and BLM jointly initiated consultation with local Tribes. Letters were sent to the Confederated Tribes and Bands of the Yakama Indian Nation, the Cowlitz Indian Tribe, the Nisqually Indian Tribe, and the Squaxin Island Tribe discussing the Proposed Action. Throughout the EA process, government-to-government consultation was carried out with the Cowlitz Indian Tribe.

1.3.1.3 Wetlands and Floodplains

The Proposed Action would comply with E.O. 11988 and 11990 to avoid adverse impacts associated with the occupancy and modification of floodplains and the destruction or modification of wetlands, as described in Section 3.3, *Hydrology and Hydrogeology*.

1.3.1.4 Unique Characteristics of the Area

The Green River, whose headwaters cross through the Project Area, has been determined to be eligible for designation under the National Wild and Scenic Rivers Act. Additional studies, however, will be required to determine suitability for formal designation, which would require an Act of Congress. Until a suitability analysis is completed, the values contributing to Wild and Scenic River eligibility are protected on NFS lands.

1.3.1.5 Air Quality and Sensitive Airsheds

Ambient air quality is defined by the Clean Air Act of 1970 as the air quality anywhere people have access to, outside of industrial site boundaries. Ambient air quality standards are designed to protect human health, welfare, and environmental quality. Air resource management includes any activity to anticipate, regulate, or monitor air pollution, air pollutant emissions, ambient air quality, or the effects of air pollution resulting from fires or fire management. The Project Area is not located within a sensitive airshed. The Clean Air Act requires the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) and thresholds for criteria pollutants to control pollution and protect public health, safety, and welfare. Furthermore, the Clean Air Act establishes state-level responsibilities for preventing and controlling air pollution. Emissions from forest burning in Washington are regulated by the Washington Clean Air Act (Revised Code of Washington [RCW] 70.94, 1991) and the Department of Natural (WDNR) Resources Smoke Management Plan (WDNR 1998). As discussed in Section 3.10, *Air Quality*, Project impacts on air quality would be minor under all alternatives and would predominantly result from the operation of internal combustion engines and from vehicle-generated fugitive dust. No burning is proposed as part of the Project.

1.3.1.6 Potential or Unusual Expenditures of Energy

The No Action Alternative would not require any expenditure of fuel or energy. The Proposed Action would require expenditures of fuel for workers to access the Project Area, use power equipment, and to run drilling systems. Overall, the Project would not result in any unusual expenditure of fuel under any alternative.

1.3.1.7 Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that are forever lost and cannot be reversed. Irretrievable commitments of resources are considered to be those that are lost for a period of time, but in time can be replaced. The monetary investment by the permit applicant is not considered to be an irreversible or irretrievable commitment of resources. If this Project is not permitted, the investment that would have otherwise been made could be spent elsewhere. The Project would require an irretrievable commitment of natural resources from the direct consumption of fossil fuels.

1.3.1.8 Prime Farmlands, Forest Lands, and Rangelands

As defined by the Farmland Protection and Policy Act of 1981, prime farmland has the best combination of physical and chemical characteristics for producing food, feed and forage, fiber, and oilseed crops and is also available for these uses (7 U.S.C. 4201). Prime forest land has soil capable of growing wood at the rate of 85 cubic feet or more per acre per year in natural stands and is not in urban or built-up areas (USDA 1983). Prime rangeland has the highest quality or value for grazing animals because of its soil, climate, topography, vegetation, and location. The potential natural vegetation is also palatable, nutritious, and available to the kinds of herbivores common to the area (USDA 1983). The Project Area does not contain any prime farmland, prime forest land, or prime rangeland.

1.3.1.9 Management Direction

The Goat Mountain hardrock prospecting project is proposed to comply with goals and objectives of the 1990 GPNF LRMP, as amended.[3] This EA is tiered to the GPNF LRMP Final Environmental Impact Statement (EIS) and Record of Decision (RD), and incorporates by reference the accompanying Forest Plan. The Forest Plan guides all surface natural resource management activities and establishes management standards and guidelines for the Forest. It describes resource management practices, levels of resource production and management, and the availability and suitability of lands for various resource management practices. Goals, objectives, and desired future conditions of the management areas within the project area are discussed below in the description of land allocations. In addition, management direction for the area is provided in three major amendments to the Forest Plan:

- The Northwest Forest Plan (NWFP) – Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (1994)
- Survey and Manage – Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (2001); and
- Invasive Plants – Pacific Northwest Invasive Plant Program Preventing and Managing Invasive Plants Record of Decision (2005).

Lands associated with this proposal are designated as “TS-Timber Production” and “6M – Wild and Scenic River” by the Forest Plan (see map of land allocations in Appendix A, Figure 5). Timber Production lands are for the optimization of timber production, utilization of wood fiber, and other commodities in a manner which assures the future productivity of the land (Forest Plan IV-136). The Wild and Scenic River corridor of the Green River is considered to be a “Recreational River” in the Forest Plan and has a range of accepted development levels. Until the suitability for the Green River as Wild and Scenic is determined, no activities are permitted that would alter the eligibility or potential classification of the stream under the 1968 Act. Forest-wide Standards and Guidelines for Minerals and Geology are provided in the Forest Plan on page II-32 to II-33 and VI-26 to VI-28.

The permit area also includes “UD-Unroaded Recreation” to the north, “VM-Visual Emphasis” to the east, and “AA- Mount St. Helens National Volcanic Monument” to the south, although none of these are in immediate vicinity of proposed project activities.

The area encompassed by this proposal is generally within the Matrix land allocation according to the NWFP. Matrix consists of those federal lands outside of the six categories of designated areas (Congressionally Reserved Areas, Late Successional Reserves, Adaptive Management Areas, Managed Late-Successional Areas, Administratively Withdrawn Areas, and Riparian Reserves). Most timber harvest takes place in Matrix lands with suitable forest.

Riparian Reserves are a component of the Aquatic Conservation Strategy under the NWFP and include a buffer for lands along streams and unstable and potentially unstable areas where special standards and guidelines direct land use, regardless of the surrounding management allocation. Riparian Reserve widths are generally one site-potential tree height distance from the stream for perennial non-fish bearing streams, two site-potential tree heights for fish-bearing streams; for the Green River the width is defined as 300 feet and for tributaries in the Project Area it is 150 feet. Standards and Guidelines may limit or prohibit certain activities within Riparian Reserves in order to meet Aquatic Conservation Strategy Objectives. These are discussed in further detail in Section 3.3.3.1 of this EA.

Neither the GPNF Forest Plan nor the NWFP prohibits mineral exploration within the Permit Area. In order for the Forest Service to provide consent to the BLM for the Project, it would require standard conditions to assure that permitted activities would be consistent with NWFP Standards and Guidelines.

A number of laws guide the overall FS mission to “sustain the health, diversity, and productivity of the Nation’s forests and grasslands to meet the needs of present and future generations.” The Multiple-Use-Sustained-Yield Act (1960) requires that NFS lands be administered considering the values of various resources in management decisions and provides that nothing in the Act affects the use or administration of mineral resources on NFS lands. The NFMA (1976) requires the FS to keep a detailed inventory of lands and resources, and to consider the physical sciences in interdisciplinary planning for use of NFS resources. The Mining and Minerals Policy Act (1970) states that it is the continuing policy of the federal government to encourage development of economically sound and stable domestic mining and minerals industries and the orderly development of domestic mineral resources to help ensure satisfaction of industrial, security, and environmental needs. Consistent with these and other statutes, the FS Manual 2802 on Minerals and Geology establishes an agency objective to “Ensure that exploration, development, and production of mineral and energy resources are conducted in an environmentally sound manner, and that these activities are integrated with the planning and management of other National Forest resources” (FS 2012c).

In 1982, Congress established the 110,300-acre Mount St. Helens National Volcanic Monument *(*P.L. 97-243), and prescribed in part that “Nothing in this Act shall be construed as authorizing or directing the establishment of protective perimeters or buffer zones around the Monument for the purpose of precluding activities outside the

Monument boundary which would otherwise be permitted under applicable law."[3] In a related report dated July 15, 1982, it was noted that the nearby Monument boundary was specifically drawn to exclude what was believed to be the "...most potentially productive of the [former] copper mining claims on Goat Mountain and its slopes above the [Green] river."[4] The two Prospecting Permit Applications encompass an area specifically excluded from and outside the boundary of the Mount St. Helens National Volcanic Monument.[5]

1.4 Primary Purpose for Which the Lands were Acquired

Reorganization Plan No. 3 of 1946 (60 Stat. 1097, 1099; 5 U.S.C. Appendix) indicates that the USDI cannot authorize mineral development on acquired NFS lands until being "advised by the Secretary of Agriculture that such development will not interfere with the primary purposes for which the lands were acquired…." The NFS lands within the Permit Area were either purchased or donated under the statutory authority of the Weeks Act of 1911. According to the Act, as amended, Congress authorized the Secretary of Agriculture to purchase lands for the purposes of regulating the flow of navigable streams or for the production of timber. The Mineral Resources on Weeks Law Lands, 1917, established that the Secretary of Agriculture could also authorize mineral activities on lands acquired under the Weeks Act of 1911. This authority was transferred to the USDI under Section 402 of the 1946 Presidential Reorganization Plan No. 3 (see further discussion in Section 1.6 of this EA).

The NFS lands within the Permit Area were acquired in several transactions and from different entities that owned either surface or mineral interests and sold or donated them to the United States. The statutorily established purposes of Weeks Law Lands are the "regulation of the flow of navigable streams and the production of timber" (16 U.S.C. 521). In a letter from the FS to Congressional Representatives and local County Commissioners, the agency acknowledged that the acquisition of certain lands and interests in the Goat Mountain area "…will aid in the preservation of the integrity of the Green River prior to its entering the National Volcanic Monument, and will also aid in the preservation of the scenic beauty of this area which is to become an important Monument portal."

In addition, lands within MS-1329 and MS-1330 (168 acres) were acquired with funds provided by the Land and Water Conservation Fund (LWCF) established by Congress in 1964 (see Appendix A, Figure 4). Lands acquired using LWCF funds are "primarily of value for outdoor recreation purposes" (16 U.S.C. 460l-9(a)(1)(b).

In the civil case of Gifford Pinchot Task Force v. Perez (2014), the U.S. District Court of Oregon found that the Agencies' analysis in the 2012 EA did "not expressly recognize outdoor recreation as a primary purpose of land acquisition," given that some of the lands had been acquired using LWCF funds, which provide monies to acquire lands that have

[3] H.R. 1659 (105th): Mount St. Helens National Volcanic Monument Completion Act. Approved August 26, 1982 (Public Law 97-243).
[4] House Report 97-636, Part 2 at 14, July 15, 1982.
[5] Ibid.

primary value for outdoor recreation purposes. The Court thus ordered the FS to also make an express determination on whether the Proposed Action would be inconsistent with the purpose of outdoor recreation.

The FS determination related to the primary purpose of outdoor recreation only applies to the 168 acres within MS-1329 and -1330 which are included in Prospecting Permit Application WAOR-066628 because they were acquired with LWCF monies. Considering the analysis in this EA along with identified surface resource protections, and to satisfy the Court order, the FS will advise the BLM whether the Project would interfere with or be inconsistent with the flow of navigable streams, production of timber, or outdoor recreation.

1.5 Activities within Inventoried Roadless Areas

During the past three decades, the FS has conducted various local, regional, and national "inventories" of roadless areas (IRAs), including the nationwide Roadless Area Review and Evaluation (RARE II) inventory in 1979. According to the FS, "Inventoried Roadless Areas are National Forest System undeveloped areas typically exceeding 5,000 acres that meet the minimum criteria for wilderness consideration under the Wilderness Act and that were inventoried during the FS Roadless Area Review and Evaluation (RARE II) process, subsequent assessments, or lands currently inventoried for planning purposes as roadless areas."[6] The final map of IRAs came from the Roadless Area Conservation Rule (2001). This inventory is based on individual forest plans or other assessments that are completed and adopted by the agency (Figure 3, *Project Area* and Figure 4, *Mineral Survey Limits*).

Activities within IRAs are subject to the regulations at 36 CFR 294 regarding construction and reconstruction. Only some 120 acres (<15 percent) of the Permit Area within MS-708, -774, and -1330 fall within the boundary of the Tumwater IRA as shown in Figure 4. However, no road construction or drill pad placement is proposed within the IRA. All contemplated or future activities would have to be consistent with the Roadless Rule.

1.6 Federal Authority and Regulatory Context

As previously noted, the subject lands were acquired as NFS lands under the authority of the Weeks Act of 1911 (P.L. 61-435; 36 Stat. 961), with less than 170 acres purchased with LWCF funds. Federally owned mineral resources on these lands are managed in accordance with Mineral Resources on Weeks Law Lands of 1917 (39 Stat.1150, as supplemented; 16 U.S.C. 520), pursuant to the President's Reorganization Plan No. 3 of 1946 Section 402 (60 Stat. 1097; 1099, 5 U.S.C. Appendix).

In the Act of March 1, 1911, Congress authorized the Secretary of Agriculture to purchase lands for the regulation of the flow of navigable streams or for the production of timber. In the Act of March 4, 1917, Congress further authorized the Secretary of

[6] www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsbdev3_000250.pdf.

Agriculture to permit the prospecting, development, and utilization of the federal mineral resources of the lands acquired under the Act of March 11, 1911.

In 1946, Congress transferred the authority to manage the federal mineral estate on NFS lands acquired under the Weeks Act for hardrock minerals, from the Secretary of Agriculture to the Secretary of the Interior (Reorganization Plan No. 3, of July 16, 1946; 43 CFR 3501.1(b)). The Reorganization Plan established a cooperative relationship between the Departments and provided that the Secretary of Interior shall allow mineral development of these lands "…only when he is advised by the Secretary of Agriculture that such development will not interfere with the primary purposes for which the land was acquired and only in accordance with such conditions as may be specified by the Secretary of Agriculture in order to protect such purposes."

Under the guidance of the Mining and Minerals Policy Act of 1970, the agencies fulfill the federal government's overall policy to "…foster and encourage private enterprise in the development of economically sound and stable industries, and in the orderly and economic development of domestic resources to help assure satisfaction of industrial, security and environmental needs" (Mineral Policy Act 1970).

The FS considers mineral exploration and development to be important parts of its management program and cooperates with the USDI in the development of federally owned leasable mineral resources. The FS recognizes that mineral exploration and development are ordinarily in the public interest and, with appropriate operating conditions, are compatible with the purposes for which the NFS lands are managed (FS Manual 2822.03) to "[e]ncourage and facilitate the orderly exploration and production of mineral and energy resources within the National Forest System in order to maintain a viable, healthy minerals industry, and to promote self-sufficiency in those mineral and energy resources necessary for economic growth and the nation defense" (Forest Plan, p. IV-4).

The applicable statutes and their implementing regulations, orders, and notices authorize the BLM to issue prospecting permits and leases and to approve and administer any subsequent operations regarding exploration, development, production, and transportation of federally owned leasable minerals, including those within the NFS. The BLM's leasing authority and the FS consent are discretionary actions and must comply with NEPA; the Forest and Rangeland Renewable Resources Planning Act, P.L. 93-378, as amended by the NFMA, P.L. 94-588; and other applicable statutes, regulations, Executive Orders, and agency directives.

Regulations governing these activities are found at 43 CFR 3505 for prospecting permits and in Subpart 3509 for fractional interest prospecting as would be the case for exploration on MS-708 where an undivided 50 percent of the mineral estate is privately held. Requirements for exploration operating plans are specified at 3590 for Solid Minerals Other than Coal and at 3592 regarding Plans and Maps. By construct of regulation, the BLM has full discretion regarding the issuance of prospecting permits subject to the written consent of the FS consistent with the President's Reorganization

Plan No. 3 of 1946 (39 Stat.1150, as supplemented; 16 U.S.C. 520), pursuant to the President's Reorganization Plan No. 3 of 1946 Section 402 (60 Stat. 1097; 1099, 5 U.S.C. Appendix).

It is important to reiterate that if the FS consents to issuance of the requested prospecting permits, a DN and FONSI will be prepared that articulates the FS consent and specifies conditions consistent with the agency's legal authority for surface resource protection. As part of its consideration, the FS will make findings with respect to the other applicable authorities, including a finding on interference with the primary purpose(s) for which the land was acquired per the 1946 Reorganization Plan, and other determinations (see Section 1.6). In turn, based on the FS consent, the BLM will develop a DR and FONSI substantiating its decision to issue the permits for the proposed prospecting, including a determination that doing so is in the public interest inclusive of appropriate terms and conditions. Decisions of both Agencies regarding the prospecting permits will be based on this EA. The BLM will also use this EA as a basis for its administrative action on the Exploration Plan of October 5, 2011. This plan was submitted concurrently with the Prospecting Permit Applications. The decisions will be released by each agency's legal notice that will be posted to the BLM Mineral Program website at < http://www.blm.gov/or/programs/minerals/ >, and to its National ePlanning Register at < http://1.usa.gov/1NFp1eT >.

1.7 Purpose and Need of Action

The BLM has the responsibility to manage the federal mineral estate, as well as implementation of regulations for minerals available and subject to prospecting and exploration (43 CFR 3505). The BLM purpose and need is to either approve two hardrock Prospecting Permit Applications (WAOR-066628 and 066973) with or without stipulations, or deny them. To do this, the BLM needs to evaluate the actions proposed by Ascot to carry out mineral prospecting within MS-708, -774, -779, -1329, and -1330 according to an Exploration Plan that accompanied the Prospecting Permit Applications.

Because the Permit Area under consideration encompasses NFS lands, the BLM must first obtain consent and any accompanying conditions from the FS prior to issuing the prospecting permits. Thus, the purpose and need for the FS is to respond to the BLM's request for consent under the applicable legal and regulatory framework by granting consent with or without conditions or by denying consent, and to make other findings required by law and regulation

The FS purpose follows GPNF LRMP direction for minerals management to "encourage and facilitate the orderly exploration, development, and production of mineral and energy resources within the NFS in order to: maintain a viable and healthy minerals industry; promote self-sufficiency in those mineral and energy resources necessary for economic growth and national defense;" ensure consistency with Forest Plan Standards and Guidelines; and facilitate the exploration of federal mineral resources in an environmentally sound manner.

In addition, the purpose and need supports FS Minerals Program Policy to "coordinate and cooperate with other Federal and State agencies having authority and expertise in mineral-related activities" (USDA 2015a), and the joint statement of support for sustainable minerals development between the FS and BLM signed on October 22, 2003 (USDA 2015b). The need for the action is also founded upon FS Minerals & Geology Management Program Mission "…to provide for the sustainable use and enjoyment of mineral and geologic resources on the National Forests" (USDA 2015c).

Both the BLM and the FS are mindful of the federal government's policy to foster and encourage private enterprise in the development of economically sound and stable industries, and the orderly and economic development of domestic resources to help ensure satisfaction of industrial, security, and environmental needs (Mining and Minerals Policy Act of 1970). The government is also interested in the scientific knowledge that might be gained from the prospecting for which it is largely dependent on private exploration.

1.8 SCOPING AND PUBLIC INVOLVEMENT

The purpose of the public scoping process carried out in February and March of 2012 was to determine the range and nature of issues that should be addressed in this EA, including alternatives. Scoping involved the issuance of notification to the public, Tribes, other state and federal agencies, organizations, and local and state governments. Scoping was used to identify needed coordination with other entities; refine issues through public, Tribal, and agency feedback on the preliminary issues; and to identify new issues and reasonable alternatives. Tribal input was also achieved through government-to-government consultation.

Following receipt of Ascot's Prospecting Permit Applications, the BLM and FS sent formal Project announcements and notifications of the public scoping meetings to local, state, and Tribal government officials; established non-government organizations; newspapers of general circulation encompassing the proposed Permit Area; and to individuals and groups who directly participated during consideration of a previous hardrock lease application for the same lands. Organizations who submitted comments on behalf of individuals (petitions and form letters) were provided notice; however, the extensive memberships that they represent were not individually contacted due to the time and logistics that would be required. The Agencies then held scheduled public scoping and open house meetings at the following locations and dates:

- Longview, Cowlitz County, Washington on February 15, 2012. This location was chosen due to its central location to potential attendees within the vicinity of the Project Area.
- Morton, Lewis County, Washington on February 16, 2012. This location was chosen due to its proximity to the Proposed Action site and nearby population centers at Randle and Morton.
- Stevenson, Skamania County, Washington on March 13, 2012. This location was chosen in response to a request by local government officials in Skamania County, within which the Proposed Action site is physically located.

At these meetings, attendees were asked to sign the attendance roster, fill out a comment form that was attached to a Project fact sheet, and listen to an illustrated presentation by staff of the BLM, FS, and AECOM and URS (contractors for preparation of this EA). Display boards were placed around the meeting room, and agency staff was available to answer questions. The slide presentation included maps and graphics showing the location of the Proposed Action, images of the proposed drilling equipment, a discussion of agency review and permitting processes, and general information regarding the public scoping process. Afterwards, questions from the floor were responded to. All of the meetings were well attended, and some participants submitted comment forms before leaving. Table 1.3-2 summarizes the attendance and the number of comment forms received at or subsequent to each of the three meetings.

Table 1.3-2. Public Scoping Meetings

Open House Location	Date 2012	Attendees	Comment Forms Received at the Meetings	Comments Received via the BLM Website or by Mail (through March 23)
Longview, Cowlitz County, WA	February 15	84	21	**189**
Morton, Lewis County, WA	February 16	400+	11	
Stevenson, Skamania County, WA	March 13	135+	10	
Total		**619+**	**42**	

Attendees were also informed about the BLM Project information website. The website included a description of the Proposed Action and Exploration Plan, along with various maps of the area, and other related documents for the public to review. The website provided an opportunity for submission of comments electronically. Scoping comments were accepted until midnight March 16, 2012, when the formal comment period closed. Subsequent substantive comments were also considered and the commenters were added to the list of known parties of interest. By March 23, 2012, a total of 189 formal comments were received either via the website or by mail posted to the BLM or FS. Subsequent to the end of scoping, several thousand additional comments were received, mostly as e-mail form letters.

Comments from public scoping addressed a range of issues and concerns, which are broadly summarized below. All comments were made a part of the Project Record and are available for inspection at the BLM Oregon/Washington State Office, 1220 SW 3rd Avenue, Suite 1100, Portland, Oregon, during normal weekday business hours.

Key issues from the public scoping comments included:

- Impacts on jobs and local economy.
- Environment
  - Impacts on threatened and endangered and otherwise protected wildlife species.

- o Impacts on other wildlife including elk and deer wintering and calving/fawning grounds.
- Water Quality
  - o Changes in water quality that might affect resident fish near the Project or salmon and steelhead downstream.
  - o Impacts on groundwater quality; spills of petroleum products, contamination from drilling products that would degrade quality.
  - o Contamination or alteration of aquifer capacity from potentially acid-generating mineralization encountered during drilling or upon abandonment.
  - o Impacts on the routing of groundwater and its interface with surface water.
  - o Impacts on streams and wetlands.
- Recreation
  - o Impacts on horse and hiking trails and use of recreation sites.
  - o Concern with Mount St. Helens viewshed.
- Effects of dust, traffic, and noise on local flora, fauna, and streams.
- Adequacy of information to analyze impacts (surveys needed).
- Public safety.
- Better understanding of the subsurface geology.

Scoping comments also reflected both support for the proposed exploration drilling and concern for exploration and potential mine development. Because the Proposed Action relates only to agency decisions regarding the permitting of exploration activities, concerns related to future mine development lie beyond the scope of this EA.[7] It is important, however, to note that if as the result of exploratory drilling Ascot can demonstrate the discovery of a valuable deposit, they may apply for a noncompetitive preference right lease pursuant to 43 CFR 3507. The environmental consequences of such an action would be evaluated by the Agencies as a separate issue and NEPA process, and would be the subject of separate decision by the Agencies.

The primary subject of other comments submitted during public scoping included jobs and the general impacts on the environment, water quality, and recreation. Approximately one-third of the scoping comments related to jobs and the general environment. About 90 percent of these comments noted that the Project would bring needed employment and improve economic conditions to the area, while 10 percent noted that the Project would not improve the job market. Approximately 10 percent of the comments showed concern that the Project would negatively impact water quality, and about 10 percent were concerned with the impacts on recreation (Appendix C, *Public Scoping Comment Summary Matrix*).

[7] Because a mine is not currently being proposed at Goat Mountain, and is only speculative, there is no requirement for a mine to be accounted for in the cumulative effects analysis. See Appendix D, NAEP NEPA Review; Jones v. Nat'l Marine Fisheries Serv., 741 F.3d 989, 1000-01 (9th Cir. 2013); Wilderness Workshop v. U.S. Bureau of Land Management, 531 F.3d 1220, 1229 (10th Cir. 2008); O'Reilly v. U.S. Army Corps of Eng'rs, 477 F.3d 225, 236 (5th Cir.2007) (citing 40 C.F.R. § 1508.23).

Other subjects that were mentioned in less than 10 percent (each) of the scoping comments are summarized as follows:

- That development will not interfere with the primary purpose for which the lands were acquired.
- The range of alternatives evaluated in the EA, specifically suggesting trucking water to the site.
- Effects on compaction of soil.
- Bond requirements of the Project proponent.
- Effects on the Tumwater IRA.
- Consistency with the 1990 GPNF Forest Plan as amended by the NWFP of 1994.
- Concern that exploration would result in a mine.
- Concern regarding eligibility of the Green River for Wild and Scenic River status.

The EA was publically announced and released for an extended 45-day comment period on June 29, 2012. Concurrently it was posted on the BLM Oregon/Washington Mineral Program Webpage at http://www.blm.gov/or/programs/minerals/, along with a number of related documents and an e-form for submitting comments. The public comment period formally ended at midnight on August 15, 2012. Over 6,000 individual comment documents were received and are on file at the BLM Oregon/Washington State Office. All substantive comments were taken into consideration in modification of this EA with requisite information and clarification. Following scoping, Alternative 3, *Alternative Based on Scoping Comments*, was developed by modifying Alternative 2, *Proposed Action Alternative*, to respond to scoping comments and includes design features (which are analyzed in full in Chapter 3) to reduce potential impacts. Alternative 4, *Drill Site Riparian Reserve Avoidance Alternative*, was developed to consider a reduction in the potential for impacts in the Riparian Reserve, as well as respond to the 2014 Court ruling. The nature of the revisions to the environmental review process include:

1. Additional information identified during government-to-government consultation with the Cowlitz Indian Tribe regarding resources of cultural importance.
2. Alternative 3, *Alternative Based on Scoping Comments*, was modified to add the following additional conditions and design features:
    a. Scheduling Proposed Action activities around wildlife and recreation concerns.
    b. Balancing water use between on-site sources, re-use of drilling fluids, and water from off-site sources.
    c. Drilling fluid management to improve re-circulation and minimize subsurface impacts.
    d. Monitoring the quality of existing water resources during drilling activities.

e. Requiring that all drillholes be sealed after completion.

3. The FS consent decision was clarified in each alternative as to the required specified conditions for the Permit Area that will not interfere with the primary purposes for which the lands were acquired under authority of the Weeks Act, consistent with the LWCF Act where LWCF funds were used to acquire land, and for protection of NFS lands.
4. The BLM decision regarding administrative action on the Prospecting Permit Applications was further clarified to apply only to the Exploration Plan for the specified parcels consistent with the actions analyzed in this EA.
5. Appendix A, Figure 4 was revised to show the boundaries of the MS units and appended to show the permit boundaries of the two Prospecting Permit Applications.
6. Alternative 4, *Drill Site Riparian Reserve Avoidance*, was developed to reduce the potential for impacts from the installation and operation of drill pads within the Riparian Reserve.

2 ALTERNATIVES, INCLUDING THE PROPOSED ACTION

2.1 ALTERNATIVES

The NEPA regulations at 40 CFR 1508.9(b); 42 U.S.C. § 4332, Section 102(2)(E), state that agencies of the federal government shall "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." The alternatives evaluated in this EA include the following:

- Alternative 1 - No Action: Under the No Action Alternative, the FS will not consent to issuance of the two proposed prospecting permits, and/or the BLM will subsequently decide not to issue the permits or approve the Exploration Plan.
- Alternative 2 - Proposed Action*:* The Proposed Action is that described in Ascot's Prospecting Permit Applications and associated Exploration Plan for prospecting on the south face of Goat Mountain within the GPNF. Alternative 2 includes specified conditions to protect the lands and the primary purposes for which the lands were acquired, which the FS would specify if it were to consent to the BLM issuing the two prospecting permits. This alternative also contains conditions to address certain resource issues that the BLM would require if it were to approve the exploration.
- Alternative 3 - Based on Scoping Comments: Alternative 3 is the same as Alternative 2, but includes added protective design features to address changes in water use where the use of water from on-site sources would be balanced with the re-use of drilling fluids and the use of water from off-site sources as needed; drilling fluid management to improve recirculation to minimize aquifer impacts; monitoring the quality of on-site water sources during drilling activities; additional requirements related to drillhole abandonment; timing restrictions to protect habitat of the northern spotted owl and recreational resources; and using a portable drill shack/baffling/insulation and directional lighting at the drill sites.
- Alternative 4 – Drill Site Riparian Reserve Avoidance: Alternative 4 is the same as Alternative 3, but excludes installation and drilling activities from the Riparian Reserve (e.g., at proposed drill pads 6 and 7 identified in Alternative 2) along the Green River and drainage National Hydrography Dataset (NHD) 1.

2.1.1 No Action Alternative (Alternative 1)

Under the No Action Alternative, the FS would not consent to the Proposed Action, and/or the BLM would not issue the prospecting permits or approve the proposed Exploration Plan. Former temporary roads would not be reactivated, drill pad sites would not be prepared, and no drilling or associated activities would occur. The No Action Alternative, however, does not foreclose or preclude an unforeseen future application for mineral prospecting or leasing in the Project Area, which would require a separate environmental analysis and administrative decisions specific to such application by the FS and the BLM.

2.1.2 Proposed Action Alternative (Alternative 2)

Ascot applied to the BLM for two prospecting permits for lands in Skamania County in southwest Washington State as listed in Table 2.1-1, below. The lands are located within portions of Sections 8, 9, 16, 17, 18, and 19 of Township 10 North, Range 6 East, Willamette Meridian, Skamania County, Washington. Minerals applied for include copper, molybdenum, silver, and gold and associated minerals. Under Alternative 2 the FS would consent to BLM issuing the prospecting permits and would specify conditions required to protect NFS lands and the primary purposes for which they were acquired. The BLM would subsequently issue the two prospecting permits conveying prospecting rights and specifying conditions including any permitting conditions required by the FS. The BLM would then approve the proposed Exploration Plan including operating conditions specified by the BLM and recommended by the FS. All conditions required by the Agencies under Alternative 2 are design features and are analyzed accordingly in Chapter 3.

Table 2.1-1. Parcels Included in Prospecting Permit Applications

Name	Serial #	Patent Date	Acres	MS#
Index Group	43393	March 8, 1906	247.93	MS-779*
Earl Group	43189	November 20, 1906	266.15	MS-774*
Judy/April Group	46820016	August 6, 1982	163.90	MS-1329*
Wendy Group	46820017	August 6, 1982	2.70	MS-1330*
Germania Group	114944	March 21, 1910	217.27	MS-708†
Total acres under application:			**897.94**	

* Parcels included in Prospecting Permit WAOR-066628.
† Parcel included in Prospecting Permit WAOR-066973.

The Permit Area is located on surveyed parcels MS-708, -774, -779, -1329, and -1330 (Figure 4, *Mineral Survey Limits*). The accompanying proposed Exploration Plan includes accessing sites for 23 drill pads and drilling 63 small NQ diameter diamond core holes (with larger HQ diameter casing as needed) to collect samples for analysis to establish the geology, mineralogy, and mineral value of the target formation.

All drill sites would be accessed using current or previously constructed and subsequently closed temporary logging and/or mineral exploration roads. Of the 23 drill sites, nine (Pads 1–7, 14, and 15) would be accessed directly along current Forest roads (FS Road 2612 and a campground road). The remaining 14 sites would be accessed from former temprary roads that would be temporarily reactivated.

Of the 14 sites on decommissioned roads, seven (Pads 10, 11, 12, 20, 21, 23, and 24) would be along road segments that were closed in the 1980s and may now have small tree seedlings and saplings growing on them. It is important to note that the pad numbering sequence is not continuous, as proposed Pads 8 and 9 were eliminated by Ascot following its original submission because their construction would result in substantial disturbance, including grubbing and tree removal to gain access for drilling and support equipment. The proposed drill pads and associated roads are shown on Figure 4. No new roads would be constructed to access any of the proposed drill sites, which are all located on or adjacent to existing roads (both forest roads and temporary roads).

The proposed Exploration Plan includes the following major elements:

- Reactivation of former temporary road segments for access. This includes removal of small trees and other vegetation that may have sprouted since road closure; grubbing, brushing, and removal of bank slough; limbing of over-hanging vegetation and removal of hazard trees as necessary for safe passage of equipment; and such other maintenance required by the FS.
- Clearing for drill pads to create a safe work site.
- Implementation of runoff, sediment, and other environmental controls.
- Installation of temporary sumps to contain drilling fluids.
- Exploratory drilling with one or two portable rigs using fluids to lubricate the drill and remove cuttings that consist mostly of water and non-hazardous additives.
- Removal of rock core and hand samples for off-site analysis.
- Drillhole abandonment and reclamation of the drill pad sites and the temporarily reactivated roads. This would include complete abandonment of each hole with sealing material (bentonites) or cement if artesian flow is encountered.
- Installation of temporary signage and traffic controls to maintain public safety.

The following subsections provide specific information related to elements of the proposed Exploration Plan.

2.1.2.1 Timetable of Operations

The snow-free season in this area is generally from late May until early November. The Proposed Action would take approximately 5 months to complete with the proposed equipment. To accommodate seasonal access limitations, drilling would start as early as May and be completed, including reclamation, by late October. The drilling schedule would be on a 24-hour, 7-day-a-week basis. Some scheduling flexibility would be needed to meet seasonal conditions and timing limitations required by the Agencies to comply with the GPNF Forest Plan, as well as the purposes for which the lands were acquired.

At the discretion of the Agencies, drilling could begin earlier or continue later depending on weather conditions (e.g., precipitation and its effect on road stability and surface integrity). Contingent on when the prospecting permits are issued, the drilling program may have to be split into two phases, with drilling of the southern area separated from drilling on the northern steeper slopes. No drilling would take place in the vicinity of the Green River Horse Camp during the peak use periods, including Labor Day weekend. Regardless of timing, the road to the horse camp would remain open during the proposed exploration activities.

2.1.2.2 Access

Access to the Project Area is from FS Road 2612, as described in Section 1.1.1, *Location*. As part of the proposed Exploration Plan, approximately 0.34 mile (0.62 acre) of former temporary roads would be temporarily reactivated with the minimum disturbance possible. These roads were constructed in the 1980s and were not reactivated during the 2010 exploration program (see Section 1.1.2, *History*). This action would also utilize 1.35 miles (2.45 acres) of temporary roads that were reactivated during the 2010 exploration program. The area of disturbance for reactivating temporary road is based on a 10-foot wide road with a 5-foot cast area. Drill sites within MS-774 would be located on existing temporaryroads reactivated for Ascot's 2010 MS-708 drilling program. A total of approximately 1.69 miles (3.07 acres) of temporary roads would be briefly used for access.

A FS Road Use Permit would be required for commercial use, over-weight/over width, special maintenance, snow plowing, or other activities, and would be provided upon request and under the appropriate terms and conditions, pursuant to 36 CFR 261.54 (c). This permit would be obtained from the FS prior to drilling operations. If drilling activities are conducted during inclement and/or unpredicted weather conditions, a snow plow permit may be required and would be subject to certain conditions. Operations will cease if ruts in the road are greater than 2 inches deep and/or agency representatives determine that use of the road during wet conditions is causing excessive resource damage.

A local contractor would be used to temporarily reactivate the existing temporary road segments using a mid-size excavator and a small "Kubota" style brushing excavator. The brushing excavator would be used for removal of vegetation, and for building drill pads and sumps. One or two self-propelled track-mounted diamond drill rigs would be used to bore the exploration's core holes. Drilling rods would be moved between sites with six-wheel all-terrain vehicles (ATVs) equipped with rod carrier beds. Drillers would use two or more four-wheel drive pickup trucks for site access, movement of small equipment, and mobile fuel supply.

For safety reasons, public access to drill sites in the northern portion of the Project Area would be limited during active drilling through the use of a temporary locked gate. All equipment, when not in use, would be parked along existing roads that are located beyond the access gate (Plate 1, *Proposed Security Gate off FS Road 2612*). There are numerous turn-around locations along these roads, and no additional sites would need to be cleared for mobilizing, storage, or turn-arounds.

Plate 1. Proposed Security Gate off FS Road 2612 (similar to gate used in 2010, as shown).

During implementation of the Project, employees would not be allowed to travel off designated routes in motorized vehicles. Typically, temporary roads are narrow, have restricted visual paths and steep grades, and pose a safety hazard for the general public. Because of irregular Project traffic and equipment activity on these roads, the general public would be warned about accessing them during active exploration operations, primarily for safety reasons. Temporary signage would be posted, a security gate installed and maintained, and security personnel utilized to protect public safety and provide equipment security.

Temporary improvements to roads would require some tree removal, minor surface grubbing, removal and side casting of sloughed soil, and removal of logs and installation of small berms to deter public vehicle access (Table 2.1-2, *Tree Removal*). The FS considers this type of activity as maintenance.

The drill pads would be located largely within the existing road prism. In most cases, temporary improvement or grading to prepare drill pads is not planned as the drilling equipment is both self-propelled and self-leveling.

The Exploration Plan proposes 23 drill pad locations for a total affected area of approximately 0.23 acre (the area of each pad would be about 20 feet by 20 feet, or roughly 400 square feet) (Figure 3, *Project Area*). During the 2010 drilling program, vegetation encountered along old logging and drill roads was not as dense as anticipated. This enabled the temporary roads to be reactivated and reclaimed to nearly original (pre-reactivation) condition, using salvaged sloughed and cast material. Trees growing on the roads would be removed and saved for reclamation as downed woody debris, while trees along road edges would be limbed only to the extent necessary to avoid job hazards. If hazard trees are noted in the area and are deemed dangerous by the Agencies, they would be removed on a selective basis.

As was the case for roads that were reactivated for the 2010 exploration program, no trees greater than a 12-inch diameter-at-breast-height (dbh) would be removed, with the possible exception of hazard trees that have developed because of wind or other factors since 2010; and the road footprint would be almost identical to the 2010 footprint (Table 2.1-2). In all cases, trees requiring removal would be marked for approval by the Agencies before action is taken. It is estimated that up to 68 trees would be removed in the entire Project Area. Their size and location are described below.

Table 2.1-2. Tree Removal

Road Segment or Location	Number of Trees Removed	Diameter at Breast Height (dbh) in inches	Type of Stand
Road segments to Pads 13, 22, and 25	5	< 12	Mature Timber
Road between Pad 22 and Pad 23	1 4	10 < 4	Mature Timber
Pad 22	2	10–12	Mature Timber
Road between Pad 23 and Pad 25	2 25	< 10 4-7	Mature Timber
Pad 25	1 2	12 6	Mature Timber
Road between Pad 25 and Pad 13	2 4	12 < 4	Mature Timber
Pad 13	20	< 4	
Total Trees Removed	**68**	**All < 12dbh**	Mature Timber

In areas where soil is present, it would be removed from the reactivated temporary roads and drill pad sites, and stockpiled for use during reclamation. Soil stockpiles would probably not be required within the MS-1329, as the terrain in this area is much flatter and soil removal/disturbance can be largely avoided.

Water bars would be established along roads in the Project Area to prevent/control erosion. Selected water bars would be retained during reclamation as recommended by the FS. Temporary culverts would be installed in areas with seasonal drainages as shown on Figure 6, *Surface Water Analysis*, and as recommended by Agencies. Silt screens would be installed at the outfall of the culverts along with weed-free straw bales for filtration. As recommended by the FS, weed-free straw would also be placed on the roads as needed to minimize erosion. During reclamation, culverts and silt screens would be removed and the original drainage channels and slope configuration would be re-established. During Project implementation, water bars would be constructed on roads to minimize the concentration of runoff and the potential for erosion. Water bars would be placed closer together on roads with steeper slope or road grade and farther apart on roads with more gradual grades. The approximate distances between water bars on roads of various road grades are shown in Table 2.1-3.

Table 2.1-3. Road Grades and Water Bars

Road Grade (%)	Distance Between (feet)
2	250
5	135
10	80
15	60
20	45
25	40
30	35

Water bars would be installed at an approximate 30-degree angle downslope across, but not perpendicular to the road. The outflow end of the water bar would be kept open to prevent water from accumulating. Outflow would be directed away from any nearby natural drainages and streams. At the direction of the Agencies, water bars would be left as a supplement to road closure once Project operations are completed.

2.1.2.3 Proposed Design Features and Best Management Practices

Implementation of the proposed Exploration Plan would result in the temporary installation of 23 drill pads (0.23 acre total) located primarily on reactivated temporary roads: 1.35 miles (2.45 acres) of existing temporary roads reactivated for the 2010 drilling; and 0.34 mile (0.62 acre) of newly reactivated temporary roads, for a total directly impacted area of approximately 3.3 acres (see Table 2.1-4, *Acres Disturbed by the Proposed Project*).

Directional drilling would consist of 63 NQ (2.5-inch) diameter drillholes that would yield approximately 110,000 feet of core. Hand samples and drill cores would be removed from the Project Area to an off-site location for further analysis. The majority of the directional holes would yield core samples and related geological and mineralogical information needed to fill gaps in the historic data largely gathered by the previous mineral patent owner, Duval. Some of the holes would be twinned with old drillholes to verify historic information in order to complete an up-to-date geological model.

The remainder of this section describes the general design features, including the Best Management Practices (BMPs) that would be incorporated into this alternative as analyzed in Chapter 3, *Affected Environment and Environmental Consequences*. Specific BMPs identified as part of this alternative are described in Appendix E, *Best Management Practices.* BMPs are design features that are incorporated into this alternative to avoid or minimize potential environmental effects.

Table 2.1-4. Acres Disturbed by the Proposed Project

	Quantity	Miles	Acres	Newly Disturbed Acres
Drill Pads	23	-	0.23	0.23
Existing temporary roads reactivated for the 2010 drilling	-	1.35	2.45	0
Newly reactivated temporary roads for current Proposed Action	-	0.34	0.62	0.62
Total Disturbed Area/Acres:		**1.69**	**3.30**	
Total Newly Disturbed Area/Acres:		**0.34**		**0.85**

Project equipment would include four-wheel drive pickup trucks for use by drillers and support personnel, two six-wheel ATVs with drill rod carrier beds, a standard 3,000–5,000 gallon water truck, and a small track excavator (similar to a Kubota 290) for pad and sump installation. A larger track-mounted excavator (such as a JD690) may be needed in limited areas for road clearing and pad installation. The small track excavator with a chipper head for limbing and small tree reduction would be used for removal of woody material and for minor grubbing jobs.

Two small track-mounted hydraulic drill rigs would be used. They are self-propelled and can move between drill sites without the assistance of a dozer or excavator. All components of the drill rigs lock onto a steel base, and all engine and fuel tanks have oil and fuel containment systems (Figure 7, *Drilling Equipment*). As needed, the drilling equipment would be surrounded by a portable tarpaulin-covered drill shack encompassing an area of approximately 16 feet by 16 feet. The drill shack would help to attenuate equipment noise, shade night lights, and protect drill operators from inclement weather. Several pieces of smaller equipment including a diesel generator, pumps, and hand tools would be housed within or positioned next to the drill shack within a separate baffled structure.

Approximately 300 gallons of fuel and lubricants would be temporarily stored at each drill site. Secondary containment would be utilized under all fuel storage tanks, generators, pumps, and drill sumps. Ascot would adhere to the Spill Prevention Control and Countermeasures (SPCC) Plan submitted to and approved by the Agencies. All materials would be stored properly and drill sites monitored and inspected for compliance with the SPCC Plan. Spill kits and enviro-mats for fuel and petroleum products would be located at each drill site along with first-aid kits, fire-fighting equipment, and satellite phones for off-site communications. Pumps used to convey water from on-site sources within the Project Area or from tanks would include self-contained fuel containment systems, with attached fuel and oil spill kits. Any spills or leaks of hazardous substances would be promptly cleaned up in accordance with the SPCC Plan. The Agencies, the National Response Center (1-800-424-8802), and the Washington State Emergency Management Division (1-800 258-5990) would be immediately notified of any spills or leaks.

The mast on each drill rig is approximately 14 feet long/high when fully extended. While being moved, the track-mounted drill rigs would be folded up to about 10 feet wide by 12 feet long. When unfolded, the drill rigs have an outside dimension of about 16 feet by 16 feet. The tracks can turn independent of the decking so a turning radius of 14 feet can be obtained. The drills would generally be operational 24-hours a day, seven days a week, including holidays, subject to Agency directed schedule changes. Drilling would use NQ diamond drill rods with an outside diameter of 2.75 inches. If casing is required, HQ diameter rods would be used with a diameter of 3.5 inches.

To the extent possible, each drill pad would be located within the existing road width/prism so that additional disturbance would not be required. The drills are equipped with hydraulic-powered leveling equipment to reduce the amount of grading required at each site.

During drilling, fluids would be introduced to keep the holes open and cool the drill bit, and would be circulated to the ground surface to remove drill cuttings. These fluids would consist primarily of water with bentonite and polymer drilling additives to increase the density and efficiency of drill cutting removal. Bentonite is an earthen product comprised of ash and clay, similar to materials expected to be present naturally in the area due to nearby volcanic activity. According to the Exploration Plan, drill fluid additives would be minimally used and the polymers are environmentally safe as described in Washington State Minimum Standards for Construction and Maintenance of Wells (Washington Administrative Code [WAC] 173-216). Material Safety Data Sheets (MSDS) for the drilling fluid additives have been provided to the BLM and FS and are available for inspection.

Returned drilling fluids would be contained within the immediate vicinity of the drillhole. A small temporary sump averaging 4 to 6 feet in width and 2 to 4 feet in depth would be installed at each drill site to collect drill cuttings and fluids. The sump would be installed within the existing road prism next to the drillhole and lined with a semipermeable enviro-mat to capture the drill mud and cuttings. Soils at the drill sites generally consist of unconsolidated material with a large component of volcanoclastic, such as pumice and ash, which is very permeable.

Drilling spoils collecting in the sumps would be a mixture of drill muds and rock cuttings that are generally fine in grain size. Between 2 and 10 gallons of mud and drill cuttings are anticipated to remain at the completion of drilling at each pad site. This material would be allowed to air-dry to facilitate removal and off-site disposal. After the mud and cuttings have been removed, the temporary sumps would be reclaimed by backfilling with locally stockpiled or borrow material. Drill pads would then be reclaimed by re-contouring as closely as possible to the original grade. Topsoil and vegetative debris would be returned from separate stockpiles to promote revegetation and to prevent erosion.

2.1.2.4 **Drilling Operations and Hole Abandonment**

Drilling would advance with a geologist logging the recovered rock core until the target depth of each drillhole is reached. The depth and inclination of the drillholes would vary depending on the location, but range from 1,000 to 1,300 feet in depth and at inclinations from up to 70 degrees.

Upon completion of each drillhole, the drill casing would be removed and a small wooden post placed in the well collar to mark the hole location. Over time, the drillhole would naturally cave in and close. drillholes that produce water would be abandoned by pressure filling with a cement sealant from the bottom to surface. The sealant would consist of material meeting the requirements of WAC 173-160-221, such as either Portland cement types I, II, or III, or high-alumina cement mixed with at least 6 gallons of water per sack. The plugging procedure would be accomplished while the drill rig remains on site in order to introduce the prescribed sealant into the hole followed by a grouting plug. Once the grout is set and the plugging and capping have sealed off any groundwater flow to the surface, the site would be fully reclaimed.

2.1.2.5 Water Requirements

Water for drilling would be obtained locally from existing flowing wells on proposed Pad 10 (former Duval Hole 06) or Pad 21 (former MM-10-10) in MS-708; and would be supplied to individual drill sites by gravity feed or by small diesel pumps placed near the water source, with pressure hoses supplying water to drill sites up to 1,000–2,500 feet away. Total water use from local sources would be measured with a flow rate gauge.

The Washington State Department of Ecology (Ecology) allows up to 5,000 gpd of water to be withdrawn from groundwaters of the state without a water right or use permit. Supplemental water, if needed, would be obtained from outside of the Project Area from municipal sources such as Randle, WA, and delivered to the drill sites by a water truck. If on-site storage of water is required, the location of a water storage tank will be mutually agreed upon by the FS, BLM, and Ascot. Under the Proposed Action, most of the water required for drilling would be obtained from on-site sources.

Water usage at each drill site would average between 5 and 20 gallons per minute (gpm) during drilling, with downhole loss to the formation of generally less than 5 gpm. This would vary somewhat based on the actual subsurface geologic conditions encountered. Total water usage would average approximately 5–10 gpm during an 8-hour period over a 24-hour work cycle. If water usage exceeds the 5,000 gpd groundwater withdrawal limit, supplemental water would be required and supplied, as mentioned above. At depths below the water table and in tight unfractured formations, less water would be used, possibly as little as 2,400 gpd as experienced during 2010 exploration program. In highly fractured areas above the water table, or if the boring intercepts a dry fracture, water use would increase.

2.1.2.6 Reclamation

Drill pads and temporarily reactivated roads would be reclaimed by restoring them to an uneven stable surface as close to the original grade as practical. Cast piles would be pulled back from the outside fill slopes and spread irregularly over the surface and the cut banks sloped to recreate natural contours. In areas with steeper grades, water bars conforming to the natural drainage pattern would be installed. Temporary culverts would be removed and natural drainage slopes would be re-established with forest cover placed as natural silt barriers and as wildlife habitat features.

Sites on existing active FS roads would be reclaimed to as close to original condition as possible. Topsoil and vegetation removed during Project activities would be stockpiled and returned as remediation material to promote regeneration and to prevent erosion. Trees, stumps, and other woody debris would be placed on the temporarily reactivated roads scheduled for re-closure. Reclamation would be conducted on a site-by-site basis as drilling and related activities are completed in each area. This would avoid maintaining long-term topsoil or vegetation stockpiles. Re-seeding would be done with a native seed mix, woody vegetation, and other amendments prescribed by the FS.

Topsoil, which is generally minimal in this pumice-rich area, and vegetation debris would be selectively piled in local cast piles. These materials would be redistributed on the final reclaimed surface. Most of the proposed drill sites would be located on existing temporary roads. As such, they are often constructed with rock ballast introduced as road bed material ranging from 1 to 8 feet in thickness and compacted from prior logging, drilling, recreation, and FS activities. Road areas and drill sites would be scarified during reclamation to relieve compaction.

The amount of material left as residue in drilling fluid sumps would normally be between 2 and 10 gallons of mud and cuttings. Use of enviro-mat to line sumps would allow removal and off-site disposal of the solid drilling wastes. The sump would then be reclaimed as part of the pad reclamation by backfilling with cast material.

2.1.2.7 Employee Accommodations and Security

Housing of employees and contractors would be primarily in the local communities of Randle and Morton. The Project would require a crew of approximately 18 people, with half of the personnel on the job site and the others working at the core facility that would be established in Randle (see Table 2.1-5). Some of the required work is specialized, but Ascot typically tries to hire local residents for staffing crews as much as possible, and attempts to rent local motels and facilities for core storage and equipment.

Table 2.1-5. Job Types Associated with Exploratory Drilling and Anticipated Number of Positions

	Drill Foreman	Driller	Drill Assistants	Geologists	Core Technicians	Road/Pad Contractor	Security	Water Truck Operator
#	1	4	4	2–3	2–3	2	1	1–2

To ensure security, a local security employee would stay on site at the staging/storage location near the gate as shown on Plate 1. Security is required to prevent theft and vandalism of equipment at the job sites, and to control public access to areas of active exploration for safety reasons. Appropriate temporary signage would be posted at the job site and at the gate for public information and to control access. Warning signs would also be placed at sites along FS Road 2612, where heavier traffic occurs.

2.1.3 **Alternative Based on Scoping Comments (Alternative 3)**

Like Alternative 2, Alternative 3 provides for consent of the FS with specified conditions required to protect NFS lands and resources. Alternative 3 also provides for issuance of the prospecting permits by BLM with required terms and conditions on actual operations associated with implementation of exploration activities. This alternative, however, takes into consideration scoping comments and provides alterations from the Proposed Action Alternative, including the following: changes in drilling and abandonment procedures; drilling fluid management to protect surface and groundwater resources; obtaining off-site water from regulated potable sources; periodically testing the quality of on-site water sources; prescribed uses for water maintained in an on-site storage tank; timing restrictions to protect spotted owl habitat and recreation resources; and the use of a portable drill shack to reduce noise and night-time light intrusion into the surrounding environment. Alternative 3 also includes the design features and environmental protection measures described in Section 2.1.2.2, *Proposed Design Features and Best Management Practices*, and the BMPs described in Appendix E, *Best Management Practices.*

Under Alternative 3, drilling fluid additives would be required to meet NSF/American National Standards Institute (ANSI) 60-2003 standards, or as approved by the Agencies for use in potable water supply wells to protect human health and the environment should drillholes encounter permeable zones and groundwater systems. Water used for drilling would emphasize the use of on-site sources, including that available from former Duval Hole 06 and/or MM-10-10, supplemented as necessary by purchase from regulated potable water source(s) that are periodically tested and documented. On-site sources would be tested prior to use for pH, temperature, salinity, and at a minimum arsenic, cadmium, copper, lead, mercury, and zinc. Salinity testing is required to assist in the selection of drilling fluid additives (bentonite). Arsenic was present in the former Pad 10 drillhole, but below the state standard for drinking water, while arsenic in the existing Pad 21 drillhole is slightly over the state standard and five times greater in the Green River Horse Camp drillhole as described in the *Groundwater Resources Report* in Appendix G.

A temporary water storage tank would be placed at the Project site and filled with water procured off site, possibly from the town of Randle or other local community. The on-site tank would provide surge storage and/or compensation storage during times when uses of on-site sources are administratively restricted, or additional water is needed for road maintenance, dust suppression, or emergency fire control. The location of a water storage tank would be agreed upon by the FS, BLM, and Ascot's field representative.

Use of on-site water from Pad 10 (former Duval Hole 06) and/or Pad 21(former MM-10-10) would be limited to 5,000 gallons of groundwater per day, unless an appropriate water right or use permit is obtained from Ecology. Other unforeseen conditions may arise that could result in further restrictions by the Agencies. No local surface water would be used for Project water needs. Daily on-site water use would be recorded using a totalizing flow meter. Duval Hole 06 and MM-10-10 would be abandoned in accordance with WAC 173-160-251(4) and (5) for artesian wells following the cessation of the drilling program, unless otherwise directed by the Agencies.

Drilling operations would be optimized to promote the return of drill cuttings to minimize distribution into the adjacent formation, and to seal water bearing and porous zones to reduce any cross-aquifer flow of groundwater. If loss of circulation is encountered during drilling, steps would be taken to re-establish circulation by sealing the formation unit causing the loss prior to continued drilling. If circulation is not re-established, the drillhole would be abandoned by sealing.

Drilling fluid would be reused to the extent possible to minimize water usage. Appropriately sized and lined sumps (generally 4 to 6 feet in width and 2 to 4 feet in depth), and/or portable tanks would be used to contain recyclable drilling fluids. Sumps and/or tanks would be placed on the drill pads, or at an alternative location approved by the Agencies.

All drilling fluids would be contained within the immediate vicinity of each drill site. Soils at the drill sites generally consist of unconsolidated material with a large component of volcanoclastic, such as pumice and ash, which is very permeable. The water in the sumps would be allowed to infiltrate through the sump liner into the unconsolidated material and/or to evaporate. The dried-out drilling mud would then be removed to a suitable off-site disposal facility.

Monitoring of exploration drilling operations would consist of site visits and inspections by the appropriate agency staff to verify that the agreed-upon drilling procedures, drilling fluid management, drillhole abandonment procedures, required monitoring, and BMP implementation (FS 2012b) are being followed. The monitoring data would be used to assess how the drilling operations are affecting the groundwater quality/quantity compared to established baseline data, and to determine any adaptive management necessary to avoid impacts.

Because the effective protection of groundwater resources is strongly dependent upon the proper implementation of the Project as designed with appropriate BMPs, a monitoring plan would be prepared and implemented as indicated in Section 3.2.8 of the Groundwater Resources Report (Appendix G). The monitoring plan would include the following items:

- Regular review of relevant drilling data gathered by Ascot (e.g., drilling fluid losses, water entries, borehole abandonment records, etc.).
- Periodic site inspection by a certified minerals administrator for compliance with BMPs and effectiveness of implementation.
- Review of water chemistry trends at baseline monitoring wells.

The draft working guide for “Evaluating Groundwater Resources for Mineral Exploration Drilling” (FS 2014) strongly discourages the conversion of drillholes into monitoring wells due to the limited diameter of the holes and limitations in terms of isolating the individual groundwater aquifers for collecting representative data. Nevertheless, all existing drillholes that are flowing in the Project Area were sampled during the baseline groundwater quality assessment and will be sampled again periodically during the Project to track any significant changes in groundwater conditions.

Monitoring the groundwater conditions of drillholes at the Green River Horse Camp, Pad 10, and Pad 21 before, during, and after drilling would be conducted in accordance with Section 3.2.8 of the Groundwater Resources Report (see Appendix G) prepared for this Project. The monitoring data would be used to compare against the baseline conditions as noted in the report, assess if and how the drilling operations are affecting groundwater quality/quantity compared with the baseline data, and determine whether any adaptive management is necessary to avoid impacts. Because the three drillholes present on site are flowing, problems with downhole purging and sampling are eliminated. These drillholes were sampled during the baseline groundwater quality assessment and are considered by the URS investigators to be representative of the groundwater conditions within the Project Area based on the location of the samples obtained and results of analytical testing performed on groundwater as described within the Groundwater Resources Report in Appendix G. In addition, because of the proximity to the other drillholes, impacts on groundwater quality would be noted relatively quickly so that adaptive management could occur in a timely manner.

The information collected during the exploration program would be used to determine the need for and configuration of more permanent groundwater monitoring if additional delineation or refinement of a potential mineral resource is identified.

Drillholes advanced through overburden would be over-cased with a temporary casing extending into underlying bedrock to prevent near surface groundwater from flowing into the annular space of the exploratory drillholes and to prevent drilling fluids from discharging out of the annular space into the soil.

Borehole abandonment entails plugging the boreholes from bottom to top with a low-permeability bentonite-based grout (Benseal®) that seals off all water transmission. To ensure a continuous seal throughout the hole, the grout is pumped down the hollow drill string starting at the bottom of the hole. As the hole is filled, the drill string is withdrawn, but never pulled above the surface of the ascending column of grout in order to prevent the formation of voids.

When the grout has risen to within approximately 3 feet of the ground surface and has set up, the remainder of the hole would be plugged with cement. In the case of abandonment of a flowing artesian drillhole, neat cement grout would be used to seal the entire column of the borehole instead of bentonite grout. If cement grout cannot be emplaced due to excessive flow from the borehole, inflatable packers would be used to seal the hole prior to placing the cement grout.

The sealing of the boreholes with high-solids bentonite grout and/or bentonite/cement mixtures such as described in Washington State Minimum Standards for Construction and Maintenance of Wells (WAC 173-160) would prevent groundwater discharges from drillholes, and would prevent the flow of water between zones of differing water pressures. Grout sealing would prevent water loss and further prevent acid rock drainage (ARD) generating reactions with sulfide minerals that may be encountered during drilling.

To verify that Ascot is prepared to address artesian flow of groundwater, an emergency sealing plan would be provided to the Agencies in advance of drilling that includes instructions and contact information for getting equipment and supplies to the drill site in a timely manner and providing reasonable plans for controlling and stopping flow.

Drilling at Pads 6 and 7 in close proximity to the Green River Horse Camp would be controlled to reduce seasonal use conflicts with recreation. Drilling at these sites would be restricted to daytime hours during the week prior to Labor Day and precluded after Labor Day.

None of the drill sites appear to lie within critical owl habitat; however, Drill Pads 10, 11, 12, 13, 22, 23, 24, and 25 are located within spotted owl nesting, roosting, and foraging habitat. Drilling at these pads would be restricted to occur after the nesting season, which occurs between March 1 and July 15. Drilling may proceed after July 15 until February 28, unless precluded by adverse conditions, such as weather, at the discretion of the Agencies.

To reduce impacts on surrounding areas from equipment noise, a portable drill shack with baffles and/or insulation would be used. Baffling would also minimize visual intrusion to areas surrounding each drill site. To reduce the impacts from operating lights particularly at night, work lights would be shielded and directed inward toward the drill. Sump use would be monitored by agency personnel to ensure they adequately hold drill cuttings.

2.1.4 Alternative 4 – Drill Site Riparian Reserve Avoidance

As with Alternatives 2 and 3, formal FS consent would be required for Alternative 4, including specified conditions to protect other resources on NFS lands. Alternative 4 also provides for the issuance of the prospecting permits by BLM with required terms and conditions on actual operations associated with exploration activities described in the proposed Exploration Plan. All other elements of this alternative and their associated effects, as described in Section 3, are the same as those for Alternative 3, but without those that would result from the installation of Project drill sites and conduct of exploration at Pads 6 and 7 in order to avoid placing Project facilities within Riparian Reserve. Activity at the other proposed drilling sites would be the same as those described under Alternative 3 and would include all design features and alterations from Alternative 2, including changes in drilling and abandonment operations and procedures, drilling fluid management to protect surface and groundwater resources; timing restrictions to protect the spotted owl habitat and recreation resources, and the use of a drill shack/baffling/insulation to reduce noise and light intrusion into surrounding environs.

2.1.5 Alternatives Considered but Eliminated from Detailed Analysis

Several alternatives to the Proposed Action were considered but found to be either infeasible or resulting in effects that would not differ measurably from the alternatives analyzed in detail. These alternatives were, therefore, eliminated from detailed analysis in this EA.

The first alternative considered but eliminated was the use of overland travel to avoid reactivation of existing temporary roads and use of road sections that cross through riparian buffers. This alternative was rejected because it would be physically impossible to traverse most of the Project Area without constructing new roads or drill trails that would not be more deleterious due to the steepness of the terrain and/or density of the forest cover.

The second alternative considered but eliminated was Ascot's initial Exploration Plan that included completing the drilling program using all 25 drill pads. Pads 8 and 9 were eliminated from the Proposed Action because their installation would cause too much disturbance, including a substantial amount of grading and tree removal, to gain access to the drill sites. Ascot concurred with this revision plan during the Prospecting Permit Applications process.

The third alternative considered but eliminated was limiting access along FS Road 2612, to use the existing road in its current condition, rather than permitting road improvements and maintenance. Such improvements and maintenance are planned under the Proposed Action to ensure the safety of Project personnel and the traveling public. Additionally, this route is the primary access to the northeastern portion of the Goat Mountain area, including associated recreation. This alternative was eliminated as it would be technically infeasible due to safety concerns and would limit access to the drill sites needed to carry out the proposed exploratory drilling activities.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This chapter describes the affected environment for each resource and addresses the anticipated direct, indirect, and cumulative effects from each alternative. Cumulative effects of the Project are described following the discussion of the environmental consequences for each resource. The cumulative effects study area (CESA) encompasses the upper Green River watershed (i.e., the "Action Area" as described in the Biological Assessment [see Appendix F]). This area is based on Project-generated noise having the potential to affect the greatest geographic area of any potential project effect. The "Action Area" encompasses "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 CFR §402-02). The analysis considers related past activities, current activities, Proposed Action, and other reasonably foreseeable future actions (RFFAs) in the area that could result in cumulative effects. The analysis considers RFFAs anticipated within 10 years of prospecting permit approval as the cumulative effects study period, which comprises the up to 6-year permit term, as well as site reclamation and establishment of verified trend toward self-sustaining restoration.

Human activities in the vicinity of the Proposed Project have occurred for over 100 years and include wildfires, volcanic activity, timber harvest, dispersed recreation, minerals exploration, and limited road reactivation, maintenance, and decommissioning. Mineralization of interest was discovered near the end of the 1800s, with the first mining claim locations being filed between 1901 and 1904. Sporadic development then occurred, resulting in various surface and subsurface workings. Adits, shafts, cuts, trenches, cabins, powder magazines, and machinery were used to support these activities. After 1969, additional limited exploration programs and mine/metallurgical studies were conducted, including diamond core drilling and surface sampling. Mount St. Helens experienced a major eruption on May 18, 1980, generating hurricane-force winds of hot gases filled with rocks that toppled 143 square miles of trees and left 42 square miles of trees standing but dead from the heat of the blast. All prospecting within the area was halted by the eruption. The Permit Area is about 12 miles from the resulting crater, on the edge of the eruption blast zone. A portion of the northern part of the Permit Area is covered by mature forest that escaped the effects of the 1980 eruption. Following the major 1980 eruption, the CESA was extensively salvage logged and many trees were removed. Approximately 300 acres were harvested and replanted following the 1980 eruption, while 100 acres of natural stands remain. Some forest thinning occurred roughly 15 years ago within the regrowth that followed the eruption.

Current or ongoing activities present in the area include dispersed recreational use and road use and maintenance. Primary recreational use of the CESA is the Green River Horse Camp, Green River Trail #213, and Goat Mountain Trail #217. The horse camp has eight campsites limited in space to two trailer rigs or three vehicles. The primary use season is July through late October, primarily based on practical accessibility of local trails, and the number of visitors varies between less than 20 per week to about 50 per week during the fall hunting season. The roads in the CESA (FS Roads 26, 2612, and 2612027) are designated Road Maintenance Level 2 roads. Road Maintenance Level 2 roads are typically local roads that connect other local roads and are maintained for low traffic volumes travelling at slow speeds. These roads are not subject to the requirements of the Highway Safety Act, and surface smoothness is not a consideration with dips being the preferred drainage feature. These roads are generally not suitable for travel by passenger cars. FS Road 26 receives maintenance annually, including surface, ditch, and culvert cleaning. Logs and brush are removed from the road surface as necessary to provide passage for high-clearance vehicles. Drainage features are cleared and maintained to provide proper function and prevent environmental damage. No work is generally required along roadsides. FS Roads 2612 and 2612027 are maintained on a rotational basis, and the maintenance interval varies from every year to every other year. No foreseen road reconstruction projects are planned for the CESA, and no vegetation management aside from road maintenance is proposed within the CESA during the cumulative effects study period.

The BLM defines RFFAs in 43 C.F.R. § 46.30, which states as follows: "Reasonably foreseeable future actions include those federal and non-federal activities not yet undertaken, but sufficiently likely to occur, that a Responsible Official of ordinary prudence would take such activities into account in reaching a decision. These federal and non-federal activities that must be taken into account in the analysis of cumulative impact include, but are not limited to, activities for which there are existing decisions, funding, or proposals identified by the bureau. Reasonably foreseeable future actions do not include those actions that are highly speculative or indefinite." The FS defines RFFAs in 36 CFR § 220.3, which states as follows: "Those Federal or non-Federal activities not yet undertaken, for which there are existing decisions, funding, or identified proposals." Identified proposals for Forest Service actions are described in § 220.4(a)(1), which states as follows: "The Forest Service has a goal and is actively preparing to make a decision on one or more alternative means of accomplishing that goal and the effects can be meaningfully evaluated (see 40 CFR 1508.23)."

The scope of the Proposed Action does not encompass future mining as reasonably foreseeable. At this time and state of mineral knowledge, BLM has not projected that future mining is foreseeable in the Project Area. There are no known current specific plans for management or development activities (including mineral development) in or near the Project Area.[8] There are no existing decisions, funding, or proposals for development of a mine in the CESA. Any future mining proposal would require separate administrative actions by the FS and BLM, supported by a separate NEPA analysis and review process and separate decisions. Similarly, no timber sales are currently proposed in the Project Area. Assessment of an RFFA is only appropriate when a "future action" becomes "reasonably foreseeable" once it is "proposed"; until then it is "speculative" and

[8] Because a mine is not currently being proposed at Goat Mountain, and is only speculative, there is no requirement for a mine to be accounted for in the cumulative effects analysis. See Appendix D, NAEP NEPA Review: *Jones v. Nat'l Marine Fisheries Serv.*, 741 F.3d 989, 1000-01 (9th Cir. 2013); Wilderness Workshop v. U.S. Bureau of Land Management, 531 F.3d 1220, 1229 (10th Cir. 2008); O'Reilly v. U.S. Army Corps of Eng'rs, 477 F.3d 225, 236 (5th Cir.2007) (citing 40 C.F.R. § 1508.23).

need not be accounted for in the cumulative effects analysis in an EA or Environmental Impact Statement (EIS) (*Jones v. Nat'l Marine Fisheries Serv.*, 741 F.3d 989, 1000-01 [9th Cir. 2013]; *Wilderness Workshop v. U.S. Bureau of Land Management*, 531 F.3d 1220, 1229 [10th Cir. 2008]). (See Appendix D, *NAEP NEPA Review*.)

Hardrock mineral prospecting of the type proposed does not mean a mine is reasonably foreseeable, as a mineral deposit of sufficient magnitude and economic value must first be discovered before consideration can be given to the feasibility of the manner and means of mine development. It is possible that such a deposit does not exist in the Project Area or, if present, lacks sufficient value, in which case mining would not be feasible. As described in Section 1.1.2, *History*, based on previous explorations, the Project Area appears to include a large portion of what is often referred to as the undeveloped "Margaret Deposit"; however, several data gaps exist, and the most recent exploration was halted following the 1980 eruption of Mount St. Helens, before sufficient information on current economic resource evaluation was developed. Interest in mineral exploration does not in and of itself indicate the presence of a valuable deposit. Similarly, it would not be possible to foretell at the prospecting stage what mining methods, if any, would be viable. According to the FS, "Only a very small percentage of prospects develop into producing mines; authoritative estimates are in the range of 1 in 5,000 to 1 in 10,000" (USDA 1995).

3.2 GEOLOGIC AND MINERAL RESOURCES

3.2.1 Affected Environment

The Project Area lies within the Cascade Mountain Range in southern Washington State. These mountains are generally Cenozoic-aged (65.5 million years ago) to Holocene (present era), consisting mostly of volcanic and intrusive igneous rocks and associated mineralization. In Washington State, the Cascade Mountains are bordered by Columbia Basin basalt flows to the east and the Puget Sound Lowland to the west. The mountain range is bisected along the Oregon/Washington border by the Columbia River Gorge created by the antecedent Columbia River.

Goat Mountain is approximately 12 miles northeast of Mount St. Helens, which is an active stratovolcano that in historic times has erupted in 1800, 1854, and 1980. Mount St. Helens continues to experience eruptive and/or uplift sequences associated with its current cone-building phase. Historic and prehistoric eruptive cycles have deposited ash, pumice, and scoria forming tephra throughout the area. During the May 18, 1980 eruption, a massive landslide occurred along a horseshoe-shaped slip-plane that lowered the summit of Mount St. Helens by approximately 1,300 feet. Debris from the eruption-induced landslide material was largely deposited to the northwest of the volcano and west of Goat Mountain. Effects of the 1980 eruption have affected land near the Project Area and are mapped as "blowdown area" in the recent United States Geological Survey (USGS) 7.5-minute "East Spirit Lake" topographical map (USGS 1994) that includes the Project Area.

Goat Mountain has an approximate peak elevation of 4,921 feet above mean sea level (amsl). To the south, the headwaters of the Green River flow west along the toe of Goat Mountain, at an approximate elevation of 2,600 feet amsl. The Green River valley along the southern toe of Goat Mountain likely owes its shape to alpine glacial scour from sources originating near the summit of Mount St. Helens and possibly other peaks in the area.

Surficial geologic deposits in the Project Area likely include drift resulting from alpine glaciations and pyroclastic materials from eruptions of nearby Mount St. Helens. Observations by the URS field geologist of road cuts in the Project Area identified tephra deposits, including ash and pumice deposits overlying bedrock in 2011 and 2014. Other volcanic debris resulting from lahar deposition might be present in the Project Area.

Bedrock comprising the southern Washington State Cascades Mountains formed primarily during volcanic activity that began during the Oligocene epoch of the Tertiary period (23 to 34 million years ago). Bedrock formed during this time includes andesite, dacite, and rhyolite of igneous origin. Later during the Miocene (5 to 23 million years ago), these formations were intruded by granitic magma comprising the Spirit Lake Pluton. The intrusive bedrock geology consists mostly of granodiorite with some quartz diorite and quartz monzonite. Rock formations that comprise the Project Area include eastern portions of the Spirit Lake Pluton, which in the vicinity of the site is comprised of quartz diorite, monzodiorite, granodiorite, monzogranite, and granite. Contact metamorphic and other transitional and altered rocks associated with intrusion of the Spirit Lake Pluton into the early Cascade Mountain volcanic rocks are also found in the vicinity of the Project Area. The copper porphyry in the Project Area is also associated with the Spirit Lake Pluton. In the general area, most bedrock fractures exhibit a northwest and east direction or strike (Moen 1977).

Past exploration activities in the general vicinity of the Project Area have identified possible economic mineralization within fractures of the bedrock, ranging in size from less than 1 inch to as much as 4 feet in thickness (Moen 1977). Vein materials in the fractures consist of quartz, calcite, gouge, and wall rock fragments containing disseminated cubic pyrite grains. Pyrite within the veins is also accompanied with chalcopyrite (copper), sphalerite (zinc), galena (lead), pyrrhotite (nickel, copper, platinum), arsenopyrite (arsenic), and gold. These minerals generally occur in small lenses and stringers, and are generally discontinuous (Moen 1977).

3.2.2 Environmental Consequences

3.2.2.1 Alternative 1: No Action Alternative

Under the No Action Alternative, none of the proposed activity including drilling would be conducted. Current road maintenance, equestrian activities, and other recreational activities would continue throughout the Project Area. No surface or subsurface geologic samples would be collected beyond the extent of casual use (e.g., rockhounding), and the rock to be extracted by core drilling would remain in place. No direct, indirect, or cumulative effects from this alternative are anticipated.

3.2.2.2 Alternative 2: Proposed Action Alternative

Alternative 2 involves the FS consenting to and the BLM issuing the prospecting permits and approving the Exploration Plan, which includes the completion of a total of 63 exploratory drillholes at 23 separate pad sites to collect geologic samples. Eight of the drillholes would be completed to parallel/duplicate historic borings to verify past results for incorporation into a current resource evaluation.

3.2.2.2.1 *Direct Effects*

Alternative 2 would include the removal of a small quantity of rock core material from the Project Area for geologic analysis. Approximately 108,200 linear feet of drilling would be performed using NQ diamond drill rods (2.75 inches) and HQ diameter casing (3.78 inches) as needed. In addition to rock core, hand samples would be removed by Project geologists from surrounding outcrops. Rock core and hand samples would be evaluated using standard geologic and geochemical analytical methods.

Proposed drilling may encounter veins of varying mineralization. As noted earlier, historic documents indicate that the veins in the general area are small, ranging from 1 inch to 4 feet in thickness. The amount of non-mineralized and mineralized material that would be removed from the Project Area as part of Alternative 2 is considered to be negligible compared to the total quantity in place.

3.2.2.2.2 *Indirect Effects*

Extraction of the drill core samples for analysis and study would provide information regarding the economic value of the hardrock mineral resources in the Project Area. The analysis and study of the Project Area's subsurface will also better define the current geology, including faults, physical stability, mineralization, and potential for generation of ARD. Geologic information obtained from the Project would afford a better understanding of the unique geology surrounding Mount St. Helens.

ARD can form in both aerobic and secondary anaerobic conditions when water comes into contact with sulfide minerals (such as pyrite) and reacts with oxygen (in the air) leading to the generation of an acidic discharge. If sufficient contact time is afforded with reactive minerals, water can also acquire concentrations of deleterious and possibly toxic metals. The proposed core drilling, however, would not result in conditions conducive to generation of measurable or significant quantities of ARD. The amount of surface area in each drillhole that might contain sulfide mineralization would be limited due to the small drillhole diameter (< 3.78-inch), and the narrow vertical area available for air and moisture contact. Furthermore, ARD reaction in any drillhole intervals that are not sealed with cement or grout would be self-limiting once the free oxygen is consumed through mineral oxidation. Anaerobic ARD processes would also be limited since oxidation of the sulfide minerals, a prerequisite for secondary anaerobic ARD production, would be incomplete.

3.2.2.2.3 *Cumulative Effects*

The collection and analysis of geologic samples, which is the objective of the Proposed Project, would cumulatively enhance existing information regarding the geologic structure and mineralization including its possible economic viability in the Goat Mountain area.

Removed rock core and collected geologic samples would not have detectable or cumulative effect on the current geologic and mineralogical environment of the Project Site.

3.2.2.3 **Alternative 3: Based on Scoping Comments**

Under this alternative, the FS would consent to the BLM issuing the prospecting permits, and the BLM would issue the permits and approve the Exploration Plan with requisite terms and conditions to ensure conformance with operating requirements at 43 CFR 3590, Solid Mineral (Other Than Coal) Exploration and Mining Operations, specific to exploratory drilling. However, Alternative 3 is distinguished from Alternative 2 in that changes in drilling and hole abandonment operations would be required to better protect surface and groundwater resources, emphasize the use of water from on-site sources balanced by use of documented off-site sources and re-use of drilling fluids to the extent possible, and implementation of additional requirements and operational changes related to timing as well as light and noise attenuation.

3.2.2.3.1 *Direct Effects*

The direct effects on geologic and mineral resources would be similar to those described for Alternative 2. No adverse direct effects are anticipated.

3.2.2.3.2 *Indirect Effects*

Under Alternative 3, the indirect effects on geologic and mineral resources would be similar to those described for Alternative 2. No adverse indirect effects are anticipated.

3.2.2.3.3 *Cumulative Effects*

Under Alternative 3, the cumulative effects on geologic and mineral resources would be similar to those described for Alternative 2. No adverse cumulative effects are anticipated.

3.2.2.4 **Alternative 4: Drill Site Riparian Reserve Avoidance**

Under Alternative 4, the FS would consent to BLM issuing the prospecting permits, and the BLM would issue the permits and approve the Exploration Plan in the same manner as for Alternative 3. Alternative 4, however, is distinguished from Alternative 3 in that it does not include the installation of facilities and conduct of exploration activities previously described at Pads 6 and 7 in order to avoid conducting operations within the Riparian Reserve.

3.2.2.4.1 *Direct Effects*

The direct effects on geologic and mineral resources would be the same as those described for Alternatives 2 and 3. No adverse direct effects are anticipated.

3.2.2.4.2 *Indirect Effects*

The indirect effects on geologic and mineral resources would be the same as those described for Alternatives 2 and 3. No adverse indirect effects are anticipated.

3.2.2.4.3 *Cumulative Effects*

The cumulative effects on geologic and mineral resources would be the same as those described for Alternatives 2 and 3. No adverse cumulative effects are anticipated.

3.2.3 Impact Summary

As outlined in Section 2.1, *Alternatives*, and Appendix E, *Best Management Practices*, a number of BMPs would be implemented during reactivation/installation, operation, and reclamation of the Proposed Project to minimize potential impacts on geology. Any impacts on geology would be minor to insignificant, and no specific mitigation is proposed.

3.3 HYDROLOGY AND HYDROGEOLOGY

This section describes the existing surface water and groundwater resources within and adjacent to the Project Area. Analysis of surface water hydrology includes stream distribution, water temperature, flow regimes, riparian habitat, wetland potential, and floodplains. It also considers the potential for impacts on surface waters as a result of the Proposed Project, including road crossings, erosion, and sediment delivery to streams.

The analysis of groundwater resources includes likely occurrence and nature of the groundwater system, potential impacts as a result of the Proposed Project, and design features to minimize those impacts.

3.3.1 Affected Environment

The Proposed Action is located within the upper Green River Watershed (Hydrologic Unit Code [HUC] No. 170800050401), which is located in the Cowlitz Watershed Resource Inventory Area (WRIA) No. 26, as defined by Ecology. The Green River is a tributary of the Toutle River, which drains to the Cowlitz River near the town of Castle Rock. The Project Area is primarily located on the south-facing slope of Goat Mountain, which is situated above the north bank of the Green River at elevations that place the proposed drill sites at between 2,880 and 3,780 feet amsl. (Note: elevations vary throughout this EA depending on the location of the topic of discussion.) Slopes are stabilized by Douglas-fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*) forest cover, which intercepts precipitation and provides groundwater uptake through evapotranspiration.

The Spirit Lake Ranger Station is the closest official weather gauging station to the Proposed Action site, and is located at a comparable elevation of 3,240 feet amsl. Data from this station indicate that the area receives an average annual rainfall of 93.31 inches, and an average total snowfall of 311.2 inches. Most of the precipitation falls between the months of November and March (WRCC 2012a). No staff gauges are known to exist near the Project vicinity, but a staff gauge on the Green River located approximately 4.5 river miles (RM) upstream of the confluence with the North Fork of the Toutle River documents general flow trends in the river. At the staff gauge, the river discharges an annual low monthly mean flow volume of 80 cubic feet per second (cfs) during August, with the annual high of 752 cfs occurring in February.

The physical properties of the area are largely influenced by local volcanism, most recently by the 1980 eruption of Mount St. Helens, which covered much of the Project Area in ash and pyroclastic materials associated with lateral blast deposits (U.S. Army Corps of Engineers [USACE] 2007). The Project Area includes five soil units mapped by the Skamania County Area Soil Survey (Natural Resources Conservation Service [NRCS] 2008) as described in Section 3.4, *Soils*. Generally, the soil units are described by NRCS as "well drained" and lacking any restrictive soil layer that would prevent deep infiltration. The soils are also listed as having relatively low soil erosion K Factor (0.15).[9] A K factor of 0.15 indicates that the area's soils have a low risk of erosion from surface water flows. Additional discussion of the geology of the Project Area is presented in Section 3.2, *Geologic and Mineral Resources*.

3.3.1.1 **Mapped Waters, Wetlands, Floodplains, and Riparian Reserves**

Waters mapped within or adjacent to the Project Area include portions of the Green River within the upper Green River watershed and associated headwaters tributaries of the river that cross through or adjacent to the proposed drill pad sites or associated reactivated temporary roads (Figure 3, *Project Area*). Mapped surface waters include perennial and intermittent drainages mapped by the NHD and additional minor ephemeral drainages mapped by the Washington State Watercourse Hydrography (WC) layer[10].

The NHD is a model that predicts streamflow duration and alignment based on contributing drainage area, precipitation, and detailed surface elevation data. It is intended to capture intermittent and perennial surface waters. The WC layer was developed by the State of Washington to support the implementation of the Forest Practices Fish Habitat Water Type Map. The WC data include additional potential ephemeral or minor seasonal drainages that are not mapped by the NHD.

Based on these mapping sources, the Project Area is located between the Green River to the south and two unnamed perennial tributaries to the east and west. An intermittent drainage mapped by the NHD and several minor ephemeral tributaries mapped by the

[9] Factor K is one of six factors used in the Revised Universal Soil Loss Equation to predict the average annual rate of soil loss by sheet and rill erosion. The K Factor is based on the percentage of silt, sand, and organic matter, soil structure, and saturated hydraulic conductivity.

[10] Originators: Washington State Department of Natural Resources. Title: Washington State Watercourse (WC) Hydrography. Publication date: 03/01/2006; Geospatial data presentation form: vector digital data.

WC layer are located within the Project Area (Figure 6, *Surface Water Analysis*). All surface waters within the Project Area drain to the Green River.

No wetlands or floodplains are mapped within the Project Area. However, there are small areas associated with relatively flat spots along the intermittent or seasonal streams that may have wetland characteristics. Wetlands are located off site near the Green River Horse Camp and the Polar Star Adit. Project-related activity would avoid these locations. No wetlands were observed at the proposed drill pad locations. Because the Project is located on moderate to steep slopes with pumice gravel dominating the composition of surface materials, wetlands are unlikely to be present. Existing temporary roads cross some intermittent and/or seasonal streams. Most stream crossings have been equipped with culverts, but locations that are near headwater seeps that were dry at the time of road reactivation may not have been so augmented.

Under the NWFP, FS Riparian Reserves[11] are mapped along perennial and intermittent drainages in the NHD, and can be viewed as dotted lines around these drainages in Figure 3, *Project Area*. Riparian Reserves were established as part of the Aquatic Conservation Strategy (ACS) to support the NWFP (FS 2008a). These planning areas vary in width and include some distance on either side of the stream. The specific width is determined based on the highly variable hydrologic, geomorphic, and ecologic processes in a watershed and the importance of these areas to fish, plant, and wildlife species. Restrictions are placed on what can be done in these areas in order to protect the water quality and ecological functions of the land and water in that reserved area. Because some of the drill pads and portions of the roads proposed to be reactivated are within Riparian Reserves, road rebuilding and drilling activities would comply with the guidelines established for Minerals Management and Road Building outlined in the ACS and are described further in Section 3.3.3.1, *Consistency with Aquatic Conservation Strategy Guidelines*.

3.3.1.2 Surface Water Characteristics

The Project Area is within the Green River's headwaters near RM 32. The river in this portion of the watershed is moderately entrenched within a valley bottom dominated by gravel/cobble or bedrock substrate. The river gradient is approximately 2 percent with moderate sinuosity. The river provides habitat for native trout, but upstream fish passage is blocked to salmonids by natural gradient barriers downstream at the confluence of the Green River with Falls Creek at RM 24.95 and at RM 31.3, as noted on a 1993 final reach identification data form provided by the FS. Tributaries in the Project Area drain to the river down steep-gradient channels (>10 percent) with gravel and silt substrates. Intermittent and perennial tributaries average 4–6 feet wide at the ordinary high water level (OHWL). Smaller ephemeral or short seasonal drainages tend to be 1–4 feet wide at the OHWL.

[11] Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (1994). See B-12-B-13 for Riparian Reserves definition within the matrix lands of FS. And page C-32-C-33 for Standards and Guidelines for Roads Management and Mineral Activities.

Water quality samples collected by Ecology in 2002 indicate that relatively high baseline amounts of copper appear to be naturally present in the Project Area drainage system. Background water quality samples taken at the upper end of the unnamed tributary located just east of the proposed drill pads contained relatively high amounts of copper, as did samples collected lower in elevation along the unnamed tributary (Ecology 2002). This same area is registered twice on the 2008 303(d) list for copper in WRIA 26. This means that the area has been identified as an area with surface water quality issues indicating that the surface water may not be a good source of drinking water or for fish habitat. Similar results were obtained from water quality samples collected by URS in 2014 (URS 2015a) in order to establish a baseline understanding of surface water quality.

URS performed a preliminary geochemical analysis of the above-mentioned surface water and groundwater that was sampled and analyzed in the fall of 2014. The water quality data were evaluated utilizing Piper diagrams, which are commonly used to evaluate groundwater quality in terms of relationship between cations and anions, which can assist in assessing possible relationships between the water samples. In this case, the cations calcium, magnesium, and sodium plus potassium, and the anions chloride, fluoride, sulphate, carbonate, and bicarbonate were used in the evaluation. In most natural waters, these ions make up 95 to 100 percent of the ions in solution. One of the key findings of the Piper diagram-related assessment is that the samples collected from the three streams that bisect the Project Area are very similar even though two of the three streams have known historic mining features associated with them. The data suggest that the surface characteristics are reflective of the site-specific background conditions. The widespread occurrence of copper in surface water suggests that it may be, in part, natural background concentrations related to the local copper-rich porphyry bedrock. In addition, the groundwater samples collected from the three holes drilled during past mineral exploration programs are also similar. This suggests that the groundwater quality in terms of the elevated arsenic is possibly reflective of the site-specific background conditions.

3.3.1.3 Existing Hydrologic System Constraints

Human activity in the area has been dominated by logging and silvicultural activity, recreation use, and mineral prospecting, resulting in a supporting network of roadways that are now either temporary or active. All historic and current uses have the potential to impact water resources in the Project Area. A 2002 report by Ecology notes that there are three mine adits along the perennial drainage located adjacent to the eastern edge of the Project Area; data presented in the 2002 report indicate that there are increases in surface water and sediment copper concentrations downstream of these features within the unnamed tributary associated with this drainage. The Polar Star mine, located downstream (west) of the Project Area, is reported to discharge low pH water with high conductivity. Similar results were obtained from water quality samples collected by URS in 2014 (URS 2015a) as noted above. The Green River Horse Camp is located at the south edge of the Project Area, which attracts recreational equestrian uses and hikers. It has been reported that water from a hose located east of the proposed security gate on FS Road 2612 is non-potable water, and has not been approved for potable use by the FS or other agency according to the Forest Supervisor. Approval for use as a potable water source would require regular analytical testing. The Proposed Project would not limit access to this water source.

Within the Project Area, existing logging roads cross all of the drainages, often at two or three separate locations. These crossings were/are managed by the installation of culverts and subsequent removal following timber harvests. Seasonal drainage on temporary roads is managed by water bars, or notches dug diagonally across the road to draw off surface water without eroding the road. Where the road gradient is steep, water bars were placed more frequently. Stream crossings along the main access road, FS Road 2612, are managed by existing culverts.

3.3.1.4 Hydrogeological Conditions

Groundwater in the Project Area is likely found in unconfined and confined conditions. Phreatic (unconfined) groundwater is likely present within alluvial, tephra, and drift deposits overlying bedrock in the vicinity of the Project Area. If present, unconfined groundwater aquifers in the Project Area are likely recharged primarily through local precipitation including rain and snow-melt, although some recharge is suspected through bedrock seeps and springs. Unconfined groundwater is likely discharged through evapotranspiration, seeps and springs, and directly to surface water.

Flow of unconfined groundwater generally follows the topography. Occurrence of and depth to unconfined groundwater in the Project Area is variable, with thin to non-existent saturated intervals lying immediately above bedrock in steep portions of the site and thicker saturated intervals, likely within 10 feet of the ground surface, in valley bottoms. Groundwater within the unconfined aquifer along the southern portion of Goat Mountain is believed to flow toward the Green River at the valley bottom. High hydraulic conductivities are suspected in soil materials expected to comprise the ground surface in the Project Area. The saturated hydraulic conductivities of these materials likely range from 0.1 to 1,000 centimeters per second (cm/s) (Driscoll 1986). Lower hydraulic conductivities are suspected in materials consisting primarily of ash.

A confined to semi-confined groundwater bedrock aquifer appears to be present beneath the Project Area based on the artesian conditions observed at three drilled holes that were sampled during the fall of 2014 (Green River Horse Camp, Pad 10, and Pad 21 drillholes) and a review of the geologic conditions as described in the Groundwater Resources Report (URS 2015a included as Appendix G). All three drillholes were completed in conjunction with historical exploratory drilling. The Green River Horse Camp drillhole is located along FS Road 2612 east of the proposed security gate and in the easternmost portion of the Project Area. The Pad 10 and Pad 21 drillholes are associated with the proposed respective drill pads that are located in the eastern and central portions of the Project Area, respectively. The conditions within the existing drillholes are considered to be representative of the groundwater conditions because of the flowing condition, the geologic formations encountered, the proximity to proposed drillhole locations, and topographic setting. Because the three drillholes present on site are flowing, problems with downhole purging and sampling are eliminated. Newly drilled holes may not represent the groundwater conditions until well purged and groundwater temperatures, clarity, and pH are consistent with the data from the existing drillholes.

Based on the review of the historical exploration drill logs, artesian conditions were also encountered in two other drilled holes that were completed within the Project Area. These included one drillhole located at Pad 11 within the north-central portion of the site, and one drillhole located at Pad 6 in the southern, lowermost portion of the Project Area. An intermittent spring or seep was also observed at Pad 18, which is south of Pad 21.

Groundwater flow within bedrock is believed to be along fractures/faults and within brecciated bedrock formations. The logs that documented the completion of the historical drilled holes indicate that the confined to semi-confined aquifer conditions are created by low permeability soils that extend to depths of 10 to 30 feet below the ground surface. As noted above, these soils overlie the bedrock and result from the weathering of the volcanic deposits, which form bentonite.

Hydraulic conductivities of bedrock in the area are unknown. However, detailed fracture density-related information was collected on the drill logs collected during previous mineral exploration programs, which indicated that the bedrock ranges from relatively massive near the center of the Project Area to moderately fractured for the remainder of the Project Area. The hydraulic conductivities of moderately fractured igneous bedrock can range from 0.001 to 0.00001 cm/s (Driscoll 1986). The actual hydraulic conductivities vary depending on the level of fracturing and continuity of fractures within the rock.

Discharge of the confined bedrock aquifer is believed to occur into the overlying unconsolidated materials and along seeps and springs in the lower elevations of the Project Area. Recharge of the confined aquifer likely occurs in the higher elevations of Goat Mountain through precipitation (snow melt and rain) that drains through overlying unconsolidated deposits and seeps into bedrock fractures, and through seepage from several cirque lakes on the north and east sides of Goat Mountain.

No mapped springs were identified in the Project Area. A spring was observed in the Green River Horse Camp wetland (which is located immediately south of the Project Area and Green River). Groundwater possibly discharges to the two small perennial tributaries of the Green River located on the east and west side of the Project Area. During field reconnaissance conducted by URS on November 11, 2011, a small seep was noted immediately west of Pad 19. As previously mentioned, an abandoned drillhole (Green River Horse Camp drillhole) located along FS Road 2612 east of the proposed security gate is reportedly used as a non-FS approved/non-potable water source by recreational users of the Project Area. No water wells are documented in the Ecology Well Log Database within 5 miles of the Project Area (Ecology 2015b).

The baseline water quality is described in the Groundwater Resources Report (URS 2015a) included in Appendix G. Water quality samples collected by URS in 2014 were analyzed to establish a baseline understanding of surface water quality. URS performed a preliminary geochemical analysis of the above-mentioned surface water and groundwater that was sampled and analyzed in the fall of 2014. The water quality data were evaluated utilizing Piper diagrams, which are commonly used to evaluate the groundwater quality in terms of relationship between cations and anions, which can assist in assessing possible relationships between the water samples. One of the key findings of the Piper diagram-related assessment is that the samples collected from the three streams that bisect the Project Area are very similar even though two of the three streams have known historic mining features associated with them. The data suggest that the surface characteristics are reflective of the site-specific background conditions. The widespread occurrence of copper in surface water suggests that it may be, in part, natural background concentrations related to the local copper-rich porphyry bedrock. In addition, the groundwater samples collected from the three holes drilled during past mineral exploration programs are also similar. This suggests that the groundwater quality in terms of the elevated arsenic is possibly reflective of the site-specific background conditions.

3.3.2 Environmental Consequences

3.3.2.1 Alternative 1: No Action Alternative

Under the No Action Alternative, no temporary construction or exploratory drilling would be done. The need to reactivate temporary roads, remove vegetation, install culverts and erosion controls (including but not limited to installation of silt fencing, water bars or re-vegetation at the completion of drilling) would not be necessary. There would be no changes to existing runoff patterns, resulting erosion patterns, or volumes following precipitation events. Likewise, there would be no use of groundwater for drilling and no discharge of drilling fluid. Nor would there be direct, indirect, or cumulative effects on surface water or groundwater as a result of this alternative. The baseline water and groundwater conditions would remain the same. Furthermore, potential stormwater improvements to reactivated roads (leaving water bars in place at the completion of the Proposed Action) also would not occur.

3.3.2.2 Alternative 2: Proposed Action Alternative

All activities conducted under Alternative 2 would avoid direct drilling within mapped surface waters. However, proposed improvements to existing road crossings would involve the placement of temporary culverts at existing ephemeral or seasonal drainages that currently cross the roads via water bars.

Alternative 2 potentially includes advancing exploratory drillholes through unconfined and confined aquifers at the Project site. Alternative 2 would use up to 5,000 gpd obtained from Pad 10 (former Duval Hole 06) and Pad 21 (former drillhole MM-10-10) under artesian (flowing) groundwater conditions. Groundwater consumption would be between 2 and 20 gpm during the drilling process, but it would average approximately 5 gpm during an 8-hour period over a 24-hour work cycle. Water use during drilling is dependent on geologic and hydrogeological subsurface conditions. Zones of higher rock fracturing or dry faults would require the use of additional water. Conversely, more competent rock and encountering groundwater within the drillhole would require less water use. Water used for drilling would be combined with a non-toxic standard drilling additive, and the resulting mixture (drilling fluid) would be used to cool the drill bits and to return drill cuttings to the surface. A limited amount of water would also be used to mix cement grout during the drillhole abandonment. Most of the water used for drilling activities would infiltrate back into the ground during drilling or through the drilling fluid sump installed at each drill pad. A small percentage (less than 1 percent) would be lost through evaporation.

3.3.2.2.1 *Direct Effects*

Elements of Alternative 2 that could directly affect surface water quality include road and drill pad improvements, movement of equipment, vehicle traffic, parking equipment on gravel roads above perennial drainages, and riparian impacts associated with tree removal, drilling, and management of produced water. Road improvements would result in loose, side cast soil staging. However, the erosion K factor of 0.15 indicates that the area's in-place soils have a low risk of erosion from surface water flows; therefore, any direct effect on surface water quality is likely to be negligible. Side cast soil, where the soil's natural structure has been disturbed, would have a higher possibility for erosion. The Project, however, would implement all practicable sedimentation controls consistent with applicable erosion control measures and BMPs as design features of Alternative 2. The applicable erosion control measures that would be required in a prospecting permit are described in Section 2.1.2, *Proposed Action Alternative (Alternative 2)* and in Appendix E, *Best Management Practices*.

Riparian impacts would be minor. Some tree clearing (<12-inch dbh) and minor brush removal may occur in association with Drill Pads 6 and 7. Road reactivation and drilling would be consistent with the ACS Objectives (see Table 3.3-1, later in the section), and also comply with the Minerals and Road Management Standards and Guidelines established for Riparian Reserves in the GPNF Forest Plan (see Table 3.3-2, later in the section). However, the limited impact on upland vegetation and the few trees cleared relative to the existing forest cover would have minimal potential to alter temperature conditions or otherwise affect nearby streams.

Elements of Alternative 2 that could directly affect groundwater include drilling operations, drilling fluid management, and drillhole effects. Drilling operations would include the introduction of drilling fluids into the drillholes, which would be circulated to the ground surface to remove drill cuttings, and to lubricate and cool the drill bit. Drilling fluids are primarily water, to which bentonite and polymer products would be added to increase the density of the fluid to facilitate the removal of drill cuttings and enhance bit cooling. Bentonite is an earthen product comprised of sodium montmorillonite, which is naturally formed during weathering of volcanic ash.

Bentonite is similar to natural materials expected to be present in the area due to nearby volcanic activity. Polymer products would be added in small amounts and include anionic polyacrylamides, polysaccharide, anionic water soluble polymer, and polymer salt chemical classes. In addition, assembly lubricants and anti-seize compounds would be used on drill steel and casings. While these polymer products and lubricants are considered environmentally safe, as described in Washington State Minimum Standards for Construction and Maintenance of Wells (WAC 173-216), Alternative 2 does not specify environmentally protective performance criteria or industry standards. Therefore, there is a potential that toxic drilling fluid additives and lubricants could be used under Alternative 2. The Project, however, would implement all practicable controls consistent with applicable control measures as design features of Alternative 2 to minimize any potential effects.

During drilling, the drill core string would be extended into the ground producing an approximately 2.98-inch diameter drillhole using an NQ drill bit to an approximately 3.75-inch diameter drillhole using HQ casing. The core itself would be about 1.87 inches in outside diameter. The difference in diameter between the core and the NQ and HQ drillhole diameters represents the volume of formation material that would be pulverized into drill cuttings (possibly as fine as rock flour). Approximately 110,000 feet of total exploratory drilling would be conducted while completing 63 drillholes with an average drillhole length of about 1,750 feet. Generation of drill fines, based on the volume of formation displaced, would range from about 40 to 100 cubic feet per drillhole. Under Alternative 2, less than 10 gallons of cuttings would be expected based on returns observed during 2010 drilling. Therefore, most of the formation displaced during drilling would remain in the ground. Drill cuttings that are not removed from the drillhole would be combined with drilling fluids by the drilling action, and a portion of the cuttings would be forced into the surrounding formation through hydrostatic pressures introduced by the drilling fluid.

This zone around a drillhole penetrated by drilling fluid and rock flour is called the "invasion zone." The invasion zone is characterized as an area of reduced porosity around a drillhole resulting from drilling fluid and rock flour filling natural voids in the formation. As the drilling fluid and rock flour moves outward into the formation near the drill bit, the surrounding rock filters the bentonite, additives, and rock flour from the drilling fluid. By definition, drilling fluids and rock flour would be contained within the invasion zone, and once the formation is sufficiently invaded a "mudcake" forms on the drillhole wall, significantly limiting the introduction of additional drilling fluids. Studies of invasion phenomena have found that invasion distances range from less than 1 foot outwards in low porosity formations to 10 to 15 feet outward in higher porosity formations[12]. According to the proposed Exploration Plan, drilling additives would be used as little as possible, which would likely increase the size of the invasion zone, potentially allowing more sulfide mineral containing rock flour to be present in the invasion zone. The presence of rock flour potentially containing sulfide minerals and metals that invades adjacent formation material poses risk to groundwater quality since the geochemical characteristics of the adjacent formation might be different than the invading rock flour, especially if the rock flour is from another zone in the drillhole. However, the estimated filtrate loss into the geologic formation based on the reported hydraulic conductivity values for filter cake are very low (Campbell and Gray 1975; Jaio & Sharma 1994; Kelessidis et al. 2006), and are comparable to that of non-fractured

[12] Quantification of the Depth and Volume of Mud Filtrate Invasion in Boreholes Drilled with the Mud Rotary Drilling Method, Hughbert Collier, Tarleton State University.

granite. Wu et al. (2005) indicate that this low permeability is reached in a matter of seconds. A range of filter cake thicknesses (from 1 mm to 1 cm) have been reported. The primary constraining factor on filter cake build-up is the flow rate of the mud that acts to erode the filter cake from the borehole wall. For Alternative 2, a very thin filter cake is expected (probably 1 mm or less) due to the relatively high annular velocity of the mud (over 8 feet per second). Therefore, the risk is very low within the granite formations. As noted in the Groundwater Resources Report, the amount of filtrate that could seep into the overburden, using a 100-foot-deep borehole (which would be deeper than anticipated under Alternative 2 based on the review of historical borelogs) completed within overburden can be used to provide a rough estimate of 25 gallons of filtrate loss in 10 hours, which is considered insignificant (URS 2015a).

Returned drilling fluids would be directed to sumps dug within the drill pads and lined with a permeable matting material to settle the returned drill cuttings. Decanted drilling fluid, which is primarily water, would then be allowed to infiltrate into the subsurface beneath and adjacent to the sump. Use of lined sumps would minimize surface runoff and erosion, while safely collecting water filtered from returned drilling fluids. Exploration activities completed in 2010 suggest that the hydraulic conductivity of native soils is sufficient to allow complete infiltration of the fluid. Following the completion of drilling activities, the matting material would be removed along with drill cuttings and accumulated sediment for off-site disposal.

Drilling operations may encounter unconfined groundwater in surficial (overburden) soils and confined conditions in bedrock. During drilling, there would be a potential for water from one aquifer cross-flowing into another aquifer since drilling fluid additive used under Alternative 2 would be minimized, limiting the formation of a drillhole wall “mudcake” that prevents the outward flow of water from the drillhole. Also, because drillholes that do not “make water” would not be sealed, and because no attempt to isolate deeper aquifers from the near surface aquifer would be performed, Alternative 2 would have the potential to open pathways between unconfined near-surface groundwater and deeper confined groundwater. The movement of water between the aquifers is likely to occur during wetter seasons. drillholes that make water would be sealed with grout to prevent the release of water to the ground surface, and would limit the movement of groundwater within the drillhole. However, changes in groundwater elevation could create situations where drillholes that did not make water during drilling could periodically flow water in the future, depending on seasonal changes and the location of the drillhole in relation to faulting and fracture patterns as noted in Appendix G, *Groundwater Resources Report*.

Alternative 2 would use groundwater available from previous drillholes within the Project Area as a source of water for drilling fluids. The Project Area is located entirely within the Green River watershed. According to Ecology (2015a), two users have water rights on the Green River, including the Washington Department of Fish and Wildlife (WDFW) and Weyerhaeuser. Two other users are listed; however, their status is listed as inactive. Accounting for only the active water users, a total of 48.5 cfs, or 21,800 gpm, is allocated for use. Water requirements for Alternative 2 are estimated to average approximately 5 gpm, with a potential peak use of 20 gpm. Actual water use may average lower based on conditions experienced in 2010 (possibly as little as 2,400 gpd or approximately 360,000 gallons over the 5-month Project). Most water used, with the exception of a negligible amount lost to evaporation, would be returned to the subsurface during drilling or through infiltration in the drill sump. Assuming conservatively that the peak water use is consumed during drilling, only 0.09 percent of the allocated water would be used on a per minute basis. This is a negligible amount of water that would not affect allocated uses.

Geology in the Project Area consists of a core of relatively massive bedrock that is surrounded by fractured rock (URS 2015a). According to USGS Bulletin 1693 (USGS 1992), the Project Area has been identified as fitting the porphyry copper model with arsenic included in the geochemical signature. In addition, artesian conditions have been encountered in a number of the existing boreholes that penetrated through the primary east-west-trending fault. The east-west-trending fault zone that crosses near the middle of the Project Area likely has the highest probability of encountering artesian groundwater conditions and resulting potential for cross-aquifer flow. drillholes at Pads 10, 11, 16, 17, 18, 19, 20, and 21 are located within the vicinity of the fault zone. Baseline water samples associated with these bedrock fault zone aquifers have elevated levels of arsenic. In the Pad 10 drillhole, arsenic is present, but below the state standard, while arsenic in the Pad 21 drillhole is slightly over the state standard and five times the state standard in the Green River Horse Camp drillhole. However, elevated arsenic was not detected in the seeps, springs, or other surface water.

Groundwater containing elevated levels of arsenic would likely be encountered to some extent during the drilling of exploration boreholes that penetrate bedrock fault zones in the area, and some of those boreholes would likely encounter artesian conditions. Use of lined sumps would safely collect water from returned drilling fluids that may contain arsenic and copper due to local mineralization. The drilling procedures, which include sealing drillholes after drilling completion and the use of lined sumps as described below, would minimize the mixing of waters from different sources.

A USGS gauging station is located along the Green River downstream from the Project Area. Flow data records were available from September 8, 1980 through September 30, 1994. Average flow recorded at the station for this period was 476 cfs (213,630 gpm), with maximum and minimum flow rates of 7,310 and 32 cfs (3,281,000 and 14,360 gpm), respectively. Low flows were generally observed in July through September while higher flows were observed during the spring melt. Maximum (peak) estimated water use for Alternative 2 (20 gpm) would be approximately 0.1 percent of the minimum and 0.01 percent of the average flows recorded for the gauging station (on a per minute basis). Estimated average water use of Alternative 2 (5 gpm) is 0.03 percent, and 0.002 percent of the minimum and average recorded flows (on a per minute basis). Given that water use for the Project represents fractions of a percent of allocated and available water within the watershed; and since most water used during drilling would be discharged back into the watershed, the effects of water withdrawal are expected to be negligible. Furthermore, if additional water is needed, groundwater would be supplemented by hauling it by truck from off-site sources under Alternative 2. Off-site water, following use in drilling fluid, would be returned to the watershed, further offsetting local groundwater water use.

Groundwater use would be allowed under an Ecology groundwater withdrawal exemption where up to 5,000 gpd could be withdrawn for industrial purposes, including mineral exploration. Use of groundwater by the Project from on-site sources would be limited to 5,000 gpd. If more than 5,000 gpd per day of groundwater were used, an Ecology groundwater right permit would be required.

As described in Section 2.1.2, *Proposed Action Alternative (Alternative 2),* drillholes that produce water would be abandoned by pressure filling with a cement sealant from the bottom to the surface. This would limit the amount of groundwater lost to the negligible amount released before the hole is abandoned, eliminating further loss of groundwater from such holes.

In-water work would be needed at intermittent stream crossings, where culvert placement along existing temporary roads is required (Figure 6). Work in waters that are regulated under Section 404 and 401 of the Clean Water Act would require a permit from the USACE and Ecology. This may be authorized under a Nationwide Permit, which would speed up the permit review process. In addition, any work in intermittent or perennial streams may require a Hydraulic Project Approval (HPA) permit from WDFW. Because the Project Area is located entirely on federal lands, it is not regulated under Skamania County's Shoreline Master Program or Critical Areas Ordinance. If the Project would result in more than 1 acre of soil disturbance, a Stormwater Construction General Permit may be needed. These environmental review and permitting processes may include conditions to minimize environmental impacts. Controls included in the BMPs would be incorporated into this alternative. Specific BMPs identified as part of this alternative are described in Appendix E, *Best Management Practices.* Because BMPs, including installation of erosion controls and spill prevention measures, would be incorporated into this alternative to avoid or minimize potential environmental effects, the impact would be negligible.

3.3.2.2.2 *Indirect Effects*

The long-term anticipated effects on surface waters would be minimal due to the small scale and short duration of Alternative 2. Potential indirect effects include short-term changes to groundwater elevation within saturated soil and rock horizons that would occur during the period of drilling. Such changes could affect the location, duration, and frequency of groundwater discharge at various locations along the slopes in the Project Area. This potential would be minimized at drillhole locations that make water and would be sealed.

Operation of mechanical equipment, such as the drilling equipment, generators, pumps, and other support equipment and vehicles, presents a potential risk to surface water and groundwater quality at the site through leaks and spills of petroleum-based fuels, lubricants, and hydraulic fluids. Deleterious effects, however, would be avoided by placing spill containment kits in operation areas to allow site workers to respond to spills and releases as they occur.

3.3.2.2.3 *Cumulative Effects*

Goat Mountain is within the Saint Helens Mining District, Ryan Lake area (WDNR 1977). The majority of limited mineral development in the area was conducted in the early 1900s, and little (if any) has occurred since then. The inactive Polar Star Mine is located less than 1 mile west of the Project Area, and an unnamed stream less than 1/4 mile east of the Project Area has three historic mine adits (small tunnels) nearby. Acidic water has reportedly been documented at the Polar Star Mine, and surface water samples collected by Ecology both upstream and downstream in the unnamed stream east of this site have indicated elevated copper levels that exceeded state water quality standards (Ecology 2002) based on the results of the baseline testing documented in the Groundwater Resources Report included in Appendix G, *Groundwater Resources Report*. It is unknown whether elevated copper in upstream samples is related to past exploration/mining activities or is naturally occurring copper.

The cumulative effects of Alternative 2 on surface water and groundwater quality are considered minimal relative to existing surface water and groundwater quality. The baseline copper concentration at the Green River sampling location is approximately 11.5 micrograms per liter. Copper was not detected in the samples obtained from drillholes at Pad 10 and Pad 21. Copper was detected at the horse camp drillhole at a concentration of about 2.2 micrograms per liter. The addition of water from these wells to the Green River would likely result in a decrease in copper concentration. Arsenic was not detected in samples obtained from the Green River sampling point. Arsenic at levels on the order of 55 micrograms per liter were detected at the Green River Horse Camp drillhole and at significantly lower levels in the samples obtained from water obtained from the drillholes at Pads 10 and 21. The differences in the quality of the surface water and groundwater at various locations indicate that the quality of the groundwater has minimal impact on the cumulative quality of the surface water.

Ongoing use of FS Road 2612 for recreation and forest management requires periodic maintenance during which fine sediment may be mobilized, however, all practicable sedimentation controls will be implemented consistent with applicable erosion control measures and BMPs, including such additional design features subject to the authorizing Agencies' discretion. Recreational use including trail building and use have increased since the Green River Horse Camp was built. Where trails intersect with streams, some fine sediment is likely entering the watercourse.

Cumulative effects on streams are mostly related to additional small increments of the same kinds of effects as have occurred in the past and will continue to occur based on current uses. The re-growth of vegetation that helps prevent erosion and sedimentation would be impacted in areas that are disturbed. However, the soils in the disturbance areas are relatively low in fine sediment content, and the locations of disturbance are far enough upstream on small tributaries that additional sediment is not likely to reach downstream. In addition, the placement of silt fences, mulch on roads, culverts at stream crossings, and water bars would further prevent sedimentation. The collective consequences of these small incremental impacts would be minor and are considered negligible.

3.3.2.3 Alternative 3: Based on Scoping Comments

Under Alternative 3, exploratory drilling would be performed with operational, drilling fluid management, monitoring, and drillhole siting and abandonment changes as described in Section 2.1.3, *Alternative 3 - Based on Scoping Comments*. Exploration drilling would be performed with emphasis on the following: use of water from on-site sources up to 5,000 gpd or greater if appropriate Ecology water right/use permits are obtained; maintenance of return circulation throughout drilling of each bore hole; complete abandonment of each hole with sealing material (bentonites) or cement if groundwater or artesian flow is encountered; and operational changes related to timing, and light and noise abatement.

3.3.2.3.1 *Direct Effects*

The direct effects on surface waters, riparian habitat, stream distribution, water temperature, flow regimes, wetland potential, and floodplains would be similar to those described for Alternative 2 and as indicated in the Groundwater Resources Report (URS 2015a, Appendix G). Project work including road improvements could increase the potential for erosion and sedimentation over baseline conditions. The Project, however, would implement all practicable sedimentation controls consistent with applicable erosion control measures and BMPs, including such additional design features subject to the authorizing Agencies' discretion. The erosion control measures that would be required in a prospecting permit are described in Section 2.1.2, *Proposed Action Alternative (Alternative 2)*, and in Appendix E, *Best Management Practices*.

Potential groundwater quality impacts would be negligible. Drilling fluid additives used under Alternative 3 would meet NSF/ANSI approval standards for drinking water wells, which would eliminate the potential for toxic compounds from directly entering groundwater during drilling. Water for drilling not obtained from a regulated water system with periodic source water analysis would be tested for potential contaminants before use to further reduce the potential for the inadvertent introduction of potential contaminants into groundwater at the site. Water not meeting drinking water standards, would not be allowed for use.

To reduce effects of sulfide minerals and metals contained in drilling fines from entering formation water-bearing zones through various invasion processes, drill cutting return would be optimized by using methods that increase the return of drilling fluids. Under Alternative 2, about 10 gallons of drill cuttings would be expected to be produced at each drill site. Under Alternative 3, return of drill cuttings to the ground surface would be increased to between 30 and 50 gallons, reducing the volume of drill cuttings remaining in the down hole. Optimized drilling methods would be used to reduce the invasion of cuttings into the surrounding formation, replace rock flour with drilling fluid additives that would meet drinking water well standards, and promote better drillhole wall "mudcake" formation. This would help to seal adjacent formations to groundwater migration and would prevent cross-aquifer environmental impacts. In instances where drill fluid circulation is lost, the formation causing the loss would be sealed prior to continued drilling, and the drillhole would be abandoned if circulation could not be re-established.

Drilling returns would be collected in an appropriately sized lined containment sump or portable tank, and decanted fluids recirculated in order to reducing the quantity of water and drilling additives required of drilling activities. Cuttings and drilling muds that settle out of the drilling fluid would be disposed off-site.

Transient effects on groundwater from drilling operations would be monitored by periodic testing of groundwater samples collected from Pad 10 (former MM-10-10) and Pad 21 (former Duval hole 06) prior to and during drilling. The conditions within the existing drillholes at Pads 10 and 21 are considered to be representative of the groundwater conditions because of the flowing condition, the geologic formations encountered, the proximity to proposed drillhole locations, and topographic setting. Because the three drillholes present on site are flowing, problems with downhole purging and sampling are eliminated. Newly drilled holes may not represent the groundwater conditions until adequately purged and groundwater temperatures, clarity, and pH are consistent with the data from the existing drillholes. The review would include review of water chemistry trends from baseline monitoring wells. Notable changes in groundwater chemistry would be evaluated relative to drilling operations and natural processes. The monitoring data would be utilized in conjunction with surface expressions of groundwater and site-specific geologic conditions that could control groundwater movement to confirm the groundwater conceptual model described in the report. The groundwater conceptual model, along with water quality monitoring data, would be used to evaluate the impacts of the proposed drilling exploration program.

The information collected during the drilling exploration program could be used to determine the need for and configuration of more permanent monitor wells if additional delineation or refinement of a potential mineral resource is identified. Upon completion of drilling activities, the drillholes at Pad 10 and Pad 21 would be permanently sealed by grouting, unless the Agencies direct otherwise.

Where unconsolidated overburden is present at drillhole locations, a temporary casing would be extended through the overburden and sealed into the underlying bedrock. This would eliminate the risk of drilling fluid loss to near surface groundwater and soils, and would prevent near surface groundwater from cascading down the drillhole annular space.

Following the completion of drilling, all drillholes would be abandoned by sealing the full well column by methods and materials that are appropriate to prevent movement of water within, into, and around the abandoned drillhole. Bentonite and/or cement mixtures, such as described in Washington State Minimum Standards for Construction and Maintenance of Wells (WAC 173-160), would be used at any drillhole that encountered artesian flow. This would eliminate downhole formation of ARD and future post-drilling risk of groundwater contamination from surface sources or from fluid migration between aquifers. This also would eliminate the potential for changing groundwater flow patterns affecting surface water seeps and springs.

Impacts on groundwater would include less use from confined site aquifer(s) since recirculation of drilling fluids would diminish the demand for water from either on-site sources or from importation from other areas. While this EA does not consider impacts on water purveyor systems outside the Project Area, it is unlikely that the quantity of water imported for drilling would significantly impact a municipal source under normal conditions.

3.3.2.3.2 *Indirect Effects*

The indirect effects on surface waters, riparian habitat, stream distribution, water temperature, wetland potential, and floodplains would be similar to those described for Alternative 2. Indirect effects on groundwater would include an increased understanding of groundwater chemistry by sampling of MM-10 and Duval hole 06. Also, these flowing historic drillholes would be sealed at the conclusion of the Project, unless directed otherwise by the Agencies, eliminating the risk of erosion or groundwater loss should existing pressure valves/caps fail in the future.

3.3.2.3.3 *Cumulative Effects*

Cumulative effects on streams would be similar to those described for Alternative 2. Cumulative effects on groundwater would be lower than the effects under Alternative 2 because Alternative 3 is protective of groundwater. With the addition of the recovery of drill cuttings, requiring the use of NSF/ANSI approved drilling additives, use of approved water sources for make-up water, and the monitoring of general water quality during drilling, the long-term impacts on water would be significantly reduced if not eliminated. The implementation of the water protective measures could well become a model for future exploration activities within the Permit Area.

3.3.2.4 Alternative 4: Drill Site Riparian Reserve Avoidance

Alternative 4 is distinguished from Alternatives 2 and 3 in that it does not include drill site installation and exploration activities previously proposed at Pads 6 and 7.

3.3.2.4.1 *Direct Effects*

The direct effects on surface waters, riparian habitat, stream distribution, water temperature, flow regimes, wetland potential, and floodplains would be similar to those described for Alternative 3, but the magnitude of these effects would be reduced by the elimination of drill pad installation and exploration activities within the Riparian Reserve. The elimination of drill pads in these areas would eliminate the potential for erosion from the installation of access road, pad construction, and other disturbance associated with drill pad operations. In addition, elimination of the drill pads at these locations would reduce the overall planned area of disturbance. Otherwise, direct effects on surface waters, riparian habitat, stream distribution, water temperature, flow regimes, wetland potential, and floodplains would be similar to those described for Alternative 3 for actions association with reactivating temporary roads that cross through the Riparian Reserve. Because of the lack of operations at the eliminated drill pads, the impacts on these areas would be similar to Alternative 1.

3.3.2.4.2 *Indirect Effects*

The indirect effects on surface waters, riparian habitat, stream distribution, water temperature, flow regimes, wetland potential, and floodplains would be less than those described for Alternative 3 due to the smaller area of operation.

3.3.2.4.3 *Cumulative Effects*

Because of the reduction in the area of disturbance and the associated restriction of operations in the riparian areas, the cumulative effects on surface waters, riparian habitat, stream distribution, water temperature, flow regimes, wetland potential, and floodplains would be less than those described for Alternative 3.

3.3.3 Surface Water Impact Summary

As described in Section 2.1, *Alternatives*, and Appendix E, *Best Management Practices*, BMPs would be implemented during reactivation/installation, operation, and reclamation of the Proposed Project to minimize potential impacts on surface water. To protect streams from being impacted by the Project, any disturbed sites adjacent to streams would be protected from erosion through approved grading, seeding (native seeds), and use of weed-free mulching and other erosion control devices necessary to prevent the movement of sediment into stream waters. If initial erosion control measures are inadequate, a new erosion control plan would be developed and implemented as soon as possible. Stream banks would be vegetated with native grasses or woody species that have been approved by the FS District hydrologist and botanist within 1 year of Project completion.

3.3.3.1 Consistency with Aquatic Conservation Strategy Guidelines

By implementing and maintaining impact avoidance and design features consistent with the ACS Guidelines and the Forest Service National Core BMPs for Water Quality Management in Minerals Management Activities (FS 2012b), impacts on surface water would be minimized to the point of being essentially negligible.

The 1994 NWFP requires that proposed projects on NFS lands be consistent with the ACS objectives. A finding must be reached that a project "meets" or "does not prevent attainment" of the ACS objectives. Findings for the No Action Alternative (Alternative 1) and the Proposed Action under the other alternatives relative to the nine ACS objectives are included in Table 3.3-1.

Table 3.3-1. Aquatic Conservation Strategy Objectives

Objective #	Objective	Findings
Objective 1	Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.	*Alternative 1:* No disturbance of watershed and landscape-scale features would occur because no prospecting activity would be permitted. *Alternative 2:* Activities would maintain the distribution, diversity, and complexity of the watershed's aquatic systems by retaining the overall character of existing landscape and watershed-scale features. The Proposed Project's potential negative effects would be temporary and limited to the local scale. *Alternative 3*: Potential effects of activities under Alternative 3 would be similarly limited to temporary and local effects to activities under Alternative 2, but Alternative 3 would include additional measures to further avoid and minimize potential impacts on surface and groundwater resources, protect spotted owl habitat and recreation resources, and reduce noise and light intrusion into surround environs. *Alternative 4*: Activities would further limit the potential for limited temporary and local effects over Alternative 3 by reducing the amount of proposed disturbance in the Riparian Reserve through eliminating the placement of two drill pads in the Riparian Reserve, limiting disturbance in the Riparian Reserve to reactivation of the same temporary roads that would be reactivated under Alternatives 2 and 3.

Objective #	Objective	Findings
Objective 2	Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.	*Alternative 1*: No disturbance to the existing spatial and temporal connectivity within and between watersheds would occur because no prospecting activity would be permitted. *Alternative 2*: Activity would maintain hydrologic connectivity within the upper Cowlitz River watershed by retaining the existing drainage networks. This Project would not result in any substantial development within the floodplain and therefore would not result in alterations to the frequency or duration of flood events, nor would it diminish the functions that floodplains provide such as flood storage and conveyance, infiltration, aquifer recharge, and reduction of peak flows and velocities. In addition, the area of impervious surface would not increase or create any hydrologic obstructions or crossings. *Alternative 3*: While spatial and temporal connectivity would be maintained similar to Alternative 2, additional measures related to drilling and abandonment procedures, drilling fluid management, water supply sources, and groundwater testing to further avoid and minimize potential impacts on surface and groundwater resources would be implemented under Alternative 3. *Alternative 4*: Alternative 4 would include the measures to protect surface and groundwater resources included under Alternative 3. Alternative 4 would also reduce the amount of proposed disturbance in the Riparian Reserve by avoiding the placement of exploration-related support facilities within the Riparian Reserve. Disturbance in the Riparian Reserve would be limited to reactivation of the same temporary roads that would be reactivated under Alternatives 2 and 3.

Objective #	Objective	Findings
Objective 3	Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.	*Alternative 1*: No disturbance of the physical integrity of the aquatic system would occur because no prospecting activity would be permitted. *Alternatives 2 and 3*: Activity would maintain the distribution, diversity, and complexity of the watershed's aquatic systems by avoiding water bodies, sensitive areas, unstable slopes and highly erosive soils to the extent practicable. *Alternative 4*: In addition to avoiding water bodies, sensitive areas, unstable slopes, and highly erosive soils as described under Alternatives 2 and 3, proposed disturbance in the Riparian Reserve would be reduced through eliminating the placement of two drill pads in the riparian area, limiting disturbance in the Riparian Reserve to reactivation of the same termporary roads that would be reactivated under Alternatives 2 and 3.

Objective #	Objective	Findings
Objective 4	Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.	*Alternative 1*: Water quality necessary to support healthy riparian, aquatic, and wetland ecosystems would be maintained because no prospecting activity would be permitted. *Alternative 2*: Activities would maintain water quality necessary to support healthy riparian, aquatic, and wetland ecosystems by using applicable BMPs to minimize erosion and stormwater discharge from ground disturbance at exploration sites; and avoiding or minimizing long-term impacts on soil, water quality, and riparian resources to the extent permitted by the geologic target when selecting locations for exploration activities. *Alternative 3*: Activities would maintain water quality similar to under Alternative 2, but would include additional measures related to drilling and abandonment procedures, drilling fluid management, water supply sources, and groundwater testing to further avoid and minimize potential impacts on surface and groundwater resources. *Alternative 4*: In addition to all measures included in Alternative 3 for maintaining water quality, proposed disturbance in the Riparian Reserve would be reduced through eliminating the placement of two drill pads in the riparian area, limiting disturbance in the Riparian Reserve to reactivation of the same temporary roads that would be reactivated under Alternatives 2 and 3.

Objective #	Objective	Findings
Objective 5	Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.	*Alternative 1*: The sediment regime under which aquatic ecosystems evolved would be maintained because no prospecting activity would be permitted. *Alternative 2*: Activities would maintain the sediment regime under which aquatic ecosystems evolved by using applicable BMPs to minimize erosion and stormwater discharge from ground disturbance at exploration sites; and avoiding or minimizing long-term impacts on soil, water quality, and riparian resources to the extent permitted by the geologic target when selecting locations for exploration activities. *Alternative 3*: Activities would maintain sediment regimes similar to under Alternative 2, but would include additional measures related to drilling and abandonment procedures, drilling fluid management, water supply sources, and groundwater testing to further avoid and minimize potential impacts on surface and groundwater resources. *Alternative 4*: In addition to the measures included in Alternative 3 for maintaining sediment regimes, proposed disturbance in the Riparian Reserve would be reduced through eliminating the placement of two drill pads in the riparian area, limiting disturbance in the Riparian Reserve to reactivation of the same temporary roads that would be reactivated under Alternatives 2 and 3.

Objective #	Objective	Findings
Objective 6	Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.	*Alternative 1*: In-stream flows would be maintained because no prospecting activity would be permitted. *Alternative 2*: The amount of groundwater used for drilling purposes or lost from borings that produce water would be negligible. Bore holes that produce water would be sealed with grout to prevent continued loss of groundwater. Most of the water used would infiltrate back into the substrate. No surface water would be used. In-stream flows would not be affected by prospecting activities. *Alternatives 3 and 4:* The amount of groundwater used for drilling purposes or lost from borings that produce water would be limited to less than the amount lost under Alternative 2 by limiting the amount of water supplied from on-site sources to no more than 5,000 gpd and reusing drilling fluid. No surface water would be used. In-stream flows would not be affected by prospecting activities.

Objective #	Objective	Findings
Objective 7	Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.	*Alternative 1*: The timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands would be maintained because no prospecting activity would be permitted. *Alternative 2*: The amount of groundwater used for drilling purposes or lost from borings that produce water would be negligible. Bore holes that produce water would be sealed with grout to prevent continued loss of groundwater. Most of the water used would be infiltrated back into the substrate. No surface water would be used. The timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands would not be affected by prospecting activities. *Alternatives 3 and 4:* The amount of groundwater used for drilling purposes or lost from borings that produce water would be limited to less than the amount lost under Alternative 2 by limiting the amount of water supplied from onsite sources to no more than 5,000 gpd and reusing drilling fluid. No surface water would be used. The timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands would not be affected by prospecting activities.

Objective #	Objective	Findings
Objective 8	Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.	*Alternative 1*: Species composition and structural diversity of plant communities in riparian areas and wetlands would be maintained because no prospecting activities would be permitted. *Alternatives 2 and 3*: Species composition and structural diversity of plant communities in riparian areas and wetlands would be maintained by avoiding water bodies, sensitive areas, unstable slopes, and highly erosive soils to the extent practicable. Limited disturbance to plant communities would occur on a local scale, but disturbed areas would be restored to pre-disturbance composition and structural diversity. *Alternative 4*: Disturbance to species composition and structural diversity of plant communities in riparian areas and wetlands would be less than under Alternatives 2 and 3 because no drill pads would be placed in the Riparian Reserve.
Objective 9	Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.	*Alternative 1*: Habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species would be maintained because no prospecting activities would be permitted. *Alternatives 2 and 3*: Habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species would be maintained by avoiding water bodies, sensitive areas, unstable slopes, and highly erosive soils to the extent practicable. Limited disturbance would occur on a local scale, but disturbed areas would be restored to pre-disturbance composition and structural diversity. *Alternative 4*: Disturbance to habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species would be less than under Alternatives 2 and 3 because no drill pads would be placed in the Riparian Reserve.

Source: Northwest Forest Plan.

ACS Objectives apply within the Riparian Reserve, which is mapped on Figure 6, *Surface Water Analysis*. See Appendix E, *Best Management Practices*, for additional surface water impact avoidance BMPs.

3.3.3.2 Consistency with *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl* - Riparian Reserve Standards and Guidelines for Minerals Management

The *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* provides standards and guidelines for land management by the BLM and FS to protect and enhance habitat for late-successional and old-growth forest related species, and to protect and enhance riparian ecosystems. All alternatives considered for this Project would be consistent with the Minerals Management Standards and Guidelines set forth as described in Table 3.3-2.

Table 3.3-2. Consistency with Minerals Management Standards and Guidelines set forth in *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl*

Standards & Guidelines	Description	Findings
MM-1	Require a reclamation plan, approved Plan of Operations, and reclamation bond for all minerals operations that include Riparian Reserves. Such plans and bonds must address the costs of removing facilities, equipment, and materials; recontouring disturbed areas to near pre-mining topography; isolating and neutralizing or removing toxic or potentially toxic materials; salvage and replacement of topsoil; and seedbed preparation and revegetation to meet ACS Objectives.	*Alternative 1*: No mineral operations would be permitted. *Alternatives 2 and 3*: Drillhole abandonment, and reclamation of the drill pad sites and reactivated roads would occur as described in Section 2.1, *Alternatives*, and Appendix E, *Best Management Practices*. A detailed reclamation plan would be developed and covered by bond to remove facilities, equipment, and materials; recontour disturbed areas to near pre-prospecting topography; isolate and neutralize or remove any toxic or potentially toxic materials; salvage and replace topsoil; prepare seedbeds and revegetate disturbed areas to meet ACS objectives. *Alternative 4*: In addition to the measures described under Alternatives 2 and 3, activity in the Riparian Reserve would be limited to reactivation of previously constructed roads and would avoid placing exploration-related support facilities within the Riparian Reserve.

Standards & Guidelines	Description	Findings
MM-2	Locate structures, support facilities, and roads outside Riparian Reserves. Where no alternative to siting facilities in Riparian Reserves exists, locate them in a way compatible with ACS objectives. Road construction will be kept to the minimum necessary for the approved mineral activity. Such roads will be constructed and maintained to meet road management standards and to minimize damage to resources in the Riparian Reserve. When a road is no longer required for mineral or land management activities, it will be closed, obliterated, and stabilized.	*Alternative 1*: No structures, support facilities, or roads would be built because no prospecting activity would be permitted. *Alternative 2 and 3*: Work in the Riparian Reserve would be limited to two drill pads and associated drillholes, and reactivation of previously constructed deactivated roads. While locating the drill pads and shacks would include placing "structures," these would be relatively small and temporary in nature. All work would be done consistent with the ACS objectives. *Alternative 4*: Work in the Riparian Reserve would only include reactivating the same previously constructed roads described under Alternatives 2 and 3, but would avoid siting drill pads and any associated "structures" in the Riparian Reserve.
MM-3	Prohibit solid and sanitary waste facilities in Riparian Reserves.	*Alternative 1*: No solid or sanitary waste facilities would be built because no prospecting activity would be permitted. *Alternatives 2, 3, and 4*: The FS consent decision would specify conditions applicable to all lands within the prospecting permits, including compliance with all standards and guidelines in the Forest Plan, as amended. As a permit condition, all operations must be designed to comply with conditions on the permit; thus, solid and sanitary waste facilities would be prohibited in Riparian Reserves.

Standards & Guidelines	Description	Findings
MM-4	For leasable minerals, prohibit surface occupancy within Riparian Reserves for oil, gas, and geothermal exploration and development activities where leases do not already exist. Where possible, adjust the operating plans of existing contracts to eliminate impacts that retard or prevent the attainment of ACS objectives.	*Alternative 1*: No surface occupancy for exploration and development activities related to leasable minerals would occur because no prospecting activities would be permitted. *Alternatives 2 and 3*: Alternatives 2 and 3 take into consideration the requirements of MM-2 that where no alternative exists, facilities within Riparian Reserves will be located in a way compatible with ACS objectives. Activities in the Riparian Reserve would be limited to two drill pads and associated support facilities, and reactivation of previously constructed roads accessing drill pads. All work would be done consistent with the ACS objectives. *Alternatives 4*: Taking into consideration the requirements of MM-2 to avoid siting facilities within Riparian Reserves where possible, no new surface occupancy would occur under Alternative 4. Activities in the Riparian Reserve would be limited to reactivating the same previously constructed roads described under Alternatives 2 and 3 but would avoid siting new drill pads and associated support facilities in the Riparian Reserve. All work would be done consistent with the ACS objectives.
MM-5	Salable mineral activities such as sand and gravel mining and extraction within Riparian Reserves will occur only if ACS objectives can be met.	*Alternatives 1, 2, 3, and 4*: No salable mineral activities are proposed in the permit applications under consideration.
MM-6	Include inspection and monitoring requirements in mineral plans, leases, or permits. Evaluate the results of inspection and monitoring to affect the modification of mineral plans, leases, and permits as needed to eliminate impacts that retard or prevent attainment of ACS objectives.	*Alternative 1*: No prospecting permits would be issued. *Alternatives 2, 3, and 4*: Inspection and monitoring would be required by any Exploration Plan approved for this Project.

3.3.4 Groundwater Impact Summary

As outlined in Section 2.1, *Alternatives*, and Appendix E, *Best Management Practices*, BMPs would be implemented during reactivation/installation, operation, and reclamation of the Proposed Project to minimize potential impacts on groundwater. The potential, however, remains for groundwater temperature, pH, salinity, and metals concentrations to be affected by the Project. To protect groundwater from being significantly impacted by the Project, groundwater quality would be monitored at the two on-site water sources and responsive adaptive management of the Project would be followed. The water at Duval Hole 06 and MM-10-10 would be sampled prior to initiation of the drilling program. The water would be tested for temperature, pH, salinity, and at a minimum arsenic, cadmium, copper, lead, mercury, and zinc. The water would be tested once per month during drilling operations. If significant changes in water quality are observed, drilling would be suspended until appropriate measures to protect groundwater are determined and implemented, or the cause is identified to not be Project related. If Duval Hole 06 and MM-10-10 are used for on-site water, the holes would be abandoned in accordance with WAC 173-160-381, to the extent practicable, unless otherwise directed by the Agencies. No mitigation is proposed.

3.4 SOILS

3.4.1 Affected Environment

Soils in the Project Area are typical of mountain slopes in the north Cascade Range. They are formed in layers of aerially deposited volcanic ash and pumice, and are mainly deep and well drained. Slopes are gentle to steep in gradient with slopes of 3 to 35 percent in grade. No Prime and Unique Farmland soils are located in the Project Area as defined by 7 CFR 657.5[13]. Soils in the Project Area were mapped by the NRCS as part of preliminary surveys of Skamania County.

Based on the NRCS Web Soil Survey (NRCS 1990), the soils in the Project Area consist of approximately 64 percent Colter cindery sandy loam, 24 percent Minnepeak loamy sand, 6 percent Colter loamy sand, 5 percent Rock outcrop-Cattcreek complex, and less than 1 percent Elkprairie loamy sand. In general, the soils in the Project Area consist of sandy loam and loamy sand with varying amounts of gravel. The soils are primarily within the hydrologic group B, which is characterized by moderate infiltration rates, a moderate rate of water transmission, moderate fine to moderate coarse soil texture, and a moderate runoff potential. The soils are characterized by a moderate to severe erosion hazard by water, and a high erosion potential by wind. However, the area has an estimated K factor of 0.15, indicating that area soils have a low risk of erosion from surface water flows. Similar soil is anticipated at each drill pad location based on the widespread blanketing deposition of ash and pumice that occurs in volcanic areas. A summary of the survey findings is presented below:

- The **Colter cindery sandy loam soil** is found on slopes of 0 to 90 percent in grade. The parent material consists of volcanic ash and pumice. The depth to a

[13] Title 7: Agriculture: Subtitle B: Regulations of the U.S. Department of Agriculture.

root restrictive layer is greater than 60 inches. The shrink-swell potential is low. The soil is well drained and does not meet hydric criteria. This soil consists of gravelly sandy loam at depths of 0 to 6 inches; extremely gravelly sand, very gravelly loamy sand, and very gravelly sand at depths of 6 to 33 inches; sandy loam, gravelly sandy loam, and gravelly loamy sand at depths of 33 to 54 inches; and extremely gravelly sand at depths of 54 to 60 inches. The soils are made of 69 percent of sand, 24 percent of silt, and 7 percent of clay. The soil is within the soil hydrologic group B, which is characterized by moderate infiltration rates, a moderate rate of water transmission, moderate fine to moderate coarse soil texture, and a moderate runoff potential. This soil is characterized by a moderate erosion hazard by water on 0 to 30 percent slopes, severe on 30 to 65 percent slopes, and severe to very severe on 65 to 90 percent slopes; and by a moderate erosion potential by wind.

- The **Minniepeak loamy sand**, **overblown soil** is found on 5 to 30 percent slopes. The soil is on ridges and mountain slopes. The parent material consists of volcanic ash and pumice. The depth to a root restrictive layer is greater than 60 inches. The shrink-swell potential is low. The soil is well drained and does not meet hydric criteria. The soil consists of loamy sand at depths of 0 to 15 inches; gravelly sandy loam at depths of 15 to 18 inches; loamy sand and sandy loam at depths of 18 to 23 inches; and extremely gravelly sand, very gravelly sandy loam, and extremely gravelly coarse sand at depths 23 to 60 inches. It is made of 82.4 percent of sand, 16.6 percent of silt, and 1.0 percent of clay. The soil is within the hydrologic group B, which is characterized by moderate infiltration rates, a moderate rate of water transmission, moderate fine to moderate coarse soil texture, and a moderate runoff potential. The soil is characterized by a moderate to severe erosion hazard by water, and a high erosion potential by wind.
- The **Colter loamy sand, overblown soil** is found on 0 to 95 percent slopes. The soil parent material consists of volcanic ash and pumice. The depth to a root restrictive layer is greater than 60 inches. The shrink-swell potential is low. The soil is well drained and does not meet hydric criteria. The soil consists of loamy sand at depths of 0 to 15 inches; gravelly sandy loam at depths of 15 to 21 inches; extremely gravelly sand, very gravelly loamy sand at depths of 21 to 48 inches; and sandy loam, gravelly sandy loam, and loamy sand at depths of 48 to 60 inches. The soil is made of 81.1 percent of sand, 16.4 percent of silt, and 2.5 percent of clay. It is within the hydrologic group B, which is characterized by moderate infiltration rates, a moderate rate of water transmission, moderate fine to moderate coarse soil texture, and a moderate runoff potential. This soil is characterized by a severe erosion potential by water, and a high erosion potential by wind.
- The **Rock Outcrop and Cattcreek soil** association consists of approximately 60 percent rock outcrop and 30 percent Cattcreek soil and is found on 65 to 90 percent slopes. The soil parent material consists of volcanic ash and pumice. The depth to a root restrictive layer is 40 to 60 inches. The shrink-swell potential is low. The soil is well drained and does not meet hydric criteria. The Cattcreek soil component consists of very gravelly loamy sand at depths of 0 to 6 inches; very gravelly sand and very gravelly loamy sand at depths of 6 to 15 inches;

extremely gravelly sand and very gravelly sand at depths of 15 to 30 inches; extremely gravelly loam and very gravelly sandy loam at depth of 30 to 54 inches, and unweathered bedrock at depths of 54 to 58 inches. The soil component includes 79.2 percent of sand, 15.8 percent of silt, and 5.0 percent of clay. The soil is within the hydrologic group B, which is characterized by moderate infiltration rates, a moderate rate of water transmission, moderate fine to moderate coarse soil texture, and a moderate runoff potential. The Rock Outcrop consists of unweathered bedrock, and is within the hydrologic group D, characterized by very slow infiltration rates and a high runoff potential. The soils are shallow over nearly impervious material and have a very slow rate of water transmission. The Rock Outcrop-Cattcreek complex is characterized by a severe to very severe erosion hazard by water, and by a high erosion potential by wind.

- The **Elkprairie loamy sand soil** is found on 5 to 90 percent slopes. The parent material consists of volcanic ash and pumice. The depth to a root restrictive layer is greater than 60 inches. The shrink-swell potential is low. The soil is well drained and does not meet hydric criteria. The soil consists of loamy sand at depths of 0 to 6 inches; gravelly coarse sand, sand and gravelly sand at depths of 6 to 17 inches; very gravelly loamy sand, gravelly loamy sand, and loamy sand at depths of 17 to 23 inches; gravelly loam, gravelly sandy loam, and fine sandy loam at depths 23 to 36 inches; and loam at depths of 36 to 60 inches. It is made of 80.7 percent of sand, 16.3 percent of silt, and 3.0 percent of clay. The soil is within the hydrologic group B, which is characterized by moderate infiltration rates, a moderate rate of water transmission, moderate fine to moderate coarse soil texture, and a moderate runoff potential. The soil is characterized by a moderate to severe erosion hazard by water, and a high erosion potential by wind.

3.4.2 Environmental Consequences

3.4.2.1 Alternative 1: No Action Alternative

Under the No Action Alternative, no exploratory drilling would be done. The need to reactivate temporary roads, remove vegetation, install culverts and other erosion controls (including but not limited to silt fencing, water bars, and re-vegetation at the completion of drilling) would not be necessary. There would be no changes to existing runoff or erosion patterns or to flow volumes following precipitation events. No direct, indirect, or cumulative effects from this alternative are anticipated.

3.4.2.2 Alternative 2: Proposed Action Alternative

Total surface disturbance associated with the Proposed Project could impact up to 3.3 acres, including reactivated existing temporary roads from the 2010 drill pad sites, and newly reactivated existing temporary roads. The total new surface disturbance associated with the Proposed Project could impact up to 0.85 acre. Activities conducted under Alternative 2 would also result in improvements to reactivated existing temporary road stream crossings. This would involve grubbing, temporary side cast soil staging, and placement of temporary culverts at existing ephemeral or seasonal drainages that cross the roads via water bars. The work would be performed in areas with grades of 3.0 to 35 percent.

3.4.2.2.1 *Direct Effects*

Reactivating existing temporary roads required for the proposed exploration, especially in steep terrain, would increase the erosion potential by wind and water of disturbed soils until reclamation is successfully completed. Removal of vegetation during preparation of access roads would expose soils on slopes. Disturbed areas on hill slopes would be especially susceptible to erosion and subsequent impacts on soil quality due to the steepness and long slope length.

The proposed drilling schedule for Alternative 2 is described in Section 2.1.2.6, *Timetable of Operations*. These impacts would be reduced by measures incorporated in the Project design, including the use of water bars and culverts, installation of erosion control material and growth media, and implementation of BMPs listed in Appendix E, *Best Management Practices*. Impacts would also be reduced by concurrent reclamation of drill pad sites, sumps, trenches, and drill roads no longer needed for access. Reclamation activities, such as re-grading, ripping, and re-vegetation of disturbed areas would also minimize soil loss.

Compaction of the soils would occur along reactivated temporary roads and in the area of the drill pads due to vehicular traffic. Compaction at pad sites as a result of Alternative 2 would be relatively minimal considering the size and weight of equipment that would be used. The compaction of the soil until reclamation is completed may temporarily increase the stormwater runoff potential and the velocity of runoff water. This effect of Alternative 2 is expected to be relatively minor considering that FS Road 2612 is already well compacted by historic and current use. Impacts would be reduced by concurrent reclamation of drill pad sites, sumps, trenches, and roads no longer needed for access, as well as the use of water bars and the installation of erosion control material.

Road improvements would result in loose, side cast soil staging, which has the potential to erode into downslope waters. The erosion K factor of 0.15 indicates that the area's in-place soils have a low risk of erosion from surface water flows; therefore, any direct effect is likely to be negligible. However, side cast soil where the soil structure is disturbed would have a higher potential of erosion. Alternative 2 would implement all practicable sedimentation controls consistent with applicable erosion control measures and BMPs.

3.4.2.2.2 *Indirect Effects*

The indirect effects on soils would be minimal due to the small scale and short duration of Alternative 2. These indirect effects include impacts that would be caused by alteration of standing vegetation, which may increase erosion. These effects would be reduced by measures incorporated in the Project design, including the use of water bars and culverts, installation of erosion control material and growth media, and implementation of other BMPs listed in Appendix E, *Best Management Practices*.

3.4.2.2.3 *Cumulative Effects*

Ongoing use of the roads for recreation, forest management, and other purposes would require road maintenance, during which fine sediment may be mobilized; however, all practicable sedimentation controls would be implemented consistent with applicable erosion control measures and BMPs. Recreational use and trail building/usage have increased since the Green River Horse Camp was built. In places where trails intersect with streams, some fine sediment is already entering the streams.

Cumulative effects on streams are mostly related to additional small increments of the same kinds of effects as those that have occurred in the past. In areas that are re-disturbed, regrowth of vegetation that limits erosion and sedimentation would be temporarily hindered. However, the soils in the disturbance areas are relatively low in fine sediment content, and the location of disturbances would be far enough upstream on small tributaries that additional sediment is not likely to reach into new areas downstream. In addition, the use of BMPs, including the placement of silt fences, mulching on road, culverts, and water bars, would largely prevent sedimentation. The collective consequences of these small incremental effects are minor and considered negligible.

3.4.2.3 **Alternative 3: Based on Scoping Comments**

Under this alternative, the same area of soil disturbance would occur as with Alternative 2, although potentially during periods with higher precipitation to minimize recreational impacts.

3.4.2.3.1 *Direct Effects*

The direct effects on soil would be similar to those described for Alternative 2. However, the drilling schedule in the area of the Green River Horse Camp would be adjusted to limit recreational conflict; the adjusted schedule might require that drilling be performed during periods when higher precipitation is forecast. Therefore, the work could increase the potential for erosion. Elements of Alternatives 2, 3, and 4 that have the potential to directly affect surface waters include road improvements, vehicle traffic, and parking on roads above perennial drainages; erosion impacts associated with tree removal; drilling; and management of erosion. Road improvements would result in the temporary creation of loose side cast soil staging, which has the potential to erode and deposit material down slope of the work area. Soil piles would be managed to prevent erosion.

Discharge from temporary culverts due to road reactivation has the potential to create a rill at the outfall of the culvert, which can deliver sediment to the tributaries that drain to the Green River. The balancing of the use of on-site and off-site water sources and re-use of drilling fluids may result in an increase in truck traffic. Hole abandonment requirements would also result in the increase of truck traffic for delivery of additional drilling supplies. An increase in water truck traffic might increase erosion and airborne entrainment of fine soil particles along roads traversed by moving equipment, although this would be partially offset by the revised drilling schedule near the Green River Horse Camp when precipitation would reduce airborne-related erosion. Based on the local soil characteristics, the proposed efforts described above, and the limited Project timeframe, the likelihood of soil erosion and resulting deleterious sedimentation is low.

3.4.2.3.2 *Indirect Effects*

The indirect effects on soils would be similar to those described for Alternative 2.

3.4.2.3.3 *Cumulative Effects*

Cumulative effects on soils are primarily related to additional small increments of the same kinds of effects that have occurred in the past. In areas that are re-disturbed, prior re-growth of vegetation that limits erosion and sedimentation would be temporarily impacted. However, the soils in the disturbance areas are relatively low in fine sediment content, and the placement of silt fences and mulch on roads would largely prevent sedimentation. The consequences of this incremental effect would be equivalent to those described for Alternative 2 and are minor and considered negligible.

3.4.2.4 Alternative 4: Drill Site Riparian Reserve Avoidance

Alternative 4 is distinguished from Alternative 3 in that it does not include the installation and exploration activities previously described at Pads 6 and 7 in order to avoid activity within the Riparian Reserve.

3.4.2.4.1 *Direct Effects*

The direct effects on soils would be similar to those described for Alternative 3; however, the potential for disturbed soil to result in sediment contributions to waterways would be reduced because soil disturbance in the Riparian Reserve would be limited to reactivating temporary roads.

3.4.2.4.2 *Indirect Effects*

The indirect effects on soils would be the same as those described for Alternative 3.

3.4.2.4.3 *Cumulative Effects*

The cumulative effects on soils would be the same as those described for Alternative 3.

3.4.3 Impact Summary

As outlined in Section 2.1, *Alternatives* and Appendix E, *Best Management Practices*, a number of BMPs would be implemented during reactivation, installation, operation, and reclamation of the Proposed Project to minimize potential impacts on soils. Any impacts on soils would be minor and no mitigation is proposed.

3.5 WILDLIFE

The Proposed Action may have the potential to affect existing wildlife resources in the Project Area, including birds, mammals, reptiles, and amphibians; species listed under the federal ESA; FS Sensitive Species; Management Indicator Species (MIS); and Survey and Manage (S&M) Species. Analysis of the Proposed Project (access, operations, and reclamation) includes identified potential sources of wildlife impacts, impact avoidance measures, and recommended design features to minimize unavoidable impacts. The following information sources were used to identify wildlife resources that may be present in the vicinity of the Project Area:

- Listed and Proposed Endangered and Threatened Species and Critical Habitat; Candidate Species; and Species of Concern in Skamania County (U.S. Fish and Wildlife Service [USFWS] 2015).
- Washington Department of Fish and Wildlife Priority Habitats and Species (PHS) data (WDFW 2015a).
- Gifford Pinchot National Forest Geospatial data (FS 2012a).
- FS Region 6 Regional Forester Special Status Species List, December 1, 2011 (FS 2011). Includes Region 6 Regional Forester Sensitive Species.
- Gifford Pinchot National Forest Land and Resource Management Plan Management Indicator Species (MIS) List (FS 1990, 1994).
- Gifford Pinchot National Forest Survey and Manage Species (S&M) List (USDA FS and USDI BLM 2001).
- U.S. Fish and Wildlife Service northern spotted owl designated Critical Habitat data (USFWS 2008; FS 2012).
- Checklist of the Birds of Skamania County (Vancouver Audubon Society 2008).
- Washington State Herp Atlas (WDNR et al. 2012).

In addition, the Proposed Project Exploration Plan (Ascot USA 2011) was used to identify Project-related activities that have the potential to impact wildlife. It is important to note that the Cowlitz Indian Tribe has indicated that they view wildlife as a natural resource of cultural value (Iyall 2012).

3.5.1 Affected Environment

This section identifies the existing wildlife habitat types in the Project Area, and the wildlife communities that may occur there. The wildlife communities are categorized as Threatened and Endangered, Sensitive, MIS, and S&M species.

3.5.1.1 Habitat Types

The Project Area is located in the Southern Washington Cascades Province, within the Pacific silver fir (*Abies amabilis*) vegetation zone (Franklin and Dyrness 1988). It is located on the south-facing slope of the east-west trending Goat Mountain, situated in the area north of the Green River between about 2,800 and 4,000 feet amsl, on the fringe of the area deforested by the 1980 eruptive blast of Mount St. Helens. A portion of the northern part of the Project Area is covered by mature forest that escaped the effects of the 1980 eruption. Areas devastated by the eruption were salvage logged in 1982 and reforested by 1985 or 1986.

The current vegetative structure within the Project Area is uniform conifer forest. Younger stands less than 30 years of age (replanted after the eruption) dominate the lower elevation southern two-thirds of the Project Area. Stands up to 127 years of age are located on the higher elevation slopes of the northern third of the Project Area (see Appendix F, *Biological Assessment, Revised April 10, 2015,* Figure 5, *Habitat*). The habitat adjacent to and in the vicinity of the Proposed Project consists of the same uniform conifer forest habitats in a broad mosaic of very few, very large patches (hundreds of acres each). Sparsely vegetated alpine zones occur along the ridge of Goat Mountain upslope and several hundred yards beyond the Project Area. No forest stands in or adjacent to the Project Area contain any appreciable amount of deciduous trees or deciduous forest habitat.

Riparian Reserves are the designated widths on either side of the stream where restrictions are placed on what can be done to protect the functions of the land and water in that reserved area along the stream. See Section 3.3.1.1, *Mapped Waters, Wetlands, Floodplains, and Riparian Reserves* for a discussion on NWFP Riparian Reserves.

Human activity in the Project Area and vicinity has been dominated by logging and silvicultural activity, recreation use, and mineral prospecting. The Project Area has active forest roads and former temporary roads, with previous drill pads established either directly on temporary roads or on the temporary road shoulder. Limited mineral exploration and development has occurred in the area for nearly 100 years. The so called "Margaret Deposit" has been investigated for decades by various mineral development interests, and some exploratory drilling was conducted in 2010. The Green River Horse Camp is located at the edge of the Project Area. Additionally, several FS system trails skirt the area providing access for equestrian and hiker use.

3.5.1.2 **Wildlife Communities**

This section describes wildlife communities typical of mid-elevation Douglas-fir and western hemlock forests on the western slopes of Washington's Cascade Mountain Range. The Project Area provides habitat for both resident and migratory wildlife.

3.5.1.3 **Wildlife Species**

This section also addresses species that are listed on the federal ESA and/or FS Sensitive Species, MIS, or S&M lists.

The ESA was established to conserve, protect, and restore threatened and endangered species and their habitats. Section 7 of the ESA (50 CFR 402) requires federal agencies to ensure that their actions do not jeopardize the continued existence of listed species, and do not result in adverse modification to designated Critical Habitats. Besides ESA-listed species, this section also considers FS Sensitive Species, FS MIS, and bald and golden eagles, which are protected under the Federal Bald and Golden Eagle Protection Act (FS 2011, 1995; USFWS 2015; WDFW 2015a).

Table 3.5-4 (later in this section) identifies species or species groups listed under the federal ESA and FS Sensitive Species, MIS, and/or S&M lists. All of these species are considered documented or suspected to occur in the GPNF. Analyses were conducted to determine which species have habitat present within or adjacent to the Project Area. The following species have potential to occur within the Project Area or immediate vicinity:

- Northern spotted owl (*Strix occidentalis caurina*, federal ESA Threatened, FS MIS).
- Northern spotted owl, federal Designated Critical Habitat.
- Pine marten (*Martes americana*, FS MIS).
- Roosevelt elk (*Cervus elaphus*, FS MIS).
- Black-tailed deer (*Odocoileus hemionus*, FS MIS).
- Mountain goat (*Oreamnos americanus*, FS MIS).
- Wolverine (*Gulo gulo luteus*, federal ESA Candidate; FS Sensitive).
- Van Dyke's salamander (*Plethodon vandykei*, FS Sensitive and MIS).
- Broadwhorl tightcoil (*Pristoloma johnsoni*, FS Sensitive).
- Cascade torrent salamander (*Rhyacotriton cascadae*, FS Sensitive).
- Larch Mountain salamander (*Plethodon larselli*, FS Sensitive and S&M).
- Bald eagle (*Haliaeetus leucocephalus*, FS Sensitive Species, Bald and Golden Eagle Protection Act).
- Pileated woodpecker (*Dryocopus pileatus*, FS MIS).
- Tree cavity excavating birds (FS MIS).

3.5.1.3.1 *Species Eliminated from Further Analysis*

The species identified in Table 3.5-1, *Wildlife Species that Would Not be Affected by Any Alternative*, are found in habitat that does not occur in the Project Area, or do not occur in habitat that would be affect by the Project. As such, they would not be affected by any of the alternatives.

Table 3.5-1. Wildlife Species that Would Not be Affected by Any Alternative

Species	Reason Not Found in Project Area
Grizzly bear	The high active road density in the Project Area (more than 1.7 miles per square mile) makes it unlikely that these species would occur there (Jenson et al. 1986; Mech et al. 1988; Thiel 1985).
Keen's myotis	The Project Area is outside its known distribution.
Marbled murrelet	The Project Area is too far from the Pacific Ocean (Ralph et al. 1995).
Common loon	The Project Area does not contain water bodies suitable for this species (Richardson et al. 2000).
Great gray owl	The Project Area does not contain open grassy habitat including bogs natural meadows, and open forests that constitute foraging areas (Quintana-Coyer et al. 2004).
Mountain quail	The Project Area is outside the known range of this species.
Peregrine falcon	The Project Area does not include rocky outcrops.

Species	Reason Not Found in Project Area
Oregon spotted frog	The Project Area does not contain large ponds that would be suitable habitat, and because of the distance to known occupied habitat.
Sharptail snake	There are no known occurrences in the Project Area.
Cope's giant salamander	There are no known occurrences in the Project Area.
Mardon skipper butterfly	There are no grassland meadows in the Project Area.
Barry's hairstreak	The larvae of this butterfly appear to require juniper upon which they feed (Pyle 2002), and juniper does not grow in the Project Area.
Johnson's hairstreak	There are no old-growth stands within the Project Area, which is where this butterfly is most likely to be found (Pyle 2002).
Golden hairstreak	The larvae of this butterfly are dependent on golden chinquapin upon which they feed (Pyle 2002), and this plant does not grow in the Project Area.
Great Basin fritillary	This butterfly inhabits mountain meadows, forest openings, and exposed rocky ridges and, in Washington, is known from sites east of the Cascades (Pyle 2002).
Puget Oregonian	This snail is thought to be a mature forest specialist and inhabits moist old-growth and late successional stage forests and riparian areas at low and middle elevations (below 600 feet) (COSEWIC 2002). The Project would not disturb this type of habitat.
Columbia Gorge Oregonian	This snail in known from sites in the eastern Columbia River Gorge, and from the Clackamas and Hood River Districts on the Mount Hood National Forest. The Management Recommendations for this snail (Duncan 2005) that there is no reason to expect it to occur on the GPNF.

Species	Reason Not Found in Project Area
Evening fieldslug	The Evening fieldslug is associated with perennially wet meadows in forested habitats. This species appears to have high moisture requirements and is almost always found in or near herbaceous vegetation at the interface between soil and water, or under litter and other cover in wet situations where the soil and vegetation remain constantly saturated. Because of the apparent need for stable environments that remain wet throughout the year, suitable habitat may be considered to be limited to moist surface vegetation and cover objects within 30 m (98 feet) of perennial wetlands, springs, seeps, and riparian areas (FS and BLM 2005a). The Project would not disturb this type of habitat.
Warty jumping slug	This species is associated with moist forest dominated by conifers but with a moderate hardwood component. The forest floor is moist but not wet or saturated. Large woody debris, both conifer and hardwood, is abundant. Habitat descriptions are not extensive, but they imply general rain forest, or other moist to wet forest conditions with heavy shading (FS and BLM 2005b). The Project would not disturb this type of habitat.
Burrington's jumping slug	This species requires habitat similar to Warty jumping slug (FS and BLM 2005b). The Project would not disturb this type of habitat.
Western ridged mussel	Low shear stress (shear stress is caused by fast flowing water over substrate), substrate stability, and flow refuges are important determinants of freshwater mussel survival (Vannote and Minshall 1982). The presence of glochidial host fish is necessary for the reproduction of mussel species. This mussel occurs on the benthos of streams, rivers, and lakes with substrates that vary from gravel to firm mud, and include at least some sand, silt, or clay (COSEWIC 2003). This species is more common on the eastern side of Oregon and Washington than the western side (Smith et al. 2008). It is generally associated with constant flow, shallow water (<3 m in depth), and well-oxygenated substrates (COSEWIC 2003). This species is often present in areas with seasonally turbid streams, but absent from areas with continuously turbid water (e.g., glacial melt water streams) (Frest and Johannes 1992) and generally occurs at low to mid elevations (Nedeau et al. 2009). The Project would not disturb this type of habitat.
Malone's jumping slug	This species requires habitat similar to Warty jumping slug (FS and BLM 2005b). The Project would not disturb this type of habitat.
Panther jumping slug	This species requires habitat similar to Warty jumping slug (FS and BLM 2005b). The Project would not disturb this type of habitat.

Species	Reason Not Found in Project Area
Barren juga	The Barren juga is found at low elevation large springs and small-medium streams (FS and BLM 2010). No habitat is present in the Project Area.
Oregon megomphix	This snail is only known from low elevations in Washington (Duncan 2005). No habitat is present in the Project Area.
Crowned tightcoil	It is associated with riparian and old-growth habitat and most abundant under the dense thickets of salal near the coast; it usually occupies the deeper, more rotten strata of decaying leaves (Baker 1931). Frest and Johannes (2000) have found the crowned tightcoil in very moist floodplain forest, with salmonberry, vine maple, waterleaf, and other floodplain edge plants; also on a steep, rocky, partly forested slope with coastal exposure. Forested sites are associated with abundant, persistent moisture. The Project would not disturb this type of habitat.
Shiny tightcoil snail	Although there is little known about this snail, known sites are east of the GPNF, and are generally in Ponderosa pine/Douglas-fir plant associations at moderate to high elevations (Duncan et al. 2003). This plant association does not occur in the Project Area.
Blue-gray taildropper	This slug normally occurs in late-successional forests of moist plant associations, or at least in stands with an abundance of late-successional attributes (i.e., cool moist sites with large and small woody debris, and relatively thick layers of litter and duff) (Burke Version 2.0). The Project would not disturb this type of habitat.
Subarctic darner	This species occurs in fens, wet meadows, and bogs with abundant sphagnum and other mosses (Paulson 2009). The larvae require submerged vegetation for their clinging-type predation behavior. This habitat does not occur in the Project Area.
Zigzag darner	This species occurs in wet sedge meadows, fens, bogs, and very shallow peaty ponds (Paulson 2009, 2010). This habitat does not occur in the Project Area.
Townsend’s big eared bat	Townsend's big-eared bats are found throughout western North America, from British Columbia south to Oaxaca, Mexico. Their most typical habitat is arid western desert scrub and pine forest regions. These agile fliers venture out to forage only after dark, using their keen echolocation to hunt moths and other insects. In the spring and summer, females form maternity colonies in mines, caves, or buildings, while males roost individually. In winter, these bats hibernate in caves and abandoned mines.

3.5.1.3.2 *Species with the Potential to Occur in the Project Area*

For species with a potential to occur in the Project Area, a brief description of each is provided below. The primary source of information is listed in parentheses.

3.5.1.3.2.1 Threatened, Endangered, and Proposed Species

Northern Spotted Owl and Designated Critical Habitat (Shohet et al. 2008)

The northern spotted owl is a relatively long-lived bird (with an average life span approximating 8 years), with a naturally low reproductive rate. Spotted owls do not reach sexual maturity until after 2 years; once an adult, females lay an average of two eggs per clutch (range 1–4 eggs). Nest sites are usually located within stands of old-growth and late-successional forests dominated by Douglas-fir, and consist of existing structures such as cavities, broken tree tops, or mistletoe (*Arceuthobium* spp.) brooms.

Spotted owls rely on older forested habitats because they contain the structure and characteristics required for nesting, roosting, foraging, and dispersal. These characteristics include the following: a multilayered, multi-species canopy dominated by large overstory trees; moderate to high canopy closure; a high incidence of trees with large cavities and other types of deformities; numerous large snags; an abundance of large, dead wood on the ground; and open space within and below the upper canopy for owls to fly. Critical habitat for the spotted owl was designated in 1992, revised in 2008, and again in 2012 (USFWS 2012a). A draft revised recovery plan was published in 2010. There is no designated Critical Habitat in the Project Area. The nearest Critical Habitat is located approximately 620 feet to the north (USFW 2015) (see Appendix F, *Biological Assessment* for more detail).

Northern spotted owls are documented to occur in the Project vicinity (FS 2012). The project area is approximately 5,000 feet south of historic Northern Spotted Owl site #570 and therefore within the species' home range area defined by a 1.8-mile radius. According to the same data, the nearest observed "activity polygon" for northern spotted owl is approximately 3.75 miles northeast of the Project Area (see Appendix F, *Biological Assessment* for more detail.). Northern spotted owl surveys were not conducted specific to this analysis. The Biological Assessment assumed that northern spotted owls would be present in suitable habitat, and includes a limited operating period in the northern portion of the Project Area to avoid effects on nesting owls[14].

Northern spotted owl suitable habitat is present within the Project Area for all stages of spotted owl life history, in the northern portion of the Project Area (see Appendix F, *Biological Assessment*). Spotted owl habitat is often subdivided into the following distinct components (USFWS 1992, 2011):

[14] Northern spotted owls are protected with the limited operating period (no drilling or loud noises until after July 15); this was concurred by USFWS.

- **Nesting / Roosting Habitat –** forested areas used for nesting, roosting, foraging, and dispersal by spotted owls that usually have more late-seral forest characteristics than “foraging” or “dispersal” habitats.
- **Foraging Habitat** – forested areas largely used for foraging, dispersal, and other nocturnal activities, but *not* nesting or roosting.
- **Dispersal Habitat –** forested areas predominantly used for dispersal, but *not* nesting, roosting, or foraging.

These categories are not absolutes, but instead represent generalizations. Nesting/roosting habitat is generally considered to provide all or most habitat requirements, whereas foraging and dispersal habitats provide only a subset of the spotted owl’s habitat requirements (USFWS 2011).

The early nesting season for the northern spotted owl in the GPNF has been identified as the period from March 1 through July 15. Northern spotted owls are sensitive to disturbance caused by noisy machinery during certain times of the year. If sound-generating activities occur within close proximity to a nest or un-surveyed suitable habitat during the early breeding season (March 1 to July 15), spotted owls may be disturbed by the sound, potentially causing missed feedings or the adults to flush, leaving young susceptible to predation and weather. After July 15, spotted owlets are no longer completely dependent upon the adults and are able to thermo-regulate, fly, and forage on their own, reducing their susceptibility to disturbance-related effects.

<u>Gray Wolf</u>

Gray wolves are wide-ranging predators that can exist in a variety of habitat types (Boyd 1999, Oakleaf et al. 2006). Their survival depends on the availability of cover and relatively secures areas that allow them to avoid humans (Carroll et al. 2003). To successfully inhabit an area they require a year-round prey base of wild ungulates. An abundant source of ungulate prey (deer and elk) is present on the Gifford Pinchot National Forest, as well as a relatively high level of habitat security in much of the forest where road access is limited.

Gray wolf numbers have been on an increasing trend in Washington State in recent years, beginning with the discovery of the Lookout Pack in North Central Washington in 2008. As of December 2014, there were 16 confirmed wolf packs and 68 individual wolves in Washington. They are all in North Central and Eastern Washington and none are known in the Southern Cascades at this time (WDFW 2015c). While wolf numbers have increased in the eastern portion of the state and they are no longer listed as “endangered” under the ESA there, they are still classified as “endangered” in the western two-thirds of Washington State and are also listed as state endangered (WDFW 2015d).

Gray wolves are known to occur on the Cowlitz Valley Ranger District, but confirmed sightings are not common. There have been several unverified sightings or reports of howling on the district in recent years. A wolf was reportedly seen at White Pass in the spring of 2015. Recently, a wolf howl was reported from the Mt. Margaret Backcountry (just south of the project area). These possible reports of wolf occurrence are thought to be transient individuals and, so far, there is no evidence of pack formation on the district or any known den sites. The Green River area, where the project site is located is potential habitat for gray wolves because it provides good habitat security as it is a remote area with few open roads and an abundance of large ungulate prey since it is near the Mt St Helens National Monument.

3.5.1.3.2.2 Sensitive Species

Wolverine

Wolverines are uncommon inhabitants of northern coniferous forests and are circumboreal in distribution, inhabiting the higher latitude regions of Eurasia and North America. These largest terrestrial members of the weasel family are very nomadic and range over extensive areas during annual movements. Carrion constitutes a major portion of wolverine diets in addition to predation on small to medium-sized animals. They generally use remote habitat and avoid areas near human habitation.

There are no known wolverine denning sites in the Project Area and no observations of tracks or other sign has been reported to occur in the Project Area. Potential denning habitat does not occur in the Project Area because of the relatively low elevation of the watershed but may be present in the Mt Margaret Backcountry to the south of the Project Area. However, prey is available within the analysis area and these wide-ranging, opportunistic carnivores may occasionally occur in the Project Area. Wolverines are known to occur in the Southern Cascades and they are known to range over very large areas.

Cope's Giant and Cascade Torrent Salamanders

The Cope's giant salamander (*Dicamptodon copei)* is a predominately aquatic species associated with clear, cold streams that rarely transforms into terrestrial adults. *Dicamptodon copei* is almost always found as an aquatic form in fast moving streams. This species is rare-to-uncommon on CVRD based on surveys performed to date. No records for this species occur in the Project Area, however, suitable habitat may be present.

The Cascade torrent salamander (*Rhyacotriton cascadae)* is a semi-aquatic species that is relatively uncommon in cold, fast-moving stream edges and waterfalls at mid- and higher elevations. Adults may be found along stream banks and during wet periods they may venture into upland areas. There are no records of this species in the project planning area. According to the 2011 Conservation Assessment for this species (Howell and Magiulli, 2011), *Rhyacotriton cascadae* occurs along the west slope of the Cascade Range, from just north of the Cowlitz River and State Route 12, Washington, south to the Middle Fork of the Willamette River, Oregon. Within this area, the species is patchily distributed. The conservation assessment lists the main suspected threats as forest management activities that increase water temperature, turbidity, peak flow or debris flow events, and habitat degradation and fragmentation. Key threats are timber harvest, impassable culverts, road construction and maintenance, and chemical applications. Additional concerns include fire, disease, predation, human recreational activities, volcanism, mining, and climate change. Considerations for maintaining or improving local populations of this species include: managing sedimentation; retaining riparian buffers to provide stream shading, near-stream terrestrial ambient moisture regimes, large wood recruitment, and terrestrial dispersal habitat; minimizing riparian management activities; and enhancing connectivity between habitats.

Rhyacotriton cascadae is listed by the U.S. Forest Service and BLM in Washington as Sensitive. It is also a Washington State Candidate species and Species of Concern. The Natural Heritage Network considers the species to be "G3," a global rank which categorizes it as "either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range" and S3, a state ranking for both Washington and Oregon, which classifies it as "rare or uncommon." The status of the Cascade torrent salamander is currently under review for ESA listing.

Bald Eagle

Bald eagles winter in the Cowlitz Valley and a few nest locations are known as well. There are no known bald eagle nesting sites within the project planning area, but records for this species near the Project Area are found in the wildlife database. Because they are not known to occur in the planning area, either during the nesting season or winter months, there are **no impacts** expected to bald eagle.

Northern Goshawk

The Project Area provides potential habitat for northern goshawk. They may occupy late-successional forest habitat that occurs in the Project Area.

Harlequin Duck

Harlequin ducks breed on fast-moving, higher gradient rivers and streams, hence rapids, and winter along rocky coastlines. Harlequin ducks may be present on the Green River during the breeding season. None of the proposed units are near suitable nesting streams, so there would be no loss of likely nesting habitat, and Project measures designed to maintain water quality in the tributary streams within and near the proposed units would maintain macroinvertebrate populations in the large streams, thereby protecting the food source for adults as well as hatchlings.

3.5.1.3.2.3 Sensitive and Survey & Manage Species

Van Dyke's Salamander (WDNR 2012, Shohet et al. 2008)

The Van Dyke's (*Plethodon vandyke*i) salamander is a rare species with few historic sites known to exist on Cowlitz Valley Ranger District (CVRD), and it is a Category A Survey and Manage species. This species occurs in high gradient streams, waterfall splash zones, moist talus associated with adjacent old growth forest and abundant large woody debris and cave entrances. The conservation concern is primarily that the species occurs in isolated sites with limited connectivity, although the biological distribution of the species is not fully known.

A record of a Van Dyke's salamander is found in the wildlife database within the Project Area near the Horse Camp trailhead on the Green River. Since the Van Dyke's is a Survey and Manage species that requires pre-disturbance surveys in suitable habitat and is known to occur in the Project Area (near drill pad sites 6 and 7), surveys must be conducted for this species where suitable habitat occurs and, if found, appropriate protection buffer applied to the sites.

Larch Mountain Salamander (WDNR 2012, Shohet et al. 2008)

There are only a few sites on the Cowlitz Valley Ranger District where the rare and sensitive (and Category A Survey and Manage) Larch Mountain Salamander (*Plethodon larselli*) has been documented. These sites form the northern extremity for this species once thought to only occur on lava, talus slopes along the Columbia Gorge. It is suggested that this species is a declining relic that once occupied a much broader geographic area (Aubry et al 1987; Herrington and Larson, 1985). Its habitat includes talus slopes and cliffs and old-growth forests surrounding those features.

The Larch Mountain salamander is a Category A Survey and Manage species which means the species is rare and has highly specialized habitat requirements. The objective for Category A species is to manage all known sites and minimize inadvertent loss of undiscovered sites. In the *January 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (ROD), the management recommendations for protection of Larch Mountain salamander sites are to maintain a minimum canopy closure of 40% within the site and within a buffer zone of one site potential tree or 100 ft. horizontal distance, whichever is greater, surrounding the site.

Survey and Manage Mollusks

Table 3.5-2 lists the status and habitat comments of Survey and Manage Mollusks on the Cowlitz Valley Ranger District.

Table 3.5-2. Summary of Survey and Manage Mollusks on The Cowlitz Valley Ranger District

Species	Status	Comments
Puget Oregonian (*Cryptomastix devia*)	Documented Category A Survey and Manage	Relatively common on CVRD. This species is strongly associated with bigleaf maple trees, usually with a moist understory containing swordferns (Burke et al 2005). All sites are below approximately 2700 elevation.
Keeled Jumping	Suspected	Found in moist conifer forests,

Species	Status	Comments
Slug *Hemophilia burringtoni*	Category A Survey and Manage	associated with conifer logs and/or heavy ground cover of low vegetation, litter and debris.
Warty Jumping Slug Hemphillia glandulosa	Suspected Category C Survey and Manage	Habitat similar to *H. burringtoni,* conifer logs and/or heavy ground cover of low vegetation,litter and debris
Panther Jumping Slug (*Hemphillia pantherina*)	Documented Suvey and Manage	Habitat similar to warty jumping slug
Oregon Megomphix *(Megomphix hemphilli)*	Suspected Category A Survey and Manage	For Washington, records indicate this species has a low-elevation distribution from Olympia to the Columbia River that does not include any National Forest. The Oregon Megomphix occurs at low to moderate elevations, below the zone of seasonally persistent snow pack. Megomphix snails are most often found within the mat of decaying vegetation under sword ferns and bigleaf maple trees and near rotten logs.
Malone jumping-slug (*Hemphillia malonei*)	Documented Category C Survey and Manage	Very rare species on CVRD (3 known locations), all north of Cowlitz River in old-growth stands. Coarse woody debris is an important habitat feature for this species.
Blue-gray tail-dropper (*Prophysaon coeruleum*)	Documented Category A Survey and Manage	Very rare species on CVRD (4 known sites), three of which are in the Woods LSR. Habitat is coarse woody debris and deciduous leaf litter, especially bigleaf maple. All known sites are in old-growth Douglas-fir stands with large bigleaf maples and other deciduous trees.

3.5.1.3.2.4 Management Indicator Species

The following species are listed as Management Indicator Species for the Gifford Pinchot National Forest. All are known to occur or could potentially occur in the Project Area.

- Wood duck – Represents species requiring mature and old-growth deciduous riparian habitat.
- Goldeneye – Represents species requiring mature and old-growth coniferous habitat.
- Pine marten, pileated woodpecker – Represents species requiring mature and old-growth forest.
- Deer and Elk
- Mountain goat
- Primary Cavity excavators – Represents species requiring snags and down logs.
- Pileated woodpecker
- Neotropical Migratory Birds
    - North American Bird Conservation Regions
    - BCR 5

<u>Wood Ducks</u>

Wood ducks may occur on small lakes found near the Project Area. There are no project activities located near small lakes or wetlands. A wood duck record occurs near the Project Area in the wildlife database.

<u>Goldeneye</u>

Goldeneye ducks may occur on small lakes found near the Project Area. A record of a Barrow's goldeneye duck is found in the wildlife database near the Project Area.

<u>Pine Marten (Shohet et al. 2008)</u>

The pine marten (*Martes americana)* is a small forest carnivore that preys on squirrels, voles, mice, and snowshoe hares. Marten are typically associated with late-seral coniferous forests with closed canopies, large trees, and abundant snags and down wood Thomas et al. (1993) and FEMAT (1993) list marten as "closely associated" with late-successional and old-growth forests and the old-growth elements of large snags and down logs. Potential marten habitat is found in the Project Area near where the proposed drilling pad sites and road clearing activities are within late-successional stands.

<u>Deer and Elk</u>

Deer and elk occur throughout the GPNF. Several established herds of Roosevelt elk reside in the GPNF as year-round residents, as well as many that are migratory. Deer occur throughout the forest. Both species use a mosaic of cover and forage habitats that are minimally fragmented by road systems.

Management direction in the 1990 Gifford Pinchot Forest Plan is to “maintain habitat for about the current potential population of elk, with an increase of about 10 percent for deer.” The Forest Plan identifies a Desired Future Condition (DFC) of at least 44% of habitat in optimal cover in winter range (USDA, 1995a). The Goat Mountain area is in summer range for deer and elk.

Extensive winter range for these species occurs throughout the GPNF below 2,400 feet in elevation; the peak elevation of Goat Mountain is 4,921 feet; the mountain toe is 2,600 feet amsl. A few elk calving areas are located mainly adjacent to small ponds and wetlands below 3,500 feet in elevation and scattered widely. In the Cowlitz Valley Ranger District, hundreds of elk forage in private fields and pastures throughout the winter, although the Project Area does not lie within this wintering habitat boundary.[15] The vicinity of the Project Area may provide migratory routes for elk moving between more suitable patches of winter foraging habitat.

Mountain Goat

Mountain goats have recently been added to the FS Region 6 sensitive species list. They may be present in the Goat Mountain Project Area where suitable habitat is present, such as the ridge to the north of the Project Area, hence the name Goat Mountain. Suitable habitat consists of steep, rocky escape cover adjacent to open foraging areas and large tree forest used for thermal protection and cover in winter. The portion of the Project Area in late-successional forest may well serve as important winter range for mountain goat.

Primary Cavity Excavators

Primary cavity excavator species include many woodpecker species that usually, but not always, require standing dead trees, or snags, to excavate cavities for nests that many secondary cavity-nesting species will also use. Often defective live trees are used by primary cavity excavators as well. Generally the late-successional stands that occur in much of the Project Area do provide excellent dead wood habitat for primary cavity excavators.

Pileated Woodpecker (Shohet et al. 2008)

Pileated woodpeckers *(Dryocopus pileatus)* use mature, closed-canopy stands for nesting and roosting, but may use younger (40-70 years) closed-canopy stands for foraging if large snags are available. Large snags and decadent trees are critical habitat components for pileated woodpeckers on the west side of Oregon and Washington.

Pileated woodpeckers are likely to occur in the Project Area especially where project activities occur in late-successional habitat. All of the drilling pad sites are almost certainly within home ranges of this species that uses relatively large patches of forest for foraging.

[15] USDA Forest Service GIS Roosevelt elk and black-tailed deer Wintering Habitat Map.

Neotropical Migratory Birds

The Migratory Bird Treaty Act of 1918 (MBTA) implements various treaties and conventions between the U.S., Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Under the Act, it is unlawful to pursue, hunt, take, capture (or kill) a migratory bird, except as permitted by regulation (16 U.S.C. 703-704). The regulations at 50 CFR 21.11 prohibit the take, possession, import, export, transport, sale, purchase, barter, or offering of these activities, or possessing migratory birds, including nests and eggs, except under a valid permit or as permitted in the implementing regulations (Director's Order No. 131). A migratory bird is any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle.

Consistent with Executive Order 13186 (66 Fed. Reg. 3853, January 17, 2001) – *Responsibilities of Federal Agencies to Protect Migratory Birds*, the U.S. Fish and Wildlife Service (FWS) is the lead federal agency for managing and conserving migratory birds in the United States; however, under Executive Order (EO) 13186 all other federal agencies are charged with the conservation and protection of migratory birds and the habitats on which they depend. In response to this order, the BLM and the FS have implemented management guidelines that direct migratory birds to be addressed in the NEPA process when actions have the potential to negatively or positively affect migratory bird species of concern. As per Executive Order 13186 – *Responsibilities of Federal Agencies To Protect Migratory Birds*, the FS shall**:** within the NEPA process…consider approaches, to the extent practicable, for identifying and minimizing take that is incidental to otherwise lawful activities, including such approaches as … altering the season of activities to minimize disturbance during the breeding season.

Executive Order 13186 further directs federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitat. This Executive Order also requires federal agencies to develop Memorandum of Understandings (MOU) with the FWS to conserve birds including taking steps to restore and enhance habitat, prevent or abate pollution affecting birds, and incorporating migratory bird conservation into agency planning processes whenever possible. The BLM and the FS MOU with the FWS covered the period 2008-2013. Both agencies are currently operating under an extension of the original MOU until the new document is finalized.

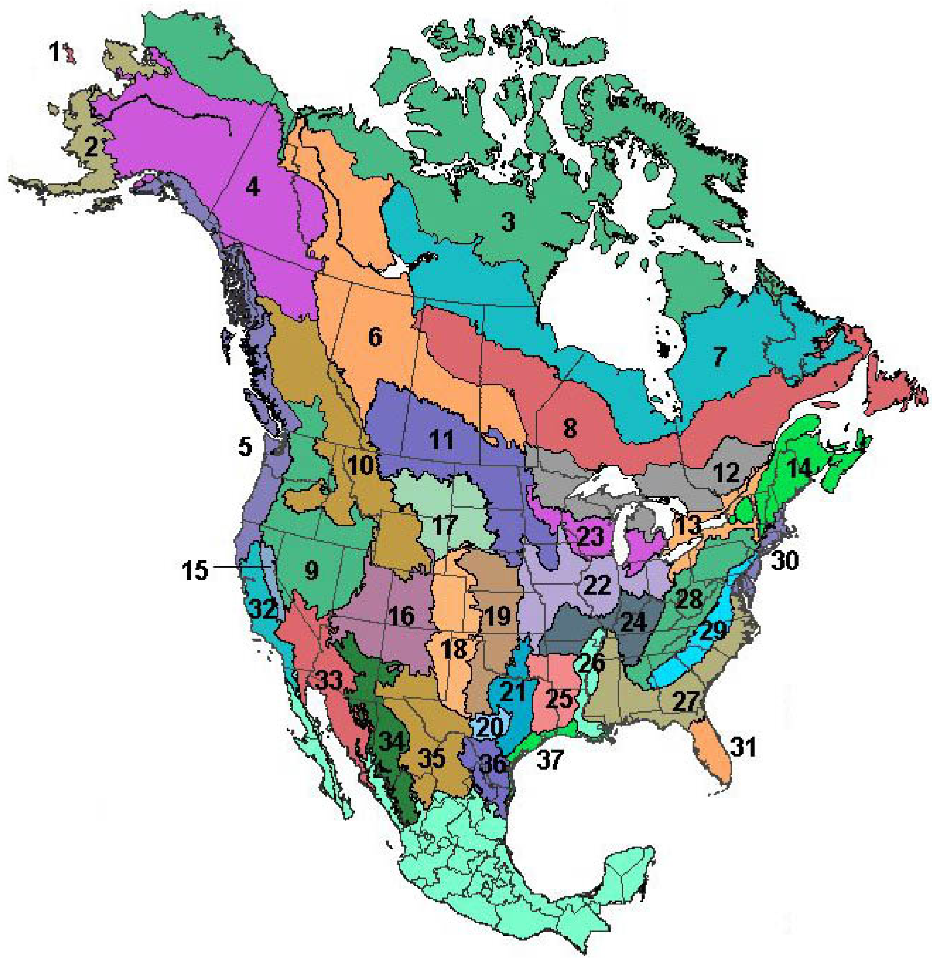
The purpose of the FS/FWS MOU is, “to strengthen migratory bird conservation by identifying and implementing strategies that promote conservation and avoid or minimize adverse impacts on migratory birds through enhanced collaboration between the Parties, in coordination with State, Tribal, and local governments.”

Under this MOU, the FS shall address the conservation of migratory bird habitat and populations when developing, amending, or revising management plans for national forests and grasslands, consistent with NFMA, ESA, and other authorities listed above. When developing the list of species to be considered in the planning process, consult with the current (updated every 5 years) FWS *Birds of Conservation Concern*, 2008 (BCC), state lists, and with the comprehensive planning efforts for migratory birds. Within the NEPA process, evaluate the effects of agency actions on migratory birds, focusing first on species of management concern along with their priority habitats and key risk factors. To the extent practicable:

a. Evaluate and balance long-term benefits of projects against any short- or long-term adverse effects when analyzing, disclosing, and mitigating the effects of actions.
b. Pursue opportunities to restore or enhance the composition, structure, and juxtaposition of migratory bird habitats in the Project Area.
c. Consider approaches, to the extent practicable, for identifying and minimizing take that is incidental to otherwise lawful activities, including such approaches as:
   1. Altering the season of activities to minimize disturbances during the breeding season;
   2. Retaining snags for nesting structures where snags are underrepresented;
   3. Retaining the integrity of breeding sites, especially those with long histories of use and;
   4. Giving due consideration to key wintering areas, migration routes, and stop-over habitats.
   5. Minimizing or preventing the pollution or detrimental alteration of the environments utilized by migratory birds whenever practical by assessing information on environmental contaminants and other stressors relevant to migratory bird conservation.

Bird Conservation Regions (BCRs) are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues. BCR's are a hierarchical framework of nested ecological units delineated by the Commission for Environmental Cooperation (CEC). The BCR is approved by the North American Bird Conservation Initiative (NABCI) Committee.

The overall goal of these BCR lists are to accurately identify the migratory and resident bird species (beyond those already designated as federally threatened or endangered) that represent our highest conservation priorities. BCR lists are updated every five years by the FWS. The proposed Project Area is located in BCR 5 as shown in the following diagram.



North American Bird Conservation Regions

In December, 2008, the FWS released *The Birds of Conservation Concern Report* (BCC) which identifies species, subspecies, and populations of migratory and resident birds not already designated as federally threatened or endangered that represent highest conservation priorities and are in need of additional conservation actions.

While the bird species included in *BCC 2008* are priorities for conservation action, this list makes no finding with regard to whether they warrant consideration for Endangered Species Act (ESA) listing. The goal is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions. It is recommended that these lists be consulted in accordance with Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds." In the BLM and FWS MOU, both parties shall work collaboratively to identify and address issues that affect species of concern, such as migratory bird species listed in the BCC and the FWS's Focal Species initiative. (BLM and FWS MOU, 2012, Section VI, page 4).

This report should also be used to develop research, monitoring, and management initiatives. *BCC 2008* is intended to stimulate coordinated and collaborative proactive conservation actions among Federal, State, Tribal, and private partners. The hope is that, by focusing attention on these highest-priority species, this report will promote greater study and protection of the habitats and ecological communities upon which these species depend, thereby contributing to healthy avian populations and communities.

BCR 5 (Northern Pacific Forest U.S. portions only)

Yellow-billed Loon (nb)
Western Grebe (nb)
Laysan Albatross (nb)
Black-footed Albatross (nb)
Pink-footed Shearwater (nb)
Red-faced Cormorant
Pelagic Cormorant (*pelagicus* ssp.)
Bald Eagle (b)
Northern Goshawk (*laingi* ssp.)
Peregrine Falcon (b)
Black Oystercatcher
Solitary Sandpiper (nb)
Lesser Yellowlegs (nb)
Whimbrel (nb)
Long-billed Curlew (nb)
Hudsonian Godwit (nb)
Marbled Godwit (nb)
Red Knot (*roselaari* ssp.) (nb)
Short-billed Dowitcher (nb)
Aleutian Tern
Caspian Tern
Arctic Tern
Marbled Murrelet (c)
Kittlitz's Murrelet (a)
Black Swift
Rufous Hummingbird
Allen's Hummingbird
Olive-sided Flycatcher
Willow Flycatcher (c)
Horned Lark (*strigata* ssp.) (a)
Oregon Vesper Sparrow (*affinis* ssp.)
Purple Finch

(a) ESA candidate, (b) ESA delisted, (c) non-listed subspecies or population of Tor E species, (d) MBTA protection uncertain or lacking, (nb) non-breeding in this BCR.

The Project Area occurs in the Northern Pacific Forest BCR region. Birds of conservation concern that may occur in the Goat Mountain area include the bald eagle, northern goshawk, olive-sided flycatcher and rufous hummingbird.

A conservation strategy for land birds in coniferous forests in western Oregon and Washington was prepared by Bob Altman of American Bird Conservancy for the Oregon-Washington Partners in Flight (PIF) (Altman and Alexander 2008). The strategy is designed to achieve functioning ecosystems for land birds by addressing the habitat requirements of 20 focal species. Recent PIF Conservation Plans identify species of importance by Avifaunal Biome Regions. The Goat Mountain area is located in the Pacific Biome Region (Rich et at, 2004)). The PIF Conservation Plan states that, among other problems, the main conservation issues for birds in this region are related to effects of forest management (e.g., timber harvest, fire suppression), and loss of wetlands and riparian woodlands.

3.5.2 Environmental Consequences

This section identifies the potential impacts on wildlife resulting from the Proposed Project.

3.5.2.1 Alternative 1: No Action Alternative

Under Alternative 1, no road building or exploratory drilling would be done. Road maintenance, equestrian use, other recreational activities, and their associated impacts on wildlife would continue to occur within the Project Area in their current manner, mean, and extent. Direct, indirect, and cumulative effects would be negligible because the extent and intensity of activity under current and Alternative 1 conditions would continue to be low.

3.5.2.2 Alternative 2: Proposed Action Alternative

3.5.2.2.1 *Direct Effects*

Wildlife Habitat

Almost no wildlife habitat would be removed as part of Alternative 2. All work would occur on or immediately adjacent to existing road prisms, or on existing drill pads created during previous prospecting actions (Ascot USA 2011). In total, approximately 1.69 miles (about 3.3 acres) of temporary roads would be used for access. This includes 1.35 miles (2.45 acres) of reactivated temporary roads from the 2010 drilling program; and 0.34 mile (0.62 acre) of newly reactivated temporary roads for Alternative 2. Sites for MS-774 are located on reconditioned temporary roads activated in 2010 for exploration drilling by Ascot on MS-708. The area of disturbance for reactivated roads is based on a 10-foot wide existing road. The Exploration Plan proposes 23 drill pads for an affected area of approximately 0.23 acre. Vegetation along old logging roads and previously reactivated roads was not as dense as anticipated in 2010, so access roads were reactivated to nearly original condition, with sloughed material removed to the side as cast material and saved for reclamation. Trees growing on the road would be removed and saved for reclamation, while trees on road edges would only be limbed to avoid job hazards. Pads and reactivated roads would be reclaimed by providing an uneven stable surface as close to the original grade as is practical. Sites on existing active FS roads would be reclaimed to as close to original conditions as possible.

Hazard trees were noted in the area and, if deemed dangerous by the FS, would be removed on a selective basis. On the roads that were reactivated for the 2010 exploration program, the footprint for Alternative 2 would be almost identical to the 2010 footprint, and no trees would be removed (with the possible exception of new danger trees that developed because of wind or other factors since 2010). The number of trees with the potential to be removed as a result of the Project was calculated for the northern portion of the Project Area, which is considered mature forest. This includes reactivated roads and pad sites for Pads 13, 22, 23, and 25, where a total of up to 68 trees would be removed. Tree removal is not planned at Pads 10, 11, 12, or 24, which are located along the upper roads. Their size and location are described in Table 3.5-3.

Downed woody debris and young regenerating trees and shrubs would be pushed temporarily to the edges along reactivated temporary roads and at drill pads. Some trees and shrubs along such roads and at drill pads may be partially de-limbed to provide access and safety at each drill site. Upon completion of the Project, the drill pads and reactivated roads would be reclaimed. Debris created during the vegetation clearing action would be scattered back across the roads and drill pads to provide cover and shelter for ground-dwelling wildlife. Grubbed/graded areas would also be reseeded using a native seed mix developed by the GPNF, which includes blue wild rye, California brome, and slender hairgrass. Reclamation, including reseeding and adding woody vegetation, would restore the habitat conditions existing prior to Alternative 2. The effects of vegetation removal are considered a temporary loss of wildlife habitat because the reclamation would be expected to regenerate into forest as it did after the 1980 eruption. In areas other than the mature forest, the existing vegetation is estimated to be less than 40 years old. Therefore, regrowth may take up to 40 years.

Table 3.5-3. Tree Removal

Road Segment or Location	Number of Trees Removed	Diameter at Breast Height (dbh) in inches	Type of Stand
Road segments to Pads 13, 22, and 25	5	< 12	Mature Timber
Road between Pad 22 and Pad 23	1 4	10 < 4	Mature Timber
Pad 22	2	10-12	Mature Timber
Road between Pad 23 and Pad 25	2 25	< 10 4-7	Mature Timber
Pad 25	1 2	12 6	Mature Timber
Road between Pad 25 and Pad 13	2 4	12 < 4	Mature Timber
Pad 13	20	< 4	
Total Trees Removed	**68**	**All < 12dbh**	Mature Timber

Wildlife Species

Direct impacts on wildlife (including federal ESA and/or FS Sensitive, MIS, S&M, and others such as migratory and resident birds and mammals) that would result from Alternative 2 are expected to be minor due to the nature and minimal extent of the action at each individual pad site, scheduling, and the temporary duration of Alternative 2. Impacts may include tree removal, noise, presence of workers and equipment, and lighting at one drill site at a time. These impacts are considered minor because where the Project may temporarily impact individuals or habitat; it would not contribute to a trend toward listing of any species under the federal ESA, or cause a loss of viability to the population or species, or a permanent loss of habitat.

Juvenile birds or other low-mobility or slow-moving wildlife species (e.g., salamanders, small mammals) have the potential for direct mortality as a result of the movement of equipment if they occupy the space where the equipment is moving. However, the old roadbed and pad locations and edges of active roads are not highly attractive habitats for any of the species likely to be in the vicinity. Adult birds and other mobile wildlife would be expected to temporarily vacate habitat adjacent to the areas where equipment is operating because of the noise and activity, but would be expected to return after the activity ceases. For MIS wildlife, there may be minor impacts on individuals from disturbance, but the Project would not influence the viability of populations. No short- or long-term wildlife population decrease would occur; therefore, the Project would not contribute to a change in wildlife species viability on the GPNF.

Animal response to sound levels depends on a number of complicated factors, and has not been well studied in many species of wildlife (WSDOT 2014). The severity of disturbance and injury to wildlife would further vary by the duration and timing of the noise. During the non-breeding season, birds and other wildlife are less likely to be tied to a certain location, such as a nest or burrow. Therefore, impacts from noise may be less during the non-breeding season when an individual can fly or otherwise relocate to a foraging or resting site without noise.

The visual presence of drillers and their equipment could also affect wildlife in the Project Area. Project actions could cause additional disturbance to wildlife if the workers travel by foot in and around the Project Area during work activities or on breaks. This would increase the area of habitat that may be subject to temporary disturbance.

Virtually all species of small- and medium-sized mammals, with the exception of most squirrels, are nocturnal. Possible effects from artificial night light on mammals may include disruption of foraging behavior, increased risk of predation, disruption of biological clocks, and disruption of dispersal movements and corridor use (Rich and Longcore 2006). Lighting may also affect an animal's willingness to move through an area, such as a corridor. Migrating birds may be disoriented by night-time illumination.

Alternative 2 is not anticipated to increase the general public's use of the area, which could disturb wildlife patterns. The general public would be kept from accessing these roads for safety reasons as indicated within Section 2.1.2.1, *Access*. Access signage would be posted and gates installed where appropriate to temporarily restrict public access. Drill pads and reactivated temporary roads would be reclaimed by providing an uneven surface as close to original grade as is practical and stable, which would mimic adjoining wildlife corridors and use areas. Sites on existing active FS roads would be reclaimed to as close to the original condition as possible.

Many of the other federal ESA and/or FS Sensitive, MIS, and S&M species have a low likelihood of being affected because they have a low likelihood of occurring near the work areas. The likelihood of occurrence of each indicator species is based on the availability of suitable habitat and key habitat elements such as tree cavities. This likelihood, along with effects from Alternative 2, is described below. A summary of presence and effects on species is presented in Table 3.5-4 (presented at the end of the narrative).

3.5.2.2.1.1 Threatened, Endangered, and Proposed Species

<u>Northern Spotted Owl</u>

A large portion (primarily the northeast area above the 2612 road) of the Project Area occurs in suitable spotted owl nesting, roosting and foraging (NRF) habitat. This portion of the project is primarily located on the 020 spur of the 2612 road. The drill pads that would be located in the NRF habitat include 10, 11,12,13,22, 23, 24 and 25. A total of 68 trees from 4 to 12 inches in diameter would need to be removed for access to drilling pads within NRF habitat. Therefore, although minor, there would be some habitat altering effects within suitable NRF habitat, as well as habitat fragmentation due to opening the 020 spur and several connected temporary (non-system) roads that have grown over with vegetation due to the long period of non-use. In addition, the removal of hazard trees for safety reasons could cause a loss of potential nesting trees for spotted owls and spotted owl prey species and would be another minor negative habitat effect.

The early nesting season for the northern spotted owl in the GPNF has been identified as the period from March 1 through July 15. Northern spotted owls are sensitive to disturbance that may be caused by machinery noise during certain times of the year. If activities that generate noise above ambient levels occur within close proximity to a nest during the early breeding season (March 1 to July 15) there is the potential for nesting spotted owls to be disturbed, potentially causing missed feedings or the adults to flush, leaving young susceptible to predation and weather. After July 15, spotted owlets are no longer completely dependent upon the adults and are able to thermo-regulate, fly, and forage on their own, reducing their susceptibility to disturbance-related effects. The early nesting season timing restriction of March 1 to July 15 that would apply to the sites within NRF habitat would minimize the potential disturbance from drilling operations during the more sensitive early season period. The proposed activities would occur in suitable un-surveyed NRF habitat and it is unknown whether or not spotted owls are nesting in the vicinity. Therefore, the Goat Mountain Project **may affect, but is not likely to adversely affect** the northern spotted owl.

Northern Spotted Owl Critical Habitat

The FS published the final rule for revised spotted owl critical habitat in the December 4, 2012, Federal Register (FR) (77 FR 71876). The effective date of the revised critical habitat was January 4, 2013. The primary constituent elements (PCEs) are the specific characteristics that make habitat areas suitable for nesting, roosting, foraging, or dispersal (77 FR 71876:71884). The PCEs identified in the revised spotted owl critical habitat rule include: 1) forest types in early-, mid-, or late-seral stages that support the spotted owl across its geographic range; 2) nesting and roosting habitat; 3) foraging habitat; and 4) dispersal habitat (77 FR71876:72051-72052). The proposed Project Area, however, occurs outside of designated Critical Habitat for Northern Spotted Owl and therefore **no effect** to critical habitat would occur as a result of project activities.

Gray Wolf

The potential adverse project effects to gray wolf would be a short term increase in disturbance that may cause avoidance of the area during project activities. Activities associated with project implementation would be an increase in noise and disturbance over ambient levels that are normally low in the area. There would be an increase in human activity associated with the opening of the currently closed roads and operations associated with the drilling pads. Increased activity would also likely result in avoidance of the Project Area by wolf prey species (deer and elk). However, given the large home range areas used by wolves and the relatively small scale of the project on the landscape, the project would likely cause wolves, if present, to move into adjacent habitat that would provide ample habitat security for human avoidance and therefore the disturbance effect would be relatively minor for this wide-ranging species.

Road access into wolf habitat reduces habitat security. The proposed project would re-open approximately 1.7 miles of system and non-system roads that are currently “ecologically” closed because they have not been maintained for several years. In some cases these currently un-drivable roads are barely discernable on the ground. These roads would be reopened for project use and be “decommissioned” once the drilling is completed. The public would not have access to these roads while the drilling is underway, so the increase in open road density during project activities would not cause a large increase in human access, but would be mainly confined to workers at the site. Nevertheless, the increase in open roads does constitute a decrease in habitat security to gray wolf. Therefore, given the potential disturbance effect and increase in open roads, the proposed project **may affect, but is not likely to adversely affect** the gray wolf. If a den or rendezvous site is located during the course of the project operations, a ¼ mile buffer protection closure around the site will be applied to limit disturbance effects to wolves.

3.5.2.2.1.2 Sensitive Species

Wolverine

As with the gray wolf, adverse effects to wolverine habitat would not be expected as a result of project implementation. The amount of habitat affected is insignificant within the very large home ranges of this species, which is found to be several hundred square miles (Aubry et al, 2011). The increase in disturbance levels at the site would be a potential adverse effect to wolverines should they be using habitat in the Project Area during implementation causing them to avoid the Project Area during drilling and road clearing operations. Therefore, the proposed project may impact individuals, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species for the wolverine.

Cope’s Giant and Cascade Torrent Salamanders

The riparian buffers would serve to protect species associated with riparian habitat, however, there is a minimal chance of destruction of habitat or direct mortality from project activities, therefore the proposed action may impact individuals or habitat but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species for aquatic and semi-aquatic sensitive salamander species.

Bald Eagle

The Project Area has no riparian habitat associated with large rivers that would provide habitat for bald eagle. It is very unlikely that bald eagles would utilize the habitat in the Project Area for anything other than transiting between other areas with suitable habitat. No impacts on the species would occur from the Project.

Northern Goshawk

Project activities that cause disturbance in late-successional forest habitat that occur during the nesting season, approximately April thru July, may disrupt nesting behavior of norther goshawk. Therefore, given the potential for disturbance, the proposed project **may impact individuals, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species** of northern goshawk**.**

Harlequin Duck

The Green River provides the only Harlequin Duck habitat in the Project Area. **No Impacts** from project activities are expected to harlequin ducks since the project is not located adjacent to the Green River.

3.5.2.2.1.3 Sensitive and Survey & Manage Species

Van Dyke's Salamander

Predisturbance surveys for Van Dyke's salamanders would be required if suitable habitat is present at the project sites. Alternative 2 **may impact individuals or habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species** for Van Dyke's salamanders.

Larch Mountain Salamander

Suitable habitat for Larch Mountain salamander is unlikely to occur in the project area and no impacts are expect to occur to potential habitat, therefore **No Impacts** are expected to Larch Mountain salamander.

Sensitive and Survey and Manage Mollusks

Sensitive and S&M mollusk species that are known or suspected to occur on the Cowlitz Valley Ranger District are generally associated with late-successional stands. Surveys according to protocol were not conducted at the proposed project drilling sites. Since many of the proposed drilling sites are located within late-successional stands (sites 10, 11, 12, 13, 22, 23, 24, and 25) where habitat disturbing activities would occur, including tree removal, pre-disturbance surveys would be required. Habitat disturbance would occur where trees are removed and "grubbing" is needed since the footprint of the drill pads is 20 by 20 feet and wider than the actual road. Access to sites 13, 22 and 25 would require re-opening a road that has been closed since 1989 that is located in late-successional forest habitat that may provide suitable habitat for survey and manage mollusk species. If these species are found, the appropriate protection buffers would be applied to the sites.

Pre-disturbance surveys may not locate all of the sensitive and survey and manage mollusks that may be present and the proposed tree removal and road clearing activities would alter micro-climatic conditions to a minor extent within the late-successional stands. Therefore, although occurrence at any of the drilling pad project sites is unlikely, the proposed project **may impact individuals or habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species** to sensitive and survey and manage mollusk species as a result of implementing the proposed project.

3.5.2.2.1.4 Management Indicator Species

Wood Duck

Because there are no wetlands or small lakes within the Project Area itself, no impacts to viability of wood ducks as a result of project activities would occur.

Goldeneye

As is the situation for wood ducks, there are no project activities located near small lakes or wetlands, and no impact to viability of goldeneye ducks would occur.

Pine Marten

Project activities have a high likelihood of causing disturbance to marten resulting in habitat avoidance. Because of the disturbance effect that would be caused by drilling operations and the potential loss of snags and down wood from clearing and hazard tree removal, the implementation of the proposed project would have a small negative impact to pine marten in the Project Area but will not contribute to a negative trend in viability of this species on the forest because of the minor amount of habitat affected and short duration of effects.

Deer and Elk

There is a small marsh within about 900 feet of Drill Pads 6 and 7 that may attract deer and elk but it is located outside the Project Area. The noise and activity associated with the project activities would be expected to displace deer and elk from the Project Area while the exploration is occurring and could displace deer and elk from this small marsh, but they would be expected to return to the area after the exploration activities cease. There would also be a small increase in open road density during project activities that would be returned to pre-project levels once the exploratory drilling is completed. Therefore, given the increased disturbance and open-road density, the proposed project would have small negative impacts to deer and elk but would not contribute to a negative trend in viability of deer and elk populations on the National Forest.

Mountain Goat

Since project activities in potential winter range habitat will not occur during winter months impacts to mountain goats are unlikely. Therefore, **No Impacts** to mountain goats are expected to occur.

Primary Cavity Excavators

Impacts to cavity excavator species would include disturbance from increased noise and a minor loss of habitat due to potential removal of hazard trees. The proposed project would have no impact to viability of cavity excavator species on the forest because of the minor amount of habitat affected and will not contribute to a negative trend in viability for this group of woodpecker species.

Pileated Woodpecker

Impacts to pileated woodpecker would include disturbance from increased noise and a minor loss of habitat due to potential removal of hazard trees. The proposed project would have no impact to viability of this species on the forest because of the minor amount of habitat affected and will not contribute to a negative trend in viability.

<u>Neotropical Migratory Birds</u>

Potential impacts to neotropical migratory birds include tree removal, which would cause a minor loss of habitat, and potential hazard tree removal that may result in nest failure to cavity nesting species. Disturbance from project noise and lighting may also cause impacts to breeding birds. Therefore, implementation of the proposed project would have some negative impacts to neotropical migratory birds, but because of the minor amount of habitat affected and short duration of disturbance the project **will not contribute to a negative trend in viability** for neotropical migratory birds on the National Forest.

Table 3.5-4. Summary of Presence and Effects on FS Threatened, Endangered, Proposed, and Sensitive Species

Species Name	**Species Status** D: Documented S: Suspected (in GPNF)	**Species Habitat** Present within or Adjacent to the Analysis Area?	**Species Documented** in Analysis Area?	**Effect and Impact** Summary
Mammals				
*Gray Wolf *Canis lupus*	Endangered (D)	Yes	Yes	NLAA
Cascade Red Fox *Vulpes vulpes cascadensis*	FS Sensitive (D)	No	No	No Impact
Grizzly Bear *Ursus arctos*	Threatened (S)	Yes (but not known to occur on Forest)	No	No Effect
Townsend's Big-eared Bat *Corynorhinus townsendii*	FS Sensitive (D)	No	No	No Impact
* California Wolverine *Gulo gulo*	FS Sensitive (D)	Yes	No	MIIH
*Mountain Goat Oreamnos americanus	FS Sensitive (D)	Yes	No	MIIH
Keen's Myotis *Myotis keenii*	FS Sensitive (S)	No	No	No Impact
Birds				
Marbled Murrelet *Brachyramphus marmoratus*	Threatened (D)	No	No	No Effect
Critical Habitat for the Marbled Murrelet	Designated	No	No	No Effect

Species Name	**Species Status** D: Documented S: Suspected (in GPNF)	**Species Habitat** Present within or Adjacent to the Analysis Area?	**Species Documented** in Analysis Area?	**Effect and Impact** Summary
*Northern Spotted Owl *Strix occidentalis caurina*	Threatened (D)	Yes	Yes	NLAA
*Critical Habitat for the Northern Spotted Owl	Designated	No	No	No Effect
American Peregrine Falcon *Falco peregrinus anatum*	FS Sensitive (D)	No	No	No Impact
Common Loon *Gavia immer*	FS Sensitive (D)	No	No	No Impact
*Northern Goshawk *Accipiter gentilis*	FS Sensitive (D)	Yes	No	MIIH
*Bald Eagle *Haliaeetus leucocephalus*	FS Sensitive (D)	Yes	No	No Impact
Harlequin Duck *Histrionicus histrionicus*	FS Sensitive (D)	Yes	Yes	No Impact
Great Gray Owl *Strix nebulosa*	FS Sensitive (S)	No	No	No Impact
Reptiles & Amphibians				
Sharptail Snake *Contia tenuis*	FS Sensitive (D)	No	No	No Impact
*Cope's Giant Salamander *Dicampton copei*	FS Sensitive (D)	Yes	No	MIIH
*Larch Mountain Salamander *Plethodon larselli*	FS Sensitive, (D)	Yes	No	MIIH
Van Dyke's Salamander *Plethodon vandyke*i	FS Sensitive, S&M (D)	Yes	No	MIIH
Oregon Spotted Frog *Rana pretiosa*	Threatened (D)	No	No	No Effect
Cascade Torrent Salamander *Rhyacotriton cascadae*	FS Sensitive (Under ESA Review) (D)	Yes	No	MIIH

Species Name	**Species Status** D: Documented S: Suspected (in GPNF)	**Species Habitat** Present within or Adjacent to the Analysis Area?	**Species Documented** in Analysis Area?	**Effect and Impact** Summary
Butterflies				
Barry’s Hairstreak *Callophrys gryneus barryi*	FS Sensitive (S)	No	No	No Impact
Johnson’s Hairstreak *Callophrys johnsoni*	FS Sensitive (D)	Yes	No	No Impact
Golden Hairstreak *Habrodais grunus*	FS Sensitive (D)	No	No	No Impact
Mardon Skipper *Polites mardon*	FS Sensitive (D)	No	No	No Impact
Great Basin Fritillary *Speyeria egleis*	FS Sensitive (S)	No	No	No Impact
Mollusks				
Puget Oregonian *Cryptomastix devia*	FS Sensitive, S&M (D)	No	No	No Impact
Columbia Gorge Oregonian *Cryptomastix hendersoni*	FS Sensitive, S&M (S)	No	No	No Impact
Evening Fieldslug *Deroceras hesperium*	FS Sensitive, S&M (S)	No	No	No Impact
Western Ridged Mussel *Gonidea angulata*	FS Sensitive (S)	No	No	No Impact
*Warty Jumping Slug *Hemphillia glandulosa*	FS Sensitive, S&M (D)	Yes	No	MIIH
*Keeled Jumping Slug *Hemphillia burringtoni*	FS Sensitive, S&M (D)	Yes	No	MIIH
*Malone's Jumping Slug *Hemphillia malonei*	FS Sensitive, S&M (D)	Yes	No	MIIH
*Panther Jumping Slug *Hemphillia pantherina*	FS Sensitive, S&M (D)	Yes	No	MIIH
Barren Juga *Juga hemphilli hemphilli*	FS Sensitive (S)	No	No	No Impact

Species Name	**Species Status** D: Documented S: Suspected (in GPNF)	**Species Habitat** Present within or Adjacent to the Analysis Area?	**Species Documented** in Analysis Area?	**Effect and Impact** Summary
Oregon Megomphix *Megomphix hemphilli*	FS Sensitive (S)	No	No	No Impact
Crowned Tightcoil *Pristiloma pilsbryi*	FS Sensitive (S)	No	No	No Impact
Shiny Tightcoil *Pristiloma wascoense*	FS Sensitive (D)	No	No	No Impact
Blue-gray Taildropper *Prophysaon coeruleum*	FS Sensitive, S&M (D)	Yes	No	MIIH

* Species with project effects analysis because they are known to or are likely to occur in the Project Area and/or suitable habitat is present in Project Area.

NLAA: May affect, but not likely to adversely affect.

MIIH: May impact individuals or habitat, but will not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species.

3.5.2.2.2 *Indirect Effects*

Indirect effects on wildlife are defined as those that would occur later in time, but are reasonably certain to occur. Disturbance to habitats and wildlife due to the Project would be temporary, either ending with the end of Project activities or diminishing rapidly as disturbed habitats recover following restoration. Any effects on wildlife would be direct effects as described in Section 3.5.2.2.1, *Direct Effects*. No indirect effects are anticipated from Alternative 2.

3.5.2.2.3 *Cumulative Effects*

Cumulative effects on wildlife and habitat would be similar to additional small increments of the same kinds of effects as have occurred in the past. The collective consequences of these small incremental impacts from all past, present, and RFFAs identified in Section 3.1, *Introduction*, would be negligible.

3.5.2.3 **Alternative 3: Based on Scoping Comments**

Under Alternative 3, FS consent and BLM issuance of the prospecting permits would occur, along with BLM approval of the proposed exploratory drilling. This work would be performed with restrictions related to on-site water use, additional drillhole abandonment requirements, and phasing of drilling and operational modifications at specific locations. Drilling at Pads 10, 11, 12, 13, 22, 23, 24, and 25, which are located near potentially suitable habitat for spotted owl, would be prohibited during the nesting season March 1–July 15. To reduce impacts on surrounding areas due to noise, a drill shack with baffles and/or insulation would be used. To reduce the impacts due to operating lights, lighting would be directed toward the drill.

3.5.2.3.1 *Direct Effects*

The direct effects on wildlife and wildlife habitat would be similar to those described for Alternative 2, with the exception that the potential effect on northern spotted owl habitat would be reduced. There is potentially suitable habitat in the mature timber stands around or adjacent to Drill Pads 10, 11, 12, 13, 22, 23, 24, and 25. Restricting the drilling at sites in the vicinity of the potential habitat to after July 15 would reduce the potential effects on the northern spotted owl. In addition, reducing the effects of lighting and reducing noise would further reduce the possible adverse effect on northern spotted owls if they are present. The USFWS concurred with the determination that the biological effect of potential noise or visual disturbance that occurs during the late nesting season is considered to be insignificant. The USFWS also concurred with the determination that tree removal from the spotted owl habitat would be insignificant; and that there would be no loss of suitable spotted owl nesting, roosting, or foraging habitat as a result of the Proposed Action (USFWS Concurrence Letter, August 21, 2012).

3.5.2.3.2 *Indirect Effects*

The indirect effects on wildlife and wildlife habitat would be similar to those described for Alternative 2.

3.5.2.3.3 *Cumulative Effects*

The cumulative effects on wildlife and wildlife habitat would be similar to those described for Alternative 2, but as described in Section 3.5.2.3.1, Direct Effects, restricting the drilling at sites in the vicinity of the potential habitat to after July 15 would reduce the potential effects on the northern spotted owl. In addition, reducing the effects of lighting and reducing noise would further reduce the possible adverse effect on northern spotted owls if they are present.

3.5.2.4 **Alternative 4: Drill Site Riparian Reserve Avoidance**

Alternative 4 is distinguished from Alternative 3 in that it does not include the installation and exploration activities previously described at Pads 6 and 7 to avoid activity within the Riparian Reserve.

3.5.2.4.1 *Direct Effects*

The direct effects on wildlife and wildlife habitat would be similar to those described for Alternative 3 except that Alternative 4 would not include drilling at pads 6 and 7 that are the nearest sites to the observed Van Dyke's salamander location. Therefore, alternative 4 would have less potential to impact Van Dyke's salamander than alternatives 2 and 3.

3.5.2.4.2 *Indirect Effects*

The indirect effects on wildlife and wildlife habitat would be the same as those described for Alternative 3.

3.5.2.4.3 *Cumulative Effects*

The cumulative effects on wildlife and wildlife habitat would be similar to those described for Alternative 3 but would affect slightly less habitat due to the lack of exploration activities at Pads 6 and 7.

3.5.3 Impact Summary

As outlined in Section 2.1, *Alternatives*, and Appendix E, *Best Management Practices*, BMPs would be implemented during reactivation/installation, operation, and reclamation of the Proposed Project to minimize potential impacts on wildlife. Any impacts on wildlife would be minor, and no mitigation is proposed.

3.6 FISHERIES

This section describes the existing fisheries resources within and adjacent to the Project Area and considers the potential for impacts on resident fish as a result of the Project, including road crossings and erosion and sediment delivery to streams. It also addresses design features to minimize those impacts, including observance of the ACS Objectives (FS 2008). It is important to note that the Cowlitz Indian Tribe has indicated that they view fish as a natural resource of cultural value (Iyall 2012).

3.6.1 Affected Environment

3.6.1.1 Habitat Types

A portion of the northern part of the area is covered by mature forest that escaped the effects of the 1980 Mount St. Helens eruption. Areas devastated by the eruption were salvage logged in 1982 and replanted within 4 years.

Two perennial streams and several intermittent streams drain the Project Area (Figure 6, *Surface Water Analysis*). Tributaries within the Project Area drain to the Green River down steep-gradient channels (>10 percent), with gravel and silt substrates. Intermittent and perennial tributaries average 4 to 6 feet wide at the OHWL. Smaller, ephemeral or short seasonal drainages tend to be 1 to 4 feet wide. The site hydrology and riparian habitats are described in detail in Section 3.3, *Hydrology and Hydrogeology*. WDNR has typed the small perennial and seasonal tributaries/drainages streams as “N,” meaning “Non-Fish.” However, WDNR commonly types fish-bearing streams as Non-Fish based on the model used and in the absence of site-specific data. For example, the Np or Ns (non-fish perennial or non-fish seasonal) determination appears not to have been made on these drainages, indicating that there is no adequate information available on these streams, or they have not been sampled (WDNR 2012). The presence of fish is assumed for all small perennial and seasonally intermittent streams for the purpose of this EA.

3.6.1.2 Fisheries Communities

Fish species expected to occur in the Project Area are typical of small streams on the western slopes of Washington’s Cascade Mountain Range. The Project Area streams provide habitat for resident fish species.

Some of the unnamed streams flowing near or through the Project Area have fish-bearing stream characteristics and may provide habitat for resident species such as cutthroat trout (*Oncorhynchus clarkii*), brook trout (*Salvelinus fontinalis*), and rainbow trout (*O. mykiss*), and sculpin. Stream surveys conducted in the GPNF in 1993 (Haapala 1993) documented the likely presence of cutthroat, brook trout, and resident rainbow trout in the Green River and its tributaries within the Project Area. As such, all perennial streams within the Project Area are considered to be fish bearing.

Pacific lamprey (*Lampetra tridentata*), river lamprey (*L. ayresi*), and western brook lamprey (*L. richardsoni*) are known to historically occur in major rivers throughout the lower Columbia River basin including in the Lower Cowlitz and Lower Toutle River reaches. Information and documentation of the current distribution and abundance of lamprey is sparse, incomplete, and based on anecdotal observation. FS fish surveys in the Project Area have not observed or recorded the presence of lamprey in recent decades, and they are not believed to occur in the Project Area reaches due to the lack of observation and fish passage barriers downstream at the confluence of the Green River with Falls Creek at RM 24.95 and at RM 31.3 that currently limit all other anadromous fish species in the Project Area. For the purposes of this Project, the potential presence of lamprey in the Project Area cannot be discounted and as such they are treated with the same considerations and conclusions as other resident and anadromous fish.

Eulachon (*Thaleichthys pacificus*) are known to inhabit the lower Cowlitz River, and Critical Habitat for Columbia River populations of eulachon has been recently designated under the ESA for the lower Cowlitz River. Eulachon and their Critical Habitat are limited in extent to the lower sand or gravel reaches of the Lower Cowlitz River where they migrate upstream to spawn.

3.6.1.3 Special Status Fish Species

The ESA was established to conserve, protect, and restore threatened and endangered species and their habitats. Section 7 of the ESA (50 CFR 402) requires federal agencies to ensure their actions do not jeopardize the continued existence of listed species and do not result in adverse modification to designated Critical Habitats. Besides ESA-listed species, this section considers FS Sensitive Species, FS MIS (FS 2011, 1995; USFWS 2015; WDFW 2015a), and Essential Fish Habitat (EFH) as noted in the Magnuson–Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act)[16].

There are no anadromous fish issues associated with this Project due to distribution-limiting barriers downstream at the confluence of the Green River with Falls Creek at RM 24.95 and at RM 31.3. The Project Area occurs around RM 32, which is approximately 7 miles upstream from the first anadromous barrier, and far enough upstream from the anadromous barrier for any ESA-listed salmonids species to not be affected by the Proposed Project activities (and is also consequently beyond EFH). The potential for soil erosion from Project-related soil disturbance is low as described in

[16] NOAA 2002. Fish Habitat Magnuson-Stevens Act Provision: Essential Fish Habitat (EFH): Final Rule (50 CFR Part 600; 67 FR 2376).

Section 3.4.3, and sedimentation of surface water at the site is not likely to occur, as described in Section 3.3.3, *Surface Water Impact Summary*. In general, sediment tends to settle out of flowing water as water velocity slows according to Stoke's Law. If sediments were released by Project activities, they would likely settle out as water velocity varies or be diluted as tributaries add to flow prior to reaching the first anadromous barrier (approximately 7 miles downstream). This Project would therefore have no effect on listed or candidate fish species including Lower Columbia River (LCR) Chinook (*Oncorhynchus tshawytscha*), LCR coho (*O. kisutch*), LCR steelhead (*O. mykiss*), and LCR bull trout (*Salvelinus confluentus*); or on Critical Habitat for Chinook salmon, steelhead trout, or bull trout. Considering that these candidate species are not expected to exist within 7 miles of the Project Area, they are eliminated from further discussion in this EA.

WDFW has established a wild fish management zone, also known as wild stock gene bank, for the Green River steelhead population. The purpose of this wild stock gene bank is to manage this population of wild fish to minimize interactions with hatchery-produced fish to preserve genetically diverse wild stocks by reducing interbreeding or competition for food or habitat by planted hatchery stocks. The Project does not affect or is otherwise related to management or planting of fish in the Project Area, and would have no effect on the genetic integrity of anadromous or resident wild fish stocks.

3.6.1.4 FS Management Indicator Species (MIS) for Fisheries

A combined indicator species generally represents trout, steelhead, and salmon habitat. These indicator species are set at the forest level and used forest-wide. The "cutthroat/steelhead" indicator represents habitat capability for resident and anadromous fish species that are sensitive to in-stream habitat modifications and angling pressure, are economically important, and require relatively high-quality habitat.

The 1990 GPNF Forest Plan designated the following fish species as MIS. The species selected represent associated habitats forest-wide. The GPNF Forest Plan currently has two MIS for fisheries:

- **Indicator 1:** Cutthroat/Steelhead (a combined indicator to represent habitat capability for resident and anadromous fish species).
- **Indicator 2:** Bull Trout (represents cold water fish species).

Resident cutthroat is the only MIS species present in the Project Area, and thus the only MIS species that could be affected by the Project. Bull trout are not present in the Project Area.

In addition to resident fish that may occur in the Project action area, other life forms associated with aquatic ecosystems, such aquatic insects and arthropods, have the potential to be affected by changes to water quality or quantity. These species have evolved and are dependent on areas of suitable water quality and quantity, including those in the Project action area. Potential Project-related effects on water quality and quantity are addressed in Section 3.3, *Hydrology and Hydrogeology*.

3.6.2 Environmental Consequences

The Proposed Project has the potential to affect existing fisheries resources in the area, including resident fish species. Analysis of the Project (access, operations, and reclamation) identified potential sources of fisheries impacts, impact avoidance options, and recommended design features designed to minimize unavoidable impacts. This section identifies the potential impacts on fisheries as the result of installation, operation, and reclamation of the Project.

3.6.2.1 Alternative 1: No Action Alternative

Under Alternative 1, no exploratory drilling and associated activities would occur. Road maintenance, equestrian activities, and other recreational activities could still occur within the proposed Project boundary, which would continue to affect vegetation, and potentially some sedimentation into the streams would continue at levels similar to those experienced in recent history. Direct, indirect, and cumulative effects would be negligible because the extent and intensity of activity under current and Alternative 1 conditions would continue to be low.

3.6.2.2 Alternative 2: Proposed Action Alternative

3.6.2.2.1 *Direct Effects*

By implementing and maintaining impact avoidance and minimization measures consistent with the ACS Guidelines and the FS National Core BMPs for Water Quality Management in Minerals Management Activities (FS 2012b), impacts on surface water should be minimized to the point of being negligible. The ACS Guidelines and FS Minerals Management BMPs that are particularly relevant are described in Section 3.3, *Hydrology and Hydrogeology*, and are included in Appendix E, *Best Management Practices*.

Fish Habitat

Alternative 2 would require the removal of vegetation in some areas to accommodate road reactivation and improvement, and installation of the drill pads. The impacts from the Project would not differ substantially from customary FS maintenance and/or forestry activities on the site. Each of the 23 pads would occupy a 20-foot by 20-foot (400 square feet) area. Approximately 9,200 square feet (0.23 acre) would be cleared of vegetation for drill pads. This is likely an overestimate of the amount of vegetation clearing because some of the pads are located on roads that have already been disturbed and cleared of vegetation. Based on visual inspection of drill pad sites, it is anticipated that most roads and pads would have only seedlings, small shrubs, and herbaceous vegetation removed; if trees need to be removed along edges, only a few trees, all less than a 12 inch dbh, would be removed.

Road reactivation would be required during the installation phase of the Project. However, the temporary modifications of habitat types from these actions are anticipated to be minor. Installation of temporary culverts on reactivated roads would affect intermittent streams in up to six locations. At each location, a length of 16 to 20 feet of channel would be temporarily placed in culverts. Channels are typically about 1 foot wide at these locations where previous culverts were removed when the road was reclosed following a previous reactivation.

Riparian impacts would be minimal. Trees growing on the road would be removed and saved for reclamation, while trees on road edges would only be limbed to avoid job hazards. Trees in danger of falling on the drill sites would be removed for safety. Only small (< 12 dbh) trees would be affected. The effects of vegetation removal are considered a temporary loss of riparian habitat due to reclamation activities that are part of the Project. At the completion of the Project, the drill pads and reactivated roads would be reclaimed, and would be expected to regrow into forest over a period of decades.

Minor displacement of soil may result from Alternative 2 ground-disturbing activities (e.g., equipment operation) but should not manifest itself as sediment in fish-bearing water. A small volume of soil (< 1 yd^3) may be mobilized but is expected to be retained as surface soil and/or captured in intermittent channels. Sediment entrained in creeks during culvert removals attenuates to background levels approximately ½ mile downstream of the removal (Foltz et al. 2008). Because of the distance of the crossings of the small tributaries from the Green River, and the distance downstream to the anadromous fish barriers (7 miles), the small quantity of fine sediment that might get into any streams would be immeasurable above baseline conditions, and would have no adverse effects on any life stage of fish or aquatic life, including downstream fish habitat in the Green River.

Resident Fish Species

No impacts on resident fish are anticipated from Alternative 2 because the BMPs should prevent impacts. The installation of culverts would occur when the perennial drainages that cross the reactivated roads are at their lowest flow and when the intermittent drainages are dry. This would reduce to the maximum extent possible potential impacts from sediment.

Proposed drilling activity and vegetation clearing that would occur near the Green River Horse Camp on the lower segment of the easternmost stream has the potential to directly affect resident fish if they are present in the stream. Adult fish may be temporarily displaced due to the vibrations from the drilling equipment. BMPs would not allow any work to occur in the stream or to discharge anything into it.

- FS Management Indicator Fish Species
  - Cutthroat/Steelhead: Alternative 2 has the possibility of affecting the estimated 2.4 miles of cutthroat and steelhead habitat in the Project analysis area. However, these effects, namely to turbidity/sediment, substrate embeddedness, and large woody material, are expected to be short-term, localized, intermittent, and below background levels at the sub-basin scale. Any cumulative effects on this indicator from other management actions are expected to be insignificant

and discountable. Therefore, no effect is expected from Project actions on Forest-wide viability for this indicator.

- FS Sensitive Fish Species
  - No FS Sensitive fish species are present.

3.6.2.2.2 *Indirect Effects*

Indirect effects on fish are defined as those that would be later in time, but are reasonably certain to occur. No indirect effects on fish or fish habitat from Alternative 2 are expected.

3.6.2.2.3 *Cumulative Effects*

Cumulative effects on fish and aquatic habitat are mostly related to additional small increments of the same kinds of effects as have occurred in the past, such as timber management, road maintenance, equestrian activities, and other recreational activities. In areas that are disturbed, re-growth of vegetation that prevents erosion and sedimentation may be affected. However, additional sediment is not likely to reach areas with fish because of the low fines content of the soil and the distance from disturbance sites to fish habitat. The collective consequences of these small incremental impacts would be minor and considered negligible.

3.6.2.3 Alternative 3: Based on Scoping Comments

Under Alternative 3, exploratory drilling would be performed with restrictions to on-site water use, additional requirements related to drillhole abandonment, phasing of drilling at specific locations, and operational modifications related to light and noise.

3.6.2.3.1 *Direct Effects*

The direct effects on fish and aquatic habitat would be similar to those described for Alternative 2. A small increase in the quantity of water delivered to the local watershed would be realized through the importation of some drilling water, although the amount would not alter fish habitat.

3.6.2.3.2 *Indirect Effects*

The indirect effects on fish and aquatic habitat would be similar to those described for Alternative 2.

3.6.2.3.3 *Cumulative Effects*

The cumulative effects on fish and aquatic habitat would be similar to those described for Alternative 2.

3.6.2.4 Alternative 4: Drill Site Riparian Reserve Avoidance

Alternative 4 is distinguished from Alternative 3, in that it does not include the installation and exploration activities previously described at Pads 6 and 7 to avoid activity within the Riparian Reserve.

3.6.2.4.1 *Direct Effects*

The direct effects on fish and aquatic habitat would be similar to those described for Alternative 3, but with a slightly reduced potential to reach the same magnitude of effects due to the elimination of Project activities at Pads 6 and 7 in order to avoid disturbance in the Riparian Reserve.

3.6.2.4.2 *Indirect Effects*

The indirect effects on fish and aquatic habitat would be the same as those described for Alternative 3.

3.6.2.4.3 *Cumulative Effects*

The cumulative effects on fish and aquatic habitat would be similar to those described for Alternative 3, but have a reduced potential to reach the same magnitude of effects due to the elimination of Pads 6 and 7 from this alternative.

3.6.3 Impact Summary

As outlined in Section 2.1, *Alternatives*, and Appendix E, *Best Management Practices*, a number of BMPs would be implemented during reactivation/installation, operation, and reclamation of the Proposed Project to minimize potential impacts on fisheries; however, the potential remains for disturbance of sites adjacent to streams to result in erosion that could adversely impact fisheries. To protect fisheries from being significantly impacted by the Project, quickly controlling erosion and revegetating such sites is proposed, as described in Section 3.4, *Soils*. No mitigation is proposed.

3.7 VEGETATION

This section describes the existing vegetation in the Project Area, including forest resources, special status plant species, and invasive species. It also considers the potential for impacts on vegetation as a result of the Project, and design features to minimize those impacts. It is important to note that the Cowlitz Indian Tribe has indicated that they view plants as a natural resource of cultural value (Iyall 2012.)

3.7.1 Affected Environment

The Project Area is located in the Southern Washington Cascades Province, within the Pacific silver fir (*Abies amabilis*) vegetation zone (Franklin and Dyrness 1988). It is located on the south-facing slope of the east-west trending Goat Mountain situated in the area north of the Green River between 2,800 and 4,000 feet amsl, on the fringe of the area deforested by the 1980 eruptive blast of Mount St. Helens. A portion of the northern part of the Project Area is covered by mature forest that escaped the effects of the 1980 eruption. Areas devastated by the eruption were salvage logged around 1982 and replanted by 1986. The current vegetative structure stage on the land where the Proposed Action would occur varies from young forest plantations 27 years of age, to forests up to 127 years of age.

3.7.1.1 Forest Resources

Most of the Project Area is comprised of young forest stands. These trees were planted in 1985 and 1986 after salvage logging occurred. However, a mature stand, which is 127 years old according to the FS GIS data, is located in the northern part of the Project Area. The majority of the site is dominated by Douglas-fir, with some western hemlock, and western white pine (*Pinus monticola*). A small "old-growth" patch is present outside the western border of the Project Area that is estimated to be over 150 years old.

Lands within the Project Area have one designation under the NWFP. This area is under the "Matrix" designation, which are forest lands outside reserves and withdrawn areas, and available for regularly scheduled timber harvests. Within the matrix lands in the Project Area are the "Riparian Reserves," which lie within a designated boundary width on either side of a given stream; restrictions are placed on what activities can occur within that boundary to protect the functions of the land and water within those Riparian Reserve areas. These are further described in Section 3.3, *Hydrology and Hydrogeology*.

Roadless areas and Late-Successional Reserves (LSRs) are present north of the Project Area, but no work is proposed in these lands. LSRs are managed to protect and enhance habitat for late-successional and old-growth-related species including the northern spotted owl. Management actions are allowed to benefit late-successional characteristics or reduce the risk of catastrophic loss.

3.7.1.2 Special Status Plant Species

The GPNF tracks species on the Region 6 Sensitive List and on the S&M List. Several sources were used to identify special-status plants that have been documented or have the potential to occur in the vicinity of the Project Area, including the following:

- Listed and Proposed Endangered and Threatened Species and Critical Habitat; Candidate Species; and Species of Concern in Skamania County (USFWS 2015).
- A Washington Natural Heritage Program (WNHP) record search of known special status plant locations in the vicinity of the Project Area (WNHP 2012).
- Rare Plant List for Skamania County (WNHP 2014).
- FS Special Status plant location data for Project Area (FS 2012a).

After review of the data sets noted above, it was determined that no federal ESA-listed plant species occur on the GPNF in Skamania County. There are also no FS records of special plant species within 3 miles of the Project Area. However, no specific special status plant surveys have recently been conducted in the Project vicinity.

Most of the species on the WNHP and Regional Forester lists have specific distribution range limitations or habitat requirements that make them very unlikely to occur in the areas that would be affected by the Project. Some have only been found in specific habitats in the Columbia River Gorge, and others are restricted to wet meadows or other wetlands not found in the Project disturbance area. However, there may be potentially suitable habitat for a few special status plant species. Almost all of the ground-disturbing activity would occur within the disturbed and compacted area of existing road prisms. The proposed drill sites are located on a previously constructed FS spur road system. This road system and the drill pad sites date to the Duval Corporation period of use in the 1970s, or timber salvage following the 1980 eruption of Mount St. Helens.

These disturbed and compacted areas are unlikely to support many special status plant species, although some special status species are known to grow in these conditions. An example of a Region 6 Sensitive plant that is sometimes found associated with old road beds is adder's tongue (*Ophioglossum pusillum*), which may be found in ditches. However, adder's tongue has not been recorded in Skamania County. The probability of finding sensitive vascular plants such as adder's tongue in the Project Area is considered low. Most non-vascular species on the S&M List are old-growth associates. The highest probability for these species is in the older stand at the northern portion of the Project Area. Approximately 174 acres (13 percent) of the Project Area is located within this habitat type, based on FS GIS data.

3.7.1.3 **Invasive Species**

Non-native plants include those species introduced intentionally or unintentionally to areas where they do not naturally occur. An "invasive species" is defined as a species that is not native to the ecosystem under consideration, and whose introduction causes or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112). Invasive non-native species are highly competitive, highly aggressive, and easily spread. They include plants designated as "noxious" by federal, state, or other legally responsible authority.

The Washington State Noxious Weed Control Board (WSNWCB) identifies three classes of noxious weeds. Class A noxious weeds have limited distribution in the state. State law, however, requires that these weeds be eradicated. Class B noxious weeds are regionally abundant, but may have limited distribution in some counties. The goal is to contain the plants where they are already widespread and prevent their spread into new areas. Class C noxious weeds are already widely established. Counties can choose to enforce control, or they can educate residents about controlling these noxious weeds. There are an estimated 2,000 invasive and noxious weed species in the U.S. with 146 noxious weeds listed in Washington State in 2015 (WSNWCB 2015). Seventy of these are specifically designated for control in Skamania County (Skamania County 2015).

The FS has records for two noxious weed species in the Project Area: Scot's broom (*Cytisus scoparius*) and tansy ragwort (*Senecio jacobaea*). Additional noxious weed species have been observed at the nearby Ryan Lake Interpretive Site. Invasive plants recorded in the Project vicinity are listed in Table 3.7-1.

Table 3.7-1. Noxious Weed Observations in the Project Area

Scientific Name	Common Name	Washington State Status
Centaurea stoebe	Spotted knapweed	Class B - Designate
Cirsium arvense	Canada thistle	Class C
Cytisus scoparius	Scot's broom	Class B - Designate
Hypochaeris radicata	Hairy cat's-ear	Class B
Leucanthemum vulgare	Ox-eye daisy	Class B
Senecio jacobaea	Tansy ragwort	Class B

3.7.1.4 Plants of Cultural Importance

The Project Area is in the traditional and accustomed use area of the Yakama, Puyallup, and Cowlitz Indian Tribes. It is likely that several plant species of cultural importance are located in the Project Area. However, information about traditional plant use is often sensitive in nature and cannot be shared without permission of the Tribes.

3.7.2 Environmental Consequences

This section identifies the potential impacts on vegetation as the result of the Proposed Project.

3.7.2.1 Alternative 1: No Action Alternative

Under Alternative 1, no exploratory drilling would be done. Road maintenance, equestrian activities, and other recreational activities could still occur within the Proposed Project boundary, which would continue to affect vegetation and potentially increase the spread of weeds. Negligible direct, indirect, or cumulative effects from this alternative are anticipated due to the low intensity of activity and travel that would continue to occur in and through the area.

3.7.2.2 Alternative 2: Proposed Action Alternative

3.7.2.2.1 *Direct Effects*

Forest Resources

The Project would require the removal of vegetation in some areas to accommodate road reactivation and the installation of 23 drill pads. To the extent possible, new road reactivation and associated habitat impacts have been minimized by reactivating existing roads instead of constructing new roads. All of this work would be done on Matrix lands. Locating the Project within and near Matrix lands means that a substantial road network is already in existence within the site. Ground-disturbing activities would only occur in early and mid-successional vegetative communities established by the previous disturbances (mineral exploration, eruption, and timber salvage). Pre-reactivation/ installation invasive plant surveys would be conducted.

Each drill pad would measure approximately 400 square feet, for a total disturbance of 0.23 acre for all 23 pads. Approximately 1.69 miles of road would be reactivated, which covers approximately 3.3 acres. Approximately 1.35 miles (2.45 acres) of these roads were previously reactivated in 2010 and have not had time to recover with large woody plants. However, 0.34 mile (0.62 acre) of these temporary roads have not been recently used and would require some vegetation removal for new reactivation. No large trees are growing on these roads. For Drill Pads 1 to 7 and 14 to 21, the surrounding vegetation has been established for less than 40 years.

The number of trees with the potential to be removed as a result of the Project was calculated for the northern portion of the Project Area, which is considered mature forest. This includes reactivated roads and pad sites for Pads 13, 22, 23, and 25, where a total of up to 68 trees would be removed. Their size and location are described in Table 3.7-2.

Tree removal is not planned at Pads 10, 11, 12, and 24, which are located along the upper roads. The small trees growing on the roads would be removed and saved for reclamation, while larger trees on road edges would only be limbed to avoid job hazards. Trees in danger of falling on the drill sites would be removed for safety.

The Proposed Project would not impact future use of the area for timber production.

Table 3.7-2. Tree Removal

Road Segment or Location	Number of Trees Removed	Diameter at Breast Height (dbh) in inches	Type of Stand
Road segments to Pads 13, 22, and 25	5	< 12	Mature Timber
Road between Pad 22 and Pad 23	1 4	10 < 4	Mature Timber
Pad 22	2	10-12	Mature Timber
Road between Pad 23 and Pad 25	2 25	< 10 4-7	Mature Timber
Pad 25	1 2	12 6	Mature Timber
Road between Pad 25 and Pad 13	2 4	12 < 4	Mature Timber
Pad 13	20	< 4	
Total Trees Removed	**68**	**All < 12dbh**	Mature Timber

Special Status Plant Species

No federal ESA-listed plant species occur on the GPNF, and thus, none would be affected. In addition, no locations of any special status species have been recorded in the Project vicinity. Based on habitat conditions, there is potential for a few special status plant species listed on the FS Region 6 Sensitive Species List (USDA FS 2005) or S&M Species List (USDA FS and USDI BLM 2001) to be present in the Project Area (see Section 3.7.1.2, *Special Status Plant Species*). However, it is less likely that any of them would be growing on the roads to be reactivated. Given the limited ground disturbance proposed, it is very unlikely that any sensitive vascular plant species would be impacted.

Non-vascular species, such as lichens and mosses, often grow on trees, and many are old-growth associates. Younger forest stands less than 30 years of age (replanted after the Mount St. Helens eruption) dominate the lower elevation southern two-thirds of the Project Area. Stands up to 127 years of age are located on the higher elevation slopes of the northern third of the Project Area.

The total area within the mature forested area that would be affected is small, approximately 1.63 acres, and only a small fraction of that would encroach on currently forested habitat. About 0.86 mile of reactivated road would be in mature forest stands. Drill pads are each approximately a maximum of 20 x 20 feet (400 square feet). They would be situated within the road prism on reactivated roads, and most of them would reuse old drill pad sites to avoid clearing or grading additional forest habitat. Each drill pad location would be cleared of vegetation and leveled to the extent needed to accommodate the mobile drill rig. No impervious surface would be created.

In addition, the changes that would occur are incremental changes from already non-forest habitat to cleared status. The nature of the habitat to be disturbed is generally open, because it has previously been cleared of forest. The large woody debris to be removed is all from windfall or was previously replaced on the roadway as part of reclamation. The trees to be removed are along the edge or are ones that sprouted back after the roads were previously reclaimed. None of the habitat is forest interior habitat. It is therefore unlikely that it is suitable habitat for any of the S&M species. Of the 23 drill sites, nine (Pads 1 – 7, 14, and 15) are accessed directly along existing open roads (FS Road 2612 and a campground road). The remaining sites would be accessed on via former temporary FS roads that would be temporarily reactivated. Of the 14 sites on roads to be reactivated, seven (Pads 10, 11, 12, 20, 21, 23, and 24) are on roads that were reactivated for drilling in 2010 and then closed again. Four sites (Pads 16, 17, 18, and 19) are on a road that was reactivated recently (possibly 2007 or 2008) and then closed again. The remaining three (Pads 13, 22, and 25) are on former temporary roads that currently have small tree seedlings and saplings growing on them. Seven of the drill pads (10, 11, 12, 13, 22, 23, and 25) are within mature forest stands (representing a total of 2,800 square feet).

Up to 68 trees would be removed as a result of the Project in the northern portion of the Project Area, which is considered mature forest. This includes roads between Pads 10, 11, 12, 13, 22, 23, and 25. On the road segments to Pads 22, 25, and 13 in the mature timber stand, which were not reopened in 2010, a few trees would be removed. On the road between Pad 23 and Pad 22, one approximately 10-inch dbh tree and several up to 4-inch dbh trees would need to be removed. At Pad 22, two trees of 10–12-inch dbh would probably need to be removed. On the road between Pad 23 and Pad 25, two approximately 10-inch dbh trees would probably need to be removed plus about 25 trees between 4 inches and 7 inches dbh. At Pad 25, one approximately 12-inch dbh tree and two approximately 6-inch dbh trees would probably need to be removed. On the road between Pad 25 and Pad 13, two approximately 12-inch dbh trees and several trees up to 4-inch dbh would probably need to be removed. At Pad 13, no trees larger than 4-inch dbh would need to be removed. Therefore, a total of eight trees with 10–12-inch dbh would be removed, along with about 60 trees with less than 7-inch dbh (mostly less than 4-inch dbh).

Because the area is small and the change in the habitat would not be dramatic, the effect on the habitat of a potential S&M species (if one did occur there) would not likely make it non-viable. Therefore, it was not deemed necessary to conduct pre-construction surveys.

Invasive Species

Invasive species and noxious weeds can dominate a site and alter ecosystem balance. The results may include changes in biodiversity, fire frequency, soil erosion, and hydrology of a site. Other effects include reducing the quality of recreational experiences.

While no Class A weeds have been observed in the Project vicinity, several Class B and C weeds are present (see Section 3.7.1.3 for definitions). Under Alternative 2, there would be ground disturbance, which exposes an available seedbed for noxious weeds. These areas would be susceptible to noxious weed and invasive plant spread, particularly since there are already invasive species growing along temporary roads. Roads function as corridors for weed spread by providing continuous areas of increased light levels and repeated disturbance, and by allowing for weed transport.

FS Manual (FSM) direction requires that noxious weed risk assessments be prepared for all projects involving ground-disturbing activities. For projects with a moderate to high risk of introducing or spreading noxious weeds, recent FS policy requires that decision documents must identify noxious weed control measures that would be undertaken during Project implementation (FS 1995b).

Although there is a risk of spreading noxious weeds in the Project Area, this risk is associated only with the potential for noxious weeds to be spread within a very limited area based on the limited amount of disturbance proposed. No landscape-scale spread of noxious weeds would be expected. Six noxious weed species were found in the Project Area, as listed in Table 3.7-1, *Noxious Weed Observations in the Project Area*. Roads that have not been surveyed are assumed for purposes of this analysis to have weed populations similar to those on nearby surveyed roads. Scot's broom is the most widely distributed recorded weed.

Scot's broom is of particular concern in areas managed for timber. The seeds are long-lived and can remain dormant in the soil for over 50 years, to sprout at the next disturbance. Scot's broom can be highly competitive with conifer seedlings. There is no effective control for seeds lying dormant in the soil, so the most effective management is to prevent the spread and control seed production. Control requires consistent treatment and follow-up for many years once plants have been allowed to go to seed.

Noxious weeds would be managed within each Project site. By implementing applicable BMPs (Appendix E, *Best Management Practices*), weeds are not anticipated to spread further as a result of the development of the Project. Many of these invasive plant prevention and treatment/restoration standards come from the Guide to Noxious Weed Prevention Practices (USDA 2001); the Pacific Northwest Region Invasive Plant Program Record of Decision for Preventing and Managing Invasive Plants (USDA FS 2005a); and the Forest Plan Amendment #20 for GPNF and Columbia River Gorge National Scenic Area (Washington Portion) (FS 2008b).

Plants of Cultural Importance

Plants of cultural importance are often common species that are widely distributed across the landscape. A list of cultural plant species has not been made for the Project Area. However, the impacts from the Project reactivation/installation activities would involve a very limited amount of vegetation disturbance that is restricted to either existing road prisms or small areas immediately adjacent to roads. The loss of native plants from these modifications is anticipated to be minor and would not occur in areas where any culturally significant plant is abundant enough to be harvested.

3.7.2.2.2 *Indirect Effects*

Forest Resources

No indirect effects on vegetation communities are anticipated from Alternative 2.

Special Status Plant Species

No indirect effects on special status plant species are anticipated from Alternative 2.

Invasive Species

The spread of noxious weeds beyond a very limited area is not anticipated to occur as a result of Alternative 2.

3.7.2.2.3 *Cumulative Effects*

Cumulative effects on vegetation and plant species are mostly related to additional small increments of the same kinds of effects that have occurred in the past. In areas that are re-disturbed, plant succession is set back a few years. The collective consequences of these small incremental effects considered with the past, present, and RFFAs identified in Section 3.1, *Introduction*, would be minor and negligible under Alternative 2.

3.7.2.3 Alternative 3: Based on Scoping Comments

Under Alternative 3, exploratory drilling would be performed with an emphasis on minimizing water use through further actions to limit loss to the formation, additional requirements related to drillhole abandonment, phasing of drilling at specific locations, and modifications related to light and noise.

3.7.2.3.1 *Direct Effects*

The direct effects on vegetation habitat would be similar to those described for Alternative 2.

3.7.2.3.2 *Indirect Effects*

The indirect effects on vegetation would be similar to those described for Alternative 2.

3.7.2.3.3 *Cumulative Effects*

The cumulative effects on vegetation would be similar to those described for Alternative 2.

3.7.2.4 Alternative 4: Drill Site Riparian Reserve Avoidance

Alternative 4 is distinguished from Alternative 3, in that it does not include the installation and exploration activities previously described at Pads 6 and 7 to avoid activity within the Riparian Reserve.

3.7.2.4.1 *Direct Effects*

The direct effects on vegetation would be similar to those described for Alternative 2.

3.7.2.4.2 *Indirect Effects*

The indirect effects on vegetation would be the same as those described for Alternative 2.

3.7.2.4.3 *Cumulative Effects*

The cumulative effects on vegetation would be similar to those described for Alternative 2.

3.7.3 Impact Summary

As outlined in Section 2.1, *Alternatives*, and Appendix E, *Best Management Practices*, BMPs would be implemented during reactivation/installation, operation, and reclamation of the Proposed Project to minimize potential impacts on vegetation; however, limited vegetation removal is a necessary component of the Project. Areas cleared for roads and drill pads would be reclaimed resulting in no long-term impacts. All roads would be water barred and closed after use. Native plant materials would be selected as the first choice in revegetation where timely natural regeneration of the native plant community would not be likely to occur. Under no circumstances would non-native invasive plant species be used for revegetation. Woody vegetative debris would also be installed in disturbed areas. The FS would specify the seed mixture. No mitigation is proposed.

3.8 HERITAGE AND CULTURAL RESOURCES

Heritage and cultural resources consist of locations of human activity, occupation, or use identified through field inventory, historic documentation, or oral evidence. The term encompasses historic properties as defined by the National Register of Historic Places (NRHP), including archaeological and architectural properties, as well as sites or places of traditional cultural or religious importance to American Indian Tribes or other social or cultural groups. Section 106 of the National Historic Preservation Act (NHPA) of 1966 requires that activities requiring federal permits or using federal funds undergo a review process to consider historic properties that are listed in or may be eligible for listing in the NRHP. The State Historic Preservation Office (SHPO) and Tribes are the federal agencies' primary Section 106 consulting parties. Because Section 106 is a process by which the federal government assesses the effects of its undertakings on historic properties, it is the primary regulatory framework used in the NEPA process to determine impacts on cultural resources.

This section describes the existing heritage and cultural resources in the vicinity of the Project Area. It also considers the potential for impacts on such resources as a result of the Proposed Action, and design features to minimize those impacts.

3.8.1 Affected Environment

Recent human activity in the area has been dominated by logging and silvicultural activity, recreation use, and mineral prospecting. The Project Area has active forest roads and former temporary roads, and some of the latter would be temporarily reactivated. The Green River Horse Camp is located at the southern edge of the Project Area. Additionally, FS system trails skirt the area, providing access for equestrian and hiker use. A small "old-growth" patch of forest is present outside the western border of the Project Area that is estimated to be over 150 years old.

Current uses of the Goat Mountain and headwaters of the Green River are primarily for recreation and timber production. The area is also important for camping, picnicking, fishing, hunting, hiking, equestrian riding, and huckleberry and mushroom picking, among other recreational activities.

3.8.1.1 Ethnographic and Historic Context

The Proposed Project is located in an upland setting along the Green River, within the traditional territory of the Taitnapam, a Shahaptian group speaking the Klickitat dialect. Many independent bands occupied contiguous territory in south central Washington State including the Yakama, Kittitas, Klikitat, Wanapam, and Taitnapam (Schuster 1998:327). The Taitnapam often intermarried with Salishan-speaking Cowlitz residing to the west, and the Taitnapams have been thought by some ethnologists to be Upper Cowlitz whose original band, through absorbing a sufficient number of Western Klickitats, formed a new group that retained the Shapatian language and Cowlitz culture (Ruby and Brown 1992:234). Taitnapam villages and camps were located along the headwaters of the Cowlitz and Lewis rivers (Schuster 1998:329); one band of Taitnapam lived on the southern flank of Mount Rainier, and another on the southern flank of Mount St. Helens. Their homeland was characterized by hilly and mountainous terrain, and hunting of big game like elk, deer, and sheep was of primary importance, along with root digging and berry picking (Schuster 1998: 329).

Widespread epidemics, Euro-American settlement, and the establishment of reservations had devastating effects on traditional lifeways by the 1850s. Although Cowlitz groups were among those attending the Chehalis River Treaty Council of 1855, they refused to sign because it did not provide a reservation in their own territory. A presidential proclamation in 1863 offered Cowlitz lands for public sale, even though the Tribe had never relinquished them, and some Cowlitz Indian Tribal members were forcibly removed to the Yakama Reservation. A later attempt in 1872 to establish the Chehalis Reservation for all non-treaty Indians of southwestern Washington Territory was not recognized by the Cowlitz Indian Tribe, and many remained in the general area of their ancestral homelands (Ruby and Brown 1992). The Cowlitz Indian Tribe was officially recognized by the federal government in 2000, a "belated acknowledgement of a cohesive culture spanning centuries. In 1973, the Indian Claims Commission found that the presidential proclamation of 1863 had deprived the Cowlitz Indian Tribe of exclusive aboriginal title to approximately 1.66 million acres of southwest Washington State (including the present Project Area of Potential Effects), without compensation." (Iyall 2012).

Many areas of traditional use continue to be of importance to modern tribal peoples. The Cowlitz Indian Tribe has stated that goats are an important element of their cultural heritage and as the name implies, Goat Mountain was a dispersal or travel corridor for this animal (Iyall 2012). Goats were hunted in the fall for their wool, which was used in the production of blankets that served as indicators of wealth and status in pre-contact communities.

Trails near the Project Area, including those along the Green River, Quartz Creek, and the Strawberry Mountain ridgeline, probably originate from pre-contact period Indian trails tied to resource gathering activities. These same trails were likely adapted by the early miners during the late 1800s. Also, burned areas in the Project Area, as depicted on the earliest historic General Land Office (GLO) maps, may reflect purposeful burning by Indians to manage huckleberry and strawberry production (Iyall 2012 citing Mack 2003). Pre-contact archaeological sites would be expected near the Green River, south of the Area of Potential Effect (APE), based on these past activities. The upper Green River fork of the Toutle River is considered a culturally significant landscape by the Cowlitz Indian Tribe (Iyall 2012).

Due in part to its remote setting, the Project Area was not intensively utilized by Euro-Americans until mineral exploration and limited mining within the area began in the late 19th century. The Project Area falls within the Saint Helens Mining District, which was designated in 1892 as a 156-square mile area along the flanks of Goat Mountain and headwaters of the Green River (McClure 1984). Over 400 mining claims were filed between 1892 and 1911, with copper, gold, and silver being the most sought-after minerals. Specifically, the Germania Mining and Milling Company filed historic mining claims circa 1900, including the Germania, Germania Jr., Germania Secundus, and Adamantine No. 2 lodes of Mineral Claim 708, which overlap the Project Area.

The Germania consisted of 12 patented claims and was one of the first mineral development groups opened in the Saint Helens Mining District; it was so named because of its association with a group of Germans from Wisconsin who initially worked the claims in the summer season via pack trains (Saint Helens Mining District 1934). A trail along the Green River from near its confluence with the North Fork of the Toutle River was initially used to transport equipment to the mines. Resources associated with these claims included at least two tunnels created to intersect gold veins, one near the bottom of Goat Mountain and one near the top. The Germania lodes, like others in the Saint Helens Mining District, appear to have been generally abandoned in the 1910s as lack of improved transportation networks made operation costs prohibitive.

Although a small amount of exploration re-occurred in the 1930s, most mineral development activity was suspended until larger mining corporations re-filed many old claims in the 1960s and 1970s (McClure 1984:4-5). Previous drilling was conducted in the same location as the Proposed Project by Duval Corporation in the 1970s and 1980s, who suspended operations following acquisition by Pennzoil, and the 1980 eruption of Mount St. Helens. The Proposed Project drill sites are all located on a previously constructed spur road system on drill pad sites dating to the Duval Corporation period of use, or salvage logging following the 1980 Mount St. Helens eruption.

3.8.1.2 Identification of Historic Properties

The FS as the lead federal agency for the Section 106 process has delineated the APE for the Project as approximately 3.3 acres, including reactivated portions of temporary roads, and drill pads. The 3.3-acre APE is considered to be identical for both above-ground (architectural) and archaeological resources.

Efforts on identified historic properties initially included a desktop review of archival materials, including data on file at the SHPO and FS; aerial photographs; and historic maps. A field visit was initiated in January 2012, and the Project was reviewed by a URS archaeologist, qualified under the *Secretary of the Interior's Professional Qualification Standards* (36 CFR Part 61) for archaeology.

A review of records on file at the Washington SHPO office, available online via the restricted-access Washington Information System for Architectural and Archaeological Records Database, and at the FS GPNF office at Trout Lake, Washington, was undertaken to determine the presence or absence of previously recorded historic properties, and the extent of cultural resource survey coverage in and near the APE. To protect archaeological resources from vandalism, location information is restricted under the Archaeological Resources Protection Act. Previously documented archaeological resources are considered as part of the Cultural Resources Inventory Report for the Project (McDaniel and Stegner 2012).

Several previously documented archaeological resources are located within approximately 1 mile of the APE; nearly all are historic mining-related sites, although peeled cedars associated with American Indian use have also been documented. Two previously recorded historic archaeological resources are located near but outside of the APE. Archaeological site 45SA90, consisting of the circa 1904 Earl Claims cabin, mineshaft, and powder house, was identified during surveys for a salvage timber sale. The site, which dates to circa 1904, is located near but outside of the APE along a developed forest access road. As part of Henry Coe's Saint Helens Mining District Earl Claim, the site, unlike most other mineral development sites in the area, is considered potentially eligible for the NRHP. Another archaeological Site, 45SA89, the Germania Secundus mineral exploration-related cabin, is found about 650 feet west of the APE and consists of structural remains of a collapsed miner's cabin dating to circa 1902. This site was determined by SHPO to be ineligible for the NRHP in 1982.

Portions of three prior investigations overlapped the APE. In 1981, shortly following the eruption of Mount St. Helens, FS personnel conducted cultural resource inventories for salvage timber sales, which appear to have examined at least half of the APE (McClure 1982a, 1982b). Several resources found outside the APE were documented as part of these inventories, including historic mining-related sites such as collapsed cabins, tunnels, debris scatters, and other features, all dating to the early 20th century. Most of these resources were determined by SHPO at that time to be ineligible for the NRHP. Because of the number of historic mining-related sites determined to be ineligible, the Saint Helens Mining District has not been nominated as an NRHP historic district.

In 2010, the FS conducted a field inventory for exploratory drilling activities proposed by Ascot, including drill pad locations, roads to be reactivated, and a gate, all within the same area as the current Proposed Project (Flores 2011; Taber 2010a, 2010b). Using a metal detector, a 25-foot radius around each drill pad site was examined, and temporary roads, including roads used to skid equipment, were also surveyed. No cultural resources were identified.

Mining features have been identified on historic GLO plat maps and assigned resource numbers by the FS. Several are noted near the Project APE but have not been field verified to date, including: Germania No. 1 Tunnel (FS #10060806), Germania No. 2 Tunnel (FS #10060807), Ardentine No. 1 Tunnel (FS #10060808), Ardentine No. 2 Discovery Cut (FS #10060809), Germania Jr. No. 2 Discovery Cut (FS #10061706), and Adamantine No. 2 Discovery Cut (FS #10061708) (Taber 2010a).

Historic trails near the APE include the Goat Mountain Trail #217, which appears on forest maps beginning in 1933 to the present. The trail follows the ridgeline of Goat Mountain, typically at least 0.5 mile to the north of the APE. The Green River Trail #213, which appears on maps as early as 1908, trends along the north side of the Green River in this area and is approximately 200 feet from the nearest proposed drill pad. Previous surveys along the Green River Trail identified a historic mining-related cabin site, but this is more than 1 mile from the APE. Previous small inventories along the Goat Mountain Trail #217 and in the Green River Horse Camp did not identify cultural resources.

3.8.1.3 Field Investigation

A field visit was conducted by URS cultural resource personnel in January 2012. Only about half of the Proposed Project drill pad sites were surveyed at that time due to the presence of snow cover on higher elevation pads, which precluded visual examination of the ground surface. A second field visit was conducted in July 2012 as soon as the snow melted, by URS staff archaeologists. All drill pads were revisited at that time. No cultural resources were observed during either the January or July 2012 field visits.

Following the same field methods utilized in 2010 by the FS (Taber 2010a), individual drill pad sites were inventoried using a 25-foot diameter radius around the outer dimensions of each pad site. Temporary roads where reactivation is planned were also surveyed, along with a buffer of 15 feet on each side of the road prism, unless precluded by steep slopes. A metal detector was used to search for potential buried historic materials, since the results of a record search indicated the potential for such site types to be found in the general vicinity. Older trees, where present, were examined for cultural scarification.

Negative findings of the 2010 (Taber 2010a, 2010b) and 2012 (McDaniel and Stegner, 2012) field surveys indicate that there is a low potential for as-yet-unidentified cultural resources to be affected by the Project. Prior disturbances associated with timber harvesting and mineral exploration have extensively altered the ground surface.

3.8.1.4 American Indian Consultation

In addition to public scoping meetings, the FS and BLM have jointly initiated consultation with local Tribes. Letters were sent to the Confederated Tribes and Bands of the Yakama Indian Nation, the Cowlitz Indian Tribe, the Nisqually Indian Tribe, and the Squaxin Island Tribe discussing the Project.

To date, the Cowlitz Indian Tribe has responded in a letter dated March 16, 2012, requesting formal consultation with the BLM and FS. Several concerns were expressed, including the following: the need for completion of a cultural and archaeological resources survey; the need for known historic mining resources to be better characterized so that impacts can be avoided; the likely association of trails near the APE with pre-contact period Indian trails tied to resource gathering; the presence of wild goats at Goat Mountain, which were and are an important element of the Cowlitz Indian Tribe cultural heritage; and the importance and presence of berries, for which the Project Area would also have been utilized. Additionally, the upper Green River fork of the Toutle River is considered a culturally significant landscape by the Cowlitz Indian Tribe (Iyall 2012).

A formal government-to-government consultation meeting was held with the Tribal Chairman, Tribal Historic Preservation Officer, and other staff of the Cowlitz Indian Tribe on March 30, 2012, with agency officials from both BLM and FS attending. At this meeting, the Cowlitz Indian Tribe stated that the Toutle River and Green River systems are of importance for restoration activities, and that any action in this area is a cause for concern to the Tribe. The Tribe noted that natural resources, such as first foods, are considered cultural resources. The Washington State fish hatchery on the Green River is important as it provides salmon for the fish distribution program to Tribal members. The Tribe observed that geotechnical borings have the potential to impact archaeological resources. The Cowlitz Indian Tribe requested having a voice in possible conditions of permit issuance for this Project.

The Agencies held a second meeting via conference call on May 30, 2012 to brief the Cowlitz Indian Tribe on the EA prior to its release for public comment. A third government-to-government meeting with the Tribe occurred on August 28, 2012 at Toledo, Washington regarding the status of the EA process, cultural features, and the nature of the action alternatives being considered. A fourth government-to-government meeting occurred on November 16, 2012 to present the revised EA to the Tribe prior to its public release.

In early March 2015, the Cowlitz Indian Tribe notified the BLM of two Traditional Cultural Properties (TCPs) in the vicinity of the Project Area. The two areas are located in the upper reaches of Mount St. Helens and on approximately 7,000 acres along Mosquito Meadows/Pole Patch/Burley Mountain ridge and are outside the Project Area. Government-to-government consultation was renewed with the Cowlitz Tribe in August 2015 regarding further modifications to the EA consistent with 2014 opinions of U.S. District Court for Oregon.

3.8.2 Environmental Consequences

This section identifies the potential impacts on heritage and cultural resources as the result of both reactivation/installation and operation associated with the Proposed Project.

3.8.2.1 Alternative 1: No Action Alternative

Under Alternative 1, no exploratory drilling would occur. Road maintenance, equestrian activities, and other recreational activities could still occur within the Project Area. Cultural resources would continue to be identified and managed by the FS following Section 106 of the NHPA.

3.8.2.2 Alternative 2: Proposed Action Alternative

3.8.2.2.1 *Direct Effects*

The Project would require temporary road reactivation, and drilling small diameter (< 3.78-inch) holes from an approximately 20 foot by 20 foot (400 square feet) drill pads. Impacts would not differ substantially from prior drilling activities conducted during the 1970s and 1980s, as the Proposed Project is located entirely within a previously constructed spur road system of rocked and graveled roads, and drill pads associated with the modern period of mineral exploration.

Some vegetation may need to be removed to reactivate roads and install drill pads. Harvesting of timber occurred within the Project Area in the 1980s, and thus the potential for certain resource types typically associated with old-growth trees (such as arborglyphs or peeled cedar trees) is limited, except within a small section of the APE. The ground surface has also been previously disturbed by past timber harvesting, further indicating there is a low probability of encountering intact cultural resources.

Given the negative findings of past and current field investigations (Taber 2010a, 2010b; McDaniel and Stegner 2012 forthcoming; also, McClure 1982a, 1982b), combined with the extent of prior disturbance related to previous road building and drill pad installation within the APE, the Project is not anticipated to have direct impacts on currently known archaeological resources. It is possible, but unlikely, that the Project would encounter as-yet unidentified archaeological resources during reactivation/installation.

Natural resources are of traditional and contemporary importance to American Indians. Berry plants, fish, and goats are of specific concern in the Project Area based on consultation that has occurred to date with the Cowlitz Indian Tribe. Effects of the Project on these natural resources that are also of cultural value are considered within Sections 3.5, *Wildlife*, 3.6, *Fisheries*, and 3.7, *Vegetation*, of this EA. Almost no wildlife habitat would be disturbed as a result of Alternative 2. Direct impacts on wildlife resulting from Project actions may include tree removal, temporary noise, presence of workers and equipment, and lighting. These impacts are considered minor because, although some individuals may be temporarily affected, populations would not. Impacts on fish habitat are expected to be minimal, and no impacts on resident fish species are anticipated from the Project. By implementing and maintaining impact avoidance and minimization measures, impacts on surface water would be negligible. Plants of cultural importance are often common species that are widely distributed across the landscape. A list of cultural plant species has not been made for the Project Area. However, the impacts from the Project would involve a very limited amount of vegetation disturbance that is restricted to either existing road prisms or small areas immediately adjacent to existing roads.

The loss of native plants from these modifications is anticipated to be minor, and would not occur in areas where any culturally significant plant is abundant enough to be harvested.

As described in Section 3.9, *Visual/Scenic Resources*, any potential visual effects would be minor and occur on a local level. The two TCPs in the vicinity of the Project Area are sufficiently distant that no adverse effects due to changes in visual resources would be anticipated. With respect to potential effects resulting from noise, in addition to being sufficiently removed from the Project Area, any noise produced by the Project would be temporary and muffled, as described in Section 3.14, *Noise*, and no effects on the TCPs due to noise would be anticipated.

Based on these findings, Alternative 2 would not directly impact natural or archaeological resources of the upper Green River fork of the Toutle River that contribute to its being considered a culturally significant landscape by the Cowlitz Indian Tribe.

3.8.2.2.2 *Indirect Effects*

Some archaeological sites in the vicinity (e.g., 45SA90, the Earl Claims Cabin) have reported occurrence of surface artifact materials. Other mining features are expected to be present near the Project Area, but have not been field verified to date. Alternative 2 could make these sites vulnerable to inadvertent disturbance during drilling activities, although all reasonable efforts will be made to identify and appropriately safeguard and/or conserve such features. Prompt site reclamation would reduce vulnerability to disturbance or vandalism after completion of Alternative 2.

3.8.2.2.3 *Cumulative Effects*

Previous survey and exploratory drilling activities have not discovered archaeological resources to date. Therefore, cumulative effects on archaeological resources are not likely to result from the Project.

3.8.2.3 Alternative 3: Based on Scoping Comments

Under Alternative 3, exploratory drilling would be performed with an emphasis on minimizing water use through further actions to limit loss to the formation, additional requirements related to drillhole abandonment, phasing of drilling at specific locations, and modifications related to light and noise.

3.8.2.3.1 *Direct Effects*

The direct effects on archaeological resources would be similar to those described for Alternative 2. No effect is anticipated.

3.8.2.3.2 *Indirect Effects*

Under Alternative 3, the indirect effects on archaeological resources would be similar to those described for Alternative 2. No effect is anticipated.

3.8.2.3.3 *Cumulative Effects*

Under Alternative 3, the cumulative effects on archaeological resources would be similar to those described for Alternative 2. No cumulative effects are anticipated.

Note: On July 30, 2012, the Forest Archaeologist for the GPNF concurred with the *No Effect* determination made in the Cultural Resources Inventory Report dated July 2012.

3.8.2.4 Alternative 4: Drill Site Riparian Reserve Avoidance

Alternative 4 is distinguished from Alternative 3, in that it does not include the installation and exploration activities previously described at Pads 6 and 7 to avoid activity within the Riparian Reserve.

3.8.2.4.1 *Direct Effects*

The direct effects on archaeological resources would be similar to those described for Alternative 2.

3.8.2.4.2 *Indirect Effects*

The indirect effects on archaeological resources would be similar to those described for Alternative 2.

3.8.2.4.3 *Cumulative Effects*

The cumulative effects on archaeological resources would be similar to those described for Alternative 2.

3.8.3 Impact Summary

No known resources occur in the Project Area and, as outlined in Section 2.1, *Alternatives* and Appendix E, *Best Management Practices*, BMPs would be implemented during reactivation/installation, operation, and reclamation of the Proposed Project to avoid or minimize potential impacts on heritage and cultural resources, including any currently unknown resources that may be inadvertently encountered during the Project. No mitigation is proposed.

3.9 VISUAL/SCENIC RESOURCES

3.9.1 Affected Environment

Scenic quality is a measure of the visual appeal of a parcel of land. Visual resources influence the public's experience of the National Forest. Section 101(b) of NEPA requires that measures be taken to "assure for all Americans…aesthetically…pleasing surroundings." The GPNF Forest Plan Visual Quality Objectives (VQOs) must also be considered for viewsheds from campgrounds, viewpoints, and other developed sites, as well as those seen from designated travel routes such as roads and rivers. Figure 8, *Project Area Outline on Goat Mountain Photo*, shows the Project Area looking northwest viewed from the southeast.

The lands encompassed by the Project Area are located on the south-facing slope of the east-west trending Goat Mountain, situated in the area north of the Green River between 2,880 and 3,780 feet amsl, on the fringe of an area deforested by the 1980 Mount St. Helens eruption. The Project Area is visible as you drive into the Green River Horse Camp, but not visible from other campgrounds, picnic areas, or other developed sites in the vicinity. Portions of the Project Area are visible from one section of FS Road 2612 just past Ryan Lake traveling north along FS Road 2612. There are no geologic or botanic features, waterfalls, or cultural sites determined to be visually significant within the Project Area.

The VQOs for the Project Area are Retention and Partial Retention in the foreground, and Modification in the middle ground viewing zones. The desired Visual Conditions are moderately altered changes possibly noticed by the average visitor; would not attract attention; and/or disturbances are not apparent. This objective corresponds to the VQO of Partial Retention and Modification (GPNF Forest Plan Figure IV-7 page 4-23). Figure 9, *Visual Quality and Proposed Drill Pad Locations*, shows the drill pad area for proposed Pads 2, 12, and 20, which are representative of the Project Area.

Figure 9. Visual Quality and Proposed Drill Pad Locations

Proposed Drill Pad 2 Location

Proposed Drill Pad 12 Location and access to other Drill Pad Sites

Drill Pad 20 Location

GPNF Forest Plan VQOs relating to the Project include the following:

- **Retention VQO:** Forest management activities may be discernible but not clearly visible to the average viewer. Disturbances must appear to be from natural causes.
- **Partial Retention VQO:** Forest management activities may be noticeable, but must blend well with the natural appearance of the landscape.
- **Modification VQO:** Forest management activities must have natural appearing characteristics, and blend in with existing landforms.

Distance zones are measured from the viewpoint and are divided into five categories:

- Immediate foreground: 0 to 300 feet
- Foreground: 300 feet to 0.5 mile
- Middle ground: 0.5 mile to 4 miles
- Background: 4 miles to horizon
- Seldom Seen: areas not normally viewed due topography and lack of access

The Project Area as seen from FS Road 26 is in the middle ground (0.5 to 4 miles). The Project Area as seen from FS Road 2612 is in the immediate foreground to middle ground (0 feet to 300 feet).

A total of five drill sites are within the immediate foreground of FS Road 2612 (Pads 1, 2, 3, 14, and 15). All of the remaining drill sites and reactivated temporary roads would be screened from the public view from FS Road 2612 and FS Road 26 because of the existing vegetative cover.

No drill sites nor the drill rigs and ancillary equipment could be seen from Mount St. Helens. There are several tall mountains/ridgelines that are located between Mount St. Helens and Goat Mountain, which is a distance of 12 miles. Mount Margaret is 5,858 feet amsl, and Mount Whittier and Bear Pass are above 5,800 feet amsl. These mountains and nearby ridgelines, including Whittier Ridge, block the view of Goat Mountain from the Mount St. Helens Volcanic Monument, so drilling operations and equipment on Goat Mountain would not be visible from the Monument. Additionally, a ridge line immediately southwest of Goat Mountain blocks the view between Goat Mountain and Mount St. Helens. Also, the 14-foot tall drill mast would be further obscured by the 20+ foot tall tree canopy.

The Green River Horse Camp is located near the southern boundary of the Project Area. The horse camp has eight developed campsites for horses and trailers. Additionally, several FS system trails skirt the area, with the camp providing access for equestrian and hiker use. There are no geologic or botanic features, waterfalls, or cultural sites determined to be visually significant within the Project Area.

3.9.2 Environmental Consequences

3.9.2.1 Alternative 1: No Action Alternative

Under Alternative 1, no exploratory drilling would be done. The need to reactivate temporary roads, remove vegetation, install culverts, install erosion control (including but not limited to installation of silt fencing, water bars, or revegetation at the completion of drilling) would not be necessary. There would be no changes to existing visual/scenic resources. There would be no direct, indirect, or cumulative effects on visual/scenic resources when considering the past, present, and RFFAs identified in Section 3.1, *Introduction*, as a result of this alternative.

3.9.2.2 Alternative 2: Proposed Action Alternative

Alternative 2 generally involves the reactivation of former temporary roads. Established vegetation, brush, and fallen trees would be removed from the temporary roads during road reactivation. Drilling operations occurring at nine locations (and occurring at single intervals) along FS Road 2612 and the road leading to the Green River Horse Camp would be seen by recreational users in the spring and/or summer months. Operations along other road segments would be visually obstructed by the existing vegetation, enhanced by restricted access to these reactivated roads located north of FS Road 2612.

3.9.2.2.1 *Direct Effects*

Visual concerns relate mainly to the Green River Horse Camp, and associated FS system trails and campsites that skirt the Project Area. Portions of the Project Area that are subject to surface disturbance are generally screened by topography and forest cover. The Project would result in short-term visual impacts caused by initial surface disturbance from the drill sites located in the immediate foreground along FS Road 2612, and campsites located in the vicinity of the Green River Horse Camp near Drill Pads 6 and 7. These impacts would principally affect the visual elements of line and color. Horizontal and shallow diagonal lines from reactivated roads and from drill pads would cause moderate and temporary line contrasts with the natural landscape. Disturbance of vegetation may also cause moderate, temporary color contrasts.

For all other drill sites and reactivated roads, there would be no effects on visual resources because they cannot be seen by the casual observer using either FS Road 2612 or FS Road 26. These sites meet or exceed the VQO of Retention.

3.9.2.2.2 *Indirect Effects*

The proposed drilling would occur 24-hours a day. Lighting would be required during night-time operations and could be a distraction or attractant to wildlife and insects. It is unlikely that lighting would be seen by people hiking or camping due to screening by topography and forest cover, with the exception of drill pads located in close proximity to existing camping/recreation areas. Capped lighting would be directed toward the drill pads and behind baffles. Also, lighting is a transient visual effect that stops when the lights are turned off.

3.9.2.2.3 *Cumulative Effects*

With successful reclamation of Project reactivated roads and drill pads, together with revegetation, long-term visual impacts would be minimized. Implementing appropriate BMPs for mineral exploration as described in Appendix E, *Best Management Practices*, would aid in protecting the visual quality of the area. The effects of Alternative 2 on visual resources would be consistent with the GPNF Forest Plan VQOs, which are foreground Retention and Partial Retention. The cumulative effects on visual impacts would be limited when considering the past, present, and RFFAs identified in Section 3.1, *Introduction*, since the work under this alternative is temporary, would be conducted on and along existing roadways, and all RFFAs involve current activities continuing at intensities similar to current levels.

3.9.2.3 **Alternative 3: Based on Scoping Comments**

Alternative 3 includes the same visual elements as Alternative 2, except drilling near the Green River Horse Camp would be controlled to reduce recreational and wildlife conflicts.

3.9.2.3.1 *Direct Effects*

By avoiding operations at Pads 6 and 7 during peak use recreational periods, direct visual effects would be reduced, since the potential for the public viewing drilling activity at Pads 6 and 7 would be reduced. Also, drilling during daylight hours, and reducing light impacts at night with baffles and directing capped lighting toward the drill pads, would further reduce visual effects in comparison to Alternative 2.

3.9.2.3.2 *Indirect Effects*

The indirect effects on visual/scenic resources would be similar to those described for Alternative 2.

3.9.2.3.3 *Cumulative Effects*

The cumulative effects on visual/scenic resources would be similar to those described for Alternative 2.

3.9.2.4 Alternative 4: Drill Site Riparian Reserve Avoidance

Alternative 4 is distinguished from Alternative 3, in that it does not include the installation and exploration activities previously described at Pads 6 and 7 to avoid activity within the Riparian Reserve.

3.9.2.4.1 *Direct Effects*

By eliminating operations at Pads 6 and 7, the direct effects on visual/scenic resources associated with campsites in the vicinity of the Green River Horse Camp near Drill Pads 6 and 7 described under Alternative 3, would not occur. Other direct effects on visual/scenic resources would be similar to those described for Alternative 3.

3.9.2.4.2 *Indirect Effects*

The indirect effects on visual/scenic resources would be similar to those described for Alternative 3, with a reduced potential to reach the same magnitude of effects due to the elimination of Pads 6 and 7 from Alternative 4.

3.9.2.4.3 *Cumulative Effects*

The cumulative effects on visual/scenic resources would be similar to those described for Alternative 2.

3.9.3 Impact Summary

As outlined in Section 2.1, *Alternatives*, and Appendix E, *Best Management Practices*, BMPs would be implemented during reactivation/installation, operation, and reclamation of the Proposed Project to minimize potential impacts on visual/scenic resources; however, limited vegetation removal is a necessary component of the Project and may affect visual/scenic resources on a local scale. Areas cleared for roads and drill pads would be reclaimed as described in Section 3.7, *Vegetation*. No mitigation is proposed.

3.10 AIR QUALITY

This section evaluates how air resources would be affected by the Proposed Action.

3.10.1 Affected Environment

The Project is located within the southern portion of the Washington Cascade Mountain range in Skamania County. Elevations in the vicinity of the Project Area range from approximately 2,300 to 5,000 feet amsl.

Air quality in Washington State is regulated by local clean air agencies. The Project Area falls within the jurisdiction of the Southwest Clean Air Agency (SWCAA). The area is in a rural setting and considered “unclassifiable/attainment” as established in 40 CFR 81.348. This designation is for areas that lack ambient air quality data, are generally unclassifiable, and are managed as attainment areas. Air quality in the Project Area is generally good due to the limited population and lack of industrial activity. The Project Area is treated as an attainment area and is categorized as a Class II area under the Clean Air Act regulations. According to the SWCAA, an SWCAA permit is required only for machinery that has an aggregate horsepower (hp) greater than 500 hp.

According to the SWCAA, the closest permitted emission sources are approximately 9.5 miles to the north near the town of Randle, Washington. Additional sources are located 25 miles to the west and south. The closest Class I federally protected area is the Mount Adams Wilderness Area, 25 miles to the east. Current emission sources in the Project Area include vehicle combustion emissions, fugitive dust from travel on unimproved roads, and campsite and wild fires. Emissions for all pollutants are generally expected to be low due to the limited number of sources in the Project Area and normal precipitation events.

An additional natural source affecting air quality around the Project Area is continued volcanic degassing by Mount St. Helens. Ongoing natural gaseous emissions from Mount St. Helens include carbon monoxide (CO), carbon dioxide (CO2), sulfur dioxide (SO2), hydrogen sulfide (H2S), and other gases. Sulfur dioxide emissions from the volcano were regularly documented following the 1980 eruption through 1988 (USGS 2012). In addition, a series of much smaller eruptions and off-gassing events were documented from 2004 to 2005. In a December 2004 report, Mount St. Helens was listed as the State’s No. 1 air polluter (Doughton 2004). This report stated that although the volcano was contributing significant amounts of emissions into the air as of December 1, 2004, there were no complaints about respiratory problems linked to the emissions “because the area around Mount St. Helens is so sparsely populated” (Doughton 2004). At the time, SO2 emissions from the volcano were reaching approximately 50 to 250 tons per day, and estimates of normal CO2 production from the volcano were between 500 and 1,000 tons per day, according to a USGS scientist (Doughton 2004).

3.10.1.1 Climate and Meteorology

Orographic lifting of moisture-laden air from the Pacific Ocean on a southwesterly to westerly track results in heavy precipitation around the Project Area (WRCC 2012b).

Snowfall generally occurs from September through late spring, although maximum snow depths are typically reached during the first half of March (WRCC 2012).

The closest and most recent official meteorological records are from the Spirit Lake Ranger Station, and indicate average annual snow fall depths of 311 inches and average annual total precipitation in excess of 93 inches. The station, now closed, was located at a similar elevation approximately 13 miles to the south of the Project Area. Similar precipitation and temperatures are expected, although the 1980 eruption of Mount St. Helens and the subsequent lowering of the summit may have had some effect on regional precipitation.

3.10.1.2 Greenhouse Gas Emissions and Climate Change

The global climate is becoming warmer, and there is strong evidence that this warming is resulting, at least in part, from human-caused production of greenhouse gases (GHG). The science of predicting future climate conditions is continuously and rapidly evolving. Addressing effects on GHG emission levels within the scope of NEPA is difficult due to the lack of explicit regulatory guidance on how to meaningfully apply existing NEPA regulations to this evolving issue.

GHG emissions require analysis when emissions would constitute a significant impact, or when analysis is necessary to determine whether the impact would be significant, such as for prescribed burning or timber harvest. GHG emissions from the Proposed Action are considered to be non-significant when considered in the context of the cumulative emissions at broader spatial scales per *BLM's Instruction Memorandum No. OR-2010-012* (BLM 2010). The Proposed Action would result in direct GHG emissions as a result of energy use (e.g., fuel consumption in vehicles or equipment). However, as described in Section 3.10.2.2.1, *Direct Effects*, the quantity that would result from this small scale, short-term Project would be too small to be regionally significant and merit quantification in this analysis.

3.10.2 Environmental Consequences

3.10.2.1 Alternative 1: No Action Alternative

Under Alternative 1, no exploratory drilling would be completed. Road maintenance, equestrian activities, and other recreational activities would still occur in the Project Area. Fugitive dust and combustion emissions would continue to occur from recreational users and volcanic activity.

3.10.2.2 Alternative 2: Proposed Action Alternative

Alternative 2 generally involves the use of relatively small displacement diesel-powered equipment, as outlined in the proposed Exploration Plan and noted below. Small off-road equipment would be used to clear existing temporary roads and prepare pad locations. Diesel-powered water pumps and water trucks may also be used. After road reactivation is completed, and the majority of pad installation is complete; the track-mounted drills, an ATV, two four-wheel drive pickup trucks, and additional equipment would remain in use to support the exploration program.

3.10.2.2.1 *Direct Effects*

Direct effects from the proposed exploration program would include combustion emissions from the following equipment:

- Two track-mounted diamond drills (diesel powered)
- Two six-wheel ATVs (gasoline and/or diesel powered)
- Small track excavator (diesel and/or gasoline powered)
- Four 4x4 pickup trucks (gasoline and/or diesel powered)
- Water truck (diesel powered)
- Two water pumps (diesel powered)

To reduce vehicle dust emissions, a local on-site water source would be used primarily from gravity-fed water sources. The water would reduce dust emissions caused by Project activities. The use of an on-site water source as the primary water supply would also significantly reduce the road traffic caused by water trucks, otherwise traveling from Randle, and thus generating additional fugitive dust emissions. The Exploration Plan states that the local water supply would be used at an average rate of 5 gpm. If drilling occurs for 8 hours over each 24-hour work period, a water truck would not be required except in limited situations. If the quantity of local water source exceeds 5,000 gpd, supplemental water delivered by water truck may be needed. Based on scoping comments, obtaining most of the water for drilling from a temporary, on-site water tank filled by water trucks, using an off-site source is considered under Alternative 3.

After road reactivation has occurred, and during normal Project operations, the only daily emission sources would be from the two track mounted drills, an ATV, and two four-wheel drive pickup trucks. At times, diesel water pumps may be required, which would also create emissions. Stationary equipment at the site is exempt from air source permitting requirements found in SWCAA regulations (SWCAA 2006).

Daily emission estimates of nitrogen oxides (NO_x), CO, sulfur oxides (SO_x), particulate matter less than 10 microns in diameter (PM-10), and CO_2 for the equipment mentioned above are listed in Table 3.10-1.

Emissions were estimated using emission factors from AP 42, an EPA compilation of air pollutant emission factors (EPA 1995). Horsepower estimates were estimated using similar equipment. The estimates are conservative in not providing credit for emissions reduction efficiency (pollution control devices), and equipment is assumed to be used at the rated horsepower for the duration shown in the tables. In general, equipment is only operated at the rated horsepower for very short periods of time. Equipment durations were roughly estimated, and it should be noted that not all equipment would be used on each day. Actual emissions from Alternative 2 are anticipated to be lower.

Table 3.10-1. Daily Emission Estimates

Equipment Type	Hp Rating	Hours per day	NO_x (lbs)	CO (lbs)	SO_x (lbs)	PM-10 (lbs)	CO_2 (lbs)
Two track-mounted diamond drills (diesel powered)	354[1]	24	264.0	56	18	19	9,770
Two six-wheel ATVs (gasoline)	48[2]	2	1.0	0.6	0.06	0.06	102
Small track excavator JD690 (diesel powered)	140[3]	10	43.4	9	3	3	1,610
Four four-wheel drive pickup trucks (diesel powered)	1,600[4]	6	297.6	64	20	22	11,040
1,500 gallon water truck (diesel powered)	200[5]	8	49.6	11	3	4	1,840
Two water pumps (diesel powered)	2[6]	24	1.4	0	0	0	56
TOTAL (lbs)			**657**	**140.6**	**44.1**	**48.1**	**24,418**
TOTAL (tons)			**0.33**	**0.07**	**0.02**	**0.02**	**12.21**

1. Prospector II, Multi Power Products LTD (177 hp each).
2. Phone conversation on March 23, 2012 with Max All Terrain. Available gasoline engines range from 18-29 horsepower. Value used is average (24 hp each).
3. Ritchie Specs.com, John Deere 690B Hydraulic Excavator.
4. Estimated from 2012 F350 6.7L Power Stroke Turbo Diesel (400 hp each).
5. Estimated from 2012 Ford F650 minimum power rating.
6. Godwin GWP-25HX, rated at 30 gpm (1 hp each).

For comparison, during the recent eruption of Mount St. Helens in 2004 and 2005, it is estimated that the following median emission rates were produced (Gerlach et al. 2008):

- CO_2 - 655 tons/day (t/d)
- SO_2 – 72 t/d

Volcanic pumice and ash are present at the site. However, the soils have a low K factor and are not easily transported by erosive forces such as wind and runoff. Soil exposed from Alternative 2 operations would be limited to sump installation and ground disturbances from vehicle traffic.

As stated in Section 3.10.1.2, *Greenhouse Gas Emissions and Climate Change*, Alternative 2 would result in direct GHG emissions as a result of energy use (e.g., fuel consumption in vehicles or equipment). However, the quantity that would result from this small-scale, short-term Project would be too small to be regionally significant and merit quantification in this analysis.

3.10.2.2.2 *Indirect Effects*

Indirect effects on air quality that may occur later in time include effects resulting from Project-related GHG and fugitive dust emissions. The combustion emissions from the Project equipment would be incrementally small and expected to be easily dispersed.

Traffic levels and associated fugitive dust emissions related with the Project are expected to be minor relative to recreational use and meteorological levels.

Alternative 2 would result in the removal of 68 trees of less than 12 inches dbh. This change in vegetation may result in net emissions or net storage of GHG. However, all woody debris would be used during reclamation as ground cover, resulting in essentially a zero net effect on GHG levels as a result of natural decay and regrowth sequestration.

3.10.2.2.3 *Cumulative Effects*

Past actions within the Project Area that have impacted air quality include camp and wildfires, volcanic activity, timber harvesting, dispersed recreation, minerals exploration, and road reactivation and maintenance. These activities generally contribute engine exhaust and particulate matter (including fugitive dust emissions) into the air. Timber harvest practices also contribute to a loss of carbon dioxide removal capacity from the air.

Recent volcanic emissions include periods from 1980–1988 and 2004–2005. Carbon dioxide emissions are continually being generated by Mount St. Helens. Following the major 1980 eruption, the area was extensively salvage logged, and many trees were removed from the area. Approximately 300 acres were harvested and replanted following the 1980 eruption, while 100 acres of natural stands remain with no proposed vegetation management within the next 10 years. Some thinning occurred roughly 15 years ago within the regrowth following the eruption.

The incremental emissions from Alternative 2 would be relatively minor, with the primary emission sources being from two drill rigs and worker vehicles following completion of road reactivation. Emissions that result from Project activity are primarily from operation of diesel engines and fugitive dust. These types of emissions are easily dispersed, and no cumulative effects on air or atmospheric conditions are expected from Alternative 2.

The incremental effect of Alternative 2 on GHG levels (either net emissions or net storage) would either be too small to merit quantification, or negligible as a result of use of all the woody debris during reclamation and subsequent sequestration during regrowth.

3.10.2.3 **Alternative 3: Based on Scoping Comments**

Under Alternative 3, exploratory drilling would be performed by balancing the use of on-site water sources, off-site sources and the re-use of drilling fluids; additional requirements related to drillhole abandonment; phasing of drilling at specific locations; and modifications related to light and noise. Restrictions to on-site water use could require up to five water truck round trips per day from the Randle area under this alternative.

3.10.2.3.1 *Direct Effects*

Direct effects on air quality would be similar to those described for Alternative 2, with the exception that additional water truck use would be necessary to meet the average daily water needs during administrative on-site water use restrictions related to higher recreational water use demand. Additional vehicle trips would be required to haul additional drillhole abandonment materials, such as bags of grout and/or cement. Balancing the use of on-site water sources with the use of an off-site water source and the re-use of drilling fluids may require a water truck to travel the roads between the Project site and the Randle water source, up to four times per day. Hauling water to the site on a regular basis would increase the amount of exhaust from the water truck fuel emissions, create additional fugitive dust from vehicle use, and increased road use/wear. The additional road use would most likely require road maintenance using heavy equipment, further increasing the carbon footprint of the Project.

3.10.2.3.2 *Indirect Effects*

The indirect effects on air quality would be similar to those described for Alternative 2.

3.10.2.3.3 *Cumulative Effects*

The cumulative effects to air quality would be similar to those described for Alternative 2. No effect is anticipated.

3.10.2.4 Alternative 4: Drill Site Riparian Reserve Avoidance

Alternative 4 is distinguished from Alternative 3, in that it does not include the installation and exploration activities previously described at Pads 6 and 7 to avoid activity within the Riparian Reserve.

3.10.2.4.1 *Direct Effects*

Direct effects on air quality would be similar to those described for Alternative 3, but have reduced potential to reach the same magnitude of effects due to the elimination of Pads 6 and 7 from this alternative.

3.10.2.4.2 *Indirect Effects*

The indirect effects on air quality would be similar to those described for Alternative 2, but have reduced potential to reach the same magnitude of effects due to the elimination of Pads 6 and 7 from this alternative.

3.10.2.4.3 *Cumulative Effects*

The cumulative effects on air quality would be similar to those described for Alternative 2.

3.10.3 Impact Summary

As outlined in Section 2.1, *Alternatives*, and Appendix E, *Best Management Practices*, BMPs would be implemented during reactivation/installation, operation, and reclamation of the Proposed Project to minimize potential impacts on air quality. Any impacts on air quality would be minor and temporary. No mitigation is proposed.

3.11 Transportation and Access

3.11.1 Affected Environment

3.11.1.1 Existing Road Network

The Proposed Action would involve a work crew likely commuting from the towns of Randle and/or Morton, Washington to the Project Area. When traveling from Morton, workers would access the area from US 12 near Riffe Lake; travel would proceed east along Highway 12 until it intersects with FS Road 26 (7 miles); travel would then proceed southwest along FS Road 25 until it intersects FS Road 26 (7 miles); then proceed on FS Road 26 until it intersects with FS Road 2612 (Development Road) (8 miles), where workers would turn west. The Project Area is located approximately 10 miles west along FS Road 2612. The travel route is asphalt-paved until approximately the final 1.5 miles to the Project Area.

Paved sections along US 12 and CR 39 are maintained by the Washington State Department of Transportation (WSDOT) and Lewis County; FS Roads 2612, 25, and 26 are maintained by the FS.

Within the Project Area, the temporary roads accessed from FS Road 2612 were closed and stabilized in the 1980s. These roads were created during salvage logging activities following the May 1980 eruption of Mount St. Helens and during historic mineral prospecting activities. A gate restricts access to the former temporary roads from FS Road 2612, in addition to Kelly humps installed farther down the road beyond the gate. Closure of these roads included the removal of culverts in existing drainages and falling multiple trees across the road system to discourage motor vehicle use.

3.11.1.2 Road Users

Road use along FS Road 2612 is generally for recreational purposes. Common uses include hiking, fishing, hunting, equestrian travel and access, camping, wildlife viewing, and other typical recreational activities experienced within the National Forest. Travel along FS Road 2612 is infrequent. Near the Project Area, the road is generally used to access the headwaters of the Green River, and the Green River Horse Camp near the southern boundary of the Project Area.

3.11.2 Environmental Consequences

3.11.2.1 Alternative 1: No Action Alternative

Under Alternative 1, no exploratory drilling would occur. Road maintenance, equestrian activities, and other recreational activities would still occur within the Project boundary. The former temporary roads would remain in their current status. Increased travel to access the Project Area would not occur. The roads used to access the site, including FS Road 2612, would continue being used primarily for recreational activities. Negligible direct, indirect, or cumulative effects from this alternative are anticipated due to the low intensity of activity and travel that would continue to occur in and through the area.

3.11.2.2 **Alternative 2: Proposed Action Alternative**

Alternative 2 generally involves 1.69 miles (about 3.3 acres) of temporary roads that would be used for access. This includes 1.35 miles (2.45 acres) of reactivated temporary roads from the 2010 drilling program, and 0.34 mile (0.62 acre) of newly reactivated temporary roads. Equipment for road reactivation and drilling would be mobilized to the site, and subsequently used to restore the former temporary roads, including the installation of temporary and permanent culverts and other water divergent structures. Drilling and exploration personnel would travel daily to the site during the Proposed Project activities. Upon completion of Alternative 2, the reactivated roads would again be restored to a more natural and hydrologically stable condition Access to active work areas and to the equipment staging area would be limited and temporary. Public access would be discouraged to the Project Area work sites by a gate at the access road off of FS Road 2612. Some drilling would occur on the sides of FS Road 2612, and the road used to access the Green River Horse Camp, although drilling would be phased to not conflict with recreational activities at the campsite. Drilling would occur at the side of FS Road 2612 and would not restrict public use of the road.

3.11.2.2.1 *Direct Effects*

Direct effects from Alternative 2 would include temporary use of former logging and temporary FS roads. There would be a minor increase in traffic along the roads to the site, with work crews traveling daily to the Project Area. Work vehicles traveling on FS roads may encounter recreational users. Access around the drill rig and equipment laydown area would be restricted for purposes of public safety. Access to the FS decommissioned road system from FS Road 2612 would remain restricted to the public with the use of a locked gate.

Approximately 15–20 Project employees would be commuting primarily between Randle and Morton, which would not add significantly to the existing Average Daily Traffic (ADT). Water trucks, if used, would make between two and five round-trips per day. The following vehicles would be used for the Project and remain on site:

- Two six-wheel ATVs (gasoline)
- Small track excavator (diesel powered)
- Four four-wheel drive pickup trucks (gasoline and/or diesel powered)

3.11.2.2.2 *Indirect Effects*

Reactivation of former temporary roads would provide improved access to areas within the Project Area, and temporarily improve access to the area by firefighting crews if needed.

3.11.2.2.3 *Cumulative Effects*

Alternative 2 would involve the use of existing active Forest roads and former temporary roads. No new roads would be constructed. Increased travel on the FS road system may lead to accelerated wear and rutting. As part of the Project, road maintenance would be made by Ascot as needed. Overall beneficial cumulative effects may be realized in the form of improved condition of existing roads within the proposed work area at the end of the Project, as Project-related road maintenance is carried out in conjunction with regularly schedule road maintenance activities or makes regularly scheduled road maintenance activities unnecessary; thus, freeing up resources to be used elsewhere.

3.11.2.3 Alternative 3: Based on Scoping Comments

Under Alternative 3, exploratory drilling would be performed with an emphasis on minimizing water use through further actions to limit loss to the formation, additional requirements related to drillhole abandonment, phasing of drilling at specific locations, and modifications to operations related to light and noise. Drilling in the vicinity of the Green River Horse Camp would be restricted to periods that do not conflict with recreation activities.

3.11.2.3.1 *Direct Effects*

The direct effects on transportation and access would be similar to those described for Alternative 2. No effect is anticipated, with the exception that an additional vehicle (water truck) would be utilized during operations, and additional pickup truck vehicle trips would be required to haul grouting materials related to drillhole abandonment. The water truck would make approximately one or two round-trips per day between the Project Area and an off-site water source, likely in Morton or Randle. The pickup truck would drive between off-site stockpiles of grouting material, material staging areas, and drill sites. This would increase traffic by approximately one additional vehicle per 4-hour period.

3.11.2.3.2 *Indirect Effects*

Under Alternative 3, the indirect effects on transportation and access would be similar to those described for Alternative 2. No effect is anticipated.

3.11.2.3.3 *Cumulative Effects*

Under Alternative 3, the cumulative effects on transportation and access would be similar to those described for Alternative 2. Any effect would be beneficial.

3.11.2.4 Alternative 4: Drill Site Riparian Reserve Avoidance

Alternative 4 is distinguished from Alternative 3, in that it does not include the installation and exploration activities previously described at Pads 6 and 7 to avoid activity within the Riparian Reserve.

3.11.2.4.1 *Direct Effects*

Direct effects on transportation and access would be similar to those described for Alternative 2.

3.11.2.4.2 *Indirect Effects*

The indirect effects on transportation and access would be similar to those described for Alternative 2.

3.11.2.4.3 *Cumulative Effects*

The cumulative effects on transportation and access would be similar to those described for Alternative 3.

3.11.3 Impact Summary

As outlined in Section 2.1, *Alternatives*, and Appendix E, *Best Management Practices*, BMPs would be implemented during reactivation/installation, operation, and reclamation of the Proposed Project to minimize potential impacts on transportation and access; however, Project-related road use may cause degradation of those roads through the course of the Project, resulting in ruts or other road damage. Rutting and road damage caused as a result of Project activities would be repaired by Ascot in a timely manner upon completion of the Project. No mitigation is proposed.

3.12 RECREATION

The GPNF provides opportunities for the public to participate and enjoy a range of outdoor recreational experiences in a variety of settings and performance levels, and has included use of the Recreation Opportunity Spectrum in the Forest Plan.

As stated in Section 1.4, *Primary Purpose for Which the Lands were Acquired*, lands within MS-1329 and MS-1330 (168 acres) were acquired with funds provided by the Land and Water Conservation Fund (LWCF) established by Congress in 1964. Lands acquired using LWCF funds are "primarily of value for outdoor recreation purposes" (16 U.S.C. 460l-9(a)(1)(b). The FS determination related to the primacy purpose of outdoor recreation only applies to the 168 acres within MS-1329 and -1330 which are included in Prospecting Permit Application WAOR-066628 because they were acquired with LWCF monies. Considering the analysis in this EA along with identified surface resource protections, and to satisfy the Court order resulting from the civil case adjudicated by the U.S. District Court of Oregon in Gifford Pinchot Task Force v. Perez (2014), the FS will advise the BLM whether the Project would interfere with or be inconsistent with the flow of navigable streams, production of timber, or outdoor recreation.

3.12.1 Affected Environment

Located in southwest Washington State, the GPNF encompasses 1,312,000 acres. The Project Area is located on the south-facing slope of the east-west trending Goat Mountain in the GPNF, and situated north of the Green River between 2,800 and 4,000 feet amsl on the fringe of the area deforested by the 1980 eruptive blast of Mount St. Helens. A northern portion of the Project Area is covered by mature forest that escaped the effects of the 1980 eruption. Areas devastated by the eruption were salvage logged around 1982 and replanted by 1986.

Lands within the Project Area have one designation under the NWFP, known as the "Matrix" designation, which are forest lands outside reserves and withdrawn areas, and available for regularly scheduled timber harvests. Roadless areas and LSRs are present north of the Project Area, but no Project activity is proposed in these areas, and FS trails that access these areas would still be open to the public during the Proposed Action.

Human activity in the Goat Mountain vicinity has been dominated by logging and silvicultural activity, recreation use, and mineral prospecting. Current uses of Goat Mountain and the headwaters of the Green River are primarily for recreation and timber production. The Project Area (Figure 3) includes active forest roads and former temporary roads. The Goat Mountain vicinity provides a variety of recreational activities for visitors, including hiking, horseback riding, bicycling, kayaking, camping, picnicking, fishing, hunting, wildlife and bird watching, sightseeing, and pleasure driving. There are also opportunities for gathering of special forest products including berries, mushrooms, boughs, beargrass, and floral greens.

The Green River, which is located at the southern end of the Project Area, has been determined to be eligible for designation under the National Wild and Scenic Rivers Act. Additional studies are required to determine its suitability for Wild and Scenic River designation. Any designation would be made by Congressional Act. Until a suitability analysis is completed, the values contributing to Wild and Scenic River eligibility are protected on NFS lands, and no activities would be permitted that would alter the eligibility or potential classification of the river.

The Forest Plan established outstandingly remarkable values for all three segments of the Green River on the Gifford Pinchot National Forest to be Scenery, Recreation, Geology, and Historic Resources. The Forest Plan designates the Green River corridor in the Project Area as "6M" – Recreational River. Standards and Guidelines in this management area for Minerals and Geology Inventory and Evaluation and Processing of Site Specific Development Proposals state that "approved plans will include reasonable mitigation and reclamation measures to minimize surface disturbance, sedimentation, and visual impairment." (IV-111).

Primary use of the area is the Green River Horse Camp, Green River Trail #213, and Goat Mountain Trail #217. The Green River Horse Camp, managed by the Back Country Horsemen of Washington (Yakima Chapter), is located on FS Road 2612-027 at the base of Goat Mountain and adjacent to the Green River, and is the only designated FS campsite in the vicinity of the Proposed Action. Each of the eight campsites located there is limited in space to two trailer rigs or three vehicles.

The recreational use season is July through late October, primarily based on practical accessibility of local trails. This equates to approximately 35 weekend days and 90 weekdays. The Green River Horse Camp has six double campsites and two single sites, equaling 70 PAOT's (People at One Time). Total seasonal PAOT capacity would be approximately 8,750, although having 70 PAOT would be extremely crowded and rarely if ever happens. A more reasonable estimate of maximum PAOT would be 30–35.

Despite the fact that each site can handle five to ten people, horse party size usually averages two or three people. The horse camp is where the majority of visitors to the Goat Mountain area park, because most of the area trails noted above can be accessed from there. The numbers of visitors to this area according to the GPNF forester, who oversees FS Road 2612 and associated trail heads, are included in Table 3.12-1.

Table 3.12-1. Visitors to the Green River Horse Camp and Associated Trails

Season	Approximate Number of Visitors per Day	Approximate Number of Visitors per Week
Summer - July through Labor Day	< 2	< 20
Summer Weekends	< 10	N/A
Fall Hunting Season (usually full week stays)	20 to 40	50

The general area is managed by the Mount St. Helens Ranger District. Recreation activities associated with this camp include day hiking, backpacking, horse riding, and bicycling (the loop system of trails provides many mountain biking experiences). FS trails accessible from the Horse Camp are Trails #213, #213A, #213B, #217, #217A, #217B, #217C, #217D, #217E, #218, #218A, #220, and #220A, all of which would remain open to the public during the proposed drilling activities (Figure 11, *Goat Mountain Area Trails*). Other recreational activities include backcountry camping at several small lakes, picnicking, bird watching, and wildlife viewing.

The GPNF LRMP indicates that the management area category furthest north within the Project Area is considered "UD - Unroaded Recreation without Timber Harvest", and is entirely within the boundary of the Tumwater Inventoried Roadless Area. The purpose of Unroaded Recreation is to "provide a variety of dispersed recreation opportunities in a semi-primitive or undeveloped setting."[17]

3.12.2 Environmental Consequences

This section identifies the potential impacts on recreation as the result of the Proposed Project.

3.12.2.1 Alternative 1: No Action Alternative

Under Alternative 1, no exploratory drilling would be done. Equestrian, hunting, hiking, camping, and other recreational activities would continue as currently allowed by the FS within the Proposed Project boundary. No direct, indirect, or cumulative effects would result from this alternative.

3.12.2.2 Alternative 2: Proposed Action Alternative

Under Alternative 2, all recreational activities would continue, except within the immediate vicinity of the proposed drill sites during Project operations. Temporarily

[17] FS LRMP: "Administratively Withdrawn as an Unroaded Recreation without Timber Harvest UD"; The "U" represents the Management Area Category (Retention); D represents the Visual Quality Objectives and Recreation Opportunity Spectrum classes (Semi-primitive/Non-Motorized).

reactivated FS temporary roads would not be available for use by the general public and would be gated throughout the Project.

The scenic, geologic, and recreational values contributing to Wild and Scenic River eligibility on National Forest lands would not be impacted by Alternative 2. Project activities are not proposed immediately adjacent to the river, no new impoundments or additional shoreline access would be created, and no new shoreline development would result from Alternative 2.

3.12.2.2.1 *Direct Effects*

Opportunities for primitive and unconfined recreation throughout the Project Area will remain as they currently are limited only to the extent resulting from existing road decommissioning and closure of more than 10 years and from temporary exclusion in the immediate vicinity of operating drilling equipment in order to maintain public and operator safety. Public use of vehicles over the temporarily reactivated road segments beyond the Project security gate off of FS Road 2612 would be discouraged during the Project timeframe again for reasons of safety and to minimize impacts from road use (eg., interference with project equipment, surface compaction, dust generation, creation of "at will" turn outs, disruption of initial reclamation, etc.). FS Road 2612 would remain open to the public, along with access to the FS Green River and Goat Mountain Trails, and primitive and unconfined recreation in the surrounding area. Drill pads located along FS Road 2612 would be located within a portable drill shack to protect passersby from operating equipment during drilling activities, but the road would remain open to the public. The naturalness of areas in the immediate vicinity of the surface disturbance would be temporarily affected during operations; however, these impacts would be spatially and temporally limited, and reclamation of the roads and drill sites would avoid increased motorized use of the area. Consequently, outstanding opportunities for primitive and unconfined recreation would continue to exist throughout the vicinity of the GPNF, including:

- Recreational Access: Late June through November.
- Green River Horse Camp: Access would be available throughout the summer and fall. Several drill sites are located in and adjacent to the camp. Noise disturbance from the drilling may be an issue, especially on weekends.
- Deer and elk season occurs from September 1 to November 31.

Noise from exploration activities could reduce the opportunity for solitude in the immediate vicinity of each individual drill pad during periods of active operations. For example, the noise level at 100 feet away from a drill pad during drilling would be similar to the noise level of a vacuum at 10 feet away (approximately 70 dB) (see Table 3.14-1, *Drill Rig Equipment Noise*). Noise effects would occur at one drill pad at a time (less than a week for each pad); would be temporary in that the noise effects would last only as long as the exploration was scheduled (3–4 months); and would cease immediately upon completion of Alternative 2.

The operating noise level would be similar to a small bulldozer or skidder with a distinctive higher pitch when the drill is turning. This would be heard on a calm day for several hundred feet, but the intensity would vary with forest cover and terrain conditions. The portable drill shack would muffle noise to the outside, as well as reduce light impacts from drilling at night. Each drill would generally be operational 24 hours a day, 7 days a week, including holidays, subject to agency-directed schedule changes. Noise generated during drilling would diminish with distance as shown in Section 2.1, *Alternatives*, Table 3.14-1, *Drill Rig Equipment Noise*. These decibel levels are based on measurements obtained with the equipment placed between two buildings, which results in more reflected noise energy than would occur in the Project Area. The tarpaulin cover over the drill shack and surrounding vegetation would likely result in rapid noise attenuation and/or provide barriers for absorption of sound.

Traffic from approximately 15–20 workers commuting from Randle and Morton would add some additional vehicle traffic to the Goat Mountain site; however, employee vehicles would be parked behind the security gate leading north off of FS Road 2612, and would not interfere with visitors to the Green River Horse Camp and associated parking and trail heads. Trail #219 (Quartz Creek Big Trees) is south of the Green River and would not be impacted. There would also be a temporary noise increase from the mobilization of heavy equipment at the beginning (as early as May) and end (as late as November) of Alternative 2.

It is anticipated that hunting opportunities would not be adversely impacted by Alternative 2. Direct effects on wildlife such as migratory and resident mammals resulting from Project Actions may include tree removal, noise, and presence of workers, equipment, and lighting. These impacts are minor. Some individuals may be temporarily affected; however, the population as a whole would not. Mobile wildlife would be expected to temporarily vacate habitat adjacent to operating equipment because of noise and activity, dispersing to other areas around the Project Area where hunting activities could continue.

There would likely be a minor and temporary reduction in wildlife viewing opportunities for visitors to the area. As described in Section 3.5.2, direct impacts on wildlife are expected to be minor due to the limited amount of disturbance proposed, the scheduling, and the temporary duration of activity. Tree removal, noise, presence of workers and equipment, and lighting would occur at one drill site at a time. This would affect wildlife temporarily within very limited areas that would change as the Project progresses. Animal response to sound levels depends on a number of complicated factors, and has not been well studied in many species of wildlife (WSDOT 2014). Most wildlife would likely at least detect noise from equipment operation associated with the Project when within an estimated 400 feet or less. Disturbance of mobile wildlife is most likely to occur within 100 feet of road reactivation/pad installation activities at specific drill pad sites. The severity of disturbance to wildlife would further vary by the duration and timing of the noise. During the non-breeding season, wildlife are less likely to be tied to a certain location. Therefore, effects from noise may be reduced during the hunting (non-breeding) season when individuals can relocate to a less noisy area. The proposed prospecting activity would not contribute to a change in wildlife species viability on the GPNF.

The presence of workers and equipment could also affect wildlife in the Project Area. Employees could cause additional disturbance to wildlife if they travel by foot in and around the Project Area during work activities or while on breaks. This could increase the area of habitat that may be subject to temporary disturbance by the Project Action.

The spring that flows from a hose in the ground approximately mid-way between Pads 10 and 11 along the access road is sometimes used as a drinking water source. This water source has not been sanctioned by the FS as potable water. It is not intended to be used for anything other than non-potable uses such as washing car windows, fighting fires, and perhaps stock use. Water quality or quantity impacts on this spring resulting from the Proposed Project would be negligible.

In summary, impacts on recreation uses would be limited to the immediate vicinity of the Project Area, and more specifically, to individual drill pad sites at the time of drilling activity. Any proposed disruption would be temporary, and of a nature that would not permanently impair recreation in the Project Area.

3.12.2.2.2 *Indirect Effects*

No indirect effects on recreation activities are anticipated from Alternative 2.

3.12.2.2.3 *Cumulative Effects*

Alternative 2 would not limit access to this area for recreation use; therefore, the only potential impacts would be from temporary noise and slightly increased traffic and work activity in the area. The primary recreation uses in the immediate area are hiking, fishing, backpacking, trail and pack horse activities, wildlife and bird watching, hunting, and mineral collection. These activities may be impacted by noise and human presence in the immediate area, but effects would be temporary and would diminish as recreation activity moves away from the south face of Goat Mountain. Noise could affect hunting; however, Alternative 2 would result in only localized temporary disturbance from noise and would, therefore, have negligible impacts on hunting. When considering the past, present, and RFFAs identified in Section 3.1, *Introduction*, cumulative effects on recreation as a result of Alternative 2 would be negligible because the effects would be temporary and localized, only occurring during the Project, and road repairs required as part of the Project would likely offset many scheduled road maintenance activities. The incremental increase in road maintenance due to the Project may overlap the temporary and localized effects of regularly scheduled road maintenance, but the overall scale of the combined Project effects and effects of RFFAs is small relative to the recreation opportunities available in the GPNF and surrounding area.

3.12.2.3 **Alternative 3: Based on Scoping Comments**

Under Alternative 3, the drilling on pads in close proximity to the Green River Horse Camp would be controlled to reduce seasonal use conflicts with recreation. Pads 6 and 7 are located near the horse camp, and drilling there would be restricted to daytime hours only during the week prior to Labor Day. Drilling at Pads 6 and 7 may not occur after Labor Day. To reduce impacts on surrounding areas due to noise, a drill shack with baffles and/or insulation would be used. To reduce the impacts due to operating lights, lighting would be directed toward the drill. Hiking, equestrian activities, recreational vehicle traffic, and other recreational uses could still occur within the Proposed Project boundary.

Under Alternative 3, which emphasizes minimizing water use through further actions to limit loss to the formation, there may still be a need to bring water in from off-site portable sources to supplement drilling needs that cannot be met locally due to permit restrictions, or for dust control and emergency use including fire suppression. This would require the use of a water truck operating over paved and improved forest roads making up to five round-trips per day during drilling. All drillholes would be sealed with cement or grout.

The values contributing to Wild and Scenic River eligibility on National Forest lands would not be impacted by Alternative 3 for the same reasons as stated for Alternative 2 in Section 3.12.2.2.

3.12.2.3.1 *Direct Effects*

The direct effects on recreation would be reduced over those stated for Alternative 2 due to reduced impacts in the vicinity of the horse camp resulting from restricting drilling at Pads 6 and 7 to daytime hours only during the week prior to Labor Day and prohibiting drilling at these pads after Labor Day. However, use of more off-site water would increase the potential for recreational users encountering water trucks along roadways. Also, the negligible impacts on water quality or quantity of the (Pads 10 and 11) spring would be further reduced because all drillholes would be sealed with grout under this alternative.

3.12.2.3.2 *Indirect Effects*

Under Alternative 3, the indirect effects on recreation would be similar to those described for Alternative 2. No effect is anticipated.

3.12.2.3.3 *Cumulative Effects*

The cumulative effects of Alternative 3 would be similar to Alternative 2 and would be negligible.

3.12.2.4 **Alternative 4: Drill Site Riparian Reserve Avoidance**

Alternative 4 is distinguished from Alternative 3, in that it does not include the installation and exploration activities previously described at Pads 6 and 7 to avoid activity within the Riparian Reserve.

3.12.2.4.1 *Direct Effects*

By eliminating operations at Pads 6 and 7 under this alternative, direct effects on recreation associated with horse camp described under Alternative 3 would not occur. Other direct effects on recreation would be similar to those stated under Alternative 3.

3.12.2.4.2 *Indirect Effects*

The indirect effects on recreation would be the same as those described for Alternative 2.

3.12.2.4.3 *Cumulative Effects*

The cumulative effects on recreation would be similar to those described for Alternative 2.

3.12.3 Impact Summary

As outlined in Section 2.1, *Alternatives*, and Appendix E, *Best Management Practices*, BMPs would be implemented during reactivation/installation, operation, and reclamation of the Proposed Project to minimize potential impacts on recreation; however, limited vegetation removal is a necessary component of the Project and may affect recreation on a local scale. Areas cleared for roads and drill pads would be reclaimed as described in Section 3.7, *Vegetation*. No mitigation is proposed.

The Proposed Project would meet Forest Plan Standards and Guidelines for management allocations within the project area. Unroaded Recreation (UD) would not be affected because the nearest proposed project activities (Pad 13) are almost a half a mile from this management area and should not be seen or heard by recreationists within the Tumwater Roadless area, except as they are passing through while going to or from trails. In "TS-General Forest," Forest-wide Minerals and Geology Standards and Guidelines apply which require that "operating plans include reasonable and operationally feasible requirements for timely and effective coordination with other resources" (IV-63). Recreation impacts in this area would be further limited by the small footprint of the drill sites (400-square foot area per drill pad) site; timing of the drilling to avoid noise and other conflicts with recreational activities as much as possible; designing the Proposed Action with plans to remove all equipment at the end of the Project activities; and reclaiming all disturbed areas.

Pads 4, 5, 6, and 7 are within ¼ mile of the Green River, but would not directly affect recreation occurring in the river, nor will they affect the Wild and Scenic eligibility of the river because no new impoundments or additional shoreline access would be created, and no new shoreline development would result from any of the action alternatives. The values (Scenic, Recreation, Historic, Geologic) contributing to the eligibility of the Green River as Wild and Scenic would not be affected due to the limited area of disturbance that would be caused by action alternatives.

For the above reasons the project is not expected to disturb the recreation experience to the extent that it would interfere with recreation as a primary purpose for the lands acquired through LWCF.

3.13 Socioeconomics

The U.S. Department of Housing and Urban Development (HUD), Executive Order 12898, Environmental Justice, directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations resulting from federal programs, policies, and activities. Also, socioeconomic and demographic data for residents in the Project vicinity were studied to determine if the Proposed Action would have disproportionate impacts on minority or low-income persons.

3.13.1 Affected Environment

The Project Area is located in Skamania County, Washington, but the communities most convenient to the Project Area are Randle and Morton in adjacent Lewis County. Detailed data for minority population are available from the 2010 Census (U.S. Census Bureau 2010), and data regarding poverty status are available from the 2006–2010 American Community Survey. These data were used to identify the minority and low-income compositions of the Project Area including the City of Morton, Skamania County, Lewis County, and Cowlitz County, relative to State of Washington compositions. Randle is unincorporated but general population data appear similar to Morton. Table 3.13-1 indicates minority and low-income populations within these populations:

Table 3.13-1. Project Vicinity Population Data

Geographic Area	Total Population	Minority Population		Low-Income Population	
Washington State	6,724,540	1,526,471	22.7%	813,669	12.1%
Cowlitz County	102,410	11,368	11.1%	17,307	16.9%
Lewis County	75,455	7,772	10.3%	10,036	13.3%
Skamania County	11,066	797	7.2%	1,040	9.4%
City of Morton	1,126	65	5.8%	69	6.1%
Randle*	2,184	106	4.3%	(Not available)	

Notes: Percentages from U.S. Census Bureau; population number was calculated from that percentage.
*Randle is unincorporated and limited census data and statistics are available.

The minority population was lower within the Project Area (Randle and the City of Morton) than the three counties and the state as a whole.

The number of individuals over the age of 16 and percentage of these individuals that are employed and unemployed within the City of Morton, Skamania County, Lewis County, and Cowlitz County as presented in the 1990, 2000, and 2010 Censuses, relative to Washington State, are shown in Table 3.13-2.

The unemployment rate in the City of Morton, Lewis County, and Cowlitz County in 1990, 2000, and 2010 was generally higher than the State of Washington. Although the unemployment rate in Skamania County was lower than the state in 2010, historically it has been higher. A portion of increasing unemployment can be attributed to declining employment in natural resource industries. As shown in Table 3.13-3, data obtained from the 1990, 2000, and 2010 Censuses of the City of Morton, Skamania County, and Lewis County show a general decrease in employment in agricultural, forestry, fisheries, hunting, and mining industries relative to Cowlitz County and Washington State. The combined agricultural, forestry, fisheries, hunting, and mining category is presented for comparison as Project-related employment would likely occur in this category.

Table 3.13-2. Project Area Employment

Subject	City of Morton			Skamania County			Lewis County		
	1990	2000	2010	1990	2000	2010	1990	2000	2010
Population 16 and Over	874	824	981	6,070	7,602	8,747	44,393	52,750	60,047
Labor Force	507	415	436	3,725	4,888	5,345	25,477	29,552	32,936
% Employed	92%	94%	86%	89%	89%	91%	92%	91%	86%
% Unemployed	8%	6%	14%	11%	11%	9%	8%	9%	14%

Subject	Cowlitz County			State of Washington		
	1990	2000	2010	1990	2000	2010
Population 16 and Over	62,042	70,982	79094	3,730,985	4,553,591	5,342,873
Labor Force	36,987	43,212	46,704	2,433,177	2,979,824	3,440,495
% Employed	93%	92%	89%	95%	94%	89%
% Unemployed	7%	8%	11%	6%	6%	11%

Table 3.13-3. Employment by Sector

Geographic Area	Agriculture, Forestry, Fisheries, Hunting, and Mining Workers			
	1990	2000	2010	% Change 1990–2010
City of Morton	17	17	8	-53%
Skamania County	312	218	237	-24%
Lewis County	2,252	2,151	1,808	-20%
Cowlitz County	935	1,405	1,592	+70%
State of Washington	89,186	68,976	81,390	-9%

The communities of Randle and Morton support existing businesses including at least three motels and inns within 1.5 miles of Randle and two motels in Morton. There are at least four grocery stores and five gas stations between the two communities.

3.13.2 Environmental Consequences

This section identifies the potential impacts on socioeconomics as the result of the Proposed Action.

3.13.2.1 Alternative 1: No Action Alternative

Under Alternative 1, no exploratory drilling would occur. Road maintenance, equestrian activities, and other recreational activities would likely continue along current trends within the Project Area. No change in current socioeconomic trends would be anticipated under this alternative.

3.13.2.2 Alternative 2: Proposed Action Alternative

3.13.2.2.1 *Direct Effects*

As Described in Section 2.1, *Alternatives*, Project work for Alternative 2 would occur between late May and early November and involve both local workers and specialized crews from outside the local area. Ascot typically attempts to hire local residents and utilize existing facilities as much as possible. A local contractor would likely be selected for clearing and reactivating roads, providing water truck services, and decommissioning roads. Road materials such as gravel would also likely be purchased locally. During exploration activities, approximately 18 workers would work in the field, at drill sites, and in a core processing facility that would be located in an existing structure in Randle. The exploration work would be distributed among the positions identified in Table 2.1-5, *Job Types Associated with Exploratory Drilling and Anticipated Number of Positions*.

Socioeconomic activity associated with Alternative 2 would include contracting with local contractors, hiring a small number (<18) of local workers, providing lodging and meals for a small number of out of area workers (<18), and purchasing fuel for Project vehicles and equipment. The total number of local workers that would be hired for this seasonal Project would be less than 5 percent of the labor force in Morton and far less than 1 percent of the labor force in any surrounding county. It is unlikely that workers would choose to stay at the nearby Green River Horse Camp as there are limited amenities and no potable water. Lodging, meals, and fuel purchases would likely be concentrated at existing businesses in the central business areas of the communities of Randle and Morton. The Project duration would be relatively short, at approximately 5 months, and socioeconomic effects would be temporary. No new infrastructure would be needed in the communities of Randle or Morton to support the Project.

While unemployment in Randle and Morton is about the same or higher than the surrounding counties, the minority population in these communities is lower. The effects from Alternative 2 on minority groups, women, civil rights, or social/ethnic groups residing in the area and in greater Lewis, Cowlitz, and Skamania counties are not expected to be disproportionately high. The disturbance from Project activities may temporarily displace recreation activity in the Project Area within the GPNF as described in Section 3.12, *Recreation*, but would equally affect all people who recreate in the area, not just minorities or low-income populations. This temporary displacement of recreation activity may result in a slight reduction in local summer season economic activity in local communities but would likely be offset by the additional economic activity that would result from the Project. The net effect would likely be beneficial. The economic effect would be concentrated in the business centers of Randle and Morton, the same businesses that serve the populations of these communities as a whole, not just minority and low-income residents. All residents of the area would be equally affected for the same length of time (approximately 5 months). Alternative 2 would not have disparate effects on any consumers, minority groups, women, civil rights, or social/ethnic groups. Future timber harvest in the area would not be precluded or impacted by Alternative 2.

3.13.2.2.2 *Indirect Effects*

The Project would be short term, lasting up to 5 months. No permanent relocations would be induced and no permanent infrastructure would be created by the Project. There would be no lingering socioeconomic effects beyond Project completion. Socioeconomic effects of the Project would be minor and limited to the communities nearest the Project Area while the Project is ongoing. No indirect socioeconomic effects are expected to result from the Project, including no indirect effects on minority and low-income populations.

3.13.2.2.3 *Cumulative Effects*

The increment of direct changes in employment, access, income, or other social or economic factors resulting from the Project would be minor and not significant. No indirect effects would result from this short duration, temporary Project. When considering the past, present, and RFFAs identified in Section 3.1, *Introduction*, the Project may cause a reduction in the number of recreational users visiting the area for one season (5 months or less) due to disturbance, and some Project-related road repairs may offset the need for scheduled maintenance on some roads, but the minor and temporary increase in local employment and economic stimulation would offset these effects. Cumulative effects resulting from Alternative 2 would be negligible.

3.13.2.3 **Alternative 3: Based on Scoping Comments**

Under Alternative 3, exploratory drilling would be performed with balancing the water use, additional drillhole abandonment requirements, phasing of drilling at specific locations, and modifications to operations related to light and noise. In addition to the local hires anticipated under Alternative 2, one or two local water truck operators may be hired for the duration of operations under this alternative.

3.13.2.3.1 *Direct Effects*

The direct effects on socioeconomics would be similar to those described for Alternative 2, except that additional local personnel may be required to operate the water truck during operations or truck in supplies needed for drillhole abandonment. The temporary noise and disturbance from Project activities in the area of the Green River Horse Camp would be minimized and would not displace recreation activity. The net socioeconomic benefit of the Project would likely be slightly greater than that anticipated under Alternative 2.

3.13.2.3.2 *Indirect Effects*

Under Alternative 3, the temporary nature, short duration, and limited spatial scale of the Project would be the same as Alternative 2, and the indirect effects on socioeconomics would be the same as those described for Alternative 2. No indirect effect would be anticipated.

3.13.2.3.3 *Cumulative Effects*

Under Alternative 3, the cumulative effects on socioeconomics would be similar to those described for Alternative 2. Negligible cumulative effects are anticipated.

3.13.2.4 Alternative 4: Drill Site Riparian Reserve Avoidance

Alternative 4 is distinguished from Alternative 3 in that it does not include the installation and exploration activities previously described at Pads 6 and 7 to avoid activity within the Riparian Reserve.

3.13.2.4.1 *Direct Effects*

Alternative 4 would include the same potential hiring of one or two additional personnel as truck operators described under Alternative 3, but with reducing the field exploration by two drill pads, the field effort would be slightly reduced. The direct socioeconomic effects of Alternative 4 would be a net socioeconomic benefit, similar to Alternatives 2 and 3.

3.13.2.4.2 *Indirect Effects*

Under Alternative 4, the temporary nature, short duration, and limited spatial scale of the Project would be the same as Alternatives 2 and 3, and the indirect effects on socioeconomics would be the same. No indirect effects would be anticipated.

3.13.2.4.3 *Cumulative Effects*

The cumulative effects on socioeconomics would be similar to those described for Alternatives 2 and 3.

3.13.3 Impact Summary

Any adverse socioeconomic impacts would be negligible and temporary. No mitigation opportunities have been identified or proposed.

3.14 NOISE

The Proposed Action would involve the operation of motor vehicles and other noise-generating equipment. This section evaluates the potential effects of any noise anticipated by the Project.

3.14.1 Affected Environment

As described in Section 3.12, *Recreation*, the Project Area includes a forested environment commonly used for recreation. Those who may perceive noise generated by the Project would likely include wildlife species and recreational users. Existing noise levels in the Project Area generally include normal forest noise, along with minor human activity from low-level recreation use. The ambient noise level in the forest is generally considered to be 40 decibels (dB) (WSDOT 2014).

3.14.2 Environmental Consequences

3.14.2.1 Alternative 1: No Action Alternative

Under Alternative 1, no Project exploratory drilling would occur. The ambient noise level in the forest, along with noise from minor recreational activity, would remain similar to current levels.

3.14.2.2 Alternative 2: Proposed Action Alternative

3.14.2.2.1 *Direct Effects*

The use of trucks, excavator, ATVs, and drill rig, as well as chainsaws and diesel-powered water pumps, would introduce a temporary increased level of sound into the Project Area. However, the noise generated during drilling and other motorized activities would diminish with distance from the source. The operating noise level of the drill rig is similar to a small bulldozer or skidder, with a distinctive higher pitch when the drill is turning. This can be heard on a calm day for several hundred feet, but the intensity varies with forest cover and slope aspect. Noise generated during drilling would diminish with distance as shown in Table 3.14-1, *Drill Rig Equipment Noise*. While ear protection is required within the drill shack, the shack itself would tend to muffles noise to the outside. In comparison, chainsaws are considered to have an average maximum noise level of 84 dB, and an excavator has 81 dB measured at 50 feet. It is anticipated that the Project drill rig would generate noise levels shown in Table 3.14-1.

The decibel levels shown in Table 3.14-1 are based on measurements obtained with the equipment placed on a hard surface between two buildings and are more intense than would be experienced in an open forest setting. The tarpaulin cover over the drill shack, open terrain, and surrounding vegetation would aid in attenuating noise levels. Using the noise attenuation table for soft-site conditions (vegetated area), drilling would attenuate (diminish) to ambient (normal forest noise) levels at 1,377 feet from the source.

Table 3.14-1. Drill Rig Equipment Noise

Distance from Drill Rig or Other Associated Activity	Maximum Decibel (dB) Level (approximate) of Drill Rig		*Decibel Levels Equivalent to:
	During Idle (2,500 RPM)	During Drilling	
10 feet	76 dB	93 dB	90 dB = jackhammer at 50 feet
50 feet	60 dB	76 dB	80 dB = heavy-duty truck at 50 feet
100 feet	55 dB	68 dB	70 dB = vacuum cleaner at 10 feet

* http://www.osha.gov/SLTC/noisehearingconservation/.

3.14.2.2.2 *Indirect Effects*

Using the noise attenuation table for soft-site conditions (vegetated area), sound levels from drilling would attenuate (diminish) to ambient (normal forest noise) levels at 1,377 feet from the source. Noise would only be generated by the temporary operation of equipment during the Project. No Project-related equipment would remain active beyond the end of the Project, and no increase in noise generating activity beyond the end of the Project would be induced. No indirect noise effects would be anticipated.

3.14.2.2.3 *Cumulative Effects*

While Alternative 2 would produce localized temporary direct noise effects, no noise is currently being produced by past activities in the CESA, very little noise is produced by current recreation activities, and localized and temporary noise is produced by ongoing scheduled road maintenance activities as they occur. In addition, RFFAs identified in Section 3.1, *Introduction*, are limited to the continuation of ongoing recreation and scheduled road maintenance activities. Negligible cumulative noise effects would result.

3.14.2.3 Alternative 3: Based on Scoping Comments

Under Alternative 3, exploratory drilling would be performed with balancing the use of on-site water with off-site water and the re-use of drilling fluids; additional requirements related to drillhole abandonment; phasing of drilling at specific locations; and operational changes related to light and noise. Noise related operational changes would include the installation of additional baffling of the drill shack to reduce noise output. Drilling at Pads 6 and 7 in the vicinity of the Green River Horse Camp would be restricted to daytime hours during the week prior to Labor Day and would not occur after Labor Day.

3.14.2.3.1 *Direct Effects*

The direct effects on noise would be similar to those described for Alternative 2, except that instantaneous noise output related to drilling would be reduced slightly by additional baffling of the drill shack; although length of time of noise generation would increase due to sealing every drillhole with grout, which requires mechanized mixing and pumping. In addition, noise related to additional water truck traffic would increase along vehicle routes and near the temporary on-site water tank. The effects related to water truck operations would likely be of short duration (the time it takes a water truck to pass a particular location or to unload water), every 2 to 4 hours depending on water use needs. Furthermore, noise and disturbance from Project activities in the area of the Green River Horse Camp would be minimized by restricting drilling to daytime hours during the week prior to Labor Day and prohibiting drilling after Labor Day.

3.14.2.3.2 *Indirect Effects*

Under Alternative 3, the indirect effects on noise would be similar to those described for Alternative 2. No effects are anticipated.

3.14.2.3.3 *Cumulative Effects*

Under Alternative 3, the cumulative effects on noise would be similar to those described for Alternative 2. No cumulative effects are anticipated.

3.14.2.4 Alternative 4: Drill Site Riparian Reserve Avoidance

3.14.2.4.1 *Direct Effects*

By eliminating operations at Pads 6 and 7 under Alternative 4, direct effects on noise associated with the Green River Horse Camp described under Alternative 3 would not occur. Other direct effects on noise would be similar to those described for Alternative 3.

3.14.2.4.2 *Indirect Effects*

The indirect effects on noise would be similar to those described for Alternative 2.

3.14.2.4.3 *Cumulative Effects*

The cumulative effects on noise would be similar to those described for Alternative 2.

3.14.3 Impact Summary

As outlined in Section 2.1, *Alternatives*, and Appendix E, *Best Management Practices*, BMPs would be implemented during reactivation/installation, operation, and reclamation of the Proposed Project to minimize potential impacts related to noise. Any impacts resulting from noise would be minor given the temporary nature of the noise, and relatively limited area and number of receptors that would be affected. No mitigation is proposed.

4 LIST OF PREPAERS

The people involved in preparing this EA, their titles, affiliation, and years of experience are listed in Table 4.0-1.

Table 4.0-1. List of Preparers

Name	Title/Discipline	Agency or Firm	Years of Experience
Eric Hoffman	Contract Geologist	BLM	44
Leslie Frewing	Planning Coordinator	BLM	25
Bob Harrison (retired)	Geologist, Solid Minerals Lead	BLM	37
Michael Campbell	Public Affairs Specialist	BLM	27
Chris DeWitt (retired)	Geologist – Minerals Section Chief - Division of Lands Minerals and Energy Resources	BLM	33
McDonald, Stan (retired)	State Archaeologist & Tribal Relations	BLM	40
Cheryl Seath (reassigned)	Forest Geologist, CME,OSC, EP	FS	22
Ruth Seeger (reassigned)	Area Mining Geologist	FS	27
John Dryden	Forest Geologist & Geotechnical Engineer	FS	6
Kristie Miller	Cowlitz Valley District Ranger	FS	31
Carol Chandler	Wildlife Biologist	FS	34
Rick McClure	Archaeologist	FS	32
Kim Vieira-Rainville	GIS Analyst	FS	25
Mike McConnell	Hydrologist	FS	15
David Hu	Fisheries Biologist	FS	11
Mark Gingrich	Washington Zone Mineral Administrator	FS	27
Erica Taecker	Natural Resource Specialist	FS	10

Name	Title/Discipline	Agency or Firm	Years of Experience
Robert Varner	Forest Engineer & Minerals Staff Officer	FS	7
Richard Langendoen, LG, LHG	Vice President/ Geologist/ Hydrogeologist	AECOM	32
David Enos LG, LHG	Vice President/ Geologist/ Hydrogeologist	AECOM	24
Keith O’Connell, P.E.	Vice President/Civil and Geotechnical Engineer	AECOM	30
David Every, Ph.D.	Principal Ecologist	AECOM	35
Jacqui Halvorson	Planner/NEPA Specialist	AECOM	11
Bill Bumback	Senior Environmental Planner	AECOM	20
Bill Mavros	Senior Fisheries Biologist	AECOM	22
Jeff Walker, PWS	Botanist	AECOM	17
Jennifer Pretare, Ph.D.	Senior Biologist	AECOM	16
Cary Kindberg	Senior GIS Analyst	AECOM	14
Sarah McDaniel, MA, RPA	Archaeologist	AECOM	13
Bill Kidder	Ecologist	AECOM	12
Michelle Stegner	Archaeologist	AECOM	12
Noah Herlocker, PWS	Senior Ecologist/Wetlands	AECOM	11
Gary Panther, LG	Geologist	AECOM	11
JR Sugalski, EIT	Environmental Engineer/Geologist	AECOM	5

5 AGENCIES, TRIBES, AND ORGANIZATIONS CONSULTED

Authorities that contain procedural requirements that pertain to the treatment of elements of the environment when the BLM is considering a federal action and where consultation compliance has been required are listed in Table 1.3-1, *Supplemental Authorities Consulted*. Tribes and federal and state agencies consulted during the development of this EA are listed in Table 5.0-1.

Table 5.0-1. Tribes and Federal and State Agencies Consulted

Consulting Agency/Tribe	Compliance Required	Date of Consultation	Approved/ Signed Y/N
Tribal Government-to-Government Consultation			
Cowlitz Indian Tribe	Government to Government Consultation	March 16, 2012 May 30, 2012 August 28, 2012 November 16, 2012 Ongoing	
Federal Agencies			
U.S. Department of the Interior – Bureau of Land Management	Lead Agent Decision Record and FONSI	Ongoing	
U.S. Forest Service – Region 6	Surface Managing Agency – Decision Notice and FONSI	Ongoing	
U.S. Department of Fish and Wildlife	Complying with the ESA. Submitting the BA initiates informal consultation with USFWS	FS	August 21, 2012
Washington State Agencies			
Washington State Department of Archaeology and Historic Preservation	A cultural resource professional completes a survey to determine if any historic buildings or archaeological sites are located in the APE.	FS Archaeologist	July 30, 2012
Washington State Department of Fish and Wildlife	Comply with the ESA. Submitting the BA initiates informal consultation with WDFW.	FS	July 25, 2012
State of Washington Department of Ecology	Comply with Southwest Clean Air Agency; chapter 90.48 RCW, Water Pollution Control and WAC 173-201, Water Quality Standards for Surface Waters of the State of Washington	BLM	August 14, 2012

6 REFERENCES

Ascot USA. 2011. Revised Exploration Plan for Prospecting Permit submitted to the BLM and FS on the Mount Margaret Project, Skamania County, Washington State, Ascot USA Inc. 14 pages + appendixes. May 26, 2011.

Baker 1931. Nearctic land snails. Proceedings, Academy of Natural Sciences of Philadelphia 73: 85-117.

Bat Conservation International. 2012. *Species profiles – Long-legged myotis*. Available at: [http://www.batcon.org/index.php/all-about-bats/species-profiles.html.](http://www.batcon.org/index.php/all-about-bats/species-profiles.html)

Boyd, Diane. 1999. Carnivores-wolves, Chapter 7 in G. Joslin and H. Youmans, coords., Effects of recreation on Rocky Mountain wildlife: a review for Montana. Committee on effects of recreation on wildlife, Montana Chapter of The Wildlife Society. 307pp.

Burke, Thomas E. Version 2.0. Management Recommendations for Terrestrial Mollusk Species *Prophysaon coeruleum*, Blue-Gray Taildropper & *Prophysaon dubium*, Papillose Taildropper.

Campbell, M.D., and G.R. Gray. 1975. Mobility of Well-Drilling Additives in the Ground-Water System. In Conference Proceedings, Environmental aspects of Chemical Use in Well-Drilling Operations. Office of Toxic Substances, Environmental Protection Agency: 261-284.

Carroll, C., M.K. Phillips, N.H. Schumaker, and D.W. Smith. 2003. Impacts of landscape change on wolf restoration: a reintroduction program based on static and dynamic spatial models. Conservation Biology 17(2):536-548.

Cascades Carnivore Project. 2008. August 17, 2008 Wolverine Sighting Reported on Mount Saint Helens. http://cascadescarnivoreproject.blogspot.com/2009/08/aug172008-wolverine-sighting-reported.html.

COSEWIC. 2002. COSEWIC assessment and status report on the dromedary jumping-slug *Cryptomastix devia* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, Canada. 20 pp.

______. 2003. COSEWIC Assessment and Status Report on the Rocky Mountain Ridged Mussel (*Gonidea angulata*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 29 pp.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish and Wildlife Service. FWS/OBS-79/31. Washington, DC.

Driscoll, F.G. 1986. Groundwater and wells (2d ed.): St. Paul, Minnesota, Johnson Filtration Systems, Inc., 1089 p.

Doughton, Doughton, Sandi. 2004. "Mount St. Helens the State's No. 1 Air Polluter." *Seattle Times* 01 Dec. 2004.

Duncan, N. 2005. Conservation Assessment for *Cryptomastix hendersoni*, Columbia Oregonian. Originally issued as Management Recommendations, February 1999, John S. Applegarth. Forest Service Region 6 and USDI Bureau of Land Management, Oregon and Washington.

Duncan, N., T. Burke, S. Dowlan, and P. Hohenlohe. 2003. Survey Protocol for Survey and Manage Terrestrial Mollusk Species from the Northwest Forest Plan, version 3.0. Portland, OR. U.S. Department of Interior, Bureau of Land Management, Oregon/Washington and U.S. Department of Agriculture, Forest Service, Region 6. 70 pp. Website: http://www.blm.gov/or/plans/surveyandmanage/SP/Mollusks/terrestrial/Mollusk%20document.pdf.

Eder, T. 2002. Mammals of Washington and Oregon. Lone Pine Publishing. 351 pp.

Flores, Kevin. 2011. *Mt. Margaret Drilling Proposal*. USDA Gifford Pinchot National Forest, Cowlitz Valley Ranger District, Randle, Washington.

Foltz, Randy B., Kristina A. Yanosek, and Timothy M. Brown. 2008. Sediment Concentration and Turbidity Changes during Culvert Removals. *Journal of Environmental Management*. 87(3): 329-340.

Franklin, Jerry F., and C.T. Dyrness. 1988. *Natural Vegetation of Oregon and Washington*. Oregon State University Press.

Frest, T.J., and E.J. Johannes. 1992. Effects of the March, 1992 drawdown on the freshwater mollusks of the Lower Granite Lake area, Snake River, SE WA and W. ID. Final Report to U.S. Army Corps of Engineers, Walla Walla District. Deixis Consultants, Seattle, Washington. i + 11 pp.

______. 2000. Baseline Mollusk Survey of Southwest Oregon (Rogue and Umpqua Basins). Deixis Consultants, Seattle, Washington. Oregon Natural Heritage Program, Portland, Oregon.

Gerlach, T.M., K.A. McGee, and M.P. Doukas. 2008. Emission Rates of CO2, SO2, and H2S, Scrubbing, and PreEruption Excess Volatiles at Mount St. Helens, 2004–2005. U.S. Geological Survey Professional Paper, 1750, p. 543-571.

Haapala, D.L. 1993. *Green River 1993 Stream Survey Narrative*. Gifford Pinchot National Forest, Mount St. Helens National Volcanic Monument. Amboy, WA.

Iyall, William. 2012. Goat Mountain Prospecting EA: *Cowlitz Tribal Consultation*. Letter from William Iyall, Chairman, Cowlitz Indian Tribe, to Edward Shepard, BLM Oregon/Washington State Office, and Kristie Miller, District Ranger, FS Gifford Pinchot National Forest. Letter dated March 16, 2012.

Jenson, W.F., T.K. Fuller, and W.L. Robinson. 1986. Wolf, *Canis lupus*, Distribution on the Ontario-Michigan Border near Sault Ste. Marie. Canadian Field Naturalist. 100(3):363-366.

Jiao, D., and M.M. Sharma. 1994. Mechanism of Cake Buildup in Crossflow Filtration of Colloidal Suspensions. Journal of Colloid and Interface Science (1994) 162, 454-462.

Kelessidis, V.C., D. Tsamantaki, N. Pasadakis, E. Repouskou, and E. Hamilaki. 2006. Permeability, porosity and surface characteristics of Filter Cakes from Water-Bentonite Suspensions. Paper to be presented at the 6th International Conference on Advances in Fluid Mechanics, 8-10 May, 2006, Skiathos, Greece.

Mack, Cheryl. 2003. *A Burning Issue. Fire Management Today*, vol. 63, No. 2, accessed online at: http://www.wildfirelessons.net (documents/Fire_Use_Mt_Ranier_fmt63-2.pdf.)

McClure, Richard H. 1982a. *Bismarck-Bridge Timber Sale*. USDA Gifford Pinchot National Forest, Randle Ranger District, Randle, Washington.

_______. 1982b. *Polar-Hope Timber Sale*. USDA Gifford Pinchot National Forest, Randle Ranger District, Randle, Washington.

_______. 1984. *The St. Helens Mining District: A Condensed History*. Skamania County Heritage. Volume 13, No. 2.

McDaniel, Sarah, and Michelle Stegner. 2012. *Cultural Resource Inventory for Ascot Corporation's Goat Mountain 2012 Exploratory Drilling Lease Application*. URS Corporation, Portland, Oregon.

Mech, L. David, S.H. Fritts, G.L. Radde, and W.J. Paul. 1988. Wolf Distribution and Road Density in Minnesota. Wildlife Society Bulletin. 16:85-87.

Moen, W.S. 1977. St. Helens and Washougal Mining Districts of the Southern Cascades of Washington: *Washington Division of Geology and Earth Resources* Information Circular 60, 71 p., available online at: http://www.dnr.wa.gov/publications/ger_ic60_sthelens_washougal_mining_dist.pdf.

National Oceanic and Atmospheric Administration (NOAA). 2002. Fish Habitat *Magnuson-Stevens Act Provision*: Essential Fish Habitat (EFH): Final Rule (50 CFR Part 600; 67 FR 2376).

Natural Resources Conservation Service (NRCS). 1990. Soil Survey Report of Skamania County Area, Washington.

______. 2008. *National Soil Information System (NASIS) database for Skamania County Area, Washington.* NRCS Information Technology Center Fort Collins, Colorado.

Nedeau, E.J., A.K. Smith, J. Stone, and S. Jepsen. 2009. Freshwater Mussels of the Pacific Northwest Second Edition. The Xerces Society for Invertebrate Conservation. 51 pp.

Oakleaf, J.K., D.L. Murray, J.R. Oakleaf (and others), 2006. Habitat selection by recolonizing wolves in the northern Rocky Mountains of the United States. J. Wildl. Manage. 70(2):554-563.

Paulson, D. 2009. Dragonflies and damselflies of the West. Princeton University Press, Princeton, NJ. 535 pp.

Paulson, D. 2010. Washington Odonata. Slater Museum of Natural History, University of Puget Sound. Available at: http://www.pugetsound.edu/academics/academic-resources/slater-museum/biodiversity-resources/dragonflies/washington-odonata/.

Pyle. 2002. *Butterflies and Moths of North America*. http:// www.butterfliesandmoths. Org.

Quintana-Coyer et al. 2004. Survey Protocol for the Great Gray Owl Within the Range of the Northwest Forest Plan. USDA, FS. USDA. Prepared by Deborah L. Quintana-Coyer-Taxon Leader –USFS; Richard P. Gerhardt- Taxon Expert-Sage Science; Matthew D. Broyles-Team Member-BLM; Jeffrey A. Dillon-Team Member-USFWS; Cheryl A. Friesen-Team Member-USFS; Steven A. Godwin - Team Member-BLM; Shane D. Kamrath-Team Member-USFS; with editorial assistance from Kimberly L. Garvey-USFS.

Ralph, C.J., G.L. Hunt, Jr., M.G. Raphael, and J.F. Piatt. 1995. Ecology and Conservation of the Marbled Murrelet. Gen. Tech. Rep. PSW-GTR-152. Albany, CA. Pacific Southwest Research Station, USDA, FS.

Rich, C., and T. Longcore, eds. 2006. *Ecological Consequences of Artificial Night Lighting*. Island Press. 458 pp.

Richardson et al. 2000. Washington State Status Report for the Common Loon. Washington Department of Fish and Wildlife.

Ruby, Robert H., and John A. Brown. 1992. *A Guide to the Indian Tribes of the Pacific Northwest*. University of Oklahoma Press, Norman.

Saint Helens Mining District (author unknown). 1934. On file, USDA Gifford Pinchot National Forest, Mount Adams Ranger District, Trout Lake, Washington.

Schuster, Helen. 1998. Yakama and Neighboring Groups. In Plateau, Vol. 12, *Handbook of North American Indians,* edited by Deward E. Walker, pp. 327-351. Smithsonian Institution, Washington, D.C.

Shohet, C., S. Bautista, and D. Perez. 2008. Appendix C: *Brief Life History Narratives for Botanical, Wildlife, and Fish Species of Local Interest*. In: Gifford Pinchot

National Forest Columbia River Gorge National Scenic Area, Washington Side Invasive Plant Treatment FEIS. 64 pp.

Skamania County. 2015. Skamania County Weed Control Program. http://www.skamaniacounty.org/noxious-weeds/.

Smith, A., Sarina Jepsen, Caitlin LaBar, and Jennifer Zarnoch. 2008. The Xerces Society for Invertebrate Conservation, mussel workgroup meeting, 2008.

Southwest Clean Air Agency (SWCAA). 2006. General Regulations for Air Pollution Sources. Section 400-045: Permit Application for Non-road Engines.

Taber, Emily. 2010a. *Mount Margaret 2010 Drilling Proposal* (Goat Mountain). USDA Gifford Pinchot National Forest, Cowlitz Valley Ranger District, Randle, Washington.

________. 2010b. *Mount Margaret 2010 Drilling Proposal* (Goat Mountain)-Addendum 1. USDA Gifford Pinchot National Forest, Cowlitz Valley Ranger District, Randle, Washington.

Thiel, R.P. 1985. Relationship Between Road Density and Wolf Habitat Suitability in Wisconsin. American Midland Naturalist. 113:340-342.

United States Census Bureau. 2010. U.S. *Census and 2006-2010 American Community Survey*.

U.S. Department of Agriculture (USDA). 1983. Department Regulation 9500-003: Land Use Policy, March 22, 1983.

United States Department of Agriculture Forest Service. Various Dates. *Land Acquisition Records* for MS- 708, 774, 779, 1329, 1330; as available in the GPNF Record Files.

______. 1995. *Anatomy of a Mine from Prospect to Production*. General Technical Report INT-GTR-35. Revised February 1995.

______. 2001. *Guide to Noxious Weed Prevention Practices*. Version 1.0. July 2001.

______. 2005a. *Pacific Northwest Region Invasive Plant Program Record of Decision for Preventing and Managing Invasive Plants*. October 2005.

______. 2005b. USDA FS, Region 6 Invasive Plants EIS Team, *Common Control Measures for Invasive Plants of the Pacific Northwest Region*. Updated June 30, 2005.

———. 2010. *Rare Plant List for Skamania County* (Revised November 2010). Washington Natural Heritage Program. Available: http://www1.dnr.wa.gov/nhp/refdesk/lists/plantsxco/skamania.html

———. 2015a. *Forest Service Minerals Program Policy*. Available: http://www.fs.fed.us/geology/FOREST%20SERVICE%20MINERALS%20PROGRAM%20POLICY.pdf.

———. 2015b. *Forest Service and Bureau of Land Management joint statement of support for sustainable minerals development.* Available: http://www.fs.fed.us/geology/fs_blm_statement_of_support.pdf.

———. 2015c. *Forest Service Minerals & Geology Management Program Mission Statement.* Available: http://www.fs.fed.us/geology/index.html.

U.S. Environmental Protection Agency (EPA). 1995. AP 42, Fifth Edition Compilation of Air Pollutant Emission Factors.

URS Corporation. 2015a. *Groundwater Resources Report, Goat Mountain Prospecting Permit Applications*. Prepared by URS Corporation. Prepared for U.S. Bureau of Land Management, Portland, Oregon.

URS Corporation. 2015b. *Goat Mountain Prospecting Permit Applications Biological Assessment*. Prepared by URS Corporation. Prepared for U.S. Bureau of Land Management, Portland, Oregon.

U.S. Army Corps of Engineers (USACE). 2007. *Mount St. Helens Ecosystem Restoration General Reevaluation Study Reconnaissance Report*. Portland District, Portland, Oregon.

USDA Forest Service, Gifford Pinchot National Forest. 1995. Gifford Pinchot National Forest Land Management Plan with Standards and Guidelines, Amendment 11 of the Northwest Forest Plan.

U.S. Department of Agriculture Forest Service and U.S. Department of the Interior, Bureau of Land Management. 1994. *Record of Decision on Management of Habitat for Late-successional and Old-growth Forest Related species within the Range of the Northern Spotted Owl* (Northwest Forest Plan, NWFP). *Portland, Oregon.*]. See *http://www.fs.usda.gov/main/giffordpinchot/landman agreement/planning.*

______. 2001. Survey and Manage Species List.

______. 2005a. Conservation Assessment for *Deroceras hesperium*, Evening fieldslug.

______. 2005b. Conservation Assessment for Four Species of the Genus *Hemphillia*

______. 2010. Species Fact Sheet Barren Juga.

U.S. Department of the Interior, Bureau of Land Management. H-1790-1 – National Environmental Policy Act Handbook – (Public). BLM Manual. Rel. 1-1710.

______. 2010. Instruction Memorandum No. OR-2010-012.

U.S. Fish and Wildlife Service (USFWS). 1992. Endangered and threatened wildlife and plants: Determination of critical habitat for the northern spotted owl. In: Federal Register, Vol. 57, No. 10, January 15, 1992.

______. 2008. *Pacific Region Endangered Species, Northern Spotted Owl, 2008 Final Revised Critical Habitat for the Northern Spotted Owl*, GIS Layers. Website last updated November 18, 2008. Available at: http://www.fws.gov/pacific/ecoservices/nsofch.html

______. 2011. Revised Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*). U.S. Fish and Wildlife Service, Portland, Oregon. Xvi + 258 pp.

______. 2012a. *Endangered and Threatened Wildlife and Plants: Revised Critical Habitat for the Northern Spotted Owl, Proposed Rule*. *In*: Federal Register, Vol. 77, No. 46, March 8, 2012.

______. 2012b. Concurrence Letter, U.S. Fish and Wildlife Service. August 21, 2012

______. 2015. *List of Threatened and Endangered Species That May Occur in the Proposed Project Area.* Information, Planning and Conservation System web site. Accessed at http://ecos.fws.gov/ipac/ on January 13, 2015.

U.S. Forest Service (FS). 1990. Gifford Pinchot National Forest *Land and Resource Management Plan,* Management Indicator Species List, 1990.

______. 1994. Gifford Pinchot National Forest *Land and Resource Management Plan,* Management Indicator Species List, 1994.

______. 1995a. *Northwest Forest Plan*. U.S. Forest Service, Portland, Oregon.

______. 1995b. Forest Service Manual 20800 – Noxious Weed Management, Section 2081.03.

______. 1994. *Aquatic Conservation Strategy* of the Northwest Forest Plan, Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (1994).

______. 2008b. Record of Decision and Final Environmental Impact Statement and Forest Plan Amendment #20. Gifford-Pinchot National Forest and Columbia River Gorge National Scenic Area (Washington Portion), Site-Specific Invasive Plant Treatment Project and Forest Plan Amendment.

______. 2011. *Region 6 Regional Forester Special Status Species List*, December 1, 2011. U.S. Forest Service, Portland, Oregon. Includes TEP Species and Region 6 Regional Forester Sensitive Species.

______. 2012a. Gifford Pinchot National Forest *Geospatial Datasets*. Gifford Pinchot National Forest, Vancouver, Washington.

______. 2012b. Forest Service *National Core BMPs* – Nonpoint Source Pollution Control for Water Quality Management Minerals Management Activities.

______. 2012c. Forest Service Manual 2800 – Minerals and Geology, Section 2802.

______. 2012d. National Best Management Practices for Water Quality Management on National Forest System Lands. FS 990a.

______. 2014. Proposed Revisions to Forest Service Manual 2500 – Watershed and Air Management, Chapter 2560 – Groundwater Resource Management.

______. 2015. *Pacific Northwest Research Station, Frequently Asked Questions #7 How were large mammals affected by the eruption?* Last Modified: Thursday, 14 May 2015 at 13:56:27 CDT. http://www.fs.fed.us/pnw/mtsthelens/faq/q7.shtml.

U.S. Geological Survey (USGS). 1992. USGS Bulletin 1693: Mineral Deposit Models.

______. 1994. *Spirit Lake East Quadrangle, Washington* [map]. U.S. Forest Service partial field check revised 1994. 1:24,000 7.5 Minute Series. Reston, VA.

______. 2012. *Emission of Sulfur Dioxide Gas from Mount St. Helens, 1980-1988*. United States Geological Survey. n.p., 29 Dec. 2009. Web. March 6, 2012.

Vancouver Audubon Society. 2008. *A Checklist of Birds of Skamania County*. http://vancouveraudubon.org/birding.html.

Vannote, R.L., and G.W. Minshall. 1982. Fluvial processes and local lithology controlling abundance, structure, and composition of mussel beds. Proceedings of the National Academy of Sciences 79:4103-4107.

Washington State Department of Ecology (Ecology). 2002. *Second Screening Investigation of Water and Sediment Quality of Creeks in Ten Washington Mining Districts, with Emphasis on Metals*. Publication No. 02-03-024. June 2002. Olympia, WA

______. 2015a. Washington Department of Ecology Water Resources Explorer (Web Map): http://www.ecy.wa.gov/programs/wr/info/webmap.html.

______. 2015b. Washington State Well Log Viewer (Well Log Database): https://fortress.wa.gov/ecy/waterresources/map/WCLSWebMap/.

Washington State Department of Fish and Wildlife (WDFW). 2015a. *Priority Habitats and Species Database*. Accessed via the internet at: http://wdfw.wa.gov/mapping/phs/ on January 14, 2015.

______. 2015b. Birding in and around Klickitat County. Accessed at: http://wdfw.wa.gov/viewing/guides/klickitat/ on January 15, 2015.

______. 2015c. Gray Wolf Conservation and Management, Legal Status. http://wdfw.wa.gov/conservation/gray_wolf/legal_status.html on December 8, 2015.

______. 2015d. Gray Wolf Conservation and Management, Wolf Packs in Washington. http://wdfw.wa.gov/conservation/gray_wolf/packs/ on December 8, 2015.

Washington State Department of Natural Resources (WDNR). 1977. St. Helens and Washougal Mining Districts of the Southern Cascades of Washington, *Information Circular No. 60*. Olympia, Washington.

______. 1998. Smoke Management Plan.

______. 2012. *Washington Department of Natural Resources Forest Practices Application Review System* (FPARS- ARCIMS Mapping Application (DNR 2012). http://fortress.wa.gov/dnr/app1/fpars/viewer.htm. Accessed on March 6. 2012.

Washington State Department of Natural Resources (WDNR), Bureau of Land Management (BLM), Washington Department of Fish and Wildlife (WDFW), and U. S. Forest Service (FS). 2012. *Washington Herp Atlas Website*, Updated October 2011. Maintained by Washington Natural Heritage Program, Olympia, Washington.

Washington State Department of Transportation (WSDOT). 2014. *Biological Assessment Preparation Advanced Training Manual*. Olympia, Washington.

Washington State Natural Heritage Program (WNHP). 2012. *Special Status Plants Species and Habitats* Data Search. Washington Natural Heritage Information System.

______. 2014. *Rare Plant List for Skamania County (Revised September 2014)*. Washington Natural Heritage Program. Available: http://www1.dnr.wa.gov/nhp/refdesk/lists/plantsxco/skamania.html.

Washington State Noxious Weed Control Board (WSNWCB). 2015 *Noxious Weed List*. Available: http://www.nwcb.wa.gov.

Western Regional Climate Center (WRCC). 2012a. *Climate Summary Information for Weather Station 457919 at Spirit Lake Ranger Station*. Accessed online on March 5, 2012: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?wa7919.

______. 2012b. *Climate of Washington*. Western Regional Climate Center. n.p., n.d. Web. 06 March 2012.

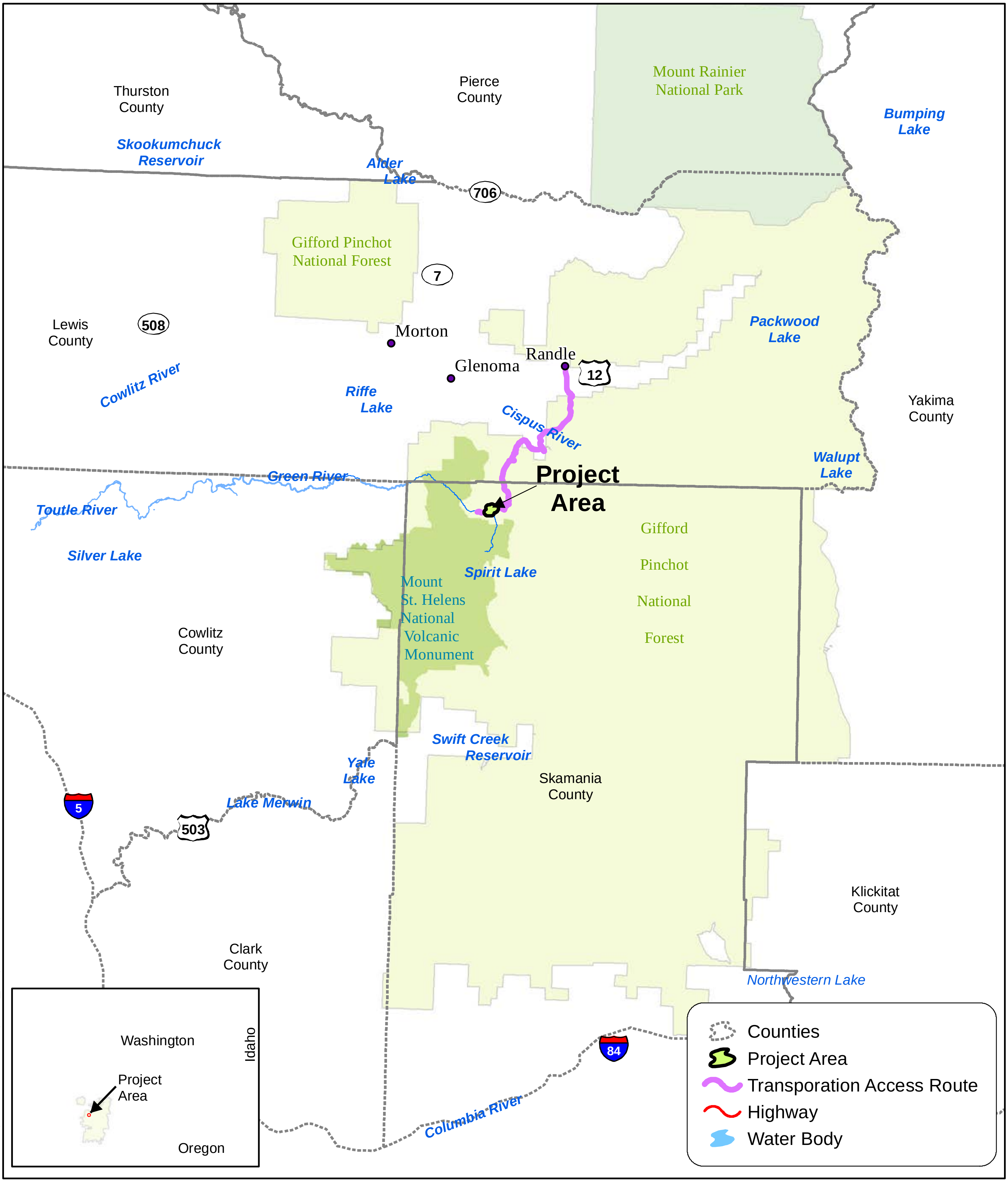
Wu, J., C. Torres-Verdin, K. Sepehrnoori, and M.A. Proett. 2005. The Influence of Water-Base Mud Properties and Petrophysical Parameters on Mudcake Growth, Filtrate Invasion, and Formation Pressure. Petrophysics (February 2005), Vol. 46, No. 1, p. 14-32.

7 APPENDICES

Appendix A	Environmental Assessment Figures 1-8, 10, and 11
Appendix B	Associated Regulations, Plans, Policies and Sample Prospecting Permit Application
Appendix C	Public Scoping Comment Summary Matrix
Appendix D	National Association of Environmental Professionals (NAEP) NEPA Review – Cumulative Effects Legal Review
Appendix E	Best Management Practices
Appendix F	Goat Mountain Hardrock Prospecting Permit Applications EA - Biological Assessment
Appendix G	Groundwater Resources Report, Goat Mountain Hardrock Prospecting Permit Applications

APPENDIX A

Environmental Assessment Figures 1–8, 10, and 11



Path: Q:\geo\Ascot\MXD\Figure1_ProjectVicinity.mxd

Figure 1
Project Vicinity

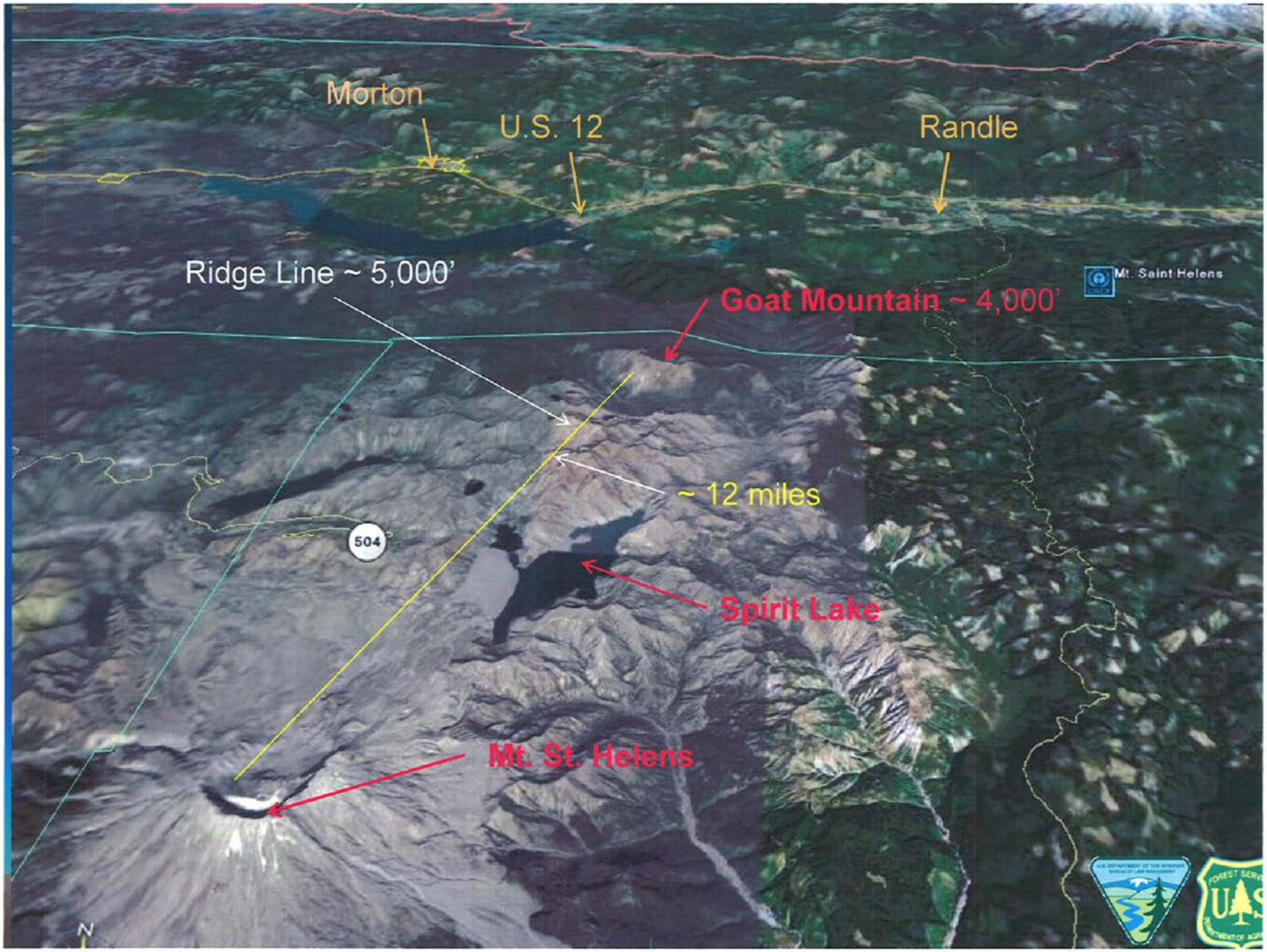
URS

N

0 5 10
Scale In Miles

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

SOURCE: USDA Forest Service



Path: Q:\geo\Ascot\MXD\Figure2_MtStHelensBlastZone.mxd

Figure 2

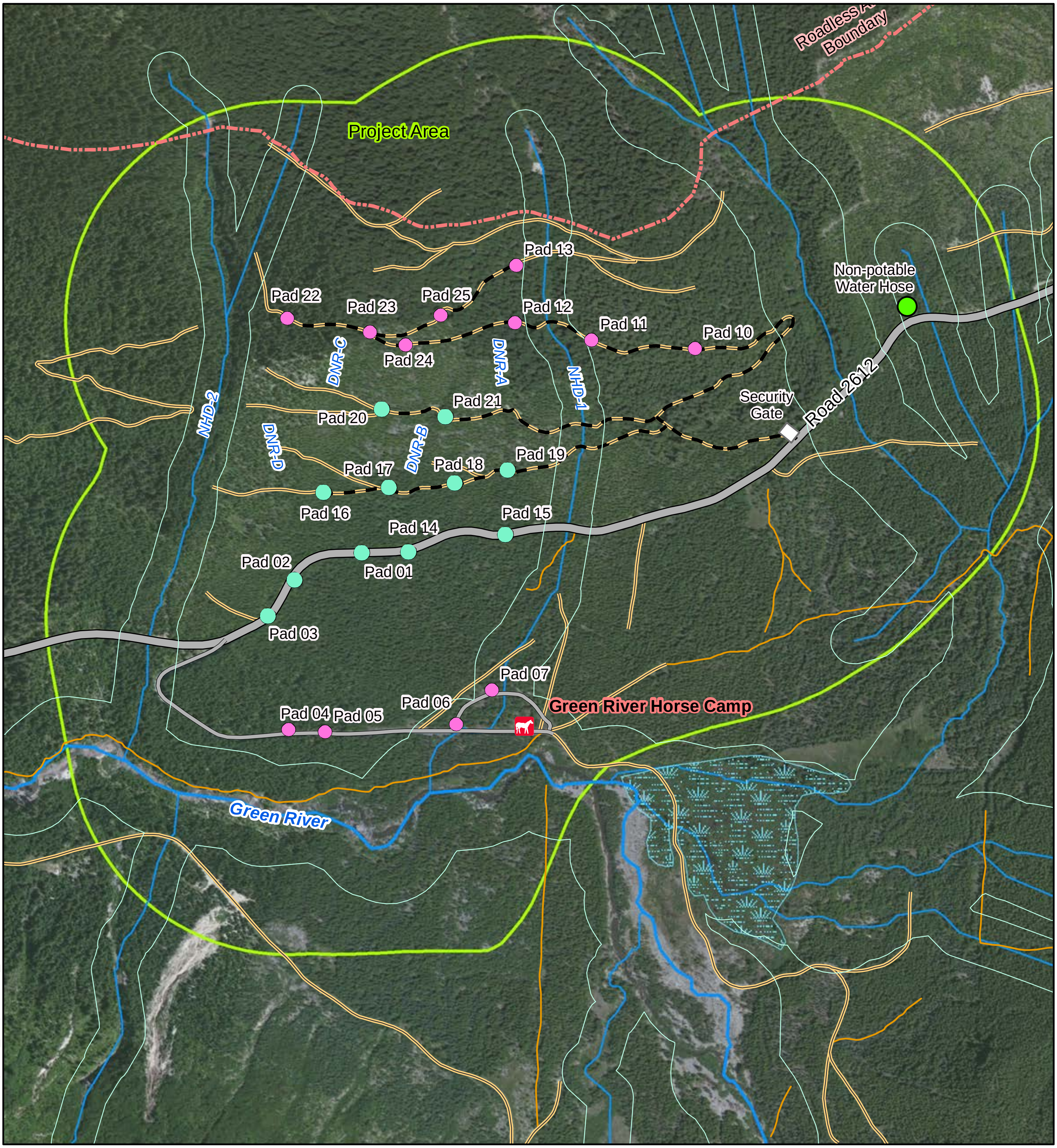
Mount St. Helens Blast Zone

URS

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

The Mount St. Helens Blast Zone is represented by the gray area on this map.

SOURCE: USDA Forest Service



Path: Q:\geo\Ascot\MXD\Figure3_ProjectArea_.mxd

- Pad Locations Subject to Scheduling Restrictions (APE)*
- Proposed Pad Locations (APE)
- Roadless Area
- Riparian Reserves
- Roads Proposed for Reactivation
- Active Road
- Inactive (LI) Road
- Primary Road
- Trail
- Lake/Pond
- Swamp/Marsh
- Stream/River
- Project Area

Figure 3
Project Area

URS

* Note: Cultural Resource Area of Potential Effect (APE) approximate size is represented by location symbol.

SOURCE: USDA Forest Service

N

0 400 800
Scale In Feet

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

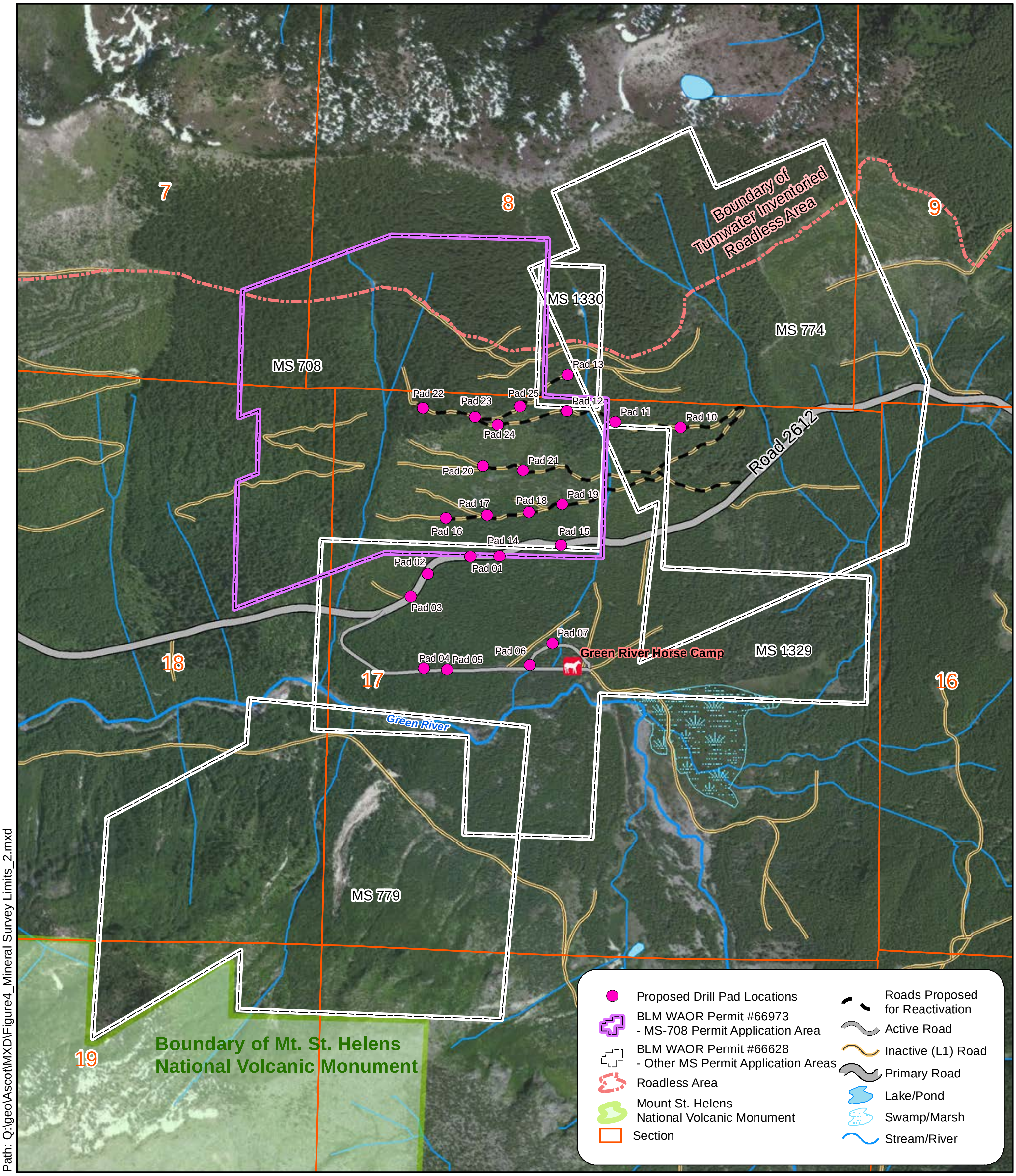
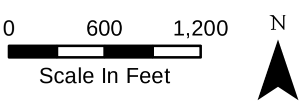


Figure 4

Mineral Survey Limits

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington



SOURCE: USDA Forest Service

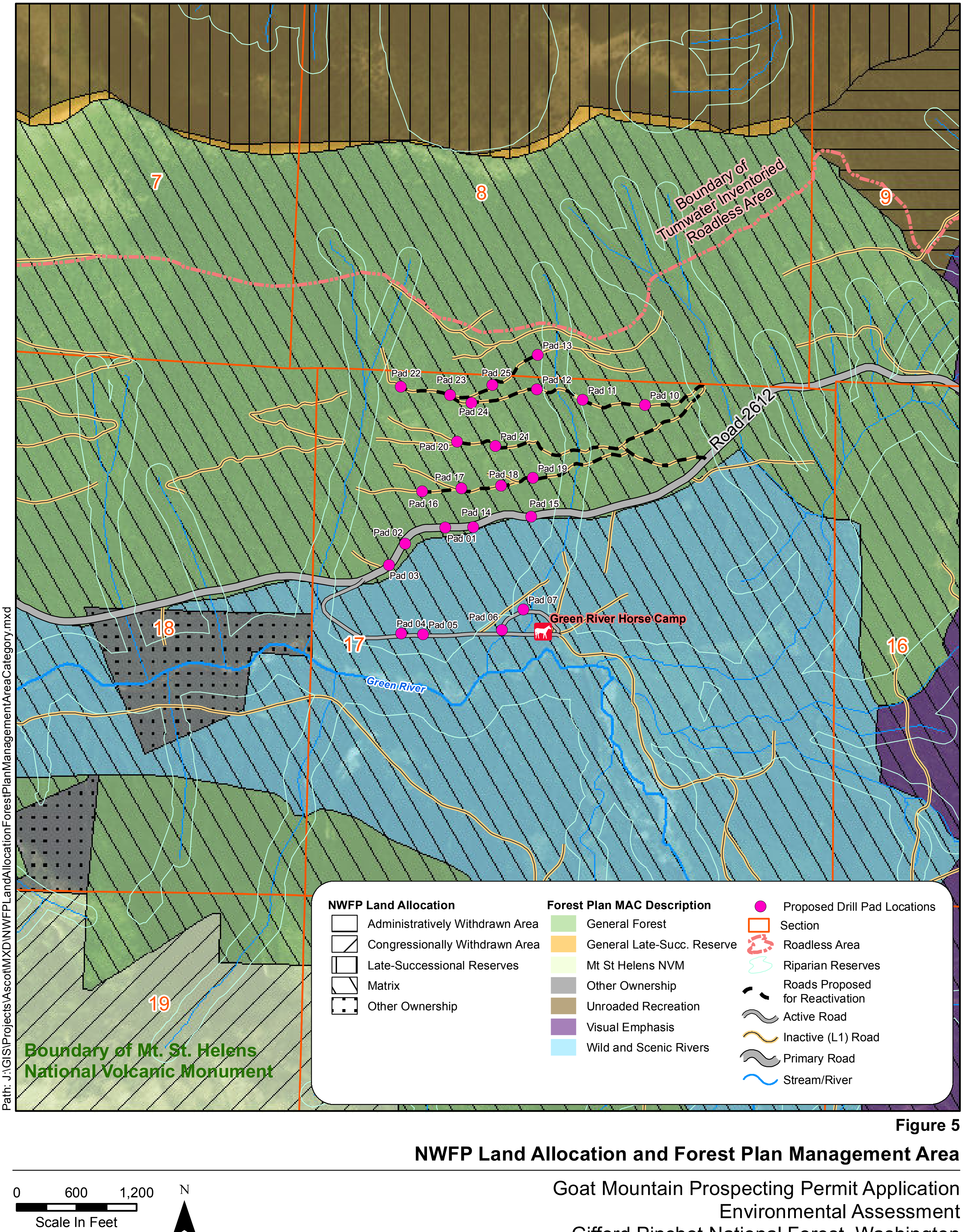
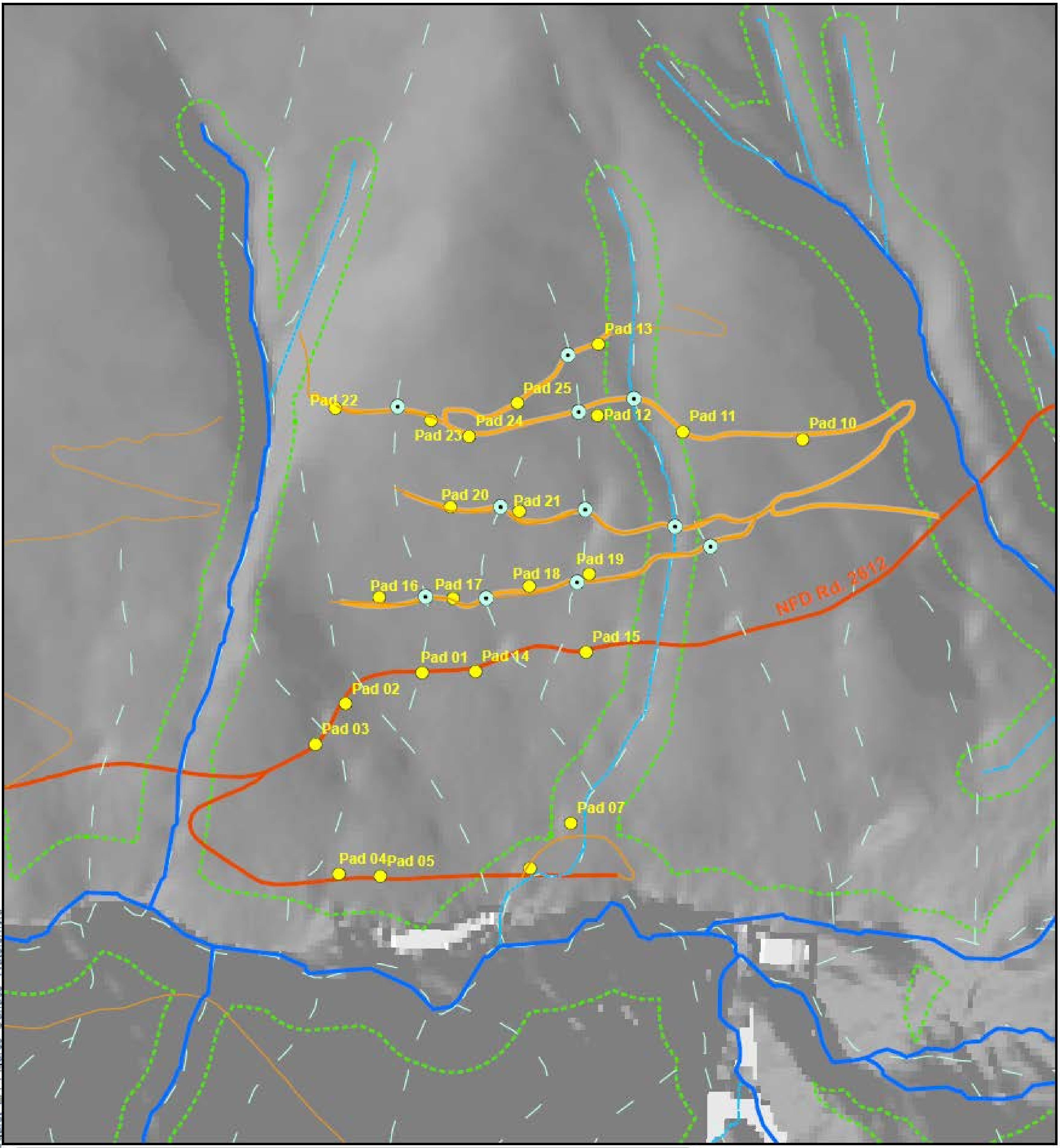


Figure 5

NWFP Land Allocation and Forest Plan Management Area

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

SOURCE: USDA Forest Service



Path: K:\Mt_Margaret_EA_Figure6_Surface_Waters.mxd

Legend

- Proposed Pad Locations
- Open high Clearance Veh. Road
- Closed, Unimproved Road
- Roads Proposed for Reactivation
- Riparian Reserves (NWFP)

Nat. Hydrography Dataset Flowlines:

- Perennial
- Intermittent
- WDNR Seasonal/Ephemeral Streams
- Possible Culvert Location

Figure 6
Surface Water Analysis

URS

N

0 400 800
Scale in Feet

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

Path: Q:\geo\Ascot\MXD\Figure7_DrillingEquipment.mxd

Figure 7

Drilling Equipment

URS

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

SOURCE: USDA Forest Service

Path: Q:\geo\Ascot\MXD\Figure8_Project Area Outline on Goat Mountain Photo.mxd

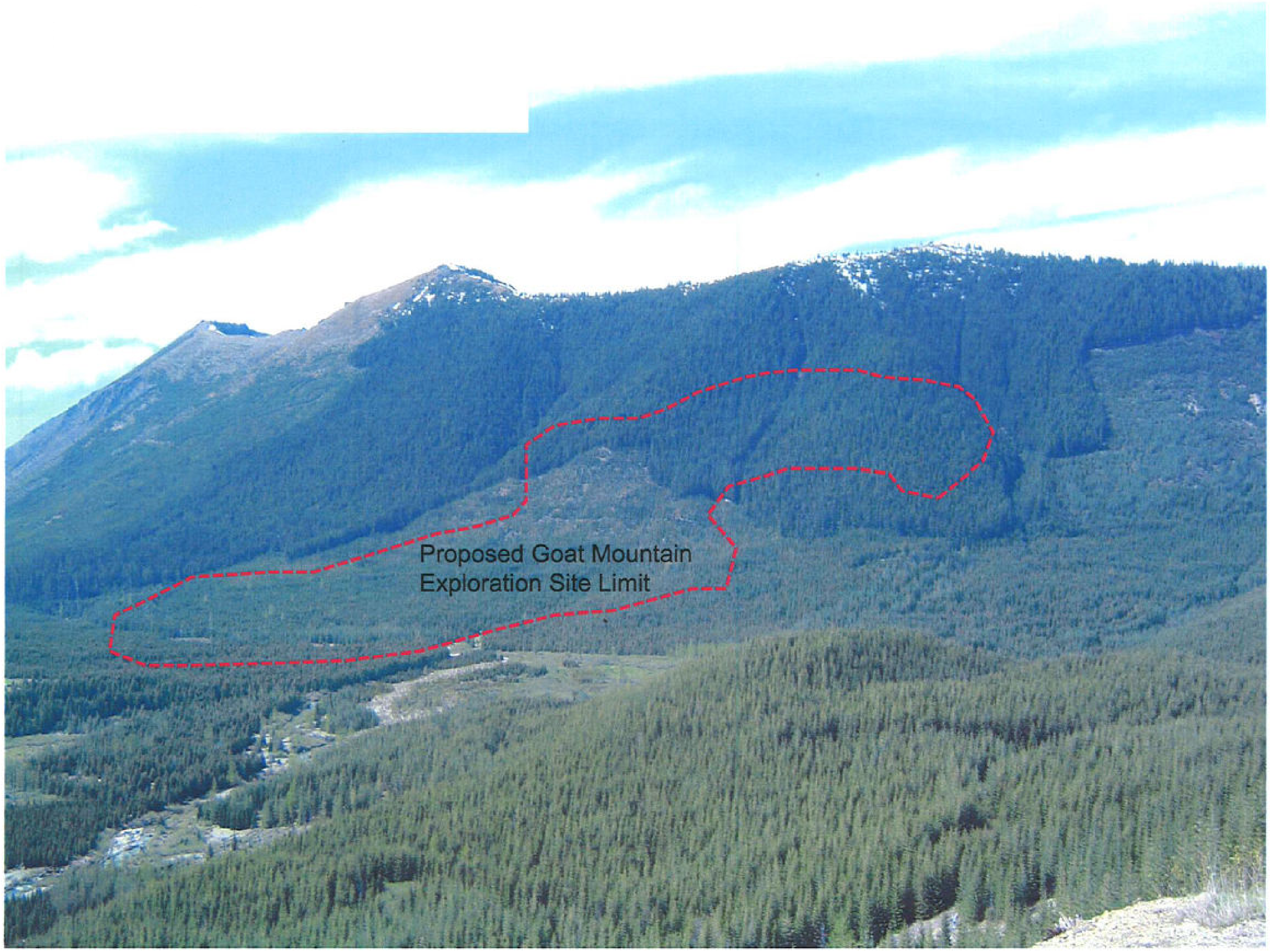


Figure 8

Project Area Outline on Goat Mountain Photo

URS

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

VIEW TO NORTHWEST
SOURCE: USDA Forest Service

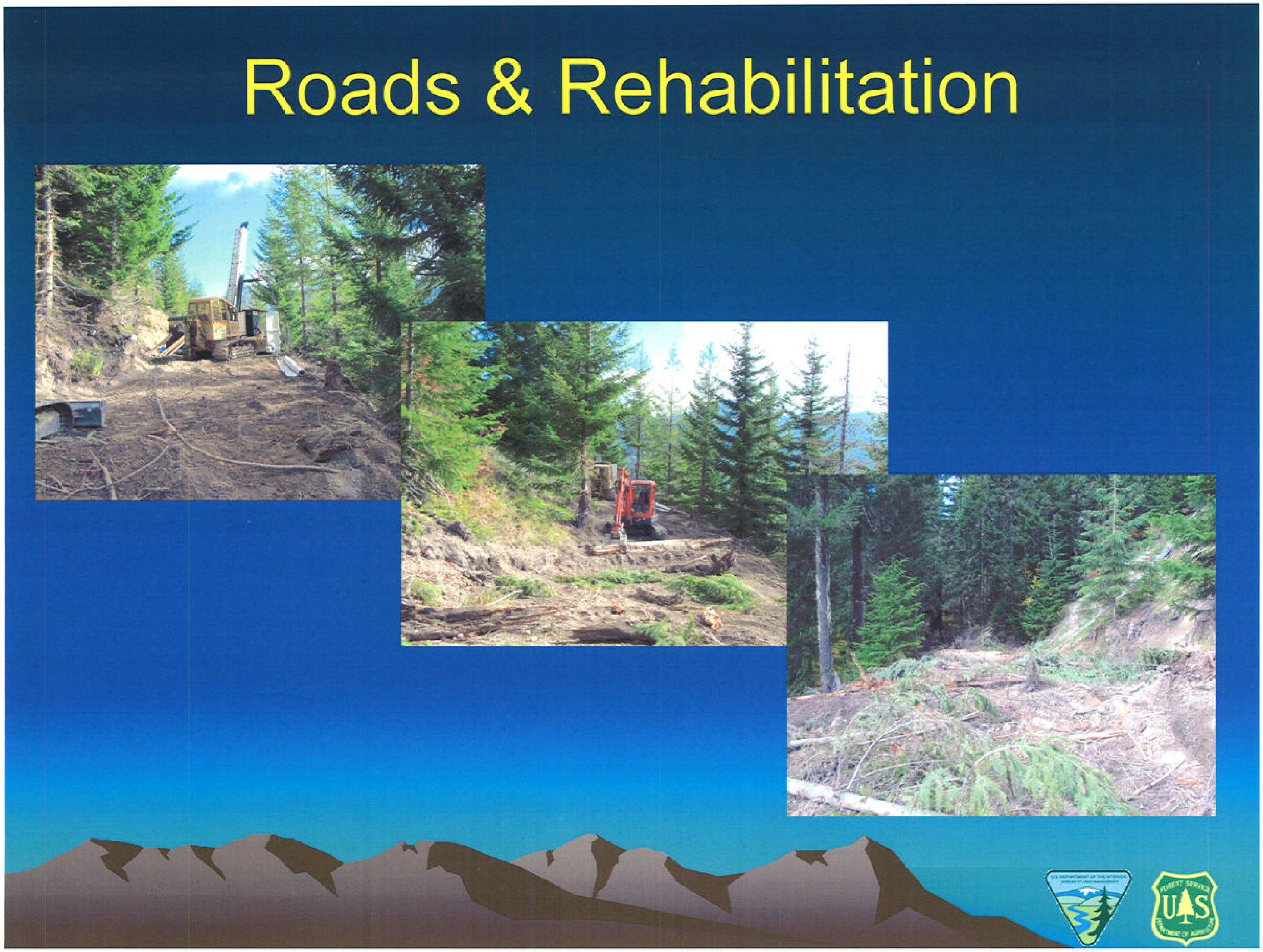


Figure 10

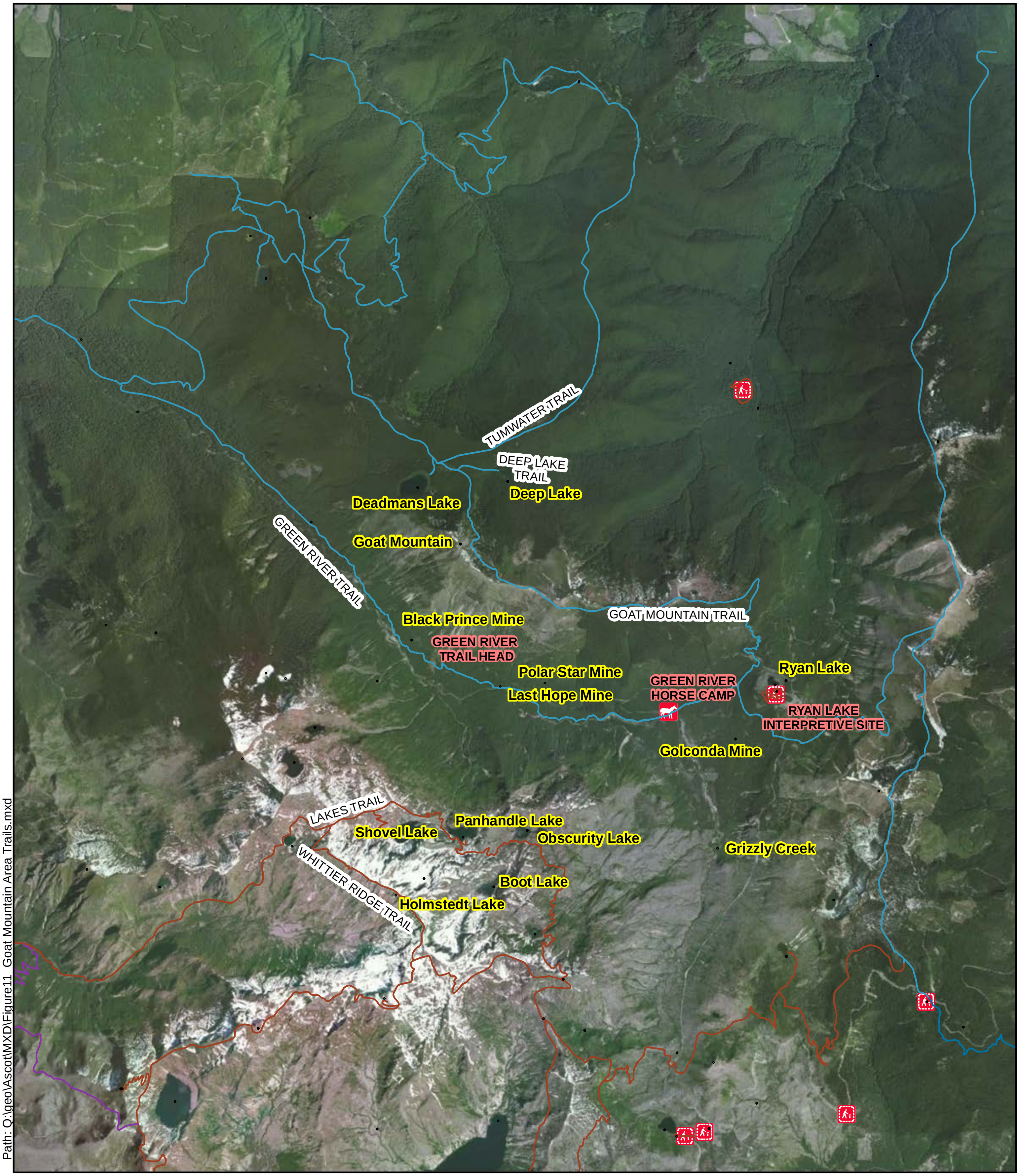
Roads and Rehabilitation

URS

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

SOURCE: USDA Forest Service

Path: Q:\geo\Ascot\MXD\Figure10_Roads and Rehabilitationo.mxd



Path: Q:\geo\Ascot\MXD\Figure11_Goat Mountain Area Trails.mxd

Figure 11
Goat Mountain Area Trails

URS

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

SOURCE: USDA Forest Service

APPENDIX B

Associated Regulations, Plans, Policies, and Sample Prospecting Permit Application

[In addition to the conditions included in this Permit Application Form, the agencies may add additional conditions appropriate to the Proposed Action.]

Relationship to Federal, State and Local Regulations, Plans and Policies

- American Indian Religious Freedom Act: (42 USC 1996a) A federal law and a joint resolution of Congress passed in 1978. It was enacted to protect and preserve the traditional religious rights and cultural practices of Native Americans. These rights include, but are not limited to, access of sacred sites, freedom to worship through ceremonial and traditional rights and use and possession of objects considered sacred. The Act required policies of all governmental agencies to eliminate interference with the free exercise of Native religion, based on the First Amendment, and to accommodate access to and use of religious sites to the extent that the use is practicable and is not inconsistent with an agency's essential functions. This may also include government to government consultation with area Tribes. See Section 5.2, Tribal Consultation and Section 3.6.1.4, Plants of Cultural Importance.

- Aquatic Conservation Strategy (ACS) Objectives: The ACS was developed to improve and maintain the ecological health of watersheds and aquatic ecosystems contained within them on federal public lands. The four primary components of the ACS are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems: Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration.

- Clean Air Act: (42 USC Chapter 85) A 1963 United States federal law designed to control air pollution on a national level. It requires the Environmental Protection Agency (EPA) to develop and enforce regulations to protect the general public from exposure to airborne contaminants that are known to be hazardous to human health. See Section 3.89, Air Quality.
- Clean Water Act: (33 USC Chapter 26). The primary federal law in the United States governing water pollution. Commonly abbreviated as the CWA, the act established the goals of eliminating releases of high amounts of toxic substances into water, eliminating additional water pollution by 1985, and ensuring that surface waters would meet standards necessary for human sports and recreation by 1983. The Clean Water Act does not directly address groundwater contamination. Groundwater protection provisions are included in the Safe Drinking Water Act, Resource Conservation and Recovery Act, and the Superfund Act. See Section 3.2.4, Surface Water Impact Avoidance and Minimization Measures; and Section XX, Proposed Hardrock Mineral Prospecting Plan and Mitigation.

- Endangered Species Act Of 1973: (16 USC Chapter 35) The Act was designed to protect critically imperiled species from extinction as a "consequence of economic growth and development untempered by adequate concern and conservation." The Act is administered by two federal agencies, the United States Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA). See Section 3.4.4, Wildlife Mitigation Measures; and Section 3.5.4, Aquatic Design Criteria/BMPs and Fisheries Design Criteria/BMPs.
- Executive Orders 11988 (Floodplains, 42 FR 26951) and 11990 (Wetlands, 42 FR 26961): Floodplains: Executive Order 11988 is to avoid adverse impacts associated with the occupancy and modification of floodplains. Floodplains are defined by this order as, ". . . the lowland and relatively flat areas adjoining inland and coastal waters are including flood prone areas of offshore islands, including at a minimum, that area subject to a one percent [100-year recurrence] or greater chance of flooding in any one year." Wetlands: Executive Order 11990 is to avoid adverse impacts associated with destruction or modification of wetlands.
- Federal Land Policy and Management Act of 1976 (FLPMA), (43 USC Chapter 35BLM 43 CFR) surface management regulations: A United States federal law that governs the way in which the public lands administered by the Bureau of Land Management (BLM) are managed. The law was enacted in 1976 by the 94th Congress and is found in the United States Code under Title 43.

- Forest Service National Core Best Management Practices (BMPs) for Water Quality Management in Minerals Management Activities (USFS 2010): The National Core BMPs encompass the wide range of activities on NFS lands across the nation.

- Inventoried Roadless Areas: An inventory of United States Forest Service (USFS) lands that have been identified by government reviews as lands without existing roads that could be suitable for roadless area conservation as wilderness or other non-standard protections. The first review of USFS roadless lands was started in 1967 after the creation of the Wilderness Act by Congress in 1964. The rationale for limiting road-building in the inventoried roadless areas was to minimize the negative associated environmental impacts of roads construction, maintenance, and automobile traffic. The second impetus for the creation of the Roadless Rule was an effort to expand the system of protected federal lands to include ecosystems that were not very well represented in the current system of National Parks, wilderness areas, and preserves.
- National Environmental Policy Act: (42 USC 4321 and 4331-4335) A United States environmental law that established a United States national policy promoting the enhancement of the environment and also established the President's Council on Environmental Quality (CEQ). NEPA outlines procedural requirements for all federal government agencies to prepare Environmental Assessments (EAs) or Environmental Impact Statements (EISs). EAs and EISs contain statements of the environmental effects of proposed federal agency actions.
- National Forest Management Act: (16 USC 1604) A United States federal law that is the primary statute governing the administration of national forests and was an amendment to the Forest and Rangeland Renewable Resources Planning Act of 1974, which called for

the management of renewable resources on national forest lands. The National Forest Management Act (NFMA) obliged the USFS to use a systematic and interdisciplinary approach to resource management. It also provided for public involvement in preparing and revising forest plans. It expanded upon the land and resource management plans (LRMP) outlined in the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), and started by requiring the USFS to compile an inventory of all its lands, followed by a zoning process to see what uses land was best suited for - dubbed the "suitability determination." These plans required alternative land management options to be presented, each of which have potential resource outputs (timber, range, mining, recreation) as well as socio-economic effects on local communities.

- National Historic Preservation Act: (16 USC 470) Legislation intended to preserve historical and archaeological sites in the United States. Among other things, the act requires federal agencies to evaluate the impact of all federally funded or permitted projects on historic properties (buildings, historic or archaeological sites, etc.) through a process known as Section 106 Review.
- National Pollutant Discharge Elimination System: (40 CFR 122) NPDES is a permit program that helps control water pollution by regulating point sources that discharge pollutants into waters of the United States
- Northwest Forest Plan (NWFP): The policy and direction of the NFP is derived from two key documents and the decisions and recommendations made by Regional Interagency Executive Committee (RIEC). Two key documents are:
    - Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl.
    - Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl.
- The Spill Prevention, Control, and Countermeasure (SPCC) rule includes requirements for oil spill prevention, preparedness, and response to prevent oil discharges to navigable waters and adjoining shorelines. The rule requires specific facilities to prepare, amend, and implement SPCC Plans. The SPCC rule is part of the Oil Pollution Prevention regulation, which also includes the Facility Response Plan (FRP) rule.

Form 3510-1
(March 2010)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB NO. 1004-0121
Expires: February 28, 2013

PROSPECTING APPLICATION AND PERMIT

1. Serial Number *(See Specific Instructions - Item 1)*

2. What mineral(s) are you applying for?

3a. Applicant's name

3b. Applicant's address

4. Give legal description of land requested *(See General Instructions, Item 4)*

Total acres | Rental submitted $

5. Legal description of land included in permit

APPLICANT DOES NOT FILL IN THIS SPACE

Total acres | Rental retained $

6. Are the lands administered by a government agency? ☐ Yes ☐ No *(If "Yes," give name of agency)*

7. Are you the sole party in interest? ☐ Yes ☐ No *(See Specific Instructions - Item 7)*

8a. Are you a citizen of the United States? ☐ Yes ☐ No

8b. Are you over the age of majority? ☐ Yes ☐ No

9a. Is application made for a corporation or other legal entity? ☐ Yes ☐ No *(If "Yes," see Specific Instructions - Item 9a)*

9b. Has a statement of qualification been filed? ☐ Yes ☐ No *(If "Yes," give file number, if "No," see regulation 43 CFR 3502)*

10. **A processing fee will be determined on a case-by-case basis.** *(See Specific Instructions - Item 10)*

11. **Be sure to enclose the first year's advance rental computed at the rate of 50¢ per acre or fraction thereof** *(See Specific Instructions - Item 11)*

I CERTIFY That my interests, direct or indirect, in leases, permits, and applications therefor, do not exceed the maximum permitted by law or regulation, and that the statements made herein are true, complete, and correct to the best of my knowledge and belief and are made in good faith.

(Signature of Applicant)

(Signature of Applicant)

(Date)

(Attorney-in-fact)

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

DO NOT WRITE BELOW THIS LINE

______________________ PROSPECTING PERMIT
(Name of Mineral(s))

A permit for the lands in Item 5, above, is hereby issued under the ☐ Mineral Leasing Act, 30 U.S.C. 181 et seq., ☐ Acquired Lands Leasing Act, 30 U.S.C. 351 et seq., ☐ Section 402 of Reorganization Plan No. 3 of 1946, 5 U.S.C. Appendix 1031, ☐ Other Special Act(s) *(as indicated below)* and is subject to all regulations found in 43 CFR 3500 and to the terms and conditions set forth on the reverse hereof.

This permit, to the extent applicable, is subject to standard and/or special stipulations. ☐ Stipulations if any are attached.

THE UNITED STATES OF AMERICA

Effective date of permit ______________________ By ______________________

This permit is issued for a period of ________ years

(Title) (Date)

(Continued on page 2)

PERMIT TERMS AND CONDITIONS

Sec. 1. *Rights conferred by issuance of prospecting permit.* Permittee is granted the exclusive right to prospect on and explore the lands to determine the existence of a valuable deposit of the mineral applied for or any compound of that mineral in accordance with the terms and conditions of the permit. Permittee must diligently prospect the lands by core drilling or other acceptable methods. The permittee may remove only such material as is necessary to demonstrate the existence of a valuable mineral deposit.

Sec. 2. *Operating regulations.* (a) Permittee must comply with all regulations of the Secretary of the Interior; and, as to the lands described herein under his jurisdiction, to the regulations and orders of the Secretary of Agriculture.

(b) Permittee must comply with the provisions of the operating regulations of the Bureau of Land Management (BLM) (43 CFR 3590) and all orders issued pursuant thereto. Copies of the operating regulations may be obtained from the BLM.

(c) Permittee must maintain a permit bond in the amount determined by the BLM.

(d) Permittee must allow inspection of the premises and operations by representatives of the Departments of the Interior, Agriculture, or other agency administering the lands and provide for the free ingress and egress of Government officers and users of the lands under authority of the United States.

Sec. 3. *Multiple use.* (a) Valid existing rights acquired prior hereto on the lands described herein will not be adversely affected hereby.

(b) The granting of this permit will not preclude the issuance of other permits, leases, or other development of the same lands.

(c) The permitted lands will be subject, at all times, to any other lawful uses by the United States, its lessees, permittees, licensees, and assigns, but such use should not materially interfere with the permittee's operations hereunder.

(d) The Government reserves the right to sell or otherwise dispose of the surface of the permitted lands under existing law or laws hereafter enacted, insofar as such disposal will not materially interfere with the rights of the permittee.

(e) The permittee must afford all facilities for inspection of the prospecting work on behalf of the Secretary of the Interior or head of agency administering the lands and to make a report, on demand, of all matters pertaining to the character, progress, and results of such work.

(f) The permittee must observe such conditions as to the use and occupancy of the surface of the lands as provided by law, in case any of said lands will have or may be entered or patented with a reservation of mineral deposits to the United States.

Sec. 4. *Removal of deposits.* Permittee must remove from the lands only such deposits as may be necessary to experimental work or to establish the existence of valuable deposits within the permit area and must keep a record of all minerals mined.

Sec. 5. *Rental.* Permittee must pay an annual rental of 50 cents per acre, or fraction thereof, but not less than $20 per year. The annual rental payment must be made on or before the anniversary date of the permit, payable to Minerals Management Service.

Sec. 6. *Extension of permit.* (a) This permit may be subject to extension under applicable regulation upon approval by the Bureau of Land Management (BLM) and upon the showing of entitlement hereto. *(No extension may be granted for sodium or sulphur prospecting permits.)*

(b) Application for extension of this permit, where authorized by law or regulation, must be filed in the proper BLM office at least 90 days prior to the date of expiration of this permit. Unless such an application is filed within the time specified, this permit will expire without notice to the permittee.

Sec. 7. *Assignments.* All assignments or transfers of this permit or of any interest therein must be filed with the BLM for approval in accordance with the provisions of the appropriate regulation and will take effect as of the first day of the month following approval thereof, or, if transferee so requests, as of the first day of the month during which such approval is given.

Sec. 8. *Relinquishment of permit.* Permittee may relinquish this permit, in whole or part, by filing in the proper BLM office a written relinquishment which, upon acceptance by the BLM, will be effective as of the date of filing.

Sec. 9 *Termination or cancellation.* (a) This permit will terminate automatically upon failure of the permittee to pay the rental on or before the anniversary date thereof.

(b) This permit may be cancelled in accordance with the regulations upon failure by permittee to comply with the regulations or the provisions of the law, or for violation of any of the terms or stipulations of the permit and exploration plan. Such cancellation may occur if such failure or default continues for 30 days after service of written notice thereof by the BLM.

Sec. 10. Protection of surface, natural resources, and improvements. The permittee agrees to take such reasonable steps as may be needed to prevent operations on the permitted lands from unnecessarily: (1) causing or contributing to soil erosion or damaging crops, including forage, and timber growth thereon or on Federal or non-Federal lands in the vicinity; (2) polluting air and water; (3) damaging improvements owned by the United States or other parties; or (4) destroying, damaging or removing fossils, historic or prehistoric ruins, or artifacts; and upon any partial or total relinquishment or the cancellation or expiration of this permit, or at any other time prior thereto when required and to the extent deemed necessary by the lessor to fill any pits, ditches and other excavations, remove or cover all debris, and so far as reasonably possible, restore the surface of the permitted land and access roads to their former condition, including the removal of structures as and if required. The BLM will prescribe the steps to be taken and restoration to be made with respect to the permitted lands and improvements thereon whether or not owned by the United States.

Sec. 11. *Antiquities and objects of historic value.* When American antiquities or other objects of historic or scientific interest including but not limited to historic or prehistoric ruins, fossils or artifacts are discovered on lands covered by this permit, or discovered during performance of this permit, the item(s) or condition(s) will be left intact and immediately brought to the attention of the contracting officer or his representative.

Sec. 12. *Discovery of Valuable Deposit:* A permittee may file an application for a noncompetitive lease not later than 60 days after expiration of the prospecting permit. An applicant for a noncompetitive lease must show that a valuable deposit of the mineral specified in the prospecting permit was discovered within the permit area and during the life of the permit. For noncompetitive lease applications for sodium, potassium and sulphur, it additionally must be shown that the lands are chiefly valuable for that mineral *(as opposed to nonmineral disposition of the lands).* See regulations in 43 CFR, Part 3500 for filing requirements for specific minerals.

Sec. 13. *Equal opportunity clause.* This permit is subject to the provisions of Executive Order No. 11246 of Sept. 24, 1965, as amended, which sets forth the nondiscrimination clauses. A copy of this order may be obtained from the BLM.

Sec. 14. *Special Stipulations:*

(Section 14 continued on page 3)

Sec. 14. *Special Stipulations (Cont.)*

GENERAL INSTRUCTIONS

Number of copies. Three copies of the application, typewritten or printed plainly and signed in ink, must be filed in the BLM office having jurisdiction for the State in which the lands are located.

If additional space is needed to furnish any of the required information, the information should be prepared on additional sheets (8 1/2 x 11"), initialed, and attached to this application.

SPECIFIC INSTRUCTIONS

NOTE: After an initial review and clearance of the application, but prior to the BLM's issuance of the prospecting permit, the applicant will be required to file in triplicate an exploration plan reasonably designed to determine the existence or workability of the deposit. *See regulations in 43 CFR Part 3500, for specific requirements regarding information to be included in exploration plan.*

Item 1 - Serial Number will be issued by the BLM at the time the application is filed. Any future correspondence concerning this application/permit should reference the serial number.

Item 2 - Specify mineral(s) applied for.

Item 4 - Land description: A complete and accurate description of the lands for which the permit is desired must be given in accordance with the regulations at 43 CFR 3503. The acreage must not exceed the maximum permitted by laws or regulations. In instances where the United States does not own a 100-percent interest in the mineral deposits in any particular tract, the applicant should indicate the percentage of Government ownership.

Item 7 - Party in interest: Applicant must indicate whether or not he is the sole party in interest. If not, the applicant must submit, at the time the offer is filed, a signed statement setting forth the names of the other interested parties. All interested parties must furnish evidence of their qualifications to hold an interest in this permit, if issued.

Item 9a - Application by a Corporation. If the applicant is a corporation, an officer or authorized attorney-in-fact of the corporation must submit the information specified in regulation 43 CFR 3502.30.

Application by an Association including a partnership. If the applicant is an unincorporated association, the application must be accompanied by a copy of the articles of association together with a showing as to citizenship and holdings of its members, as are required of an individual.

Application by a trust: See regulation 43 CFR 3502.29 for specific requirements.

Item 9b - Statement of Qualifications: If information as to qualifications has been filed previously with BLM, reference to that serial number may be made.

Item 10 - A processing fee will be charged which will be determined on a case-by-case basis under 43 CFR 3000.11.

Item 11 - Advance rental: An advance rental at the rate of 50 cents per acre, or fraction thereof, but not less than \$20 made payable to the Department of the Interior - Bureau of Land Management must be submitted with this application. *(For example, the advance rental payment for an application covering 40.1 acres would be \$20.50).*

(Continued on page 4)

NOTICES

The Privacy Act of 1974 and the regulations, in 43 CFR 2.48(d) provide that you be furnished with the following information in connection with information required by this application.
AUTHORITY: 30 U.S.C. 181 et seq., 351 et seq.; 5 U.S.C. Appendix 1031; 43 CFR 3500
PRINCIPAL PURPOSE: BLM will use the information you provide to process your application for a permit to prospect.
ROUTINE USES: BLM will disclose information to: (1) Appropriate Federal, State, local or foreign agencies, when relevant to civil, criminal, or regulatory investigations or prosecutions; (2) appropriate Federal agencies when their concurrence is required before BLM grants a right in public lands or resources: (3) a member of the public in response to a specific request for pertinent information; (4) a congressional office in response to an inquiry made at the request of an individual; and (5) to a consumer reporting agency to expedite collecting debts owed the government.
EFFECT OF NOT PROVIDING INFORMATION: Filing of this application and disclosing this information is required to obtain and a benefit. If you do not provide the information, BLM may reject your application.

The Paperwork Reduction Act of 1995 requires us to inform you that:
BLM collects this information to comply with the regulations at 43 CFR 3500, which implement the provisions of the Mineral Leasing Act of 1920, as amended; the Mineral Leasing Act for Acquired Land of 1947; and Section 402 of Reorganization Plan No. 3 of 1946 or other special leasing act.
BLM uses the information to identify the applicant and the Federal lands for which the applicant seeks permission to prospect for minerals.
Response to this request is required to obtain and keep a benefit.
BLM would like you to know that you do not have to respond to this or any other Federal agency-sponsored information collection unless its displays a currently valid OMB control number.

BURDEN HOURS STATEMENT: Public reporting burden for this form is estimated to average 5 hours per response, including the time for reviewing instructions, gathering, and maintaining data, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form to U.S. Department of the Interior, Bureau of Land Management (1004-0121), Bureau Information Collection Clearance Officer (WO-630), 1849 C Street, N.W., Mail Stop 401 LS, Washington, D.C., 20240.

APPENDIX C

Public Scoping Comment Summary Matrix

SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES ON THE 2012 GOAT MOUNTAIN HARDROCK PROSPECTING PERMIT APPLICATIONS EA

	11/30/2012		12/16/2015
No.	**Public Comment**	**Public Comment Summary**	**Agency Comment Response**
1	We believe that the BLM should not issue a permit for exploratory drilling because of the environmental and human effects the drilling will have. However, should the BLM move forward we believe that this project warrants the development of an EIS.	This project warrants the development of an EIS.	Based on initial scoping meeting with BLM, FS and URS technical staff January 6, 2012 it was determined that, based on the BLM NEPA Handbook, no significant impacts would result from this Action; and an EA was the appropriate level of NEPA analysis. (See Section 7, page 69) "The following actions normally require preparation of an EIS: (1) Approval of Resource Management Plans. (2) Proposals for Wild and Scenic Rivers and National Historic Scenic Trails. (3) Approval of regional coal lease sales in a coal production region. (4) Decision to issue a coal preference right lease. (5) Approval of applications to the BLM for major actions in the following categories: (a) Sites for steam-electric power plants, petroleum refineries, synfuel plants, and industrial structures (b) Rights-of-way for major reservoirs, canals, pipelines, transmission lines, highways and railroads (6) Approval of operations that would result in liberation of radioactive tracer materials or nuclear stimulation (7) Approval of any mining operation where the area to be mined, including any area of disturbance, over the life the mining plan is 640 acres or larger in size."
2	There was not adequate time for the public to respond to an EIS.	Not adequate time for the public to respond to an EIS.	This is an EA analysis, not an EIS. The EIS public process differs from the EA public process. (See BLM NEPA Handbook - Sections 7.0 and 8.0.) The BLM and FS provided a 30-day public scoping comment period; held three public meetings that included mailings/PSA; and a 30-day EA comment period and mailings/PSA, which was extended 15 days at the request of the public. BLM has and continues to host a public web site on this Action. (BLM Handbook Section 8.2). Both the EA and the BLM draft FONSI were made available for the well-publicized public comment period, and were posted to the BLM Internet project site. Public was given 45 days to comment. Scoping comments were also accepted early on in the EA process. See EA Section 1.9 for Scoping and Public Involvement summary.
3	The public was provided with opportunities for involvement in the process that far exceeded NEPA's minimum requirements.	The Draft EA process provided sufficient opportunity for public comment and agency consideration of those comments.	The Agencies held three well publicized public scoping/ information meetings within the geographic area of the proposed prospecting, accepted public scoping comments for a 30-day period, and released the EA for public review and comment again for 30 days which was extended for an additional 15 days (45 total). The BLM also established and maintained a well documented project web site that provided reviewers with the means to submit comments on-line.
4	We are concerned that this particular EA may not be in draft form and that comments made on this EA are not going to be fully considered. We request that all public comments be fully considered and addressed.	Will the public comments be fully considered?	All substantive comments received during the extended public comment period (see previous response) were considered and the EA, as necessary, was appropriately revised. This matrix was prepared to document a summary of the public comments and the agencies responses. Substantive comments, where warranted, resulted in modifications to the EA, and the nature of the revisions is summarized in EA Section 1.9, Scoping and Public Involvement.

	11/30/2012		12/16/2015
No.	**Public Comment**	**Public Comment Summary**	**Agency Comment Response**
5	To fully participate in the NEPA process the public should be given access to documents of importance to the analysis.	Will the public have access to the public record?	All project related documents have been placed in the BLM OR/WA State Office Public Room and the most relevant were posted on the BLM Internet project site.
6	To fully participate in the NEPA process the public should be given access to documents of importance to the analysis. This includes the documentation for the primary purpose for which the lands were acquired.	Will the public have access to all NEPA documents including documentation for the primary purpose lands were acquired?	All project related documents were placed in the BLM OR/WA State Office Public Room and the most relevant were posted on the BLM Internet project site. EA Section 1.5 and 1.7, includes discussion of the acquisition including the Primary Purpose and appropriate federal authorities. (See also response to comments #15 and #16.)
7	In determining the scope of the required NEPA analysis, a federal agency must consider not only the proposed action, but also other types of related actions including "cumulative actions" and "connected actions." Thus, BLM should have considered a future mine within the scope of its NEPA analysis as a cumulative action and/or connected action.	Consider "Cumulative Actions" including a future mine in the EA.	EA Section 3.1 – Introduction, notes that the scope of the Proposed Action does not encompass future mining as reasonably foreseeable. No mining is currently proposed, and any future mining proposal would require separate administrative actions by the FS and BLM, including a NEPA analysis and review process. A reasonably foreseeable future action (RFFA) is when a "future action" becomes "reasonably foreseeable" once it is "proposed;" until then it is "speculative" and need not be accounted for in the cumulative effects analysis in an EA or EIS. (Wilderness Workshop v. U.S. Bureau of Land Management, 531 F.3d 1220, 1229 (10th Cir. 2008)). Also see O'Reilly v. U.S. Army Corps of Engineers, 477 F.3d 225, 236 (5th Cir.2007) (citing 40 C.F.R. § 1508.23). (See EA Appendix D, NAEP NEPA Review – Cumulative Impacts Legal Review.)
8	Although we understand that this project is different from General Moly, Inc.'s lease application in 2005, this application could open the door to a mining proposal that does not meet the requirements for the reason for acquisition of this area.	This proposed Action could lead to mining.	The proposed action pertains to mineral exploration/prospecting. Should prospecting indicate the presence of a valuable deposit and should a "lease application" be received, a separate administrative action and NEPA process will follow.

	11/30/2012		12/16/2015
No.	Public Comment	Public Comment Summary	Agency Comment Response
9	The fact that the EA or Ascot Resource Inc. has labeled future mine development “speculative” is not determinative. Under NEPA: It must be remembered that the basic thrust of an agency's responsibilities under NEPA is to predict the environmental effects of proposed action before the action is taken and those effects fully known.	That the EA or Ascot Resources, Inc., have labeled future mine development "speculative" is not determinative.	EA Section 3.1 – Introduction, notes that the scope of the Proposed Action analyzed in the EA does not encompass future mining because future mining is not reasonably foreseeable. Under 43 C.F.R. § 46.30, reasonably foreseeable future actions are those “for which there are existing decisions, funding, or proposals identified by the bureau.” No mining action is currently proposed, and BLM is not aware of any plans for future mining. Moreover, any future mining proposal would require separate administrative actions by the FS and BLM, including a NEPA analysis and review process, as well as a separate decision. Future mining in the project area is highly speculative and indefinite. BLM therefore did not include future mining activities in its NEPA analysis for the hardrock prospecting permit applications. Based on both initial scoping and the analysis presented in the EA pursuant to BLM’s NEPA Handbook, BLM’s FONSI finds that no significant impacts would result from the Proposed Action; and thus an EA is the appropriate level of NEPA analysis. (See BLM NEPA Handbook Section 7, page 69).
10	An agency must engage in "reasonable forecasting" to determine the scope of its NEPA analysis. According to the Environmental Protection Agency (EPA), NEPA requires that agencies "develop scenarios that predict which future actions might reasonably be expected. This includes reasonably foreseeable future actions "even if they are not specific proposals" or "finalized [projects)."	The agency must engage in reasonable foreseeable forecasting even if they are not specific proposals.	BLM has existing case law which reinforces the position that mining impacts are not appropriate for analysis for prospecting permit applications as decided in the following appeals case: United States Department of the Interior Office of Hearings and Appeals Interior Board of Land Appeals, Missouri Coalition for the Environment Heartwood. When assessing reasonably foreseeable future actions, it was appropriate for BLM not to consider mine development, since development does not necessarily follow exploration. nor is it reasonably foreseeable to occur. (See Appendix D for relevant court cases).
11	Both BLM and the permittee acknowledge that significant mineral deposits exist in the project area to be evaluated with the proposed project.	Both BLM and Ascot acknowledge that a significant mineral deposit exists.	There is a known mineral occurrence but insufficient information exists to determine whether a "valuable deposit" occurs. BLM has taken no speculative position regarding whether or not a valuable deposit exists within the Permit/Project Area. (See 43 CFR 3501.5). Rather the EA in Section 1.1.2 -- *History*, notes that based on available information, the Permit Applications Area that encompasses the subject Mineral Survey lands appears to include a large portion of what is often referred to as the undeveloped “Margaret Deposit.” Some existing public domain reports suggest that this might be one of the largest copper-molybdenum-silver-gold calc-alkaline porphyries of Miocene age known in Washington State.

	11/30/2012		12/16/2015
No.	**Public Comment**	**Public Comment Summary**	**Agency Comment Response**
12	BLM and Ascot acknowledge that a significant mineral deposits exist in the project area and Ascot has committed financial resources to mineral exploration, therefore, a future mine is reasonably foreseeable.	Ascot has committed significant financial resources for exploration; Thus a mine is foreseeable.	As noted in EA Section 1.1.2 -- *History*, BLM only notes that available published information suggests the presence of a porphyritic Miocene age deposit. Whether that deposit is of sufficient extent and suitable mineralization to meet the criteria for a valuable deposit such that: "*a person of ordinary prudence would be justified in the further expenditure of his or her labor and means, with a reasonable prospect of success in developing a profitable mine.*" This determination will require the substantive information that would be obtained from the proposed mineral prospecting". See response to Comment #14.
13	Exploratory drilling must occur prior to mineral removal.	Exploratory drilling must occur prior to mineral removal.	Exploratory drilling does not always show the existence of a valuable deposit. According to the Rocky Mountain Mineral Law Foundation, in the 1970s of 352 likely locations, exploration indicated that only 23 were possible targets of which only 2 were developed. (An Introduction to Geology and Hard Rock Mining, Science and Technology Series, by Dr. Willard Lacy; Chapter 2, Item 9 – Risks.)
14	The Trust for Public Lands acquired these lands in 1986, via purchase and donation to protect these lands.	TPL acquired these lands via purchase and donation to protect these lands.	The comment includes mention of the intent of the 3rd Party (Trust for Public Lands) in the acquisition of some of the lands involved in the permit applications. There are no deed restrictions that were placed by TPL on the deeds and after acquisition, the lands are managed as part of the National Forest System, subject to existing statutes and Forest Plan direction.
15	Drilling is not compatible with the primary purpose for which the land was acquired.	Drilling is not compatible with the primary purpose for which the land was acquired.	FS consent is contingent upon a determination that the activities will not interfere with the primary purposes for which the lands were acquired. Under the Weeks Act of 1911, the subject lands were acquired in order to regulate flow of navigable streams or for the production of timber. The EA clearly indicates that the proposed action will not significantly affect this purpose. (See also response to Comment #17.)

	11/30/2012		12/16/2015
No.	**Public Comment**	**Public Comment Summary**	**Agency Comment Response**
16	The proposed prospecting activity will interfere with the primary purposes for which the United States acquired the public lands that are the subject of the prospecting applications.	Prospecting activity will interfere with the primary purposes for which the United States acquired the public lands that are the subject of the prospecting applications.	The Secretary of Interior is responsible for managing the Federal mineral estate and the authority to grant prospecting permits lies with the BLM. The NFS lands involved were acquired under the authority of the Weeks Act of 1911 for the purposes of regulating the flow of navigable streams or for the production of timber (P.L. 61-435, as amended). The Mineral Resources on Weeks Law Lands, 1917 established that the Secretary of Agriculture could authorize the prospecting, development, and utilization of mineral resources of the lands acquired under the Weeks Law of 1911. These functions were transferred to the Secretary of Interior in the Reorganization Plan No. 3 of 1946 (43CFR3501.1(b)). From 1917 to the present, the direction of Congress has been to consider the "prospecting, development and utilization" of minerals on lands acquired under the Weeks Act, as important and lawful uses of these public lands. Where hardrock mineral prospecting involves acquired NFS lands, the applicable regulatory framework sets out that the BLM can only issue prospecting permits with the consent of the surface managing agency. Consent is contingent upon a determination that the activities will not interfere with the primary purposes for which the lands were acquired and specifies certain required conditions for use and protection of the NFS lands involved. Under the Weeks Law of 1911, lands are acquired as may be necessary to regulate the flow of navigable streams or for the production of timber. Both agencies have worked cooperatively to evaluate the permit applications and to rely on both statutory authority and BLM regulations, as well as direction in the Forest Plan. (See EA Sections 1.5 and 1.7)The EA and project record make it clear that the lands within the prospecting permit applications are National Forest System lands that are not withdrawn from operation of the mineral leasing acts. The project record provides details about the acquisition of the lands, which were acquired because they are within the boundary of the GPNF and were considered to have important resource values especially for recreation and water quality. Upon acquisition, the lands have been and are being managed for the full range of public uses and values, consistent with existing laws, regulations, policy, and direction within the Forest Plan for the GPNF.The regulatory framework for the FS decision is described in the FS DN as well as in EA Section 1.7. The FS must make a finding that issuance of the prospecting permits will not "interfere" with the primary purposes for which the lands were acquired.
17	The Weeks Act authorized the acquisition of land for two primary purposes: to promote the production of timber and to regulate the flow of navigable streams.	The Weeks Act authorized the acquisition of land for two primary purposes: to promote the production of timber and to regulate the flow of navigable streams.	The Weeks Act authorized the acquisition of land for two purposes: (1) to regulate the flow of navigable streams; and (2) to promote the production of timber. Based on the analysis in the EA, the proposed prospecting activity will not interfere with either purpose.
18	The Proposed Project will interfere with the production of timber.	The Proposed Project will interfere with the production of timber.	Based on the EA, there is no evidence to support a determination that the proposed prospecting activity will interfere with the production of timber or the regulation of the flow of navigable streams. The proposed prospecting activities will require the removal of no more than 68 trees from mature stands. (See EA Table 3.7-2). The removal of trees from younger stands will be limited given that the total disturbed area for all of the drill pads will be approximately 0.23 acres and that the total disturbed area for road reactivation will be approximately 3.3 acres, 2.45 acres of which were reactivated in 2010. Based on these facts, the Agencies found that "[t]he Proposed Project [will] not impact future use of the area for timber production."

	11/30/2012		12/16/2015
No.	**Public Comment**	**Public Comment Summary**	**Agency Comment Response**
19	The Proposed Project will interfere with the flow of navigable streams.	The Proposed Project will interfere with the flow of navigable streams.	With respect to the flow of navigable streams, the EA, EA Section 3.3.2.2.1 explains that the impact of the proposed project, if detectable, will be negligible. The EA explains: Maximum (peak) estimated water use for the Proposed Action (20 gpm) would be approximately 0.1 percent of the minimum and 0.01 percent of the average flows recorded for the [USGS] gauging station [located on the Green River downstream from the Project Area] (on a per minute basis - EA Section 3.3.2.2.1). Estimated average water use of the Proposed Action (5 gpm) is 0.03 percent, and 0.002 percent of the minimum and average recorded flows (on a per minute basis). Given that water use for the proposed project represents fractions of a percent of allocated and available water within the watershed; and since most water used during drilling would be discharged back into the watershed, the effects of water withdrawal are expected to be negligible. The impact, if detectible, will be further reduced as pumping of onsite groundwater is limited to less than 5,000 gallons per da. As such, these findings would not support a determination that the Proposed Action will interfere with the regulation of the flow of navigable streams. Impact to flow of Green River: The amount of withdrawal is limited to 5,000 gpd and withdrawal rate is gauged using a flow rate gauge to ensure that water used from artesian sources does not exceed the state’s 5,000 gpd limit for permit exemption requirement. 5,000 gpd (668 cfd) is the upper limit for the exploration water use requirement each day. In the EA it stated the rate of water use would range anywhere from 5 to 20 gpm (0.01 to 0.04 cfs). As a comparison the Green River in the vicinity of the project flows anywhere from 30 to 50 cfs for the summer low flow in July per a 1993 survey that was done in that area, possibly as low as 20 cfs for the September month. A stream gauge many miles downstream near the confluence of the North Fork Toutle River identified in the EA which reported a low flow of 80 cfs in August. The lowest flow for all streams on the forest usually occurs in September. Whether at 80 cfs or 20 cfs for summer low flow, the hydrology report completed for the EA confirmed that the withdrawal amount of 0.01 to 0.04 cfs (5 to 20 gpm) would hardly have any impact (negligible) on Green River's flow. Impacts to groundwater: Pertinent portions of the EA have been clarified to more fully describe the water used for exploration drilling, and the written analysis regarding impacts to both surface and groundwater have been expanded. The groundwater use is limited to no more than 5,000 gallons per day, which is the amount allowed under exemption in Washington. The WA Department of Ecology also provided important comments regarding water, and these, combined with various public comments were taken into consideration by the Agencies. Additional design features to protect groundwater resources have been incorporated into the final EA and Appendix E.

	11/30/2012		12/16/2015
No.	**Public Comment**	**Public Comment Summary**	**Agency Comment Response**
20	The fact that some of the subject lands were acquired with funds made available under the Land and Water Conservation Fund Act precludes prospecting activity on those lands.	Lands acquired with funds made available under the Land and Water Conservation Fund Act (LWCF) precludes prospecting activity on those lands.	A) The Land and Water Conservation Fund was created by Congress in 1964 to provide money to purchase land for the benefit of all Americans. The money placed into the Fund, by Congress, is primarily derived from royalties received into the Treasury from off-shore Federal oil and gas leases. Four Agencies are eligible to obtain LWCF funding including the U.S. D.A. Forest Service and the U.S.D.I. Bureau of Land Management, U.S.D.I. National Park Service and the U.S.D.I. Fish and Wildlife Service. Lands purchased with money provided through the LWCF are used for a variety of public purposes. The Fund facilitates the purchase of public lands, but the enabling Statutes provide the foundation of the purpose for which the lands were acquired. (See EA, Sections 1.5 and 1.7).B) Some of the public comments described or interpreted their ideas on the intent of the 3rd Party who worked with the Forest Service on the acquisition of some of the lands/interests involved in the permit applications. The project record contains information on the dealings between the Forest Service and the 3rd party non-government organization (NGO), Trust for Public Lands (TPL). The project record also includes letters from the Forest Supervisor at the time, explaining to local members of the Congressional delegations and county commissioners, that the sought after lands and mineral interests were desirable as NFS lands. The TPL, along with many other NGOs have been long-standing and important partners in the acquisition of many acres of Federal lands across the Country. However, the "intent" or "purpose" of 3rd parties in aiding the acquisition of lands suitable and used for NFS lands, does not over-ride existing statutory direction or Forest Plan management prescriptions. In addition, the project record clearly reflects that there are no deed restrictions that were placed by TPL on the deeds, indicating that the United States was not willing and did not accept, any limits on the incoming Federal lands. In fact, the United States acknowledged that there remained an outstanding private mineral interest, which, in the view of the Agency officials at the time, would not prevent the acquisition of lands and interests that were available. After acquisition, the lands were to be managed as part of the National Forest System, subject to existing statutes and Forest Plan direction.

	11/30/2012		12/16/2015
No.	**Public Comment**	**Public Comment Summary**	**Agency Comment Response**
21	Information contained in the acquisition files associated with the subject lands does alter the statutory primary purposes for which the lands were acquired.	Information contained in the acquisition files associated with the subject lands does alter the statutory primary purposes for which the lands were acquired.	The statutory authority for an acquisition provides the best evidence of the purpose of the acquisition. Forest Service correspondence and analysis cannot alter the primary purposes for which Congress authorized the acquisition of land. The EA and project record make it clear that the lands within the prospecting permit applications are National Forest System lands that are not withdrawn from operation of the mineral leasing acts. The project record provides details about the acquisition of the lands, which were acquired because they are within the boundary of the Gifford Pinchot National Forest and were considered to have important resource values especially for recreation and water quality. Upon acquisition, the lands have been and are being managed for the full range of public uses and values, consistent with existing laws, regulations, policy, and direction within the Forest Plan for the Gifford Pinchot National Forest. The regulatory framework for the FS decision is described in the FS DN as well as in the EA, Section 1.7. The FS must make a finding that issuance of the prospecting permits will not “interfere” with the primary purposes for which the lands were acquired. When the United States acquired these lands, the Forest Service concluded that protecting the Green River was an important resource objective. The project record includes various records documenting this acquisition. These include: • A letter from the Trust for Public Lands (“TPL”)—evidences TPL’s motivation for donating certain mineral interests to the United States. • A letter from the Forest Supervisor to the Regional Forester and a purchase option and contract. The letter makes clear that the Forest Service contemplated that mining could occur on the acquired lands, (and the purchase option and contract provided that title to the acquired lands would be conveyed to the United States.) • Several letters sent by the Forest Supervisor to members of Congress and County Commissioners referred to the protection of the Green River as an important resource objective.
22	Proposed prospecting will interfere with the "scenic beauty" of the area, creating visual and noise disruptions to areas used heavily for recreation.	Prospecting would interfere with scenic beauty and recreation.	EA Section 3.9 -- *Visual/Scenic Resources,* fully describes the VQO for the Permit/Project Area. Throughout Section 3.0, *Affected Environment and Environmental Consequences*, visual and noise design features associated with the proposed project is described at some length. The drilling on pads within close proximity of the horse camp would be controlled to reduce seasonal use conflicts with recreational users of the camp. Drilling at pads 6 and 7 would be restricted to day time hours only during the week prior to Labor Day weekend and no drilling at these sites after Labor Day weekend. There are design features in place also to reduce noise and lighting impacts. (See EA Section 3.12.2.3).Hiking, equestrian activities, recreational vehicle traffic, and other recreational uses can still occur within the Proposed Project boundary.
23	Would interfere with the "primary purposes for which the land was acquired." …… "the regulation of the flow of navigable streams" and to "promote or protect the navigation of streams on whose watersheds they lie."	Protect navigable streams.	See Agency response to Comment #20. Based on the EPA (2008) definition of "navigable waters", the proposed Action, as it relates to the Green River and its tributaries, would not interfere with travelers, recreational or other purposes; or fish/shellfish interstate commerce.

	11/30/2012		12/16/2015
No.	**Public Comment**	**Public Comment Summary**	**Agency Comment Response**
24	Neglecting to include an area in a monument for political reasons and/or cost concerns regarding mineral buyout does not automatically create a preference for mining in this area.	Failure to include an area in the Mt. St. Helens NVM does not create a preference for mining.	Agree - likewise does not preclude exploration/mining. The legislation creating the National Volcanic Monument specifically sated that no "buffers" would be established around the perimeter of the Monument. That means that the lands adjacent to the Monument are to be managed according to the Forest Plan, and existing Statutes and Regulations.
25	It is the acquisition of this land, the means by which it was acquired, and the reasons for acquisition that are of primary concern. The concern is that FS already consented to the 2010 and 2011 Actions that were similar to the proposed Action. Without the FS perspective and a discussion of the potential reasons for compatibility, the EA is lacking analysis on this issue.	It is the acquisition of this land, the means by which it was acquired, and the reasons for acquisition that are of primary concern for the GPTF.	FS consent is contingent upon a determination that the activities will not interfere with the primary purposes for which the lands were acquired. Under the Weeks Act of 1911, the subject lands were acquired in order to regulate flow of navigable streams or for the production of timber. The acquisition files are included in the Project Record, and explained in the EA in Section 1.5 and 1.7.
26	FS will need to prove that exploratory drilling on the lands does not damage the primary purpose for which the lands were acquired.	Prove that exploratory drilling will not damage the purpose for which the lands were acquired.	EA determines that exploratory drilling with terms and conditions does not interfere with primary purpose. Non-significant impacts would be mitigated with BMPs and stipulations outlined in the EA and the BLM prospecting permit, (See EA Section 1.5 and 1.7).
27	EA fails to adequately consider effects of water use on aquifer levels and surface stream flows. EA fails to ensure that senior water rights downstream will not be impaired by groundwater.	EA is inadequate in addressing water issues.	Water related protection measures and drilling practices were modified in Alternative 3.0. Specific Best Management Practices that would be incorporated into the Project as design features to protect surface and groundwater including drill hole plugging are included in Appendix E. Water use was analyzed in EA Section 3.3.1.4, *Hydrological Conditions*. Total water use from local sources would not exceed 5,000 gallons per day, and will be measured with a flow rate gauge. The Washington State Department of Ecology allows up to 5,000 gallons per day of water to be withdrawn from groundwaters of the State without a water right or use permit. Supplemental water, if needed, would be obtained off-site and delivered to the drill site by a water truck. If onsite storage of water is required, location of a water storage tank will be mutually agreed upon by the FS, BLM, and the permittee. Under the Proposed Action, most water required for drilling would be obtained from on-site sources. See EA Section 3.3.1.4, Hydrological Conditions.
28	How can the amount of water use be measured if the well is not metered?	Metering of groundwater withdrawal.	See EA Section 2.1.3.2; water use will be gauged with a flow-rate meter.

	11/30/2012		12/16/2015
No.	Public Comment	Public Comment Summary	Agency Comment Response
29	The EA is lacking discussion and analysis of the impacts or effects to the stability of the water table, the surface, and underground flow regime. What is the mitigation plan for new water withdrawals? What senior water rights exist that may be impacted or impaired by new water withdrawals?	EA lacks analysis of impacts and mitigation for groundwater withdrawal.	The EA supports the conclusion that the proposed activity will not interfere with the protection of the Green River or groundwater flows. The EA found that impacts on the quantity and quality of surface and ground water would be "negligible." As discussed in EA Section 3.3.2.2.1, water use would be minimal as experienced during exploratory drilling in 2010. Drill holes would be sealed to prevent groundwater discharge from drill holes, and would prevent flow of water between zones of differing water pressures. Grout sealing, if needed, would prevent water loss and prevent potential ARD generating reactions with sulfide minerals from occurring. By limiting on-site groundwater use to 5,000 gallons per day (as required), groundwater use is limited to an amount that is negligible to watershed allocated use and water availability. Most of the water used would be infiltrated back into the substrate primarily by infiltration into drill sumps, further minimizing the loss of water from the area. Use of non-toxic drilling fluid additives would prevent impacts to groundwater and surface water. Spill containment kits would be kept at fuel storage areas and with the drill, water pump and in the service trucks. A Spill Prevention Plan submitted to the FS would be followed, and any spills or leaks would be immediately reported and promptly cleaned up. No new water withdrawals are proposed for this Action. (See EA Section 3.3.2.2). Under EA Section 3.3.2.3, the drilling system in Alternative 3 has been revised to include a closed drilling system for maintenance of return circulation throughout drilling of each bore hole, and complete abandonment of each hole with sealing materials (bentonites) or cement if ground water or artesian flow is encountered. Drill additives used would meet NSF/ANSI approval standards for drilling water wells, which would reduce the potential for toxics compounds entering groundwater. These products and methods are used for well drilling also. Best Management Practices that would be incorporated into the project as design features are listed in EA Appendix E.
30	What is the process for notifying the public and water managers if and when the drilling project requires more water to be trucked in from other location(s)?	Notifying public and water managers when additional water is required.	EA Section 2.1.3.2 -- *Water Requirements*. If more than 5,000 gpd of groundwater is needed, an appropriate State water right permit, if applicable, will be obtained by the permittee. An FS road use permit would be required for trucking from off-site sources.

	11/30/2012		12/16/2015
No.	**Public Comment**	**Public Comment Summary**	**Agency Comment Response**
31	Contamination of the water and site can occur from improper use of casing material, improper sealing of the bore holes and sediment sloughing of the grout or cement, and reactions with drilling additives that will be added to the bore holes. The EA does not include a comprehensive list of the additives to be used. To better understand the effects of the additives on the environment, the EA should include a list of the actual additives to be used.	Contamination of sites and waters from drilling and drill additives.	Under EA Section 3.3.2.3, the drilling system in Alternative 3 has been revised to include a closed drilling system for maintenance of return circulation throughout drilling of each bore hole, and complete abandonment of each hole with sealing materials (bentonites) or cement if ground water or artesian flow is encountered. Drill additives used would meet NSF/ANSI approval standards for drilling water wells, which would reduce the potential for toxics compounds entering groundwater. These products and methods are used for well drilling also. Best Management Practices that would be incorporated into the Project as design features are listed in EA Appendix E.
32	The EA does not consider where the excess water, if water is trucked in, will be discharged. Adding water to the watershed could increase instability and cause erosion. The current EA only proposes that the water used would be infiltrated back into the substrate either through down-hole loss or infiltration into drill sumps." The EA does not indicate how large these sumps will be.	How will drill water be disposed of?	EA Alternative 3 has been revised to include maintenance of recirculation throughout drilling of each borehole to minimize loss to the formation of both drilling fluids and cuttings. Excess water will be stored in lined sumps or in above ground storage tanks (see EA Section 2.1.4,) and (EA Section 3.3.2.2.1.). Sump size is described in EA Section 2.1.3. (Also see previous response.)
33	The EA fails to mention what is to be done with the cores that are brought up to the surface for analysis.	Fate of rock cores.	See EA Section 1.0, *Introduction, and* 3.13.2.2.1, which notes that rock core will be removed for off-site analysis.

	11/30/2012		12/16/2015
No.	**Public Comment**	**Public Comment Summary**	**Agency Comment Response**
34	EA fails to adequately analyze the proposed Project's effect on soils, the current road network, and soil compaction under and around the drill pads.	Project effects on soils.	See EA Section 2.1.3 - *Proposed Design Features and Environmental Protection Measures*, which describes soil management noting that it will be removed, stockpiled, returned during reclamation, and that compacted travel surfaces will be scarified, and no new roads would be constructed. Project uses existing decommissioned roads; used roads and drill pads will be scarified at the conclusion of this action. Discussed in EA Section 2.1.3.3, *Reclamation*, sites would be reclaimed as part of the permit stipulations. The physical properties of the area are largely influenced by local volcanism, most recently by the 1980 eruption of Mount St. Helens, which covered much of the Project Area in ash and pyroclastic materials associated with lateral blast deposits (USACE 2007). The Project Area includes five soil units mapped by the Skamania County Area Soil Survey (NRCS 2008) as discussed in Section 3.4 *Soils*. Generally, the soil units are described by the Natural Resources Conservation Service (NRCS) as "well drained" and lacking any restrictive soil layer that would prevent deep infiltration. The soils are also listed as having relatively low soil erosion K Factor (0.15).11 A K factor of 0.15 indicates that the area's soils have a low risk of erosion from surface water flows. Additional discussion of the geology of the Project Area is presented in Section 3.2, *Geologic and Mineral Resources*."
35	EA fails to adequately analyze road usage and effects from increased road usage.	Analyze effects of road usage.	Roads, effects from temporary reactivation of currently closed roads, road usage, and reclamation are described throughout the EA, and in particular in Section 3.11.3 - *Road Impact Avoidance and Minimization Measures*. A FS Road Use Permit for commercial operations would be required. See EA Section 2.1.3.4 Appendix E includes Best Management Practices that would be incorporated into the Project as design features to protect public safety.
36	The EA inadequately analyzes the impacts to recreation by dismissing the use of the actual drill location without due consideration. Although the roads have been decommissioned, the area still provides opportunities to hike, hunt, and observe wildlife. Recreation on a wider scale will be severely impacted by noise, dust, lights, and the physical presence of drill equipment.	Inadequately analyzed the impacts to recreation.	Effects of the proposed project on recreation are addressed throughout the EA and in particular in Section 3.12, *Recreation*. Use beyond the proposed temporary gate to the currently closed forest roads above FS Road 2612 will not preclude hiking or horseback travel into the Project Area in the long term. Only the immediate area of the active drill sites and operating equipment will be secured in the interest of public safety. The recreation impacts are considered temporary and minimal in both intensity and area. The project site impacts a total of 3/4-acre of newly disturbed ground out of the 1,368,300 acre Gifford Pinchot National Forest. No FS trails will be closed or restricted. See EA Section 3.0 and Appendix E for design features included to address dust, light, noise and traffic.
37	The action alternative could disrupt the Horse Camp for the entire season, including Labor Day weekend. If access to the horse camp is blocked, then there will be no established campsite in the area.	Disruption and access to the horse camp.	As noted in EA Section 2.1.3.4, *Timetable of Operations*, No drilling would take place during the peak use period of the Green River Horse Camp, including Labor Day weekend. Regardless of timing, the road to the Horse Camp would remain open during exploration activities. The Horse camp will not be blocked or restricted in any way as a result of this Action. Recreation design features are discussed in EA Section 3.12.3 and Appendix E.

	11/30/2012		12/16/2015
No.	**Public Comment**	**Public Comment Summary**	**Agency Comment Response**
38	The EA inadequately analyzes the effects on hunting. The Margaret elk are extremely important for quality hunting.	Effects on hunting.	As noted in EA Section 3.12.2.2.1 - *Direct Effects*, hunting opportunities would not be adversely impacted by the Proposed Action. Direct effects to wildlife such as migratory and resident mammals resulting from Project Actions may include tree removal, noise, and presence of workers, equipment, and lighting. These impacts are considered minor. Some individuals may be temporarily affected; however, the population as a whole would not. Mobile wildlife would be expected to temporarily vacate habitat adjacent to operating equipment because of noise and activity, dispersing to other areas around the Project Area where hunting activities could continue. Appendix E provides Best Management Practices that would be incorporated into the Project as design features. Goat Mountain is not considered to be suitable winter range for elk. See EA Section 3.5.1.3.
39	The EA inadequately analyzes affects to tourists using Mount St. Helens. The EA does little to address any effects to visitors' experience of Mount St. Helens and the scenic value of Goat Mountain.	Effects on tourists using Mt. St. Helens and Goat Mountain.	As noted in EA Section 3.9, *Visual/Scenic Resources*, no drill sites nor the drill rig and ancillary equipment can be seen from the visitor centers at Mount St. Helens as the view path is blocked by higher ridgelines located between Mount St. Helens and Goat Mountain, which is 12 miles away to the northeast. Nearby ridgelines, including Whittier Ridge, block the view of Goat Mountain from the Mount St. Helens Volcanic Monument, so drilling operations and equipment on Goat Mountain would not be visible from the Monument. The 14-foot tall drill mast would be further obscured by the 20+ foot tall tree canopy. The Proposed Project Area is within the Forest Plan retention and partial retention VQOs. See Forest Plan Figure iv-7, page 4-23.
40	Impacts to goshawk not addressed in EA.	Impacts to goshawk.	The GPNF biologist states: Goshawks are not found in the area. If goshawks are found near the project site, appropriate buffers and timing restrictions will be implemented. The Project Record includes the Wildlife Analysis and BA, which is summarized in the EA in Section 3.5.1.3.
41	The EA does not adequately consider effects on important wildlife species. The EA states that certain species simply do not exist in this area, or that if they exist the project will only be short term so effects from roads and noise will be temporary at best.	Effects on important wildlife species.	The EA notes in Section 3.5.1.3 - *Wildlife Species*, that only those species that were identified as having a potential to be affected by the proposed project are discussed. Those 26 species with no habitat present, and no documented presence in the Project Area are eliminated from further analysis, including: gray wolf, grizzly bear, marbled murrelet, marbled murrelet critical habitat, peregrine falcon, common loon, harlequin duck, great gray owl, sharptail snake, Cope's giant salamander, Oregon spotted frog, Barry's hairstreak, Johnson's hairstreak, golden hairstreak, mardon skipper, Great Basin fritillary, Puget Oregonian, Columbia Gorge Oregonian, Evening fieldslug, western ridged mussel, warty jumping slug, Burrington's jumping slug, Malone's jumping slug, panther jumping slug, barren juga, Oregon megomphix, crowned tightcoil, shiny tightcoil, and blue-gray taildropper. Like the gray wolf, the proposed project area does not present an attractive environment due to the high active road density (more than 1.7 miles per square mile). The Forest Plan MIS species, Forest Service Sensitive Species and threatened and endangered species were considered in analysis of this project. The species cover a wide variety of habitat needs. The EA disclosed the noise disturbance, vegetation removal and design features to minimize the potential noise and light disturbance in the wildlife section, EA Section 3.5. The proposed action has a short term noise disturbance and minimal ground disturbance in reopening roads and some vegetation removal for some of the drill sites. All roads will be closed after use. The area will have minimal disturbance as a result of the proposed action.

	11/30/2012		12/16/2015
No.	**Public Comment**	**Public Comment Summary**	**Agency Comment Response**
42	The BA does not adequately analyze effects to fisheries.	Effects on fisheries	EA Section 3.6, *Fisheries*, addresses effects of the proposed project at length, including those to the local fish population, noting that by implementing and maintaining impact avoidance and minimization measures consistent with the ACS guidelines and the FS National Core BMPs for Water Quality Management in Minerals Management Activities (FS-990a), impacts to surface water should be minimized to the point of being negligible. Of the 23 drill sites, 9 (pads 1 – 7, 14, and 15) are accessed directly along existing open roads (FS Road 2612 and a campground road). The remaining sites would be accessed on currently closed roads that would be temporarily reopened. Of the 14 sites on roads to be reopened, 7 (pads 10, 11, 12, 20, 21, 23, and 24) are on roads that were reopened for drilling in 2010 and then closed again. Four sites (pads 16, 17, 18, and 19) are on a road that was reopened recently (possibly 2007 or 2008) and then closed again. The remaining 3 (pads 13, 22, and 25) are on roads that have not been open as recently and have small tree seedlings and saplings growing on them. These project features are displayed on Figure 2. The pad number sequence is not continuous because two sites (pads 8 and 9) were eliminated from this exploration.
43	The BA never mentions black bear as being present in the area. Black bear are valuable big game species and do occur in this area. Bear activity in the area will be adversely affected by exploratory drilling activities. Effects to this species should be analyzed.	No discussion of black bear.	Wildlife and proposed project related effects are discussed throughout the EA. In particular EA Section 3.5 - Wildlife, describes how such impacts will be minimized. If black bear are present, their response to the proposed project activities would be similar to that of other large mammals, such as elk, and would be expected to be temporarily displaced from the Project Area while the exploration is occurring with a high expectation of their return to the area after the exploration activities cease as noted in Section 3.5.2.2.1 - Direct Effects. The black bear while not discussed in the effects section would have a similar response to the human activity as the elk. Bears would avoid the area during the drilling and return once the activity is over. There would be limited disturbance of vegetation and foraging opportunities and the roads would be closed once the exploration is complete.
44	A National Pollutant Discharge Elimination System permit under the Federal Clean Water Act is required.	A NPDES permit is required	NPDES permits are required In Washington State for new disturbance that is greater than one acre in size. This Action would disturb 0.85 acres including pads and roadways. Additionally, standard stipulations on the prospecting permit require holder to obtain all necessary State and Federal permits. If an NPDES or any other Clean Water Act Permit is required, the permit holder must obtain it. See Appendix E for Best Management Practices that would be incorporated into the Project as design features.

	11/30/2012		12/16/2015
No.	**Public Comment**	**Public Comment Summary**	**Agency Comment Response**
45	The BA conclusively assumes that federally listed species such as grizzly bears, gray wolves, Canada lynx, and various species of fish do not exist within the Project Area largely without citation to scientific authority. The EA does not adequately consider the effects on important wildlife species. The EA draws unsupported conclusions about project impacts to listed wildlife and other species in violation of NEPA and the ESA 'Under NEPA and the Endangered Species Act (ESA), BLM is required to discuss anticipated project impacts to listed species. ESA 7(a)(2).	BA assumes certain federally listed species do not exist within the Project Area without scientific citation. EA draws unsupported conclusion about impacts on listed wildlife. Effects on important wildlife species.	*The EA considered effects on species*: EA biologists analyzed ESA, MIS, S&M species within the project area and determined there would be no loss of habitat and no significant impacts to species as a result of this Proposed Action. WDFW and USFW concurred with the EA analysis and determination. *The project is defined as follows*: Of the 23 drill sites, 9 (pads 1 – 7, 14, and 15) are accessed directly along existing open roads (FS Road 2612 and a campground road). The remaining sites would be accessed on currently closed roads that would be temporarily reopened. Of the 14 sites on roads to be reopened, 7 (pads 10, 11, 12, 20, 21, 23, and 24) are on roads that were reopened for drilling in 2010 and then closed again. Four sites (pads 16, 17, 18, and 19) are on a road that was reopened recently (possibly 2007 or 2008) and then closed again. The remaining 3 (pads 13, 22, and 25) are on roads that have not been open as recently and have small tree seedlings and saplings growing on them. These project features are displayed on Figure 2. The pad number sequence is not continuous because two sites (pads 8 and 9) were eliminated from this exploration. The Forest Plan MIS species, Forest Service Sensitive Species and threatened and endangered species were considered in analysis of this project. The species cover a wide variety of habitat needs. The EA disclosed the noise disturbance, vegetation removal and design features to minimize the potential noise and light disturbance in the wildlife section. (EA Section 3.5). The proposed action has a short term noise disturbance and minimal ground disturbance in reopening roads and some vegetation removal for some of the drill sites. All roads will be closed after use. The area will have minimal disturbance as a result of the proposed action. EA Sections 3.5, *Wildlife* and 3.6, *Fisheries*, describe known wildlife and fisheries within the Permit Area, included listed endangered species that may occur within the Project Area. Effect Determinations were made by a qualified biologist through thorough research (see references on pages 14 and 15 in the BA.) WSFW and USFW both concurred with determinations in the BA.
46	As another general matter, the EA contains cursory and largely unsupported determinations of project effects to various listed, sensitive, or otherwise pertinent species and their habitat. Where BLM lacks data, its assumptions about project effects to listed or other species are unsupported and undermine its NEPA analysis.	EA contains cursory and largely unsupported determinations of project effects to various listed, sensitive, or otherwise pertinent species and their habitat.	Effect Determinations were made by a qualified biologist through thorough research (see references on pages 14 and 15 in the BA.) WSFW and USFW both concurred with determinations in the BA.

APPENDIX D

National Association of Environmental Professionals (NAEP)
NEPA Review – Cumulative Effects Legal Review

Appendix D

A mine is not currently being proposed at Goat Mountain, and is only speculative. A speculative mine is not required by law to be accounted for in the cumulative effects analysis.

BLM has existing case law which reinforces the position that mining impacts are not appropriate for analysis for prospecting permit applications as decided in the following appeals case: *United States Department of the Interior Office of Hearings and Appeals Interior Board of Land Appeals, Missouri Coalition for the Environment Heartwood, IBLA 2003-184. Decided 9.5.07*: "[4] Quite properly, the EA did not analyze the potential environmental effects of mining. Appellants are mistaken in their belief that the EA was required to address the potential environmental impact of mining under any future lease which might be issued to Doe Run as a result of exploration, regardless of whether appellants regard those impacts as "cumulative" or the mining itself as a "connected" or "similar" action under 40 C.F.R. § 1508.25(a). When assessing reasonably foreseeable future actions, it was appropriate for BLM not to consider mine development, since "[d]evelopment does not necessarily follow exploration, . . . nor is it reasonably foreseeable to occur," given that the results of exploration, as well as other factors, may well determine that the company will never seek to develop a mine. *Concerned Citizens For Responsible Mining (On Reconsideration)*, 131 IBLA 257, 267 (1994) (plan of operations); *see id.* at 265-66 (mine exploration and development are not connected actions, as defined in 40 C.F.R. § 1508.25(a)(1), and therefore do not require consideration in a single EA); *see also National Wildlife Federation*, 145 IBLA 348, 376 (1998) ("[m]ine development is not a reasonably foreseeable result of exploration"); *Southern Utah Wilderness Alliance*, 122 IBLA 165, 168-70 (1992) (seismic survey and drilling a well); and *Uintah Mountain Club*, 116 IBLA 269, 271-72 (1990) (prospecting permits)."

<u>From NAEP NEPA Review</u>:
<u>"Two new cases reinforce the notion that a "future action" becomes "reasonably foreseeable" once it is "proposed" ...... until then it is "speculative" and need not be accounted for in the cumulative impacts analysis in an EA or EIS:</u> *Wilderness Workshop v. U.S. Bureau of Land Management*, 531 F.3d 1220, 1229 (10th Cir. 2008) (preliminary injunction denied for decision by the Bureau of Land Management (BLM) and the Forest Service (USFS) authorizing a company to construct, operate, and maintain the Bull Mountain Pipeline through roadless National Forest land) (EIS on natural gas pipeline is adequate even though it "did not consider development of new gas wells that would be facilitated by the pipeline as connected actions," where pipeline has independent utility and additional gas wells are not imminent):

"It is important to note that 'projects', <u>for the purposes of NEPA, are described as 'proposed actions', or proposals in which action is imminent</u>." *O'Reilly v. U.S. Army Corps of Eng'rs,* 477 F.3d 225, 236 (5th Cir.2007) (citing 40 C.F.R. § 1508.23). "[T]he mere contemplation of certain action is not sufficient to require an impact statement." *Id.* (internal quotation marks omitted). "While a cumulative impact analysis requires the [reviewing agency] to include 'reasonably foreseeable' future actions in its review, improper segmentation is usually concerned with projects that have reached the proposal stage."*Id.*

In this case, the <u>defendants concluded in their FEIS, in response to public comments</u>, that it was unnecessary to analyze potential natural gas well development as a "connected action." 531 F.3d at 1231:However, as defendants noted in the FEIS, the development of additional natural gas wells is entirely speculative at this point, and will ultimately depend on "gas price and demand, among many other variables." In other words, although SG is undoubtedly contemplating the development of additional gas wells in the area, nothing in the record on appeal suggests that such development is imminent. *See O'Reilly,* 477 F.3d at 236."

APPENDIX E

Best Management Practices

Appendix E
Goat Mountain Hardrock Mineral Prospecting Permit Applications Environmental Assessment
Best Management Practices (BMPs)

BMP	Description	EA Section
Air Quality		3.10
BMP-1	To reduce impacts, excavated materials from sump construction would be visually monitored for wind and water erosion. If needed, the piles would be covered to prevent material loss. The proposed work area generally receives enough rainfall to keep dust levels low along the unimproved roads. If visual dust is observed during road travel, a water truck would be used to reduce dust emissions during heavy traffic. Prompt site reclamation following drilling activities would also result in a reduction of windblown material.	3.10
Cultural Resources		3.8
BMP -2	All project employees would be instructed regarding the type and nature of archaeological and cultural features that might be encountered during project construction, including the proper steps for protecting and reporting such features before further ground disturbing activities are undertaken.	3.8
BMP -3	Ascot and its agents would be required to adhere to protocol outlined in an Inadvertent Discovery Plan, which details actions to be followed by Ascot and its agents in the unlikely event unanticipated cultural resources or human remains are encountered during implementation of the Project. Ascot would be advised of state and federal regulations and laws protecting cultural resources and human remains, both orally and as documented in the Inadvertent Discovery Plan, which would be developed by the USFS GPNF archaeologist, who would be responsible for ensuring that the plan is adhered to throughout the duration of the Project. Should any cultural resources or human remains be encountered, further ground disturbing activities would be curtailed until the site has been properly investigated and cleared.	3.8
BMP -4	In the case that a designated member of an associated Tribe(s) requests to monitor the Project Site during drilling, this activity would be included as a permit condition and coordinated through the BLM/USFS. The designated tribal member would adhere to all on-site safety measures.	3.8
Fisheries		3.6
BMP -5	All applicable Min-2. Minerals Exploration BMPs would be implemented (USFS National Core BMPs 2012).	3.6

BMP -6	A BLM approved Spill Prevention Control and Countermeasures (SPCC) plan would be developed before operations begin and carried wherever project activities occur. The containment plan should include but not be limited to possessing a spill containment kit on-site and having pre-identified containment locations. A spill containment kit would be located where equipment is stored or operated. Equipment would be scrubbed so it is free of external petroleum-based products and invasive plant seeds or biomass. Hydraulic/oil/fuel leaks would be repaired prior to operating on National Forest System lands. Equipment would be checked daily for leaks and any necessary repairs would be completed prior to commencing work activities along the stream. Equipment storage locations would be approved by the Project administrator. Equipment would not be stored adjacent to or in stream channels when not in use, which would avoid potential effects of vandals, accidents, or natural disasters. Any accidental spills of a hazardous material (e.g., oil, fuel, transmission fluid) from any operating equipment or in place of storage on land or in water would be reported to GPNF personnel.	3.6
BMP -7	Service and refueling areas would be located at least 100 feet from stream courses or wet areas (including chainsaws and other hand powered tools).	3.6
BMP -8	Road segments treated within riparian areas would be re-contoured to mimic natural floodplain contours and gradient to the greatest degree possible.	3.6
BMP -9	Sediment control barriers would be installed between the Project and the stream for those road segments immediately adjacent to the stream or where the road fill is near the wetted stream.	3.6
BMP -10	Drainage features (drain dips) would be spaced to hydrologically disconnect road surface runoff from stream channels.	3.6
BMP -11	Excavated waste material would be disposed of in stable locations out of the flood prone area. Waste material other than hardened surface material may be used to restore natural or near-natural contours.	3.6
BMP -12	Disturbance of existing vegetation in ditches and at stream crossings would be minimized to the greatest extent possible.	3.6
BMP -13	Activities would be conducted during dry-field conditions with low to moderate soil moisture levels.	3.6
BMP -14	Project activities would restore natural drainage patterns (e.g., channel geometry, substrate and flow) and when possible promote passage of all fish species and life stages present in the area.	3.6
BMP -15	All applicable NWFP S&Gs would be followed, as well as applicable administrative unit BMPs and Washington State findings and recommendations, (Washington State Hydraulic Codes).	3.6
BMP -16	Road stabilization and decommissioning would retain LWM typically accumulated on culvert structures and channel margins. Material would be repositioned on-site or integrated into stream restoration projects as identified by a USFS Fish Biologist to the benefit of aquatic species.	3.6
BMP -17	Rip-rap or other hard structures used in culvert protection, (e.g., rock armoring at the inlet and outlet of the culvert), would be removed on decommissioned crossings at all unnamed creeks.	3.6

BMP -18	Any stream bank stabilization deemed necessary following culvert removal would use bioengineered solutions, (such as root wads, log toes, coir logs, woody and herbaceous plantings).	3.6
BMP -19	Effective and appropriate erosion controls would be used as necessary to ensure that the likelihood of sediment delivery to streams or other water bodies is negligible.	3.6
Geology[1]		3.2
BMP -20	Long-term impacts to soil, water quality and riparian resources would be minimized to the extent permitted by the geologic target when selecting locations for exploration activities.	3.2
BMP -21	Water bodies, sensitive areas, unstable slopes and highly erosive soils would be avoided to the extent practicable.	3.2
BMP -22	Clearing, excavation and other surface disturbing activities would be limited to the minimum necessary for exploration needs.	3.2
BMP -23	All new roads and drilling pads would be constructed to a safe and appropriate standard, "no higher than necessary" to accommodate their intended use (see BMP Road-2 (Road Location and Design), BMP Road-3 (Road Construction and Maintenance) and BMP Road-4 (Road Operations and Maintenance)).	3.2
BMP -24	Suitable design and construction practices would be employed to avoid, minimize, or mitigate surface disturbances as well as maintain the reclamation potential of the site.	3.2
BMP -25	Directional drilling techniques would be used when practicable to avoid or reduce surface disturbance.	3.2
BMP -26	The extent of open exploratory areas at one time would be limited and one site would be restored before moving on to the next one, to the extent practicable.	3.2
BMP -27	Applicable practices from BMP Fac-2 (Facility Construction) would be implemented to minimize erosion and stormwater discharge from ground disturbance at exploration sites.	3.2
BMP -28	Applicable practices of Chemical Use Management Activities BMPs would be implemented when chemicals are used in exploration activities.	3.2
BMP -29	Applicable practices of BMP Fac-6 (Hazardous Materials) would be implemented to manage petroleum products and other hazardous materials used in exploration activities.	3.2
BMP -30	Applicable practices from BMP Min-2 (Mineral Exploration) would be implemented to properly manage all exploration-related wastes, including drilling fluids, produced water and potentially acid-generating rock materials, to minimize the risk of groundwater and surface water contamination and to meet state and federal requirements.	3.2
BMP -31	Applicable practices of BMP Min-6 (Ore Stockpiles, Mine Waste Storage and disposal, Reserve Pits and Settling Ponds) and BMP Min-8 (Produced Water) would be implemented.	3.2

[1] Forest Service Manual BMPs for Minerals Exploration (Ref. FSM 2810, 2820, and 2850).

BMP -32	Applicable practices of BMP Min-8 (Minerals Site Reclamation) would be implemented to reclaim the project site concurrent with exploration activities.	3.2
Hydrology/Hydrogeology[2]		3.3
BMP -33	Guideline-1. Adverse effects to aquatic and other riparian dependent resources from mineral operations should be minimized or avoided. For operations in a riparian management area, ensure operators take all practicable measures to maintain, protect, and rehabilitate water quality, and habitat for fish and wildlife and other riparian dependent resources which may be affected by the operations.	3.3
BMP -34	Guideline-2. Structures and support facilities should be located outside Riparian Reserves. Where no alternative to siting facilities in Riparian Reserves exists, locate them in a way to minimize adverse effects to aquatic and other riparian dependent resources. Existing roads should be maintained to minimize damage to aquatic and riparian dependent resources in the Riparian Reserves.	3.3
BMP -35	Guideline-4. Where possible, adjust the operating plans for existing activities to minimize adverse effects to aquatic and riparian dependent resources in the Riparian Reserves.	3.3
BMP -36	Guideline RF-1. (RF-Road Management from Standard and Guidelines in Forest Plan) Generally avoid new road construction in Riparian Reserves, except where necessary for stream crossings.	3.3
BMP -37	Standard RF-2. Avoid side-casting (placement of unconsolidated earthen waste materials resulting from road and drill site construction or maintenance) in Riparian Reserves.	3.3
BMP -38	Standard RF-3. Avoid placing fill material on organic debris in Riparian Reserves.	3.3
BMP -39	Standard RF-4. Minimize or avoid disruption of natural hydrologic flow paths, including diversion of stream flow and interception of surface and subsurface flow when constructing or reconstructing roads or landings either inside or outside of Riparian Reserves.	3.3
BMP -40	Guideline RF-5. Wetlands and unstable areas should be avoided when reconstructing existing roads or constructing new roads and landings. Minimize impacts where avoidance is not practical.	3.3
BMP -41	Standard RF-6. New or replaced permanent stream crossings will accommodate at least the 100-year flood, including associated bedload and debris.	3.3
BMP -42	Standard RF-7. Where physically feasible, construction or reconstruction of stream crossings will avoid diversion of stream flow out of the channel and down the road in the event of crossing failure.	3.3
BMP -43	Standard RF-8. In fish bearing streams, construction or reconstruction of stream crossings will provide and maintain passage for all fish species and all life stages of fish.	3.3

[2] Aquatic Conservation Strategy (ACS) Objectives. Forest Service National Core Best Management Practices (BMPs) for Water Quality Management in Minerals Management Activities (USFS 2012); Minerals and Road Management Standards and Guidelines established for Riparian Reserves in the GPNF Forest Plan

BMP -44	Guideline RF-9. Construction or reconstruction of stream crossings should allow passage for other riparian dependent species where connectivity has been identified as an issue.	3.3
BMP -45	Guideline RF-11. Generally minimize hydrologic connectivity and delivery from roads. This includes roads inside and outside of Riparian Reserves.	3.3
BMP -46	Guideline RF-12. Road drainage should be routed away from potentially unstable channels, fills, and hill slopes. This applies both inside and outside of Riparian Reserves.	3.3
Standards and Guidelines: Attachment A to the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl 1994		
BMP -47	RF-2. For each existing or planned road, meet Aquatic Conservation Strategy objectives by: a) Minimizing road and landing locations in Riparian Reserves. b) Completing watershed analyses (including appropriate geotechnical analyses) prior to construction of new roads or landings in Riparian Reserves. c) Preparing road design criteria, elements, and standards that govern construction and reconstruction. d) Preparing operation and maintenance criteria that govern road operation, maintenance, and management. e) Minimizing disruption of natural hydrologic flow paths, including diversion of stream flow and interception of surface and subsurface flow. f) Restricting sidecasting as necessary to prevent the introduction of sediment to streams. g) Avoiding wetlands entirely when constructing new roads.	3.3
BMP -48	RF-4. New culverts, bridges and other stream crossings shall be constructed, and existing culverts, bridges and other stream crossings determined to pose a substantial risk to riparian conditions will be improved, to accommodate at least the 100-year flood, including associated bedload and debris. Priority for upgrading will be based on the potential impact and the ecological value of the riparian resources affected. Crossings will be constructed and maintained to prevent diversion of stream flow out of the channel and down the road in the event of crossing failure.	3.3
BMP -49	RF-5. Minimize sediment delivery to streams from roads. Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is unfeasible or unsafe. Route road drainage away from potentially unstable channels, fills, and hillslopes.	3.3
BMP -50	RF-6. Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.	3.3

BMP -51	RF-7. To meet the Aquatic Conservation Objectives. The contractor shall provide: a) Inspections and maintenance during storm events. b) Inspections and maintenance after storm events. c) Road operation and maintenance, giving high priority to identifying and correcting road drainage problems that contribute to degrading riparian resources. d) Traffic regulation during wet periods to prevent damage to riparian resources.	3.3
BMP -52	To maintain water quality and to reduce the amount of water needed during drilling the following measures would be followed: a) Only NSF/ANSI Standard 60-2003 Certified drilling fluid additives and bentonite grouts may be used during drilling. b) Water bearing zones and open formations encountered during drilling would be sealed, using approved drilling fluids and /or bentonite grouts, during drilling to allow for the recirculation of drilling fluids to the maximum extent possible. If loss of circulation is encountered during drilling, the portion of the formation causing the loss would be sealed prior to continued drilling, and the drill hole will be abandoned if circulation cannot be re-established. c) Drilling fluids would be reused to the extent possible. Appropriately sizes sumps lined with an impermeable liner and/or tanks would be used to contain drill fluids. Spent drilling fluids would be treated according to the Proposed Action Alternative 2. d) Daily on-site water use would be recorded using a totalizing flow meter.	3.3
BMP -53	Following the completion of each drill hole, the drill holes would be grouted and sealed to prevent the flow of water within, into, or around the abandoned drill hole. Sealing would include a ten-foot cement surface plug placed within the top twenty feet of each drill hole to help ensure an adequate surface seal. Portland concrete cement mixed with clean water and aggregates, or bagged cement mixed with clean water, would be used for the surface plug. The top of the surface plug would be completed one to two feet lower than the post-reclamation surface of the drill pad to prevent future trip hazards and address aesthetic concerns. Alternate drill hole abandonment/sealing methods and materials would be considered for prior approval. Alternate abandonment methods would include drill-string tremie placement of sealing materials and use of high-solids bentonite grout and/or bentonite/cement mixtures such as described in Washington State Minimum Standards for Construction and Maintenance of Wells (WAC 173-160). Drilling fluid additives would be required to meet NSF/ANSI 60-2003 standards, or as approved by the agencies. These products protect the environment should drill holes encounter permeable zones and groundwater systems.	3.3

Noise		
BMP -54	Baffles or other noise reduction techniques around the drill rigs would be used for intrusive noise reduction during drilling activity.	3.14
Recreation		3.12
BMP -55	Recreational access to GRHC (Green River Horse Camp) and Trails 213 and 217 would be maintained.	3.12
BMP -56	Drilling operations would be sequenced to reduce impacts during high recreational use periods, particularly operations associated with Pads 6 and 7 near the GRHC.	3.12
BMP -57	Signage and notices to alert users of the project area would be posted to facilitate public safety.	3.12
BMP -58	Public access to areas that are hazardous to public safety and health concerns would be controlled, especially immediately around drilling, drill pads, sumps, and access roads.	3.12
Soils		3.4
BMP -59	Erosion of soils would be minimized by BMPs such as silt fences, mulch on roads, culverts and water bars, and adherence to all practicable sedimentation controls consistent with applicable erosion control measures and BMPs, including such additional mitigation measures subject to the authorizing Agencies' discretion.	3.4
Transportation		3.11
BMP -60	As required by MSHA, drilling personnel would be required to drive defensively, maintain posted speed limits, and give the right-of-way to the travelling public by using turnouts whenever possible. Practice of defensive driving and obeying speed limits would be expected to reduce the chance of collisions with both the public and wildlife. These safe driving techniques would extend to water truck operators.	3.11
BMP -61	Drilling would not occur directly within the road, except along those segments currently closed, but temporarily reactivated for this project. A gate would be temporarily installed and maintained to control public access from FS Road 2612 to these areas for safety purpose. Proposed pad locations should offer areas large enough to accommodate the equipment without restricting access. Where the Proposed Action occurs near FS Road 2612 or the access road to the Green River Horse Camp (Pads 01-07, 14 and 15), access would be limited and controlled by the contractor. Public access to areas of active operations would be discouraged.	3.11
Vegetation		3.7
BMP -62	To prevent the introduction of noxious weeds into the project area all heavy equipment will be cleaned prior to entering National Forest System lands. An inspection by the USFS would be required to ensure that equipment is clean before work can begin.	3.7
BMP -63	Weed-free straw and/or mulch would be used.	3.7
BMP -64	The Guide to Noxious Weed Prevention Practices (USDA 2001) would be followed.	3.7
BMP -65	The Pacific Northwest Region Invasive Plant Program Record of Decision for Preventing and Managing Invasive Plants (USDA 2005) would be followed.	3.7

BMP -66	Native plant materials would be used as the first choice in revegetation for restoration and rehabilitation where timely natural regeneration of the native plant community is not likely to occur. Under no circumstances would non-native invasive plant species be used for revegetation.	
BMP -67	Road reactivation clearing zones would be minimized, as much as safety regulations will allow.	
Visual/Scenic Resources		3.9
BMP -68	Downcast lighting during night operations would reduce indirect effects. Drilling operations would be mobile and visual impacts from the presence of the drill would be temporary at each pad location. As needed, baffles can be placed around the mobile drill rig to further attenuate light intrusion to surrounding environs during night time operations.	3.9
Wildlife Resources		3.5
BMP -69	The project would have a limited operating period from March 1 to July 15 in the northern portion of the project area where mature forest is located to protect suitable owl habitat. No surface disturbing activities will occur from March 1 to July 15. No road reactivation or drilling activities in or immediately adjacent to the late successional older forest stands in the upper elevation section of the Project Area would occur until after July 15. Road reactivation or drilling would occur only between July 16 and February 28 for the northern portion of the Project Area where suitable Northern Spotted Owl habitat is present.	3.5
BMP -70	Lighting used for construction and operation of the project would be limited to the minimum needed for safety and reasonable functionality; in certain instances, lighting would be further managed by directing operational lighting inward.	3.5
BMP -71	Drilling equipment and generators would be outfitted with noise muffling devices when feasible to reduce the level of disturbance to wildlife from noise.	3.5
BMP -72	If listed species or critical habitats not identified in the EA are encountered, they would be appropriately identified and project activities appropriately adjusted to avoid or minimize impacts.	3.5

APPENDIX F

Goat Mountain Hardrock Prospecting Permit Applications EA – Biological Assessment, Revised April 10, 2015

Ver: Thursday, March 19, 2015, with comments from BLM & USFS
Plus AECOM responses 4-10-15

BIOLOGICAL ASSESSMENT –

GOAT MOUNTAIN HARDROCK PROSPECTING PERMIT APPLICATIONS TO BLM

Prepared for:

U.S. Forest Service
Gifford Pinchot National Forest
10600 NE 51st Circle
Vancouver, WA 98682

Revised April 10, 2015

URS

1501 Fourth Avenue, Suite 1400
Seattle, WA 98101-1616
(206) 438-2700

36310097

CONTENTS

TABLES

FIGURES

Appendix A List of Threatened and Endangered Species That May Occur in the Proposed Project Location.

EXECUTIVE SUMMARY

Summary of Determination: This project **may affect but is not likely to adversely affect** northern spotted owls from potential harassment caused by noise disturbance because the project activities would be restricted in suitable habitat until after the early nesting season of the northern spotted owl. The project will have **no effect** on designated critical habitat for northern spotted owls because the project area is outside of the designated critical habitat.

There would be no effect to gray wolf, grizzly bear, Canada lynx, Oregon spotted frog, whitebark pine, yellowbilled cuckoo, bull trout, Lower Columbia River Chinook salmon, Lower Columbia River coho salmon and steelhead, and Lower Columbia River Distinct Population Segment (DPS). These species are very unlikely to occur in the action area and these species are not discussed in this Biological Assessment.

1.0 INTRODUCTION

Section 7(a) of the Endangered Species Act (ESA) of 1973, as amended, requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species. Section 7(c) of the ESA, as amended, requires federal agencies to prepare a Biological Assessment (BA) for the purpose of complying with Section 7(a) by identifying any threatened or endangered species which is likely to be affected by the action.

1.1 Background and Consultation History

Information for this Biological Assessment was gathered from several sources including recent literature, Washington Department of Fish and Wildlife (WDFW) priority habitat and species (PHS) data (WDFW 2015a), U.S. Forest Service (USFS), NMFS, USFWS, Washington Department of Natural Resources (WDNR), and local agency biologists.. URS biologists conducted a site visit on October 4, 2011.

1.2 Project Location

The proposed project would occur in northeastern Skamania County, Washington within the Gifford Pinchot National Forest (Figure 1). The project area would include lands immediately adjacent to the Green River Horse Campground just outside the northeast boundary of the Mount St. Helens National Volcanic Monument (Figure 2). The proposed project would be located in portions of Township 10 North, Range 6 East, Sections 8 and 17 (Willamette Meridian). Access to the project area would occur via USFS Road 2612.

The project area occurs in both undeveloped and actively managed industrial forest lands. The project site is located in the Southern Washington Cascades Province, within the Pacific silver fir (*Abies amabilis*) vegetation zone (Franklin and Dyrness 1988). It is located predominantly north of the Green River on the south facing slopes of the east-west trending Goat Mountain.

The project would occur between approximately 2,800 and 4,000 feet in elevation on the fringe of an area deforested by the 1980 Mount St. Helens eruption. A portion of the northern part of the project area is covered by mature forest that escaped the effects of the 1980 eruption. Areas devastated by the eruption were salvaged logged in 1982 and replanted by 1986. The current habitat conditions where the proposed action would occur varies from young forest plantations about 27 years of age to forests up to about 127 years of age (Figure 2). The project area, except for a fringe at the northern edge that is in a roadless area, is designated as forest matrix land to be managed for timber harvest and other uses.

Two perennial tributaries of the Green River occur within the project area but just outside the area where roads or drill pads will be used for the project (one to the east and one to the west). They drain south directly into the Green River from the forested slopes of Goat Mountain. At least two other small tributaries go through the project area. The project area is located at approximately River Mile 32 of the Green River.

1.3 Description of Project Elements

The Goat Mountain Hardrock Prospecting Permit Applications and associated exploratory drilling (Project), would install 23 drill pads to directionally drill 63 three-inch diameter bore holes to collect rock core samples for analysis to obtain geological and mineralogical information. The proposed project would use an existing active road, and temporarily reactivate approximately 1.69 miles of existing USFS decommissioned roads. All drilling pads and temporarily reactivated roads would be reclaimed after prospecting is completed. Each element of the project is discussed in more detail below.

Drill Pads

Drilling pads are each approximately maximum of 20 x 20 feet (400 square feet). They would be situated within the road prism on reactivated roads and wherever possible would reuse old drill pad sites to avoid clearing or grading additional forest habitat. Each drill pad location would be cleared of vegetation and leveled to the extent needed to accommodate the mobile drill rig. No impervious surface would be created. Drill pads along existing open roads would include use of existing road shoulders and widening of the shoulder as needed to accommodate the drilling equipment. On active, open roads, no additional road maintenance due to the exploration activities is anticipated. Reclamation of drill pads and reactivated roads will include restoring water bars, removal of temporary culverts and re-establishing the drainage contours, placement of large wood pieces that were set aside during road reactivation, and reseeding.

Road Reactivation

Approximately 1.69 miles of existing USFS decommissioned roads would be "reactivated" by use of a small brushing excavator and/or handheld chain saw to clear shrubs, remove stumps, and remove fallen trees. This would be done by a small "Kubota" sized brushing excavator. Reactivated roads would be restricted from public access by a gate and signage. Personnel would access the drilling sites via 4 WD trucks and ATVs.

Of the 23 drill sites, nine (Pads 1 – 7, 14, and 15) are accessed directly along existing open roads (FS Road 2612 and a campground road). The remaining sites would be accessed on currently decommissioned USFS roads that would be temporarily reactivated. Of the 14 sites on roads to be reactivated, seven (Pads 10, 11, 12, 20, 21, 23, and 24) are on roads that were reactivated for drilling in 2010 and then closed again. Four sites (Pads 16, 17, 18, and 19) are on a road that was reactivated recently (possibly 2007 or 2008) and then closed again. The remaining three (Pads 13, 22, and 25) are on roads that were decommissioned and reclaimed, and currently have small tree seedlings and saplings growing on them. These project features are displayed on Figure 2. The pad number sequence is not continuous because two sites (Pads 8 and 9) were eliminated from proposed exploration.

Tree Removal

Hazard trees have been noted in the area. If hazard trees are deemed dangerous to the safety of the project by the company and USFS, they would be removed on a selective basis. On the roads that were reopened for the 2010 exploration program, no trees would be removed (with the possible exception of new danger trees that developed because of wind or other factors since 2010), and the new project footprint would be almost identical to the 2010 footprint.

The number of trees with the potential to be removed as a result of the project was calculated for the northern portion of the project area, which is considered mature forest. This includes roads and pad area for pads 10, 11, 12, 13, 22, 23, 24, and 25. Up to 68 trees would be removed. Their size and location is described below.

On the road segments to Pads 22, 25, and 13 in the mature timber stand, which were not reopened in 2010, a few trees would be removed. On the road between pad 23 and pad 22, one approximately 10-inch dbh tree and several up to 4-inch dbh trees would need to be removed. At pad 22, two trees of 10-12-inch dbh would probably need to be removed. On the road between pad 23 and pad 25, two approximately 10-inch dbh trees would probably need to be removed plus about 25 trees between 4 inches and 7 inches dbh. At pad 25, one approximately 12-inch dbh tree and two approximately 6-inch dbh trees would probably need to be removed. On the road between pad 25 and pad 13, two approximately 12-inch dbh trees and several trees up to 4-inch dbh would probably need to be removed. At pad 13, no trees larger than 4-inch dbh would need to be removed.

**Drilling Operation

Under Alternative 3, drilling fluid additives would be required to meet NSF/ANSI 60-2003 standards, or as approved by the agencies, for use in potable water supply wells to protect human health and the environment should drill holes encounter permeable zones and groundwater systems. Source water used for drilling would emphasize the use of on-site sources, including Duval Hole 06 and/or MM-10-10, supplemented as necessary by purchase from regulated potable water source(s) that are periodically tested and documented. On-site sources would be tested prior to use for pH, temperature, salinity, and at a minimum arsenic, cadmium, copper, lead, mercury, and zinc. Salinity testing is required to assist in selection of drilling fluid additives (bentonite). A temporary water storage tank would be placed at the Project site and filled with water purchased off-site, possibly from the town of Randle or other local community. The on-site tank would provide surge storage and/or compensation storage during times when uses of at-site sources are administratively restricted, or additional water is needed for road maintenance, dust suppression, and emergency fire control. Use of a water storage tank on-site for drilling operations would increase water truck traffic on local roads. The location of a water storage tank would be agreed upon by the USFS, BLM, and Ascot's field representative. Additional detail is presented in the Groundwater Resources Report prepared for the subject project (AECOM 2015).

Use of on-site water from Duval Hole 06 and/or MM-10-10 would be limited to 5,000 gallons of groundwater per day, unless an appropriate water right or use permit is obtained from the Washington State Department of Ecology (Ecology). Other unforeseen conditions may arise that could result in further use restrictions by decisions from the Agencies. No local surface water would be used for project water needs. Daily on-site water use would be recorded using a totalizing flow meter. Duval Hole 06 and MM-10-10 would be abandoned in accordance with Washington Administrative Code (WAC) 173-160-381 following the cessation of the drilling program, unless directed otherwise by the Agencies.

Drilling operations would be optimized to promote return of drill cuttings to minimize cutting distribution into adjacent formations, and to seal water bearing and porous formations to reduce cross-aquifer flow of groundwater. If loss of circulation is encountered during drilling, steps would be taken to re-establish circulation by sealing the formation causing the loss prior to continued drilling; if circulation is not re-established the drill hole would be abandoned by sealing. Drill cuttings, drilling fluid, and other waste water from drilling will be contained at the ground surface within each drill pad. Appropriately sized sumps lined with impermeable liner and/or tanks would be used. Sumps and/or tanks would be required to be placed within currently defined drill pads, or at an alternate location approved by the agencies. Drilling fluid would be reused to the extent practicable, to minimize water use. Drilling fluid decant water would be infiltrated through an enviro-mat at the ground surface within the respective drill pad; solid materials such as cuttings would be appropriately disposed of off-site.

To verify that groundwater is not negatively being impacted by drilling activities, groundwater from existing sources would be sampled prior to drilling activities and monthly during drilling as recommended in the Groundwater Resources Report prepared for the subject project.

Drill holes advanced through overburden would be over-cased with a temporary casing extending into underlying bedrock to prevent near surface groundwater from flowing into the annular space of the exploratory drill hole and to prevent fluids from discharging out of the annular space to soil.

Upon completion of drilling at each exploratory drill hole, the drill hole would be sealed generally as described in Washington State Department of Natural Resources’ fact sheet “Mineral Exploration Well/ Drill Hole Plugging and Abandonment”. Sealing would include a ten-foot cement surface plug placed within the top twenty feet of each drill hole to help ensure an adequate surface seal. Portland concrete cement mixed with clean water and aggregates, or bagged cement mixed with clean water, would be used for the surface plug. The top of the surface plug would be completed one to two feet lower than the post-reclamation surface of the drill pad to prevent future trip hazards and address aesthetic concerns. Alternate drill hole abandonment/sealing methods and materials would be considered for prior approval. Alternate abandonment methods would include drill-string tremie placement of sealing materials, and use of high-solids bentonite grout and/or bentonite/cement mixtures such as described in Washington State Minimum Standards for Construction and Maintenance of Wells (WAC 173-160), providing the sealing methods and materials ensure a seal that would prevent water flow into, within, and around the abandoned drill hole. To verify that Ascot is prepared to address artesian flow of groundwater, an emergency sealing plan would be provided to the permitting agency in advance of drilling that would include instructions and contact information for getting equipment and supplies to the drill site in a timely manner and provide reasonable plans for controlling and stopping flow.

Reclamation

Pads and access roads would be reclaimed by scarring an uneven surface as close to original grade as is practical and stable. Cast piles would be pulled back from the outside on to areas with a slope and spread irregularly over the surface with natural contours.

1.4 Project Timing

For access purposes, work would be confined to the snow-free season in this area, which is from mid to late May until early November. The proposed program would take approximately five months to complete with the proposed equipment. The preferred start date would be late May, with a completion date by late October of the same year. If permitting for the program pushes the start date past May, the project may be split it into two phases, with drilling of the southern area separated from drilling of the northern steeper areas (due to timing restrictions on various components).

Further timing restrictions are discussed below, in Section 1.5 Impact and Avoidance Measures and Section 4.1 Direct Effects.

1.5 Impact and Avoidance Measures

To avoid potential impacts to northern spotted owls, no road clearing, vegetation removal, or drilling actions would be conducted in or adjacent to spotted owl suitable habitat until after the early breeding season ends in mid-July (March 1 – July 15).

No new roads would be created in the late successional old growth forest stands. Reactivating existing roads and establishing or reestablishing drill pads, including clearing and grading, would not increase the dimensions of the road such that forest habitat would be lost.

Up to 68 trees would be removed as part of the road reactivation, none of which are considered "mature trees", and all would be less than 12dbh (diameter at breast height). Any additional danger trees that must be dropped would be retained at that location as downed woody debris to provide habitat for resident wildlife.

No new drilling pads and only minimal expansion, as necessary, of existing drilling pads (that requires clearing trees) would occur. No new drilling pads and no expansion of existing drilling pads would occur within undisturbed, late successional mature forest, or forest habitat suitable to northern spotted owls.

Temporarily reactivated roads would be reclaimed after drilling in that section of the project area is completed. Drilling pads and access roads would be reclaimed by scarring the road to an uneven surface as close to original grade as is practical and stable. This would minimize the amount of time that topsoil and vegetation is stockpiled and minimize potential erosion and downstream sedimentation from future precipitation events.

Spill containment and response kits would be present and immediately accessible at all drilling and equipment maintenance sites in the event of an accidental chemical spill or release. All equipment and maintenance / fueling operations would use adequate spill prevention containment devices.

2.0 ACTION AREA

The Action Area is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 CFR §402-02). Specifically, the Action Area includes the geographic extent of biological, chemical, or physical effects created by the project above baseline conditions. No adverse biological or chemical effects are anticipated to occur based on the project elements described in Section 1.3 Description of Project Elements. Noise is assumed to be the most significant physical effect resulting from the proposed actions and is therefore used to calculate the Action Area. Based on noise calculations in Section 4.1 Direct Effects, the action area would be approximately 2,877 feet from the geographic extent of chainsaw or excavator noise (the greatest noise producing activities) used for vegetation clearing (Figure 3). The Action Area, as shown on Figure 3, goes a shorter distance on the north side because the ridge top likely acts as a barrier to noise.

3.0 LISTED SPECIES AND CRITICAL HABITATS IN THE ACTION AREA

3.1 Federally Listed Species in the Action Area

Federally listed threatened and endangered species with potential to occur in Skamania County include (USFWS 2015, NMFS 2015):

- Bull trout (*Salvelinus confluentus*) – coastal Puget Sound distinct population segment (DPS),
- Lower Columbia River Chinook salmon (*Onchorynchus tshawytscha*) evolutionarily significant unit (ESU),
- Lower Columbia River coho salmon (*O. kisutch*) ESU,
- Steelhead (*O. mykiss*) Lower Columbia River DPS,
- Canada lynx (*Lynx canadensis*),
- Gray wolf (*Canis lupus*),
- Grizzly bear (*Ursus arctos horribilis*),
- Oregon spotted frog (*Rana pretiosa*),
- Yellow-billed cuckoo (*Coccyzus americanus*)
- Whitebark pine (*Pinus albicaulis*), and
- Northern spotted owl (*Strix occidentalis caurina*),.

Bull trout, lower Columbia River Chinook salmon, lower Columbia River coho salmon and lower Columbia River steelhead are precluded from occurring the action area by downstream fish barriers at river mile 25 (Haapala 1993, NMFS 2005, StreamNet 2015).

In 2004 the potential Canada lynx habitat was analyzed on the Gifford Pinchot National Forest. A small amount of habitat was identified near Mt Adams. It was determined not adequate to support a breeding unit for Canada lynx. The nearest regularly occurring Canada lynx is in Okanogan County, Washington. The US Forest Service submitted the information to USFWS, Lacey office. The USFWS concurred with the determination. Therefore, Canada lynx is not considered in this BA.

Grizzly bears and gray wolves may have occurred historically in Skamania County, Washington. Grizzly bears and gray wolves could utilize the habitat in the vicinity of the Action Area. However, no grizzly bears or gray wolves have been confirmed in recent history, although gray wolf sightings are reported periodically in the Gifford Pinchot National Forest (Jakubowski 2015). The closest documented recent sighting for gray wolves is the Teanaway Pack, located north of Interstate 90 in Kittitas County, Washington (WDFW 2015b). Grizzly bears occur in the North Cascades. The above mentioned species are therefore not addressed in this biological assessment.

Oregon spotted frog occur in lower elevation streams and rivers. Yellow-billed cuckoos are considered extirpated in Washington State. Whitebark pine is associated with subalpine habitat of the Cascade Range in Washington.

Of the federally listed species with potential to occur in Skamania County, only the northern spotted owl has the potential to occur in or near the Action Area. The northern spotted owl was listed as a federally threatened species throughout its range in Washington, Oregon and northern California effective July 23, 1990 (USFWS 1990). Loss of late-successional forest habitat from timber harvest was the primary impetus for the listing. A 2004 status review for the northern spotted owl found the major threats at that time included the effects of past and current timber harvesting, loss of habitat from fire, and competition with barred owls (*Strix varia*). Of the threats identified at the time of listing, only one (predation linked to forest fragmentation) does not now appear well supported (Courtney et al. 2004).

Northern spotted owls are documented to occur in the project vicinity (USFS 2012, Jakubowski 2015). According to U.S. Forest Service (USFS) GIS data, the nearest northern spotted owl observation record from surveys is located approximately 4,000 feet north of the action area (Figure 4). According to the same data, the nearest observed "activity polygon" for northern spotted owl is approximately 3.75 miles northeast of the project site (Figure 4).

Northern spotted owl suitable habitat is present within the action area for all stages of spotted owl life history (USFS 2015). Spotted owl habitat is often subdivided into distinct components (USFWS 2011, 1992).

- Nesting / Roosting Habitat – forested areas used for nesting, roosting, foraging, and dispersal by spotted owls that usually have more late-seral forest characteristics than "foraging" or "dispersal" habitats.
- Foraging Habitat – forested areas largely used for foraging, dispersal, and other nocturnal activities, but *not* nesting or roosting.
- Dispersal Habitat – forested areas predominantly used for dispersal, but *not* nesting, roosting, or foraging.

These categories are not absolutes but instead represent generalizations. Nesting-roosting habitat is generally considered to provide all or most habitat requirements, whereas foraging and dispersal habitats are considered to provide only a subset of the spotted owl's habitat requirements (USFWS 2011).

Approximately 436 acres of suitable habitat are located within the Action Area. Seven of the 23 drilling pad sites (10, 11, 12, 13, 22, 23, and 25) are located within northern spotted owl habitat considered suitable for nesting, roosting, foraging and dispersal (Figure 5). Drilling pad 24 is immediately adjacent to the suitable habitat mentioned above (within approximately 75 feet). Access routes to drilling pads 10, 11, 12, 13, 22, 23, 24 and 25 also occur within suitable habitat. The remaining fifteen pads are located within forest stands that provide no suitable habitat of any kind for northern spotted owl. The total of each type of habitat within the action area is summarized in Table 1.

Table 1. **Suitable Northern Spotted Owl Habitat Within the Action Area.**

Type of Habitat	Acres within Action Area	Percent of Habitat in the Action Area
Suitable Nesting, Roosting, Foraging and Dispersal Habitat	174	13
Suitable Foraging and Dispersal Habitat	128	9

Suitable Dispersal Habitat	134	10
Unsuitable	*918*	*68*
TOTAL	**1,354 Acres**	**100%**

3.2 Federally Designated Critical Habitat in the Action Area

Critical habitat is designated for the northern spotted owl, bull trout, steelhead, and Chinook salmon in Skamania County (USFWS 2015, NMFS 2005). Bull trout designated critical habitat does not occur in the Green River drainage (USFWS 2010). Designated critical habitat for steelhead and Chinook salmon includes the Green River upstream to approximately river mile 25, the location of an impassible anadromous fish barrier (Haapala 1993, NMFS 2005, StreamNet 2015). Steelhead and Chinook salmon designated critical habitat therefore does not extend upstream into the Action Area. Northern spotted owl designated critical habitat is present to the north, east and south beyond the proposed Action Area (Figure 6) (USFS 2012). At its nearest location, Northern spotted owl critical habitat is approximately 620 feet north of the action area.

4.0 EFFECTS OF THE ACTION

This analysis addresses all potential actions of the project on listed species and critical habitats, including direct, indirect, interdependent and interrelated effects of the project. These effects can be defined as follows:

- Direct effects are defined as the direct or immediate effects of the project on the species or its habitat. Direct effects include those resulting from interdependent or interrelated actions.
- Indirect effects are those that are caused by or would result from the proposed action and are later in time, but still reasonably certain to occur.
- Interdependent actions are those that have no independent utility apart from the action under consideration. Interdependent actions are typically “because of” the proposed action.
- Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interrelated actions are typically “associated with” the proposed action.

4.1 Direct Effects

Northern Spotted Owls

The Ascot Plan of Operations (Ascot USA 2011) proposed that actions would occur during the nesting season, raising the potential of direct effects from harassment caused by noise disturbance near active nests. Northern spotted owls may be susceptible to noise disturbance from project actions. The proposed use of trucks, excavator, ATV, and drilling rig, as well as chainsaws and pumps, would introduce increased levels of sound into the project area.

The ambient noise level in the forest is generally considered to be 40 dB (WSDOT 2014). Chainsaws are considered to have an average maximum noise level of 84 dB and an excavator 81 dB (measured at 50 feet). Using a noise attenuation table for soft-site conditions (vegetated area), it is estimated that the maximum generating activity would potentially have a behavioral effect on northern spotted owls at 182 feet or less from the activity[1]. Using the same assumptions, this noise would attenuate to ambient levels at approximately 2,877 feet from the source.

As mentioned in Section 1.3 Description of Project Elements, the drill rig is estimated to have a maximum of 76 dB (at 50 feet) while actively drilling. Using the noise attenuation table, drilling would attenuate to ambient levels at 1,377 feet from the source, and potentially have a behavioral effect on northern spotted owls at 87 feet or less from the activity.

Spotted owl nesting behaviors may be disrupted by loud noise and activity that occurs in close proximity to an active nest during the early portion of the nesting season. Northern spotted owl early nesting season is defined as March 1 to July 15 in the Gifford Pinchot National Forest. Early nesting season behavior includes nest site selection, egg laying, incubation, and brooding of nestlings to the point of fledging (Forsman et al. 1984, pp. 32-38).

Because the area has not been recently surveyed for northern spotted owls, it is possible that an active northern spotted owl nest site could be located in the northern portion of the project area (in the area of suitable habitat). **To avoid potential noise-related disturbance to northern spotted owls, the project would have a limited operating period, between July 16 to February 28 within suitable northern spotted owl habitat. No road reactivation or drilling activities in or immediately adjacent to the late successional old growth forest stands would be allowed in the upper elevation section of the project area until after July 15.**

[1] Assuming 84 dB for chainsaws, and a behavioral effects threshold of 70 dB.

Northern Spotted Owl Habitat

Up to 68 trees would be removed within designated “suitable” habitat for northern spotted owls as part of the road reactivation. The trees to be removed would be small; none would be greater than 12 inches dbh or considered “mature trees”. The relatively small number of trees to be removed, and their small size is the reason for determining that the project is “not likely to adversely affect” northern spotted owls.

A few additional danger trees may be removed, the exact number of which would be determined during road reactivation. The purpose of danger tree removal would be to assure the safety of drilling crews. Work would be primarily completed within existing road prisms or on existing drilling pads created during previous prospecting actions (Ascot USA 2011). Specific tree removal needs within the mature forest is described in Section 1.3. The potential removal of a limited number of danger trees does not change the “not likely to adversely affect” determination for northern spotted owls.

Downed woody debris and young regenerating trees and shrubs would be pushed temporarily to the edges along access roads and at drilling pads. Some trees along the access roads and at drilling pads may be partially delimbed to provide access and safety at each drilling site. At the completion of the project, the drilling pads and access road improvements would be reclaimed. Debris created during the vegetation clearing actions would be scattered back across the roads and drilling pads. Graded areas would also be reseeded according to USFS specification. The effects of vegetation removal are considered temporary due to the reclamation activities specified by the proposed action. Reclamation and reseeding would replicate the habitat conditions existing prior to the proposed action.

4.2 Indirect Effects

Indirect effects to wildlife are defined as those which will be later in time but are reasonably certain to occur. No indirect effects are anticipated from the proposed action.

4.3 Interdependent and Interrelated Actions

There are no interdependent and interrelated actions as part of the project, and therefore no effects.

4.4 Effects Determination

Suitable nesting, roosting, foraging and dispersal habitat exists for northern spotted owls within the proposed project area. A small number of small tree (no mature trees) would be removed as part of the project. Approximately 68 trees are estimated to be removed, as visually observed during a site visit. No trees to be removed are expected to be greater than 12 inches dbh. Vegetation removal would be limited to saplings, shrubs, partial delimbing, and downed woody debris unless safety hazard “danger trees” are encountered. Avoidance and minimization measures will be implemented in order to reduce the potential effects to northern spotted owls. They include a limited operating period from July 16 to February 28 within suitable northern spotted owl habitat, including drilling pads 10, 11, 12, 13, 22, 23, 24, and 25, and the roads leading to those pads. Additional avoidance and minimization measures, discussed in Section 1.5 include the use of existing drilling pads and roads and reclamation of reactivated roads. The impacts of proposed vegetation removal would be temporary, as reclamation is proposed by the applicant. Native plant materials will be used for revegetation and rehabilitation where timely natural regeneration of the native plant community is not likely to occur. Under no circumstances will non-native invasive plant species be used for revegetation.

Direct effects to northern spotted owls during the early nesting season may occur as a result of noise above ambient conditions caused by road and pad work and drilling activities. However, a limited operation period from July 16 to February 28 will be in effect for areas within suitable spotted owl habitat. Because of this avoidance measure, potential effects to northern spotted owl, if they are present, would be limited to the late nesting season when they are less vulnerable to disturbance from noise and tree cutting. Based on these avoidance and minimization measures, the project “**may affect, but is not likely to adversely affect**” northern spotted owls.

5.0 REFERENCES

AECOM, 2015. Groundwater Resources Report, Goat Mountain Hardrock Propecting Propject, Skamania County, Washington.

Ascot USA. 2011. Revised Plan of Operation for Prospecting Permit to BLM and USFS on the Mount Margaret Project, Skamania County, Washington State, Ascot USA Inc. 14 pages + appendixes.

Chandler, Carol. 2012. Personal telecommunication with David Every of URS Corporation on March 8, 2012.

Courtney, S.P., J.A. Blakesley, R.E. Bigley, M.L. Cody, J.P. Dumbacher, R.C. Fleischer, A.B. Franklin, J.F. Franklin, R.J. Gutierrez, J.M. Marzluff, and L. Sztukowski. 2004. Scientific evaluation of the status of the Northern Spotted Owl. Sustainable Ecosystems Institute. Portland, Oregon. 508 pp.

Forsman, E.D., E.C. Meslow, and H.M. Wight. 1984. Distribution and biology of the spotted owl in Oregon. Wildlife Monographs, 87:1-64.

Franklin, Jerry F. and C.T. Dyrness. 1988. Natural Vegetation of Oregon and Washington. Oregon State University Press.

Haapala, Debbie L. 1993. Green River 1993 Stream Survey Narrative. Gifford Pinchot National Forest, Mount St. Helens National Volcanic Monument, Amboy WA. 27 pp.

Jakubowski, John, North Zone Wildlife Biologist, Cowlitz Valley Ranger District, U.S. Forest Service. 2015. Personal telecommunication with Jennifer Pretare of URS Corporation on January 14, 2015.

NMFS (National Marine Fisheries Service). 2015. West Coast Salmon and Steelhead listings. Available at: http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/salmon_and_steelhead_listings/salmon_and_steelhead_listings.html. Accessed on January 13, 2015

_____. 2005. Endangered and threatened species: Designation of critical habitat for 12 evolutionarily significant units of west coast salmon and steelhead in Washington, Oregon, and Idaho. *In*: Federal Register, Volume 70, Number 170, September 2, 2005.

Stinson, Derek W. 2001. Washington state recovery plan for the lynx. Washington Department of Fish and Wildlife, Olympia, Washington. 78 pp. Available from the WDFW at: http://wdfw.wa.gov/conservation/endangered/land_mammals.html.

StreamNet. 2015. Streamnet - Fish Data for the Northwest. Available at: http://www.streamnet.org/.

U.S. Fish and Wildlife Service (USFWS). 2015. List of federally threatened and endangered species with potential to occur in the vicinity of the project area. Information, Planning and Conservation System Accessed via the internet on January 13, 2015 at: http://ecos.fws.gov/ipac/.

______. 2012. Endangered and Threatened Wildlife and Plants: Revised Critical Habitat for the Northern Spotted Owl, Proposed Rule. In: Federal Register, Vol. 77, No. 233, December 4, 2012.

_____. 2011. Revised Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*). U.S. Fish and Wildlife Service, Portland, Oregon. Xvi + 258 pp.

_____. 2010. Endangered and threatened wildlife and plants; Revised designation of critical habitat for bull trout in the coterminous United States, Final Rule. *In*: Federal Register, Volume 75, Number 200, October 18, 2010.

_____. 2008. Endangered and threatened wildlife and plants: Revised designation of critical habitat for the northern spotted owl, Final rule. *In*: Federal Register, Vol. 73, No. 157, August 13, 2008.

_____. 1992. Endangered and threatened wildlife and plants: Determination of critical habitat for the northern spotted owl. *In*: Federal Register, Vol. 57, No. 10, January 15, 1992.

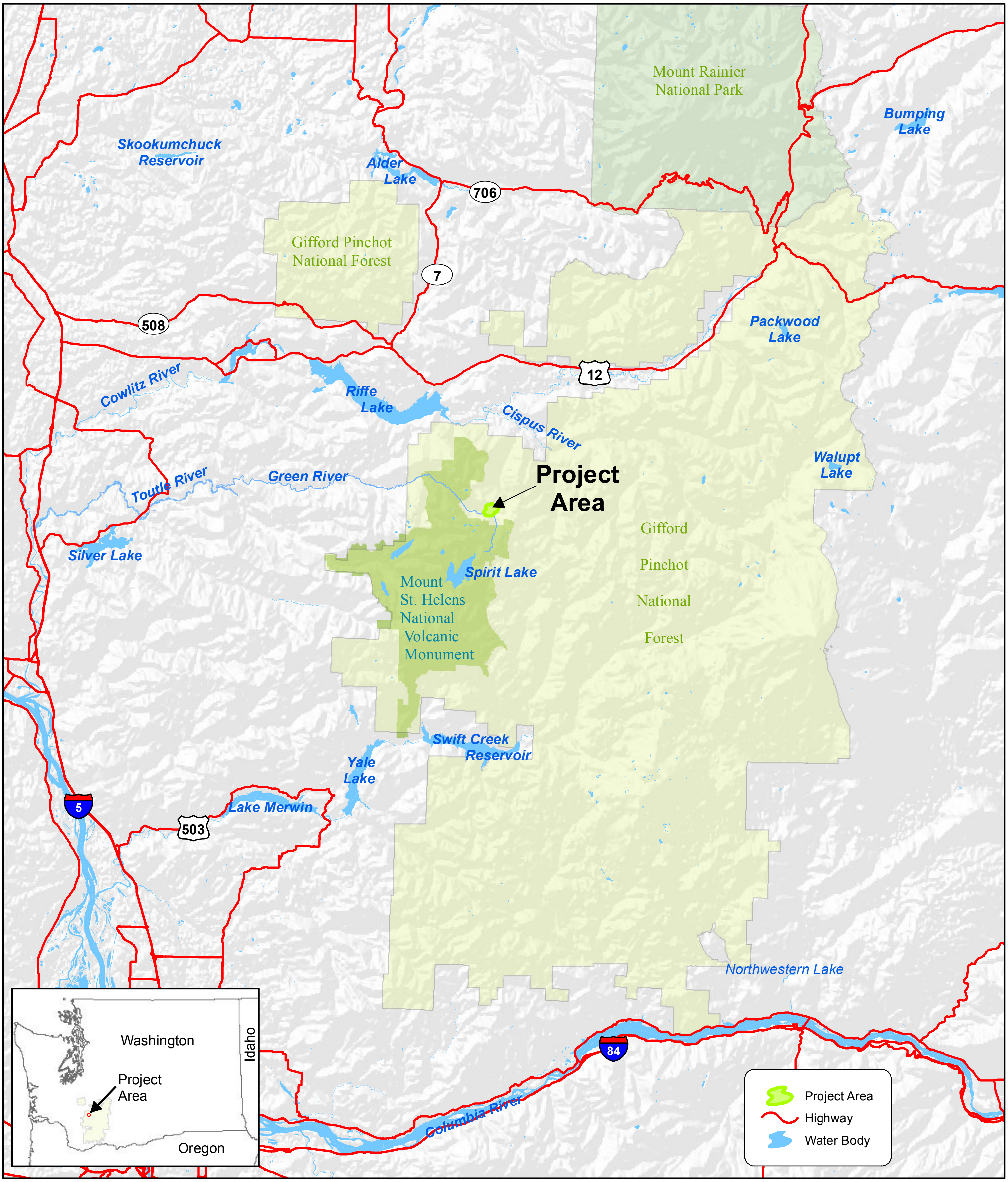
_____. 1990. Endangered and threatened wildlife and plants; Determination of threatened status for the northern spotted owl, Final rule. *In*: Federal Register, Vol. 55, No. 123, June 26, 1990.

U.S. Forest Service (USFS). 2012. Wildlife species and habitats geospatial datasets. Gifford Pinchot National Forest, Vancouver, Washington.

Washington Department of Fish and Wildlife (WDFW) 2015a. Priority Habitat and Species on the Web. Accessed January 13, 2015. Available at: http://wdfw.wa.gov/mapping/phs/

_____. 2015b. Gray Wolf Conservation and Management – Washington Wolf Packs. Available at: http://wdfw.wa.gov/conservation/gray_wolf/packs/

Washington Department of Transportation (WSDOT). 2014. Biological Assessment Preparation Advanced Training Manual. Olympia, Washington.



Path: Q:\geo\Ascot\MXD\BA\Figure1_ProjectVicinity.mxd

Figure 1
Project Vicinity

URS

Goat Mountain Prospecting Permit Application
Biological Assessment
Gifford Pinchot National Forest, Washington

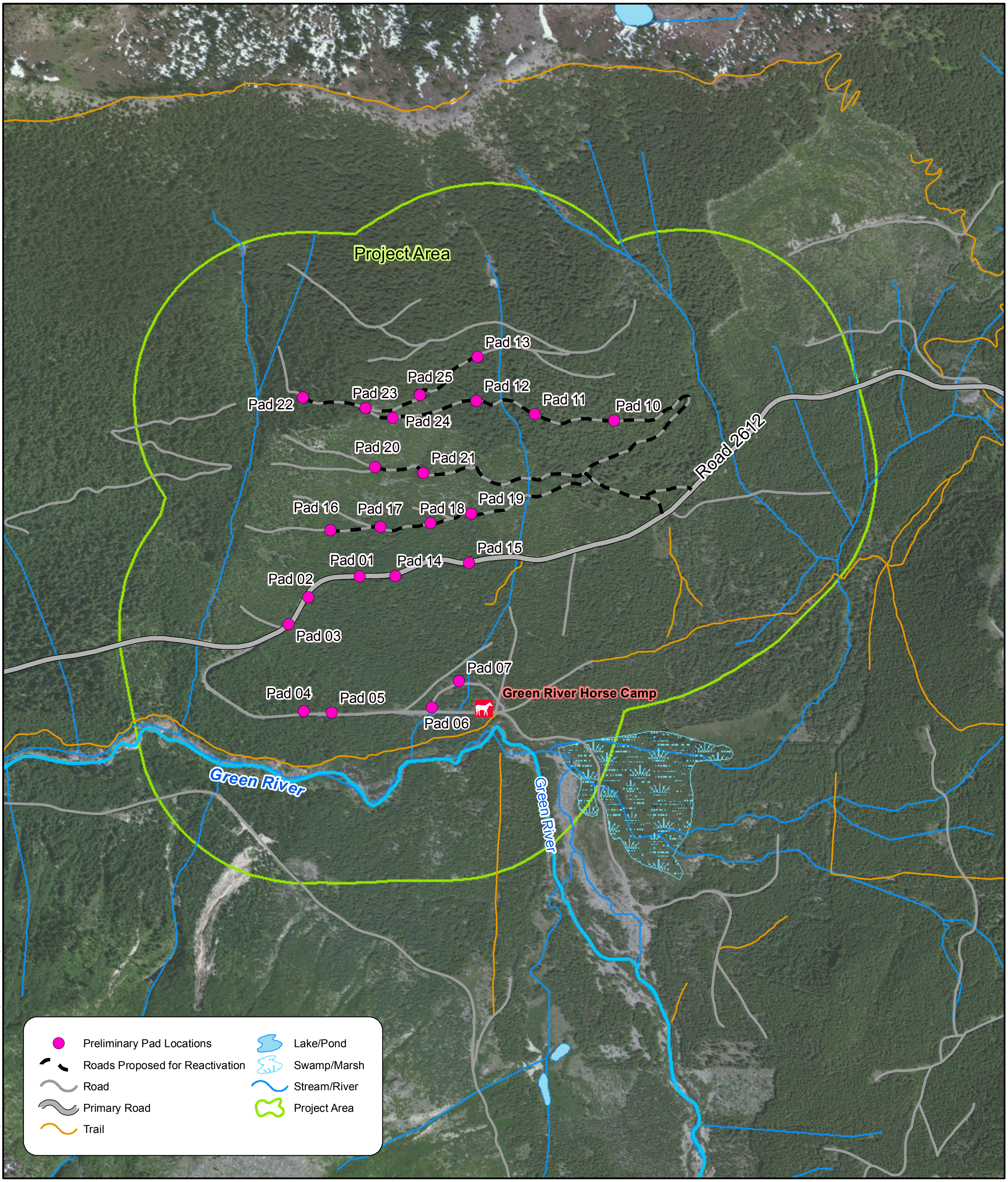
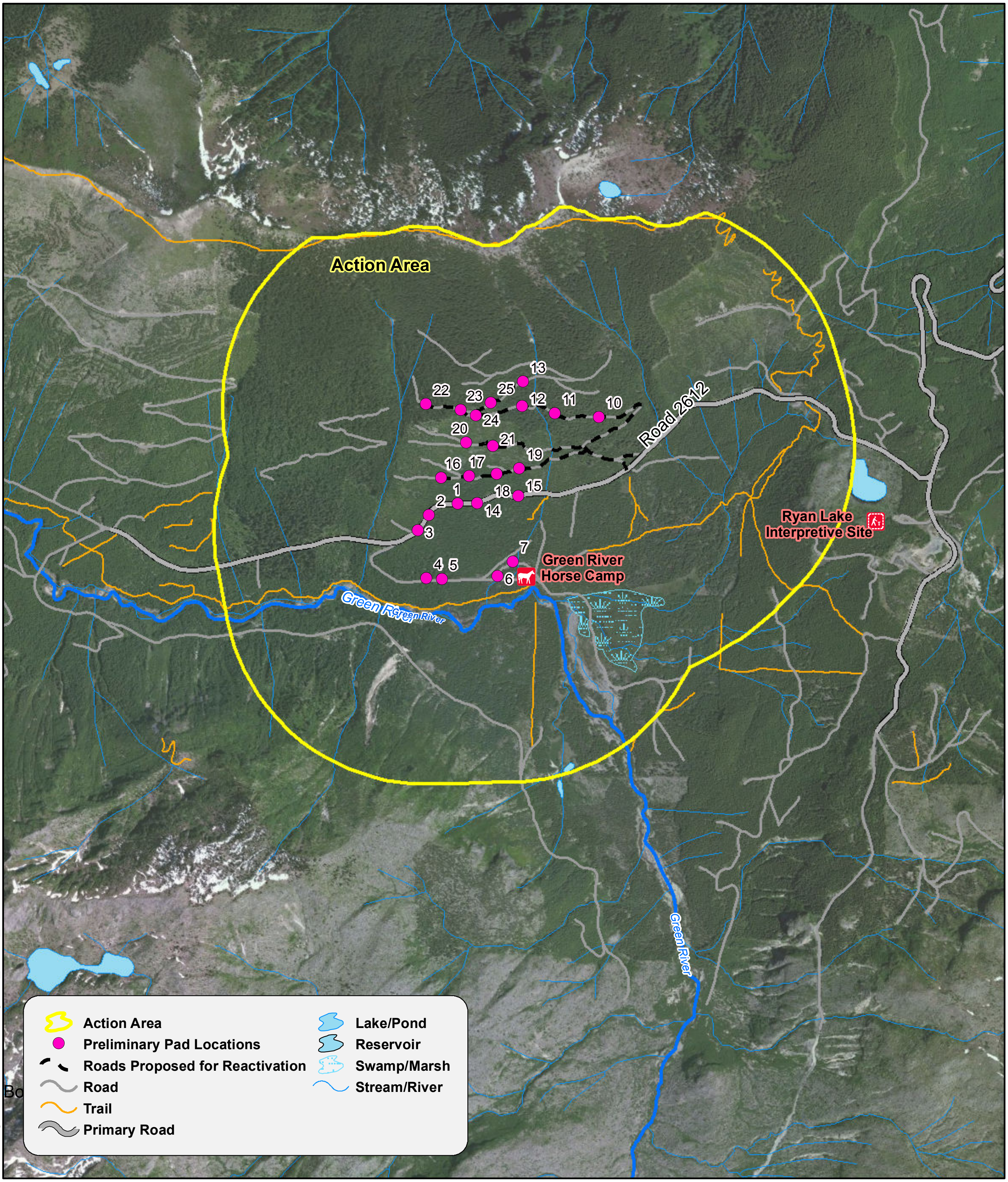


Figure 2
Project Area

URS

Goat Mountain Prospecting Permit Application
Biological Assessment
Gifford Pinchot National Forest, Washington



Path: Q:\geo\Ascot\MXD\BA\Figure3_Action_Area.mxd

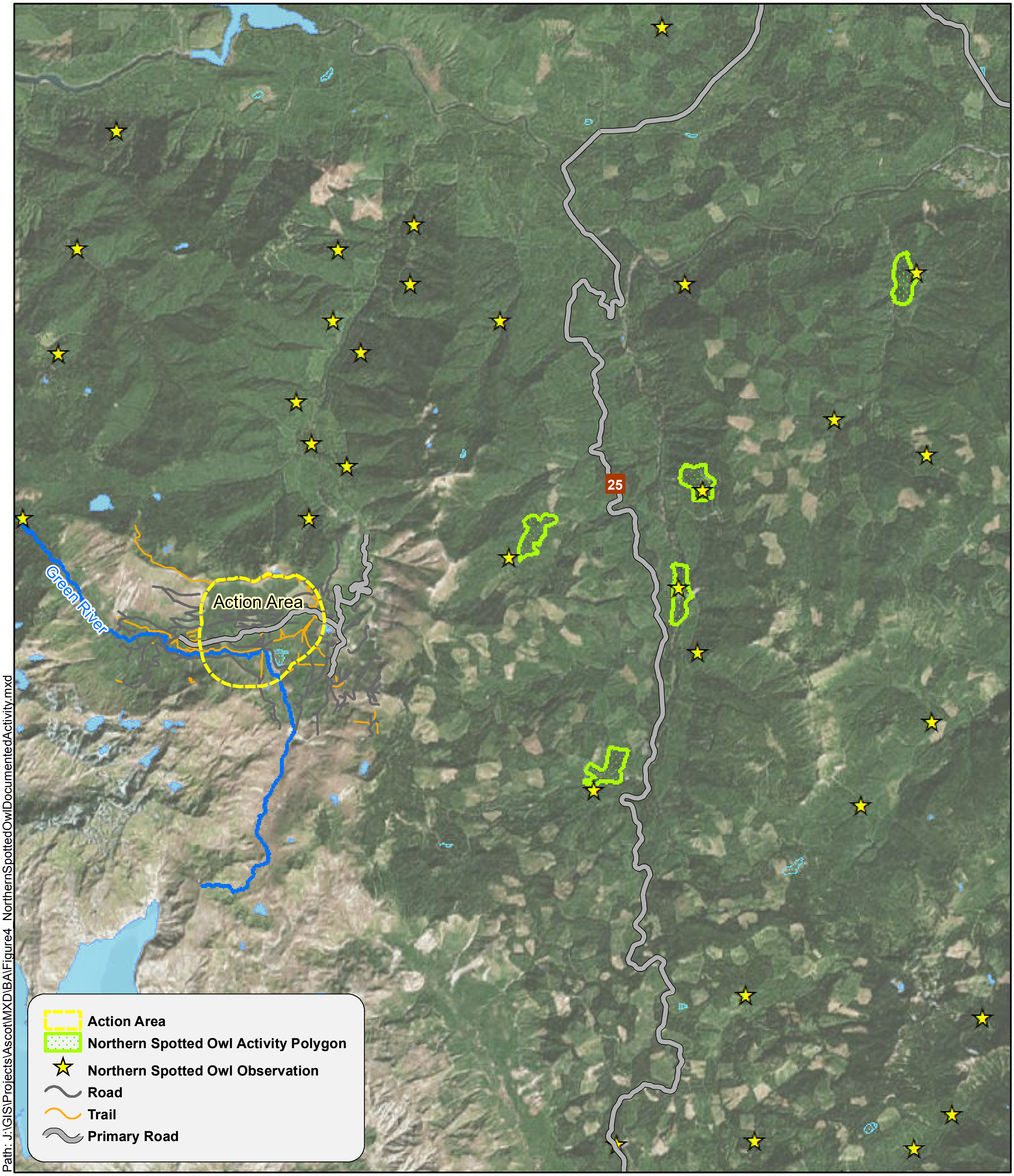
Figure 3
Action Area

URS

N

0 900 1,800
Scale In Feet

Goat Mountain Prospecting Permit Application
Biological Assessment
Gifford Pinchot National Forest, Washington



Path: J:\GIS\Projects\AscotMXD\BA\Figure4_NorthernSpottedOwlDocumentedActivity.mxd

N

0 1 2
Scale In Miles

Figure 4
Northern Spotted Owl Documented Activity

URS

Goat Mountain Prospecting Permit Application
Biological Assessment
Gifford Pinchot National Forest, Washington

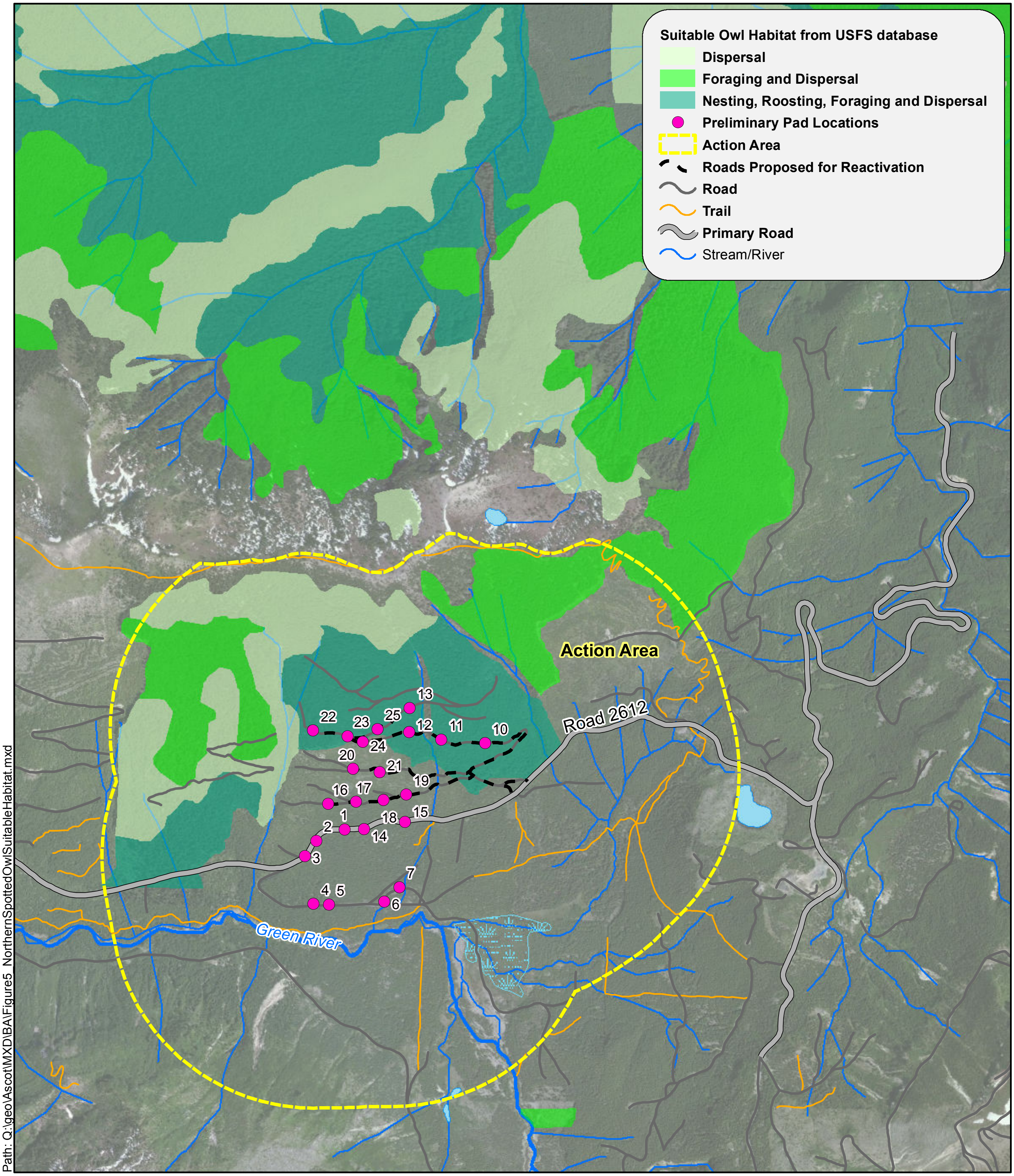


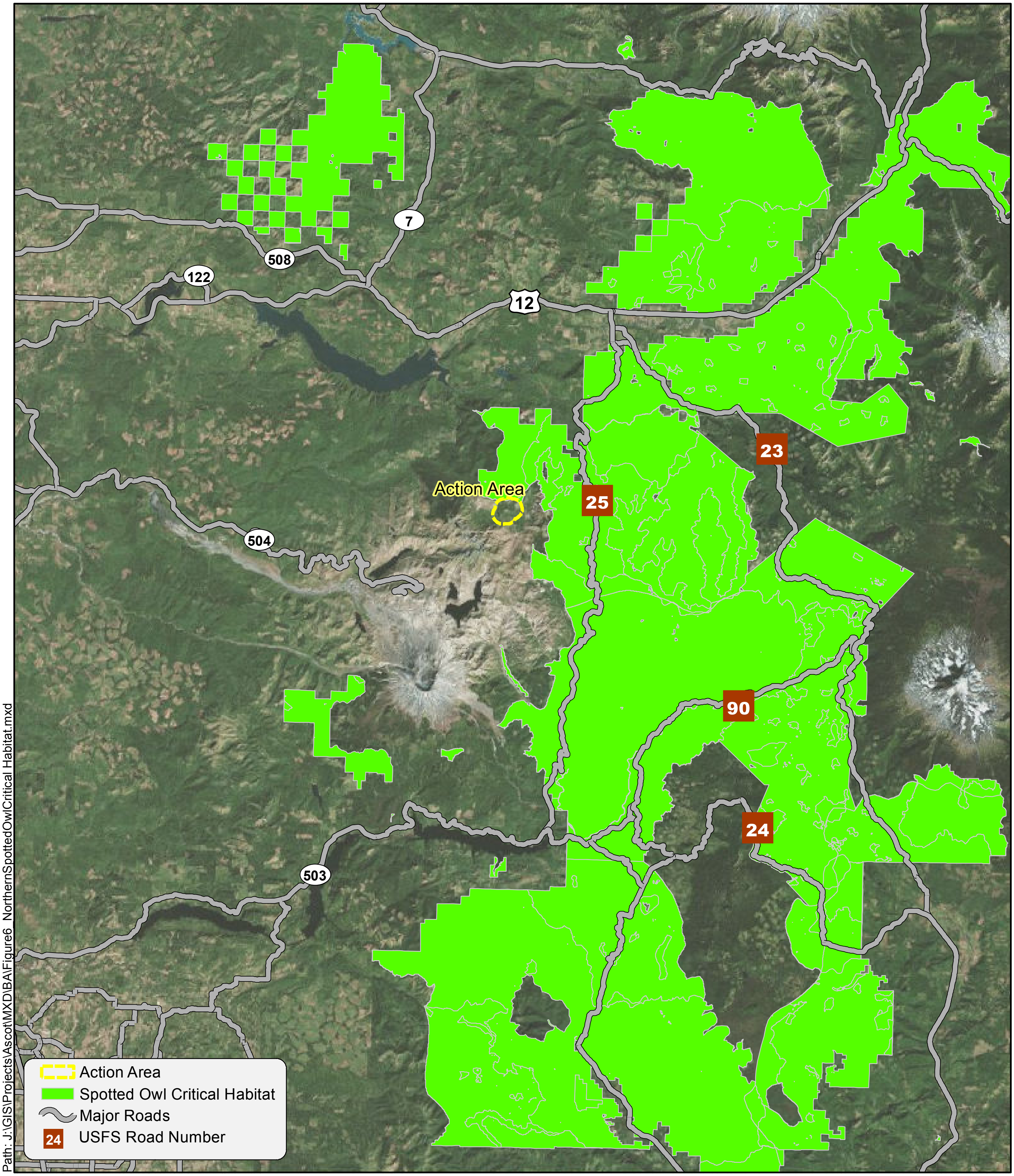
Figure 5
Northern Spotted Owl Suitable Habitat

URS

N

0 900 1,800
Scale In Feet

Goat Mountain Prospecting Permit Application
Biological Assessment
Gifford Pinchot National Forest, Washington



Path: J:\GIS\Projects\AscotMXD\BA\Figure6_NorthernSpottedOwlCritical Habitat.mxd

Figure 6

Northern Spotted Owl 2012 Designated Critical Habitat

URS

N

0 1 2 4 6

Scale In Miles

Goat Mountain Prospecting Permit Application
Biological Assessment
Gifford Pinchot National Forest, Washington

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington Fish and Wildlife Office
510 DESMOND DRIVE SE, SUITE 102
LACEY, WA 98503
PHONE: (360)753-9440 FAX: (360)753-9405
URL: www.fws.gov/wafwo/

Consultation Code: 01EWFW00-2015-SLI-0234 January 13, 2015
Event Code: 01EWFW00-2015-E-00177
Project Name: Goat Mt. Hardrock Prospecting

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated and proposed critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. The species list is currently compiled at the county level. Additional information is available from the Washington Department of Fish and Wildlife, Priority Habitats and Species website: http://wdfw.wa.gov/mapping/phs/ or at our office website: http://www.fws.gov/wafwo/species_new.html. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether or not the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:
http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.). You may visit our website at http://www.fws.gov/pacific/eagle/for information on disturbance or take of the species and information on how to get a permit and what current guidelines and regulations are. Some projects affecting these species may require development of an eagle conservation plan: (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Also be aware that all marine mammals are protected under the Marine Mammal Protection Act (MMPA). The MMPA prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas. The importation of marine mammals and marine mammal products into the U.S. is also prohibited. More information can be found on the MMPA website: http://www.nmfs.noaa.gov/pr/laws/mmpa/.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Related website:
National Marine Fisheries Service:
http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Goat Mt. Hardrock Prospecting

Official Species List

Provided by:

Washington Fish and Wildlife Office
510 DESMOND DRIVE SE, SUITE 102
LACEY, WA 98503
(360) 753-9440
http://www.fws.gov/wafwo/

Consultation Code: 01EWFW00-2015-SLI-0234
Event Code: 01EWFW00-2015-E-00177

Project Type: Mining

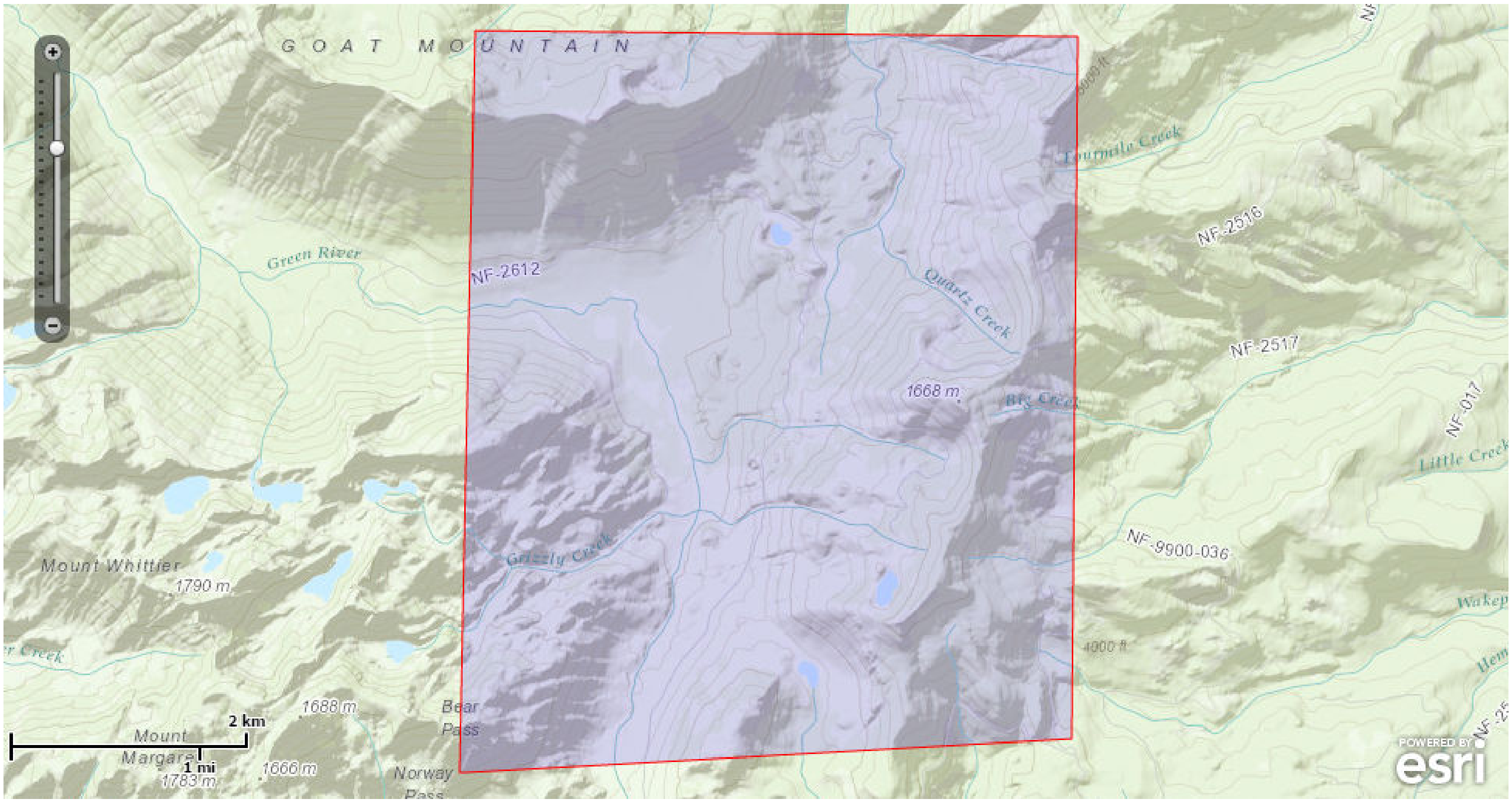
Project Name: Goat Mt. Hardrock Prospecting
Project Description: Exploratory drilling for mineral resources.

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

United States Department of Interior
Fish and Wildlife Service

Project name: Goat Mt. Hardrock Prospecting

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-122.0993593 46.3686842, -122.0324114 46.3682104, -122.0330981 46.3144076, -122.101076 46.3117991, -122.0993593 46.3686842)))

Project Counties: Skamania, WA

United States Department of Interior
Fish and Wildlife Service

Project name: Goat Mt. Hardrock Prospecting

Endangered Species Act Species List

There are a total of 7 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Amphibians	**Status**	**Has Critical Habitat**	**Condition(s)**
Oregon Spotted frog *(Rana pretiosa)*	Threatened	Proposed	
Birds			
Northern Spotted owl *(Strix occidentalis caurina)* Population: Entire	Threatened	Final designated	
Yellow-Billed Cuckoo *(Coccyzus americanus)* Population: Western U.S. DPS	Threatened	Proposed	
Conifers and Cycads			
Whitebark pine *(Pinus albicaulis)*	Candidate		
Fishes			
Bull Trout *(Salvelinus confluentus)* Population: U.S.A., conterminous, lower 48 states	Threatened	Final designated	
Mammals			
Canada Lynx *(Lynx canadensis)* Population: (Contiguous U.S. DPS)	Threatened		

Gray wolf *(Canis lupus)* Population: U.S.A.: All of AL, AR, CA, CO, CT, DE, FL, GA, IA, IN, IL, KS, KY, LA, MA, MD, ME, MI, MO, MS, NC, ND, NE, NH, NJ, NV, NY, OH, OK, PA, RI, SC, SD, TN, VA, VT, WI and WV; those portions of AZ, NM, and TX not included in an experimental population; and portions of OR, UT, and WA. Mexico.	Endangered		

Critical habitats that lie within your project area

The following critical habitats lie fully or partially within your project area.

Birds	**Critical Habitat Type**
Northern Spotted owl *(Strix occidentalis caurina)* Population: Entire	Final designated

APPENDIX G

Groundwater Resources Report
Goat Mountain Hardrock Prospecting Permit Applications

GROUNDWATER RESOURCES REPORT
GOAT MOUNTAIN HARDROCK PROSPECTING PROJECT
SKAMANIA COUNTY, WA

PREPARED FOR:
US DEPARTMENT OF INTERIOR
BUREAU OF LAND MANAGEMENT &
USDA FOREST SERVICE

June 29, 2015

TABLE OF CONTENTS

TABLES

FIGURES

PLATES

APPENDICES

1.0 INTRODUCTION

This report presents the results of a hydrogeological analysis completed for the proposed Goat Mountain Prospecting project located within the Gifford Pinchot National Forest in Skamania County, Washington (Figure 1).

The purpose of the scope of work was to collect baseline geologic and water-related data in response to the Opinion & Order; Gifford Pinchot Task Force v. Perez et al dated July 3, 2014. The goal was to map the geology and collect the baseline water-related data requested in the above-mentioned order to support the completion of technical analyses to supplement the Environmental Assessment (EA). The completed tasks included the following:

Task 1 – Literature/Data Compilation & Review: Compile and review relevant literature and data, including the following:

- Opinion & Order, Gifford Pinchot Task Force v. Perez et al, July 2014
- CuMo Exploration Project, Boise County, ID, Groundwater Supplement to the Geologic Hazards, Soils, and Water Resources Technical Report, August 2013
- Analysis of the Potential Effects to Groundwater Resources from the Proposed Golden Meadows Exploration Project, Schwartz 2013
- USDA Forest Service, Minerals and Geology Management. 2014. Working Guide – Evaluating Groundwater Resources for Mineral Exploration Drilling.
- USDA Forest Service, 2012a, National Best Management Practices for Water Quality Management on National Forest System Lands
- Northwest Forest Plan, Attachment A – Standards and Guidelines, 1994, as they apply to water quality
- Gifford Pinchot Standards and Guidelines, Amendment 11 of the Northwest Forest Plan, 1995, as they apply to mineral exploration and water quality
- Washington State Minimum Standards for Construction and Maintenance of Wells (WAC 173-160 and 173-162)
- Logs and other related geologic information received from the proponent with respect to historical exploratory drilling completed within the Project Area between the early 1970s and 1980s, and in 2010

Task 2 – Geologic and Hydrogeologic Assessment: Complete the following field and office tasks:

- Prepare a water quality Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) for the review by the BLM and USFS, and a site health and safety plan
- Conduct several field visits during the autumn of 2014 in order to:
  - Observe the geologic conditions within the vicinity of the existing drill holes
  - Complete surface geologic mapping over the Project Area to support development of a conceptual site model using road cuts and stream banks, as appropriate
  - Where possible, measure the depth of existing flowing drill holes using sounding equipment and, in all cases, measured the flow rate from flowing drill holes
  - Conduct baseline groundwater quality sampling from existing flowing drill holes installed during the historical exploratory drilling
  - Conduct baseline surface water quality sampling from existing streams and seeps, including a nearby abandoned underground mine working
- Analytical laboratory testing of the collected baseline groundwater and surface water samples

Task 3 – Environmental Impact Analysis and Report Preparation: Complete a compilation and analysis of the existing literature, field data, and analytical laboratory data, including the following:

- Compare the analytical laboratory with relevant water quality criteria
- Prepare a conceptual site model
- Complete environmental impact analysis with respect to the groundwater resources and the Proposed Action
- Prepare this report that summarizes the findings

2.0 PROJECT AREA CONDITIONS

The proposed Project Area is located within the Gifford Pinchot National Forest (Figure 1, Project Vicinity). The subject property consists of forested tracts and supporting access roads situated within Skamania County. The following summarizes the site conditions in order to provide context for the proposed exploration drilling program and this hydrogeological analysis.

2.1 SITE LOCATION AND DESCRIPTION

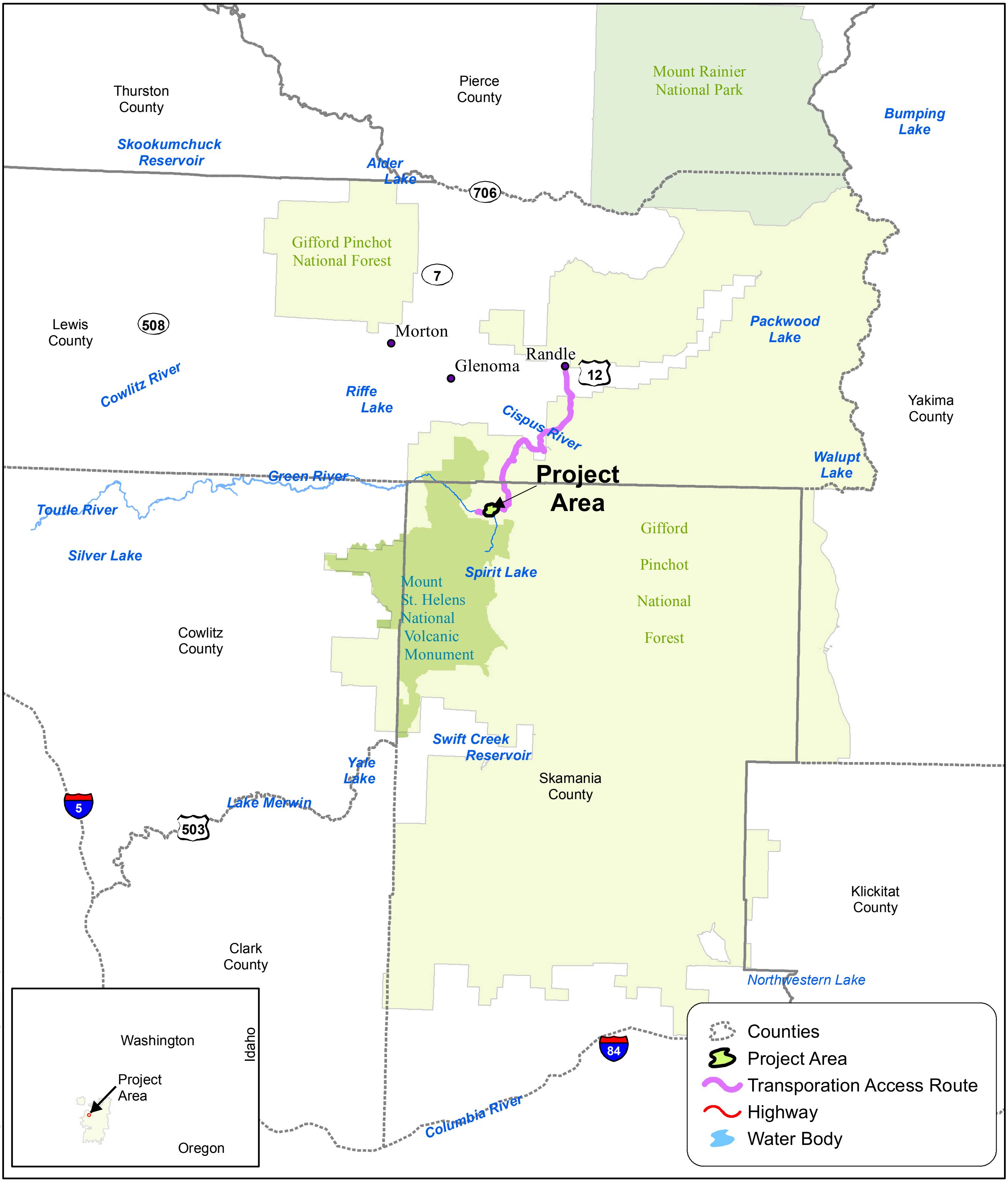
The Project Area is located approximately 25 miles south of the community of Randle, which is located along Highway US-12 (approximately mid-way between Interstate-5 and Yakima, Washington), and accessed by State Route-131 and USFS Roads 25, 26 and 2612 (Figure 1, Project Vicinity).

The Permit Applications Area (Permit Area) is within portions of Sections 7, 8, 9, 16, 17, 18, and 19 of Township 10 North, Range 6 East, Willamette Meridian, Skamania County, Washington, (Figure 2, Mineral Survey Limits). The northern portions of the Mineral Survey Application Areas 708, 774 and 1330 are situated within the Tumwater Inventoried Roadless Area. The proposed Project Area is located on and adjacent to the south-facing slope of Goat Mountain (Figure 3, Project Area). These lands are contiguous to and extend northeast from the boundary of the 110,300-acre Mount St. Helens National Volcanic Monument. The Permit Area is situated approximately 12 miles northeast of the volcanic crater, within the northernmost limit of the 1980 eruption blast zone (Figure 4, Mount St. Helens Blast Zone).

2.2 RELEVANT HISTORICAL LAND USE

The following is a summary of the historical land use within the Project Area in order to support the water resources-related analysis presented in this report. A more detailed discussion of the land use is provided in Section 1.1.2 of the MEA.

Historically, the St. Helens Mining District included limited underground mining production between the 1890s and the early 1900s at several sites in conjunction with recovery form gold-copper bearing vein type deposits. Related to the historic mining, one former mine adit is situated west of the Project Area. Another abandoned mine adit has also been mapped within the western portion of the Project Area, and several other abandoned mine adits have been mapped within the eastern portion of the Project Area (Lasmanis 1995). However, other than the one adit west of the Project Area, none were observed during the 2014 field visits. A more detailed discussion of the historical mine adits is provided in Section 2.7.4, Surface Water Quality.



Path: Q:\geo\Ascot\MXD\Figure1_ProjectVicinity.mxd

Figure 1
Project Vicinity

URS

N

0 5 10
Scale In Miles

SOURCE: USDA Forest Service

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

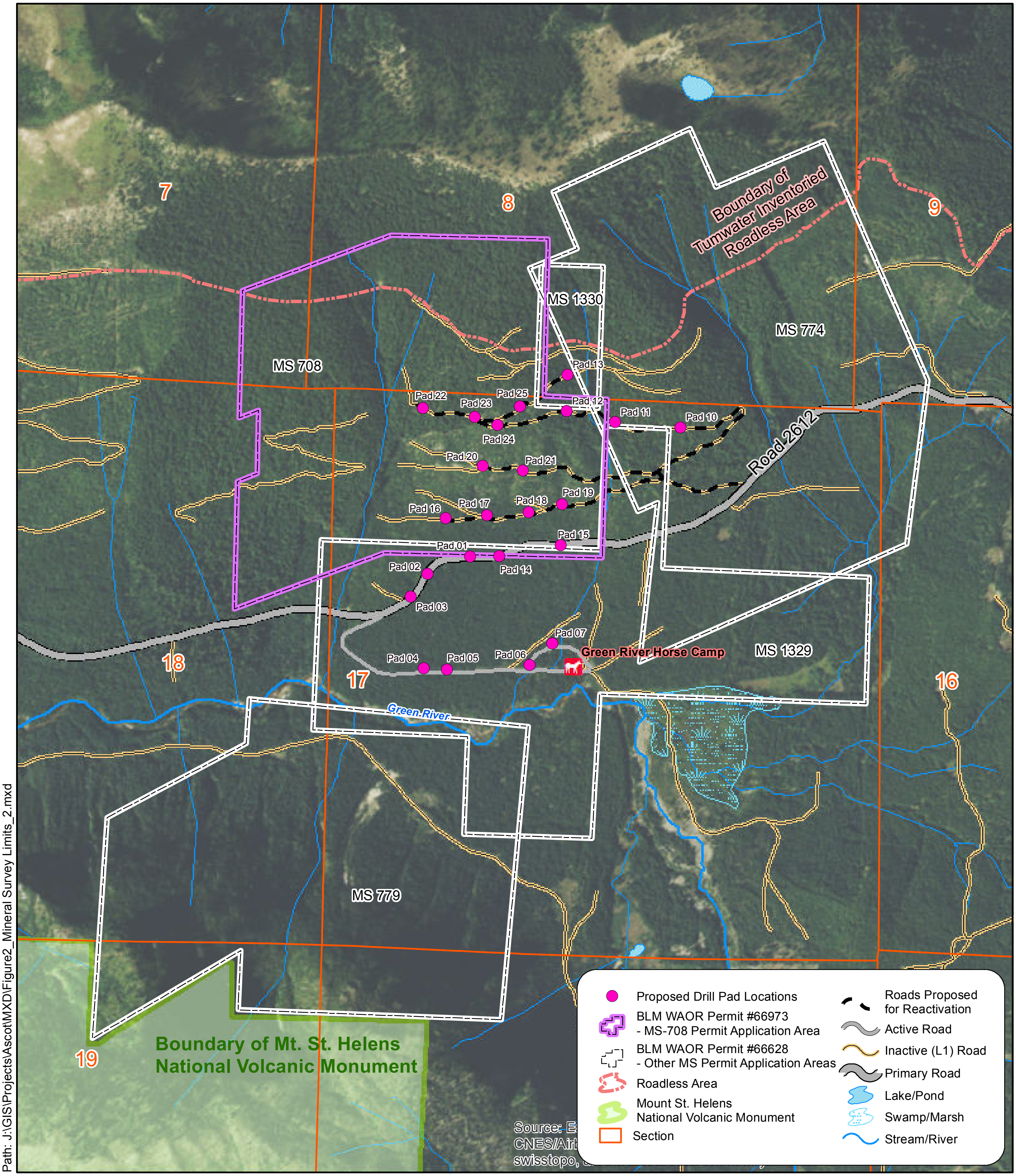


Figure 2
Mineral Survey Limits

Note: MS, MN & RB signify mineral survey nomenclature-related prefixes

SOURCE: USDA Forest Service

N

0 600 1,200
Scale In Feet

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

Figure 3
Project Area

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

* Note: Cultural Resource Area of Potential Effect (APE) approximate size is represented by location symbol.

SOURCE: USDA Forest Service

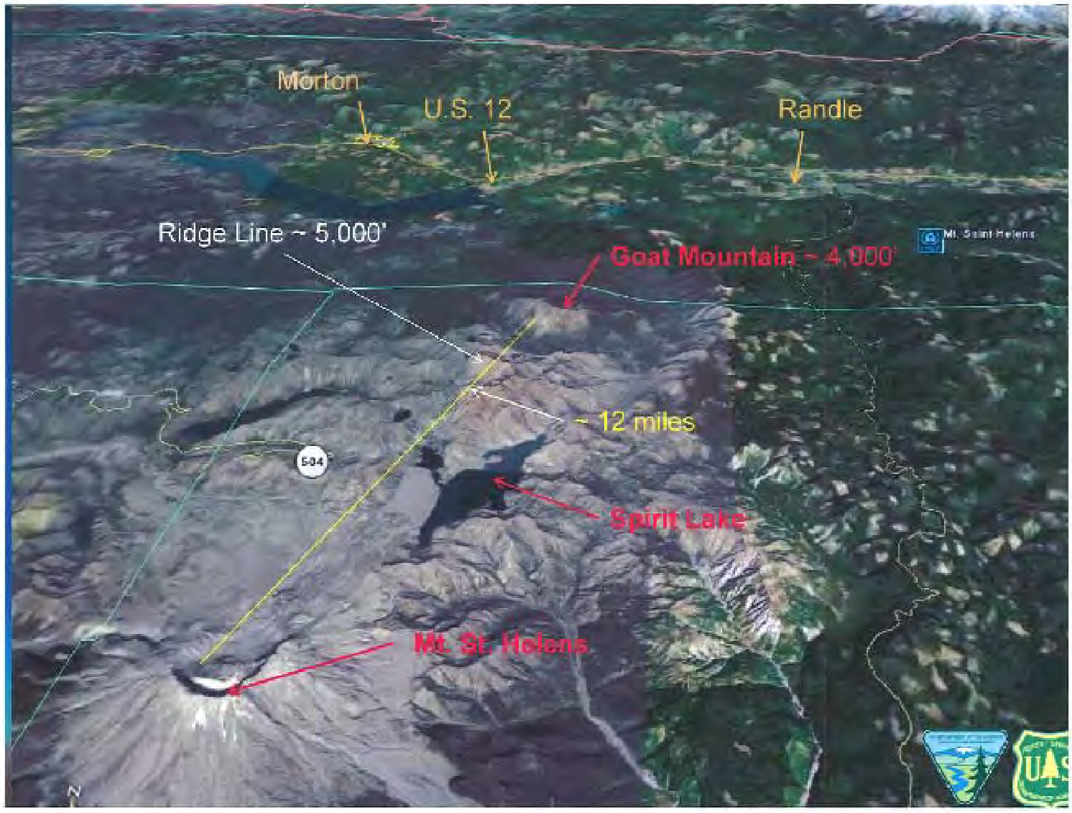


Figure 4

Mount St. Helens Blast Zone

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

The Mount St. Helens Blast Zone is represented by the gray area on this map.
SOURCE: USDA Forest Service

In the 1970s, 1980s, and during 2010, several mining companies completed an initial characterization of the potential economic mineralization within the Project Area. This included geologic mapping, geochemical sampling, geophysical surveys, and more than 100 exploratory borings that were completed to depths of upwards to about 1,300 feet. Information obtained suggests that the Project Area may have potential mineralization in the form of copper, molybdenum and considerably lesser amounts of gold.

2.3 TOPOGRAPHIC SETTING

Topographic coverage of the Project Area and vicinity is provided by the U.S. Geological Survey (USGS), Goat Mountain, Washington Quadrangle. Goat Mountain has an average ridge elevation of 5,000 feet above mean sea level (AMSL). The Green River, which bounds the Project Area to the south, flows along the toe of Goat Mountain at an approximate elevation of about 2,800 feet AMSL. The slopes of the Project Area are usually gentle to moderately steep in gradient varying from about 3 to 35 percent.

2.4 CLIMATE SUMMARY

The Spirit Lake Ranger Station is the nearest official weather gauging station to the Project Area and is located at a comparable elevation of 3,240 feet AMSL. Data from this weather station indicate that the area receives an average annual rainfall of 93 inches, and an average total snowfall of 311 inches. Most of the precipitation falls between the months of November and March (WRCC 2012). The average snow depth over a period of 30 years is 20.3 inches. The maximum snow depth is 68 inches. The temperature will vary from seasonal highs of 75 degrees F to season lows of 7 degrees F according the National Oceanic and Atmospheric Administration (NOAA).

2.5 GEOLOGIC SETTING

The Project Area lies within the Cascade Mountain Range in southern Washington State. These mountains are generally Cenozoic-aged (65.5 million years ago) to Holocene (present era) and consist mostly of volcanic and intrusive igneous rocks and associated mineralization.

2.5.1 Bedrock Geology

The bedrock that comprises the southern Washington State Cascades Mountains formed primarily during volcanic activity that began during the Oligocene (23 to 34 million years ago). Bedrock formed during this period includes andesite, dacite, and rhyolite of igneous origin. Later during the Miocene (5 to 23 million years ago), these formations were intruded by granitic magma comprising the Spirit Lake Pluton (Empsall, 1992). The intrusive bedrock geology consists of mostly granodiorite, with some quartz diorite and quart monzonite.

As noted above, exploration drilling was completed within the Project Area between the early 1970s and 1980s, and in 2010 in an attempt to characterize the potential economic mineralization. Referring to Figures 5 through 9 (Bedrock Geology; Historic Drill Holes & Mineralization; and Geologic Cross Sections A-A' through C-C'), which are interpretations of the geology and mineralization based on the past exploration drilling programs.

The mineralization of interest is considered to be a porphyry-type deposit (Lasmanis 1995), which are formed by hydrothermal fluids that originate from a magma chamber several kilometers below the existing deposit. Predating or associated with those fluids are vertical dikes of porphyritic intrusive rocks from which this deposit type derives its name. Mineralization is commonly associated with the injection of hydrothermal fluids into fractures and veins. Porphyry deposits are commonly associated with occurrences of copper and by-products such as molybdenum, silver and gold.

Referring to Figure 6, the mineralization of the Project Area appears to be distributed within a semi-cylindrical shell with a barren to low-grade core zone that is apparent in both plan and cross-sectional views (General Moly 2007). Copper, molybdenum and gold are found in conjunction with several minerals (chalcopyrite, molybdenite, and pyrite) within fractures of the bedrock. This is reflected in the low-grade mineralized core of the cylindrical shell that is relatively massive and non-fractured, which is in contrast with the remainder of the bedrock that is fractured and mineralized.

In addition, generally north-trending dacite, andesite, or quartz porphyry dikes (intrusions within the bedrock fractures zones) dissect the Spirit Lake Pluton (General Moly 2007). Also, a nearly east-west-trending fault is present. This fault exhibits as a surface expression but is not recorded as being active (Duval Corp. 1970).

Goat Mountain is located approximately 12 miles northeast of Mount St. Helens, which is an active stratovolcano that in historic times has erupted in 1800, 1854, and 1980. Mount St. Helens continues to experience eruptive and/or uplift sequences associated with its current cone-building phase. Historic and prehistoric eruptive cycles have deposited ash, pumice, and scoria forming tephra throughout the area.

During the May 18, 1980 eruption, a massive landslide occurred along a horseshoe shaped slip-plane that lowered Mount St. Helens' summit by approximately 1,300 feet. Debris from the eruption-induced landslide material was largely deposited to the northwest of the volcano and west of Goat Mountain. The effects of the 1980 eruption are believed to have impacted land near and east of the proposed Project Area, which is mapped as "blow down" (where the trees were blown over as a result of the volcanic eruption-related blast) on the USFS 7.5-minute "East Spirit Lake" topographical map (USFS 2012b). Figure 4 shows that the Project Area was located within the blast zone of the volcanic eruption but the above-referenced USFS map indicates that blow down of trees did not occur within the Project Area (most likely because the Project Area is situated within the shadow of the ridge line to the south, as noted on figure).

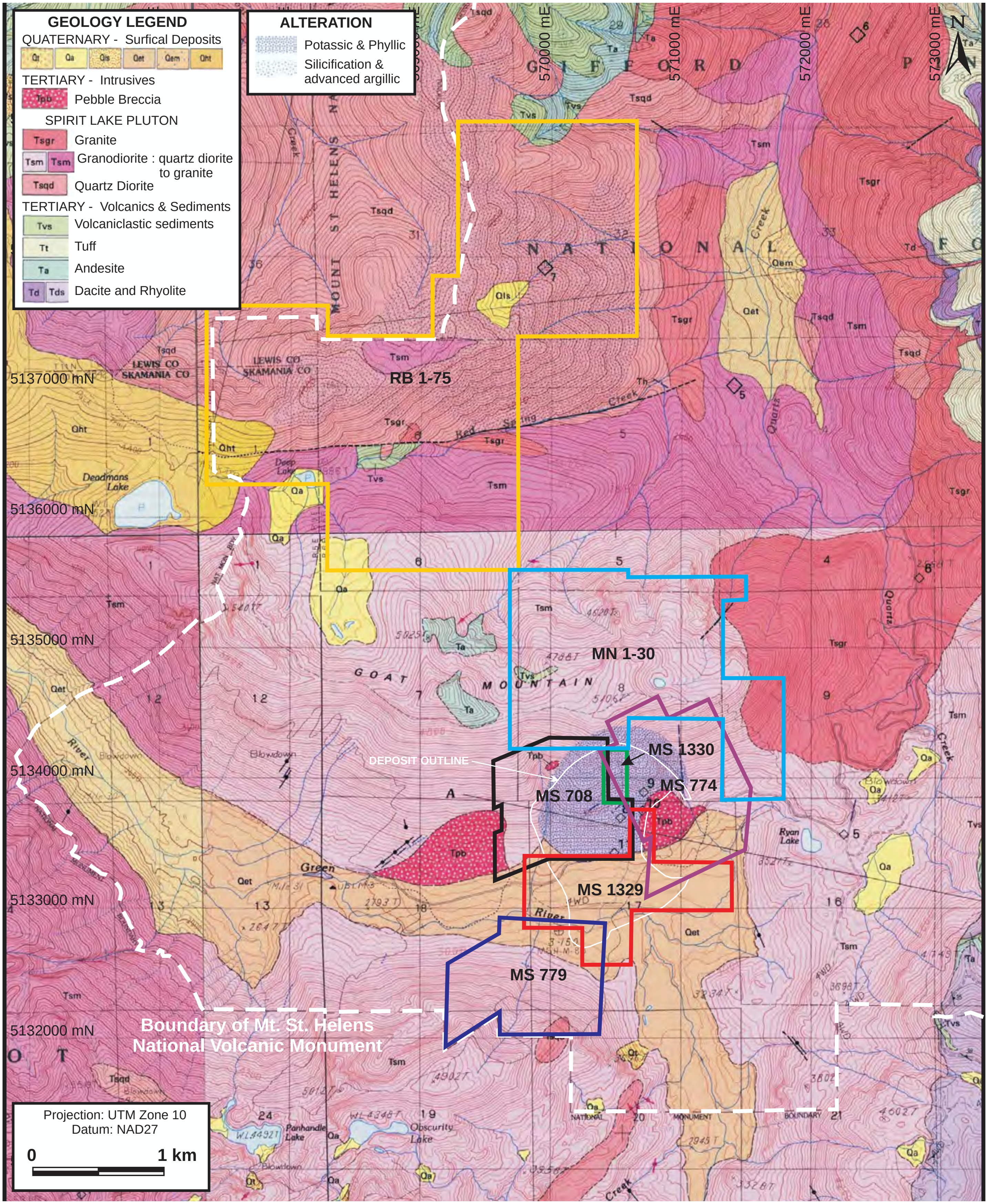
The Green River valley along the southern toe of Goat Mountain likely owes its shape to alpine glaciation that originated near the summit of Mount St. Helens and possibly other peaks within the area.

2.5.2 Surficial Geology

Surficial geologic deposits within the proposed Project Area include glacial drift resulting from alpine glaciations and pyroclastic materials from eruptions of nearby Mount St. Helens. Observations by field geologists of road cuts within the Project Area in 2014 identified tephra (rock fragments and particles ejected by a volcanic eruption) deposits, including ash and pumice, and loamy (silty and clayey soil) deposits overlying bedrock (Plate 1). The mid to lower slopes of the Project Area have been mapped as typically consisting of upwards to about 30 feet of soil horizons overlying bedrock.

Soils within the Project Area were mapped by the USDA Natural Resource Conservation District (NRCS) as part of preliminary surveys completed within portions of Skamania County (NRCS 2014). In general, the soils within the Project Area are typical of mountain slopes within this

T33764897_05.ai



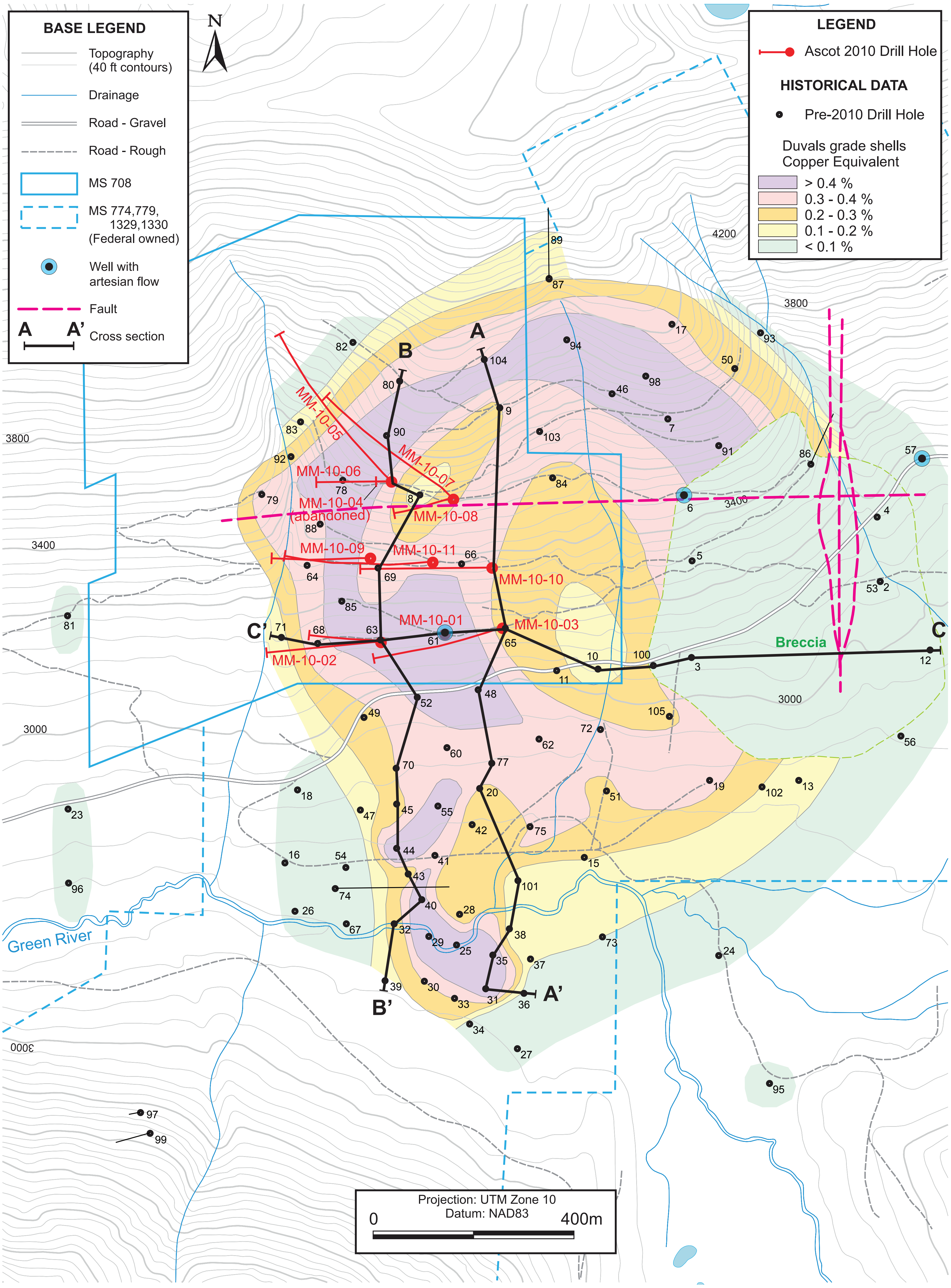
Source: Ascot Resources Ltd. (March 2011)

Figure 5
Bedrock Geology

Job No. 33764897

Ascot – Goat Mountain

URS



Source: Ascot Resources Ltd. (February 2011)

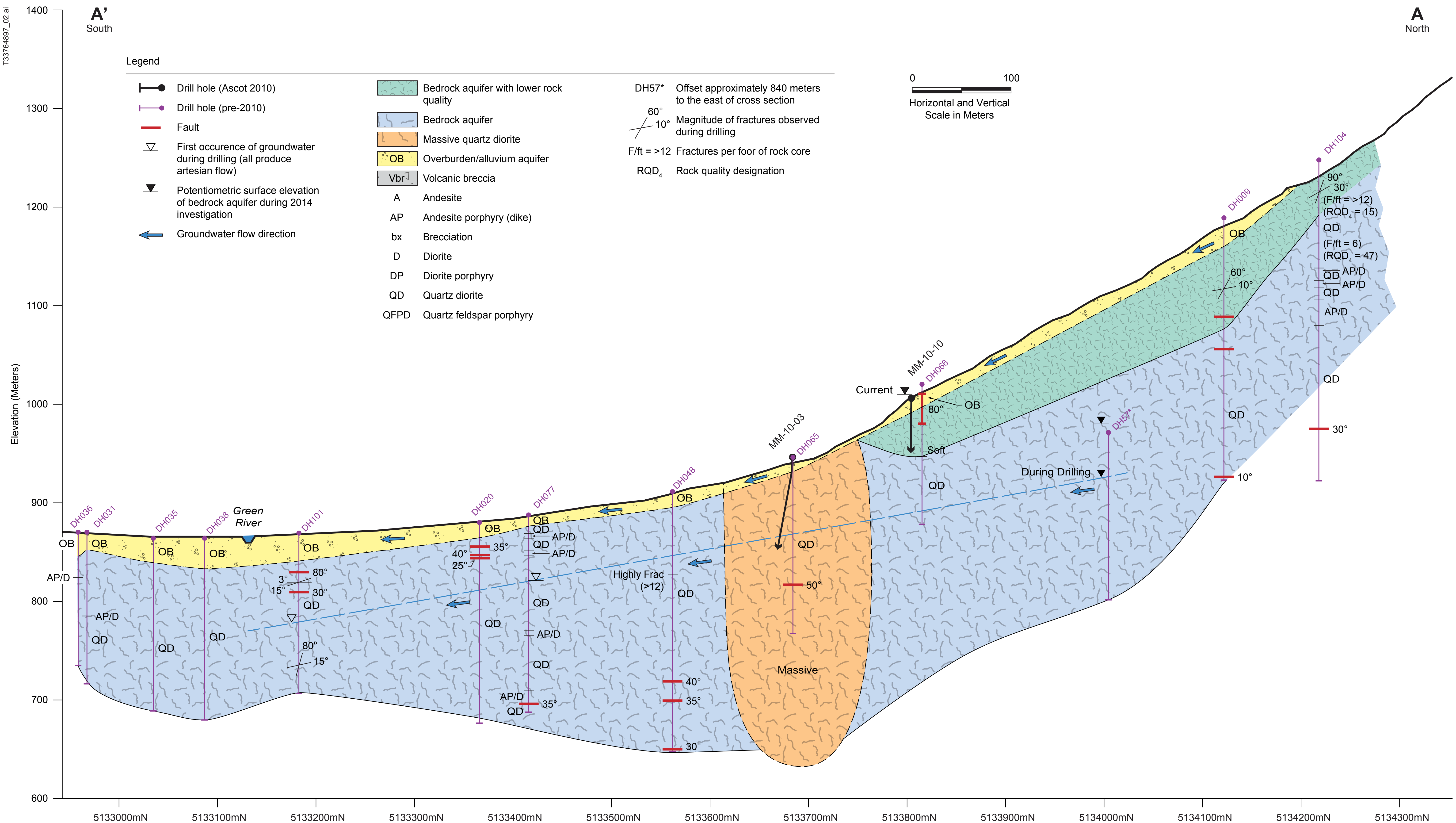
Figure 6
Mineralization and Geologic Cross Section

Job No. 33764897

Ascot – Goat Mountain

URS

T33764897_02.ai



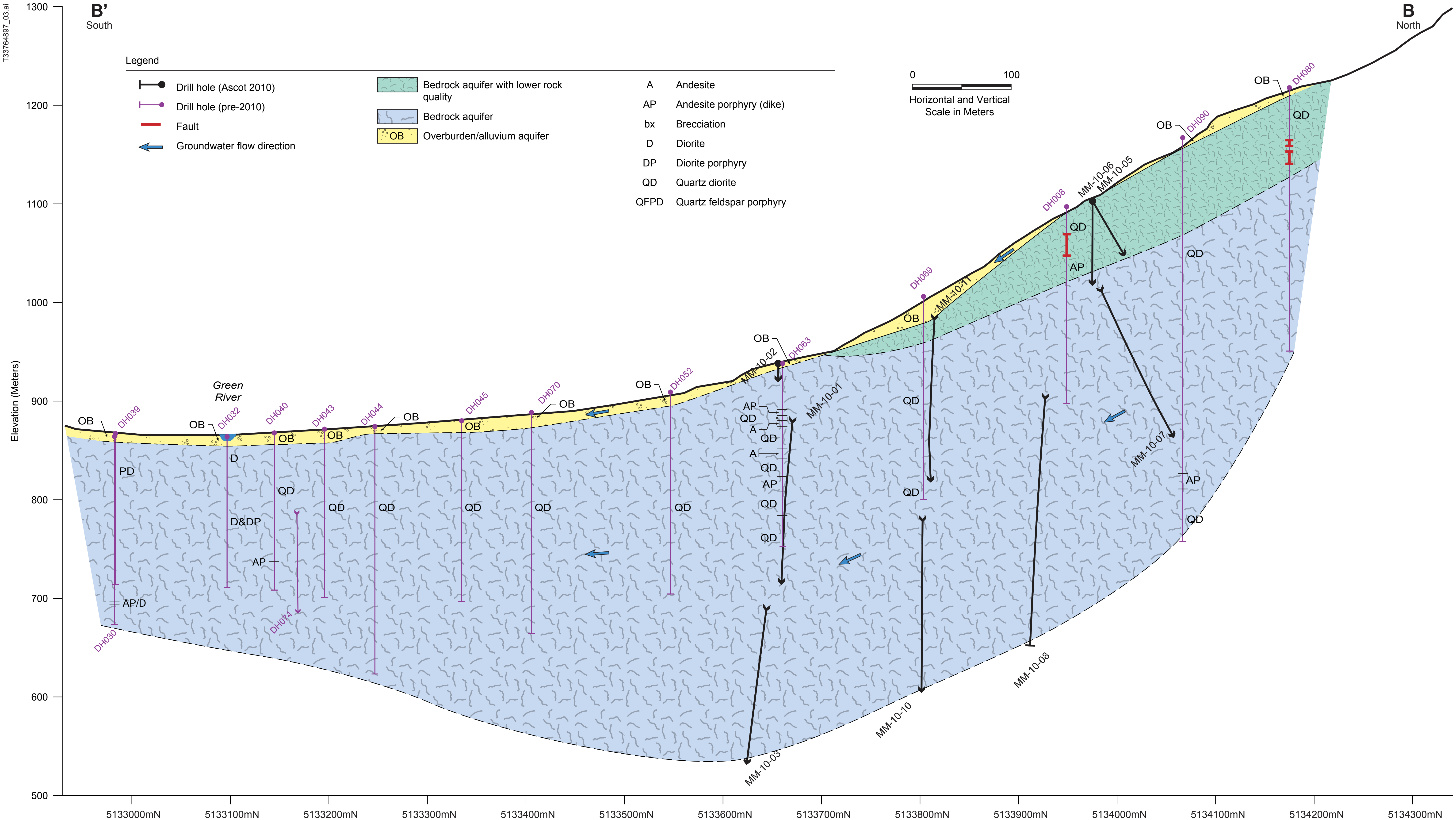
Job No. 33764897

Figure 7

Geologic Cross Section A'-A

URS

Ascot – Goat Mountain



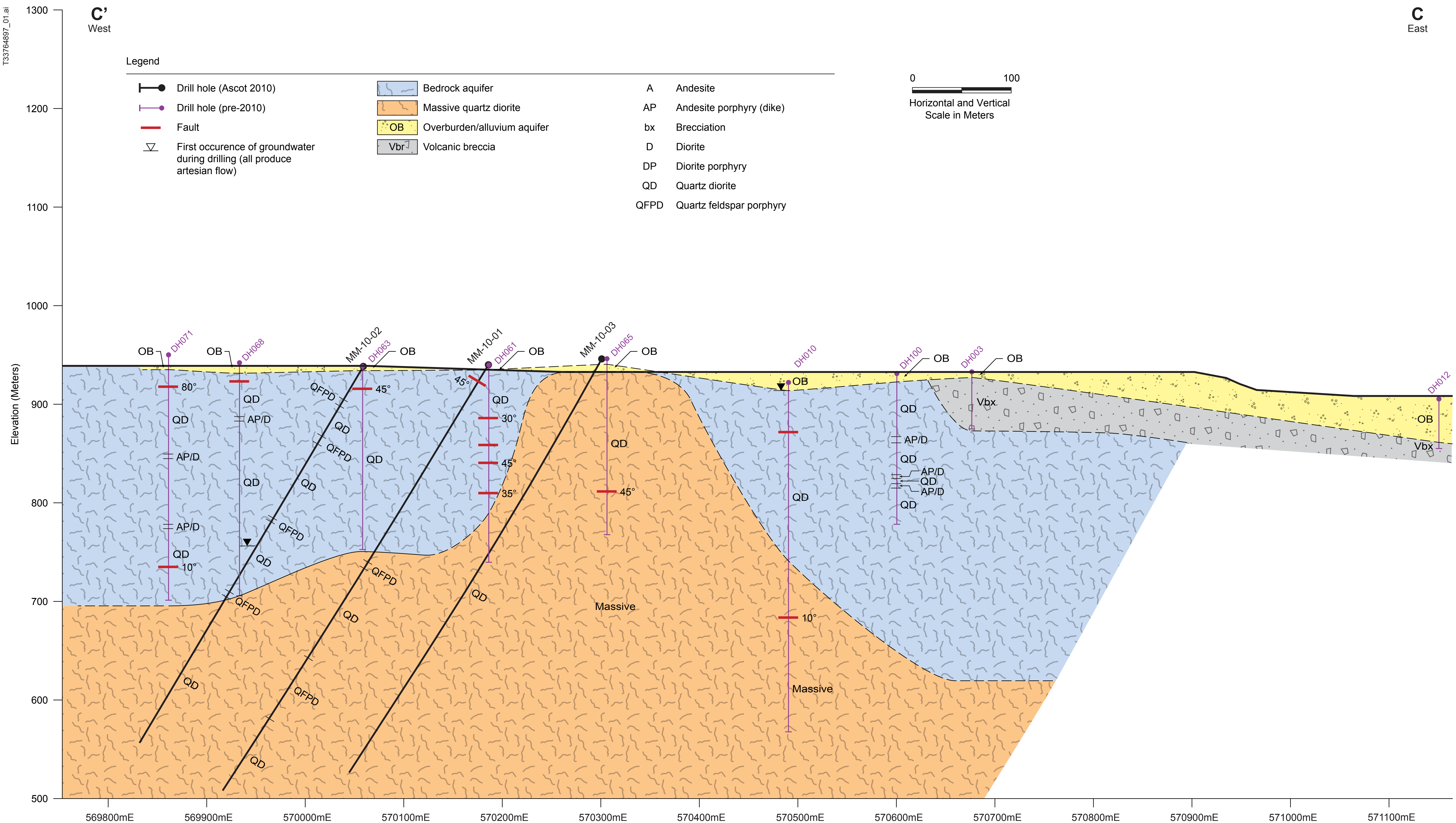
Job No. 33764897

Figure 8

Geologic Cross Section B'-B

URS

Ascot – Goat Mountain



Job No. 33764897

Figure 9

Geologic Cross Section C'-C

URS

Ascot – Goat Mountain

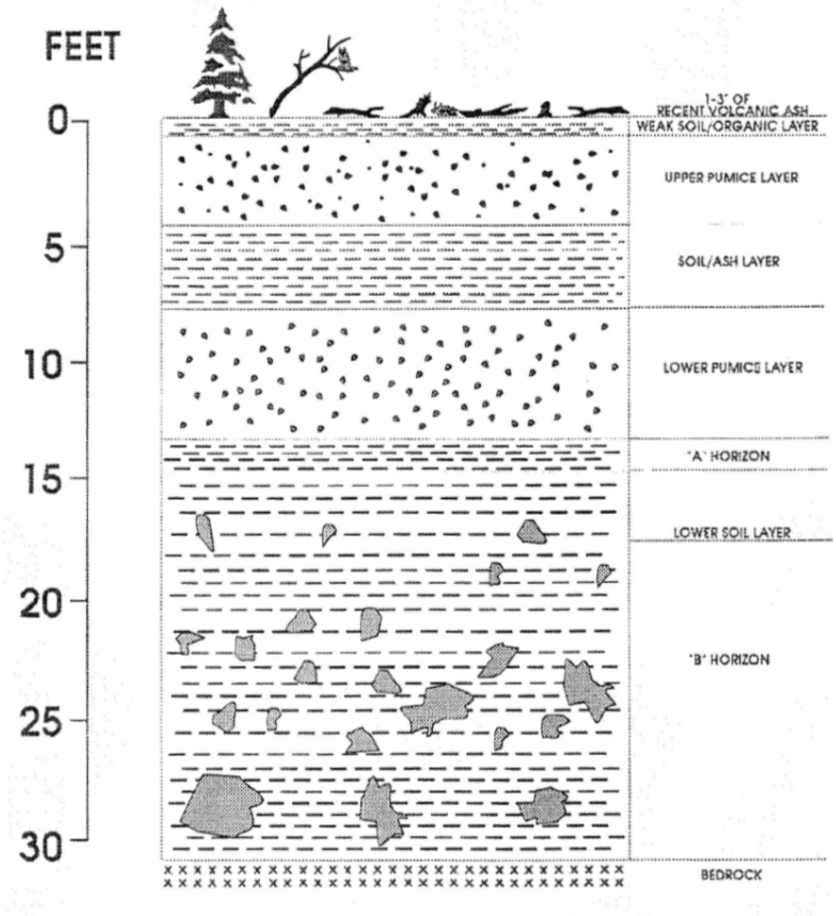


Plate 1 – Typical Project Area Soil Profile

(Source: Empsall 1992)

portion of the Cascade Range and are formed in layers of aerially deposited volcanic ash and pumice, and are mainly deep and well drained. The soils consist of sandy loam and loamy sand with varying amounts of gravel. Based on the NRCS Web Soil Survey (which only characterizes soil within the upper 60-inches of the ground surface), the near-surface soils within the Project Area consist of approximately 64 percent Colter cindery sandy loam, approximately 24 percent Minnepeak loamy sand, approximately 6 percent Colter loamy sand, approximately 5 percent Rock outcrop-Cattcreek complex, and less than 1 percent Elkprarie loamy sand.

No Prime and Unique Farmland soils are located within the Project Area as defined by 7 CFR 657.5[1].

[1] Title 7: Agriculture: Subtitle B: Regulations of the US Department of Agriculture

The soils are within the Hydrologic Group B, which is characterized by moderate infiltration rates, a moderate rate of water transmission, and fine to moderately coarse soil texture. The soils for the northern, steeper slopes that make up roughly half of the Project Area are noted as having a moderate to severe erosion hazard by water, and a high erosion potential by wind. The remainder of the Project Area, which includes the lower elevation gentle slopes, is mapped as having a low risk of erosion from surface water flows.

However, the historical drilling exploration program encountered bentonite at depths greater than five feet in most of the drilling locations (Ascot 2011). The bentonite is naturally-occurring clay and is commonly a weathering product of volcanic ash deposits, such as those related to the past eruptions of Mt. St. Helens in the A and B horizons (Plate 1). The clay also has low rates of water infiltration and transmission, which impacts the occurrences and flow of groundwater beneath the Project Area (a more detailed discussion of the bentonite and its impacts on the groundwater movement is provided in the following Section 2.6, Hydrogeology).

As a point of interest, bentonite is commonly used as a major constituent of drilling fluids during mineral exploration programs, such as proposed under the Proposed Action and as discussed in Section 3.2, Groundwater-Related Impacts.

2.6 HYDROGEOLOGY

The hydrogeology of the Project Area consists primarily of both an unconfined aquifer within the Green River valley bottom deposits (e.g. sand and gravel) and a confined to semi-confined aquifer within the fractured bedrock, with the confining conditions created by the clay-rich bentonite soil that overlie the bedrock and result from the weathering of the volcanic ash deposits. The following sections provide a description of the existing hydrogeological conditions.

2.6.1 Green River Alluvial Aquifer

An unconfined aquifer is present within the upper 10 to 30 feet of the ground surface that consists of alluvial, tephra, and glacial drift deposits, and that overlie the bedrock within the Green River valley bottom and the lower elevation valley walls (Figures 6 through 9). Consistent with typical alluvial aquifers, the unconfined groundwater aquifer is primarily recharged through local precipitation including rain and snow-melt. The unconfined groundwater is likely discharged from the aquifer through evapotranspiration, seeps and springs, and directly to surface water such as streams and the Green River.

The flow of the unconfined groundwater generally follows the topography. The occurrence and depth to unconfined groundwater within the Project Area is variable, with thin to non-existent saturated intervals lying immediately above bedrock in steep portions of the site and thicker saturated intervals within 10 feet or less of the ground surface, within the valley bottom.

Groundwater within the unconfined aquifer along the lower slopes of Goat Mountain is assumed to flow downward toward the Green River, situated within the valley bottom and bounds the Project Area to the south. High hydraulic conductivities are suspected within the granular alluvial deposits, likely ranging from 0.1 to 1,000 centimeters per second (cm/s). The hydraulic conductivity of bentonite clay, which appears to underlie the alluvial deposits, is normally orders of magnitude less than the granular alluvial deposits (Driscoll 1986).

2.6.2 Bedrock Aquifer

A confined to semi-confined groundwater bedrock aquifer appears to be present beneath the Project Area based on the artesian conditions observed at three drilled holes that were sampled during the autumn of 2014 (Horse Camp, Pad 10 and Pad 21 drill holes[2]); see Figure 10, Surface Water and Groundwater Sampling Locations – 2014. All three drill holes were completed in conjunction with historical exploratory drilling. The Horse Camp Drill Hole is located along USFS Road 2612 east of the proposed security gate and in the easternmost portion of the Project Area. The Pad 10 and Pad 21 drill holes are associated with the proposed respective drill pads that are located in the eastern and central portions of the Project Area, respectively.

Based on the review of the historical exploration drill logs, artesian conditions were also encountered in two other drilled holes that were completed within the Project Area. These included one drill hole located at Pad 11 within the north-central portion of the site, and one drill hole located at Pad 6 in the southern, lowermost portion of the Project Area. An intermittent spring or seep was also observed at Pad 18, which is south of Pad 21.

Groundwater flow within bedrock is assumed to be along fractures/faults and within brecciated bedrock formations. The logs that documented the completion of the historical drilled holes indicate that the confined to semi-confined aquifer conditions are created by low permeability soils that extend to depths of 10 to 30 feet below the ground surface. As noted above, these soils overlie the bedrock and result from the weathering of the volcanic deposits, which form bentonite (Ascot 2011 and Duval 1971-1983) (Figures 6 through 9).

The surface completions for the three existing drilled holes listed in Table 1, below, included drill casing and water control valves, which allowed for the measurement of water pressure and groundwater flow rates during a field visit in November 2014 and are presented in the following table:

---

[2] It should be noted that:

Horse Camp Drill Hole = Duval 57 Drill Hole
Pad 10 Drill Hole = Duval 06 Drill Hole
Pad 21 Drill Hole = Ascot MM-10-10 Drill Hole

Table 1 – Existing Drill Holes Pressure & Flow Rate Measurements

Location	Pressure (psi)	Equivalent Head Above the top of casing at Drill Hole (ft)	Flow Rate (gpm)
Horse Camp Drill Hole (Road 2612)	11	25.5	4.6
Pad 10 Drill Hole	10	23.0	33
Pad 21 Drill Hole	3	6.9	6

The pressure readings were relatively low and, in conjunction with the data presented in the column entitled “Equivalent Head”, support the conclusion that the bedrock aquifer is semi-confined. If the aquifer was confined, and knowing that the groundwater recharge area is significantly higher in elevation, one would expect significantly higher pressure readings and equivalent head in feet. The data presented in Table 1 also suggest that sealing the drill holes and stopping the artesian flow after the drilling is possible.

Typical of mineral exploration drilling programs, which are focused on characterizing the geology and mineralogy, no flow rate or hydrostatic pressure measurements were collected at the surface of these holes. However, it appears that the artesian conditions are more prevalent within the historical exploratory borings that were completed within the lower- to mid-slopes of the Project Area, which is consistent with the conceptual site model that is described in Section 2.10, Conceptual Site Model.

The hydraulic conductivity or permeability of the bedrock within the Project Area is also unknown because it is not common practice to collect such information during mineral exploration drilling programs. However, detailed fracture density-related information was collected on the drill logs, which indicate that the bedrock ranges from relatively massive near the center of the Project Area to moderately fractured for the remainder of the Project Area. The hydraulic conductivities of moderately fractured igneous bedrock normally range between 0.001 to 0.00001 cm/s (Driscoll 1986). The actual hydraulic conductivities will vary depending on the level of fracturing and continuity of fractures within the rock.

It should be noted that no groundwater wells are documented in the Washington State Department of Ecology (Ecology) Well Log Database at the Project Area and within a radius of about five miles of the Project Area.

2.6.3 Groundwater Quality

Referring to Figure 10, Sampling Locations, groundwater samples were collected from the three existing drill holes located within the Project Area in November 2014 (Horse Camp, Pad 10 and Pad 21 drill holes). The metals-related analyses included both total recoverable and dissolved concentrations (the latter represent samples that were filtered with a 0.45-micron filter to

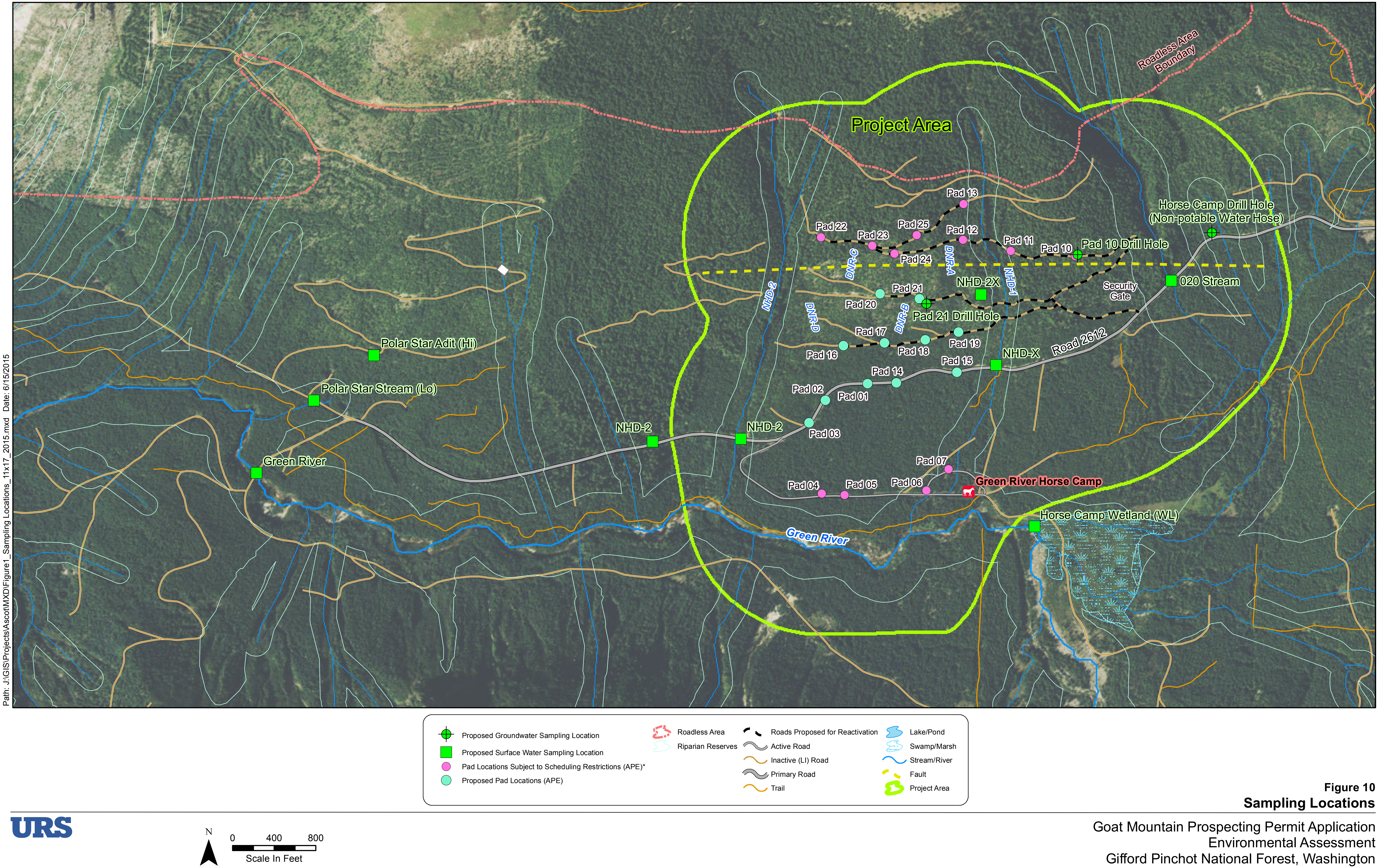


Figure 10
Sampling Locations

URS

SOURCE: USDA Forest Service

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

remove suspended solids before the analytical testing was completed). The results of the laboratory analytical testing indicate the baseline concentrations of the analyzed metals within the groundwater are generally below the relevant and appropriate water quality standards (Table 2[3]).

However, the dissolved arsenic concentration for the Horse Camp Drill Hole was about five times higher than the federal water quality Maximum Contaminant Levels (MCLs)(USEPA 2015). The field duplicate sample was tested to verify that the first results were not in error. The presence of elevated arsenic is consistent with the type of mineralization that has been characterized beneath the Project Area.

The relatively high concentration of arsenic may be related to the east-west trending fault zone that coincides with several of the existing flowing drill holes, including the Horse Camp Drill Hole (Figure 10). Faults can act as conduits for the mineralizing fluids and related mineralization. Arsenopyrite is a common mineral in a porphyry-type deposit (which exists beneath the Project Area and was described in Section 2.5.1, Bedrock Geology) and the natural oxidation of these minerals releases dissolved arsenic into the groundwater. It is likely that the more strongly fractured and mineralized portions of the fault zone have higher concentrations of soluble metals than the less fractured bedrock.

Therefore, the elevated arsenic concentrations may represent the site-specific background concentrations. A more-detailed discussion of the geochemistry of the groundwater is presented in Section 2.8, Geochemical Analysis of Surface Water & Groundwater.

It is also not possible to rule out the potential for latent impacts from previous mining activity. A 2002 report by the Washington State Department of Ecology (Ecology 2002) notes that there are three abandoned mine adits along the perennial drainage located adjacent to the eastern boundary of the Project Area (a report prepared by Lasmanis 1995 shows four adits within this drainage, as shown on Figure 10). As described in Section 2.7.4, Surface Water Quality, this drainage was sampled in 2014 and labeled the 020 Stream. Data presented in the 2002 Ecology report indicate surface water and sediment copper concentrations downstream of these features within the 020 Stream.

[3] It should be noted that for the sample collected from the Horse Camp drill hole the dissolved concentration of zinc was higher than the total concentration, which theoretically should not be possible. However, this is not unexpected due to the relatively low concentrations. During the data validation process, the concentrations of total and dissolved metals were evaluated. When the dissolved metals concentration was observed to be greater than the total metals concentration, the results were compared to field duplicates. Based on the additional analysis, none of the analytical results were found to be in question.

However, the 2002 Ecology data do not indicate elevated arsenic concentrations, as detected in the Horse Camp Drill Hole. In addition, as described in Section 2.8, Geochemical Analysis of Surface Water & Groundwater, the geochemical characteristics of the 020 Stream are very similar to two other streams that bisect the Project Area. Referring to Figure 10, one of the two drainages has one historical mine adit associated with it. The geochemistry of these three streams is very similar. Therefore, the elevated metals in both groundwater and surface water may reflect site-specific background concentrations.

Table 2 – Baseline Groundwater Quality

Location	pH	Temp. (C)	Flow (gpm)	Conduct. (ms/cm)	As[a,c] (µg/L)	Cd[a] (µg/L)	Cu[a] (µg/L)	Pb[a] (µg/L)	Hg[a] (µg/L)	Fe[a,c] (µg/L)	Zn[a] (µg/L)	Alkal.[b] (mg/L)
MCLs/Criteria	NE	NE	**N/A**	NE	10	0.2-1.0	1.4-11	0.2-2.4	0.12	NE	81-99	NE
Horse Camp Drill Hole	7.81	7.21	4.6	0.188	54.7/ 54.1	ND / ND	2.17/ ND	ND/ ND	ND/ ND	1,300/ ND	2.34/ 2.67	52
PAD 10 Drill Hole	7.93	4.91	33	0.186	5.79/ 5.08	ND/ ND	ND/ ND	ND/ ND	ND/ ND	517/ 105	5.44/ 3.68	40
PAD 21 Drill Hole	7.81	4.76	6	0.189	7.65/ 12.6	ND/ ND	ND/ ND	ND/ ND	ND/ ND	ND/ ND	7.16/ 1.83	57

[a]Total recoverable metals/Dissolved metals by EPA Method 200.8. For select metals (Cd, Cu, Pb, Hg and Zn) the criteria represent the lowest concentrations of calculated Chronic Aquatic Life—Freshwater values (Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A, revised January 2012).

[b] Total as $CaCO_3$

[c]As and Fe are compared to federal MCLs, which are based on total metals concentrations.

Cd, Cu, Pb, Hg, and Zn were compared to State of Washington Chronic Aquatic Life- Freshwater values, which are based on the dissolved fraction.

MCLs = Maximum Contaminant Levels established by the USEPA (USEPA 2015)

ND = Non-detectable concentration

NE = MCLs not established; N/A = Not applicable

Key to symbols: As=Arsenic, Cd=Cadmium, Cu=Copper, Pb=Lead, Hg=Mercury, Fe=Iron, Zn=Zinc

2.7 SURFACE WATER

Surface water within or adjacent to the Project Area include portions of the Green River within the upper Green River watershed and associated tributary streams that discharge into the Green River (Figure 4, Project Area).

2.7.1 Mapped Surface Water & Riparian Reserves

The surface waters include perennial and intermittent drainages mapped by the National Hydrography Dataset (NHD) and additional minor ephemeral drainages mapped by the Washington State Watercourse Hydrography (WC) layer[4].

The NHD is a model that predicts stream flow duration and alignment based on contributing drainage area, precipitation, and detailed surface elevation data. It is intended to capture intermittent and perennial surface waters. The WC layer was developed by the State of Washington to support the implementation of the Forest Practices Fish Habitat Water Type Map. The WC data include additional potential ephemeral or minor seasonal drainages that are not mapped by the NHD.

Based on these mapping sources, the Project Area is located between the Green River to the south and two unnamed perennial tributaries to the east and west. An intermittent drainage mapped by the NHD and several minor ephemeral or intermittent tributaries mapped by the WC layer are located within the Project Area. Referring to Figure 3, these drainages have been labeled from west to east NDH-2, NDH-1 and 020 streams.

The surface water drainages presented within the NHD display USFS Riparian Reserves[5] along perennial and intermittent drainages, and can be viewed as dotted lines around these drainages (Figure 3, Project Area). Riparian reserves were established as part of the Aquatic Conservation Strategy (ACS) to support the NWFP (USFS 1994). These planning areas represent the designated width on either side of streams where restrictions are required to protect the functions of the land and water in that reserved area around the stream, and are intended to be protective of water quality and aquatic habitat.

2.7.2 Green River & Tributary Physical Characteristics

The Project Area is situated within the headwaters of the Green River, which is near River Mile (RM) 32. The river within this portion of the watershed is moderately entrenched within a

[4] Originators: Washington State Department of Natural Resources
Title: Washington State Watercourse (WC) Hydrography
Publication date: 03/01/2006; Geospatial data presentation from: vector digital data.

[5] Record of Decision (ROD) for Amendments to USFS and BLM Land and Resource Management Plan within the Range of Northern Spotted Owl. Standard and guidelines for management of Habitat for Late Successional and Old-Growth Forest Related Species within the Range of Northern Spotted Owl. (April, 1994). See B-12-B-13 for Riparian Reserves definition with in the matrix lands of FS. And page C-32-C-33 for Standards and Guidelines for Roads Management and Mineral Activities.

valley bottom dominated by gravel/cobble or bedrock substrate. The river gradient is approximately two percent with moderate sinuosity.

The river provides habitat for native trout, but upstream fish passage is blocked to salmonids by natural gradient barriers at the downstream confluence of the Green River with Falls Creek at RM 24.95 and at RM 31.3, as noted on a 1993 final reach identification data form provided by the USFS.

Tributaries within the Project Area drain to the river down steep-gradient channels (>10%) with gravel and silt substrates. Intermittent and perennial tributaries average 4 to 6 feet wide at ordinary high water level (OHWL). Smaller, ephemeral, or short seasonal drainages tend to be 1 to 4 feet wide at OHWL.

2.7.3 Surface Water Flow

No staff gauges to measure stream discharge are known to exist within streams in the Project Area or vicinity. However, a USGS gauging station is located along the Green River downstream from the Project Area. Flow data records were available from September 8, 1980 through September 30, 1994. Average flow recorded at the station for this period was 476 cubic feet per second (cfs) (213,630 gpm), with maximum and minimum flow rates of 7,310 and 32 cfs (3,281,000 and 14,360 gpm) respectively. Low flows were generally observed in July through September while higher flows were observed during the spring melt. Maximum (peak) estimated water use for the Proposed Action (20 gpm) would be approximately 0.1 percent of the minimum and 0.01 percent of the average flows recorded for the gauging station (on a per minute basis).

Three primary drainage features bisect the Project Area. The headwaters of the drainages originate near the northern boundary of the Project Area, near the boundary between soil covered and exposed bedrock. The streams within the drainages are ephemeral or intermittent and primarily fed by precipitation in the form of snowmelt and rainfall. It is anticipated that the upper portions of the drainages flow directly over mineralized bedrock.

2.7.4 Surface Water Quality

Surface water samples were collected from the three drainage features that bisect the Project Area (from west to east were labeled as the NHD-2, NHD-1, and 020 streams), as well as Polar Star Adit and Polar Star Stream to the west of the Project Area, the Green River, and the Horse Camp wetland that is located immediately south of the Green River. The metals-related analyses included both total recoverable and dissolved concentrations (the latter represent samples that were filtered with a 0.45-micron filter to remove suspended solids before the analytical testing was completed). The results of the laboratory analytical testing indicate the baseline concentrations of the analyzed metals within the groundwater are generally below the relevant and appropriate water quality standards (Table 2[6]).

However, the dissolved copper concentrations in all of the samples, including the Green River, were higher than the relevant surface water quality criteria. The highest concentration of copper was observed at the opening of the Polar Star Adit, where the copper concentration was several orders of magnitude above the relevant surface water quality criteria. In addition, the zinc concentration within the Polar Star Adit sample was detected about five to six times higher than the relevant surface water quality criteria. The pH at this location was measured at 4.8. This reading was consistent with data collected in August 2000 (low flow conditions) and June 2001 (high flow conditions) by Washington State Department of Ecology (Ecology 2002), which ranged from 4.3 to 4.5.

Ecology also completed two rounds of surface water sampling within the drainage feature near the eastern boundary of the Project Area. The rationale for focusing the sampling events on this specific drainage feature was due to the reported presence of three historical mine adits that were mapped within the drainage[7]. Two sample locations were selected: one immediately upstream of the Road 2612 (at the same location as the 020 Stream sample collected in November of 2014), and a second sample was collected above the uppermost mine adit, near the top of the ridge and at a location that was considered to be representative of background concentrations.

Referring to Table 2 (the Ecology-related sample results are shaded in blue), the Ecology investigators were surprised to discover that elevated copper was detected at both the downstream and upstream sample locations, and it was assumed that the upper sample location was below an unknown historical mine feature.

However, after completing the surface water sampling of all three drainages that bisect the Project Area in November 2014, it was discovered that copper concentrations within all three drainages that bisect the Project Area were significantly higher than the relevant surface water

[6] As noted for groundwater, the dissolved concentration of zinc for several of the surface water samples was higher than the total concentration, which theoretically should not be possible. However, this is not unexpected due to the relatively low concentrations. During the data validation process, the concentrations of total and dissolved metals were evaluated. When the dissolved metals concentration was observed to be greater than the total metals concentration, the results were compared as field duplicates. Based on the additional analysis, none of the analytical results were found to be in question.

[7] It should be noted that Lasmanis 1994 contains a map that shows four mapped mine adits within the 020 drainage versus the three adits noted by Ecology, but all of the adits were located between the uppermost and lowermost sampling locations performed by Ecology (2002).

quality criteria. In addition, historical mine features are only known to be associated with the easternmost 020 Stream and the westernmost NHD-2 drainage.

A thorough review of historical information for the Project Area did not identify any historical mine features within the NHD-1 drainage. It is also not possible for the flowing historical drill holes to be responsible for the elevated copper since the groundwater samples have non-detectible concentrations of copper. Therefore, it would appear that the elevated copper concentrations are representative of site-specific background concentrations as a result of the presence of the mineralized bedrock. A more detailed explanation of the elevated copper concentrations in surface water is presented in Section 2.10, Conceptual Site Model.

Table 3 – Baseline Surface Water Quality

(Samples Collected by WA Ecology (2002) are Shaded in Blue)

Location	pH	Temp. (C)	Conduct. (ms/sec)	As[a] (µg/L)	Cd[a] (µg/L)	Cu[a] (µg/L)	Pb[a] (µg/L)	Hg[a] (µg/L)	Fe[a] (µg/L)	Zn[a] (µg/L)	Alkal.[b] (mg/L)
MCLs/Criteria	NE	NE	**NE**	10	0.2-1.0	1.4-11	0.2-2.4	0.12	NE	81-99	NE
Green River (surface)	7.7	6.78	0.024	ND/ ND	ND/ ND	11.2/ 3.26	ND/ ND	ND/ ND	1,000/ ND	2.84/ 2.62	6
Polar Star Stream (downstream of adit)	7.5	6.36	0.036	ND/ ND	ND/ ND	1.65/ 1.61	ND/ ND	ND/ ND	130/ ND	7.42/ 8.45	10
Horse Camp Wetland	5.3	8.23	0.044	ND/ ND	ND/ ND	112/ 104	1.76/ ND	ND/ ND	ND/ ND	4.65/ 7.95	8
NHD2X Stream	5.7	3.74	NM	ND/ ND	ND/ ND	166/ 158	ND/ ND	ND/ ND	ND/ ND	9.78/ 10.3	ND
NHD-X Stream	4.9	7.60	0.049	ND/ ND	ND/ ND	286/ 262	ND/ ND	ND/ ND	ND/ ND	8.16/ 10.1	ND
020 Stream—Up (Hi)[c]	7.4	4.3	0.036	ND/ NA	NA/ 0.043	NA/ 4.69	NA/ 0.033	0.044/ NA	ND/ NA	4.9/ NA	NA
020 Stream—Up (Lo)[c]	7.7	6.4	0.039	ND/ NA	NA/ 0.039	NA/ 5.98	NA/ ND	ND/ NA	ND/ NA	6.11/ NA	NA
020 Stream—Dn (Hi)[c]	7.3	7.3	0.059	ND/ NA	NA/ 0.042	NA/ 38	NA/ ND	0.053/ NA	ND/ NA	4.6/ NA	NA
020 Stream—Dn (Lo)[c]	6.9	10.4	0.086	ND/ NA	NA/ 0.071	NA/ 38.1	NA/ ND	ND/ NA	ND/ NA	7.07/ NA	NA
020 Stream	7.0	6.55	0.042	ND/ ND	ND/ ND	89.2/ 44.1	ND/ ND	ND/ ND	233/ ND	7.51/ 8.27	ND
Polar Star Adit (Hi)	4.5	6.7	1.283	NA	NA	NA	NA	NA	NA	NA	NA
Polar Star Adit (Lo)	4.3	12.5	0.488	NA	NA	NA	NA	NA	NA	NA	NA
Polar Star Adit	4.8	8.37	0.222	ND/ ND	1.54/ 1.33	967/ 750	5.54/ 3.76	ND/ ND	153/ ND	482/ 434	ND

[a]Total recoverable metals/Dissolved metals by EPA Method 200.8. For select metals (Cd, Cu, Pb, Hg and Zn) the criteria represent the lowest concentrations of calculated Chronic Aquatic Life—Freshwater values (Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A, revised January 2012).

[b]Total as $CaCO_3$

[c]Samples collected by Ecology (2002) within the upper (Up) and lower (Dn) segments of 020 Stream during August 2000 to represent low flow conditions (Lo) and June 2001 to represent high flow conditions (Hi)

MCLs = Maximum Contaminant Levels established by the USEPA (USEPA 2015)

NA = Not analyzed

ND = Non-detectable concentration

NE = MCL not established. Screening criteria are not MCLs, but more stringent Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A, revised January 2012, or The human health criteria is from National Toxics Rule 40 CFR 131.36, July 2006.

Key to symbols: As=Arsenic, Cd=Cadmium, Cu=Copper, Pb=Lead, Hg=Mercury, Fe=Iron, Zn=Zinc

Two offsite streams were also sampled: a spring in Horse Camp Wetland (which is located immediately south of the Project Area and Green River) and what was labeled as the Polar Star Stream. The Polar Star Stream had the lowest concentrations of copper of all of the sample locations, and the concentrations were below relevant surface water quality criteria. The water quality data suggests that the Polar Star Stream is not directly connected to the Polar Star Adit discharge.

However, the copper concentrations in the Horse Camp Wetland sample were upwards to one order of magnitude higher than the relevant surface water quality criteria. It is assumed that the higher concentrations are associated with mineralization that extends to the south side of the Green River, as indicated by the presence of at least one mine adit that is mapped apparently upstream of the sample location and another that is mapped downstream of the wetlands.

2.8 GEOCHEMICAL ANALYSIS OF SURFACE WATER & GROUNDWATER

A preliminary geochemical analysis was completed of the above-mentioned surface water and groundwater that was sampled and analyzed in the autumn of 2014. The water quality data were evaluated utilizing Piper diagrams, which are commonly used to evaluate the groundwater quality in terms of relationship between cations and anions, which can assist in assessing possible relationships between the water samples. The Piper diagrams show the relative concentrations of common ions in solutions. In this case the cations calcium (Ca), magnesium (Mg), and sodium plus potassium (Na+K), and the anions chloride (Cl), fluoride (F), sulphate (SO4), carbonate (CO3), and bicarbonate (HCO3) were used in the evaluation. In most natural waters, these ions make up 95 to 100% of the ions in solution.

Referring to Plate 2 – Piper Diagram of Project Area Surface Water & Groundwater, the Piper diagram includes two trilinear diagrams, one for cations (on the lower left) and anions (on the lower right). For each sample, the information from each trilinear diagram is projected up into the central quadrilateral or diamond-shaped area. Therefore, each sample will plot within each frame of the Piper diagram: once representing cations, once representing anions, and once representing the combination.

For each constituent, the concentration (in mg/l) is converted to chemical equivalents (meq/l) based on the valence and atomic weight. Then the percentages of each ion relative to the total are calculated and plotted on the Piper diagram. Each trilinear diagram shows the relative percentages of the three ions. Each corner on the triangles represents 100 percent of the ion shown at that corner.

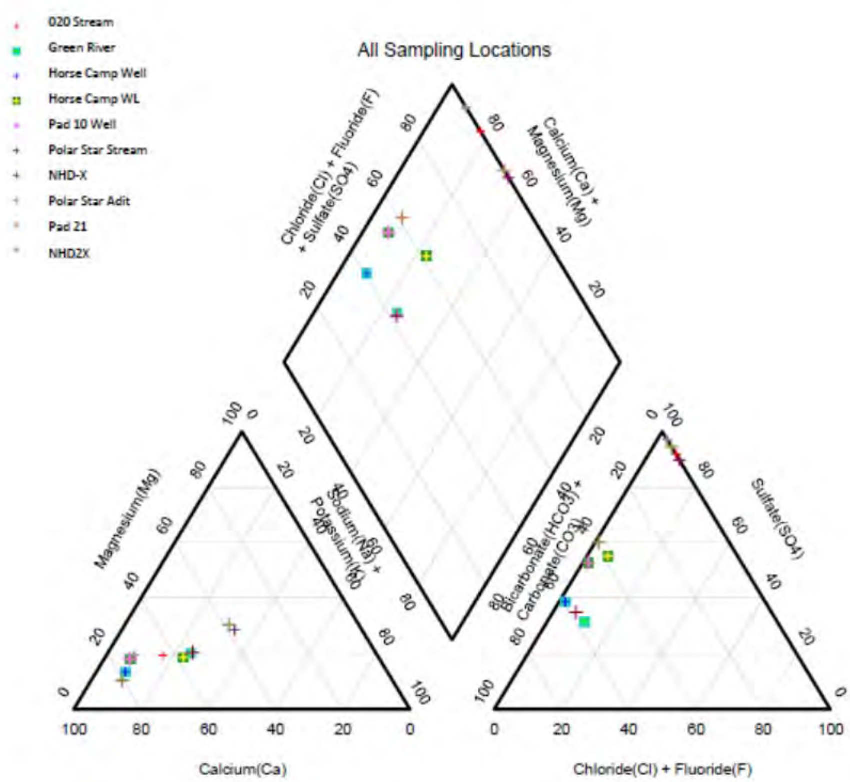


Plate 2 – Piper Diagram of Project Area Surface Water & Groundwater (2014)

The location of the data point in each of the trilinear diagrams is then projected up into the quadrilateral, and plotted where the two projections intersect. The upper right side of the quadrilateral diagram is the sum of Ca plus Mg. The upper left side is the sum of Cl plus SO4.

Plate 2 represents the complete set of surface water and groundwater data points from the autumn 2014 sampling and analysis event on a single figure. The individual Piper diagrams for each individual sample are presented in Appendix C.

Referring to both Plate 2 and Figure 10, the Piper diagram indicates that water samples can be parsed into the following four groups based on similarities with respect to the observed cations and anions:

1) Surface water that is not situated within the Project Area, consisting of the:

    i. Surface water including the Green River, Polar Stream, Horse Camp Wetland, NHD-X and NHD-2X;

    ii. Groundwater including Pad-10, Pad-21, and the Horse Camp Drill Hole;

iii. Polar Star Adit (but observed not to be directly connected to the discharge from the Polar Star Adit); and

iv. Stream 020 which appear to be a mixture of the other three types.

2) Surface water that is generally situated within the Project Area (except for one sample) that is both associated and not associated with past mining-related features and includes the:

i. Polar Star Adit, which is about two-thirds of a mile west of the Project Area and the sample was collected at the opening of the abandoned mine opening;

ii. 020 Stream, which is located near the eastern boundary of the Project Area, downstream of four previously mapped and collapsed mine adits;

iii. NHD-1 stream (sample noted as NHD-X that was collected at the culvert on Road 2612), which is located near the center of the Project Area, but with no known historic mine openings and/or workings present within the drainage; and

iv. NHD-2 stream (sample noted as NHD2X that was collected at the culvert on Road 2612), which is located near the western boundary of the Project Area, but also with no known historic mine openings and/or workings present within the drainage.

3) Groundwater that is within the Project Area and consisting of the:

i. Horse Camp Drill Hole, located east of the 020 Stream and near the eastern boundary of the Project Area;

ii. Pad 10 Drill Hole, which is located in the eastern portion of the Project Area, north of the security gate; and

iii. Pad 21 Drill Hole, which is located in the western portion of the Project Area, east of the NHD-2 stream.

Referring to Plate 2, the straight line relationships between sample points under each of the above-mentioned three groups indicates that the water associated with each group is similar in terms of the cations and anions.

One of the key findings of the Piper diagram-related assessment is that the samples collected from the three streams that bisect the Project Area are very similar even though two of the three streams have known historic mining features associated with them. It is possible that there is an un-mapped mine adit or adits or flow from fractures that intersect same within the

NHD-1 drainage, but that has not been confirmed. In the absence of additional information, the data suggest that the surface characteristics are reflective of the site-specific background conditions. The widespread occurrence of copper in surface water suggests that it may be, in part, natural background concentrations related to the local copper-rich porphyry bedrock.

In addition, the groundwater samples collected from the three holes drilled during past mineral exploration programs are also similar. This suggests that the groundwater quality in terms of the elevated arsenic is possibly reflective of the site-specific background conditions.

2.9 SURFACE WATER-GROUNDWATER INTERACTION

Seeps and springs generally reflect the surface expression of groundwater discharge. In addition, wetlands can be expressions of both groundwater recharge and discharge.

No mapped springs were identified within the Project Area during 2011. However, some seepage was observed in the drainage located approximately 400 feet east of Pad 21 in November 2014, this drainage is noted as DNR-A on the Figure 10. A spring was also observed in the Horse Camp wetland. This spring was sampled.

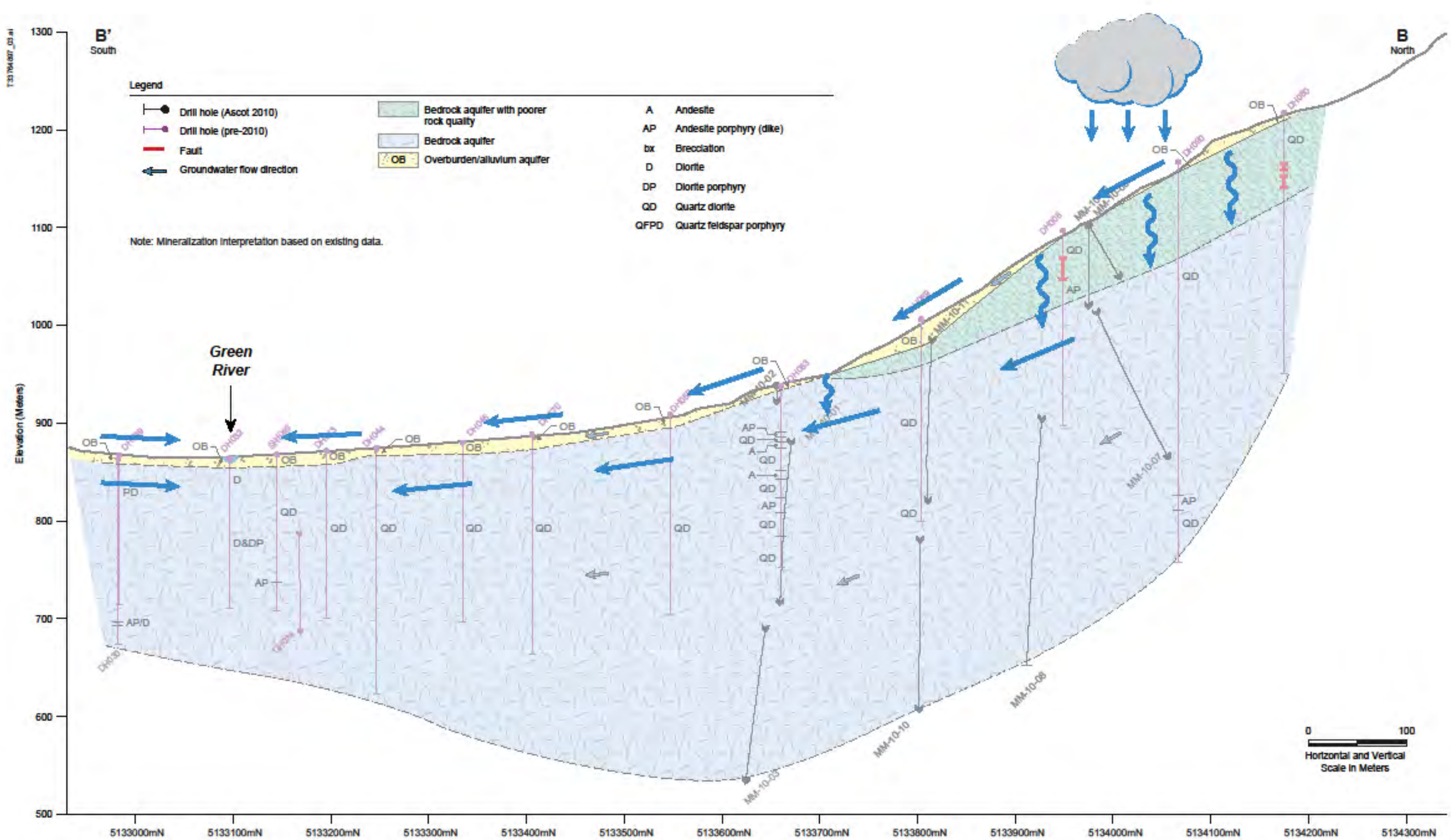
Groundwater possibly discharges to the two small perennial tributaries of the Green River located on the east and west side of the Project Area. During the field reconnaissance conducted on November 11, 2011, a small seep was noted immediately west of Pad 19, near Pad 18. There was no seepage observed at this location during October and November 2014.

2.10 CONCEPTUAL SITE MODEL

Based on the above-mentioned information, and referring to Figure 11, Conceptual Site Model – Geologic Cross Section B-B', the surface water and groundwater-related conceptual site model includes the following:

- Recharge of the alluvial and bedrock aquifers occurs within the higher elevations of Project Area and Goat Mountain through precipitation (snow melt and rain)
- The precipitation both flows overland and percolates through the overlying unconsolidated deposits and seeps into bedrock fractures.
- The bedrock within the upper portion of the Project Area has little to any soil overlying the bedrock, is relatively fractured and contains naturally-occurring elevated select metals associated with the porphyry deposit.
- In contrast the lower portions of the Project Area have upwards to about 30 feet of soil overlying the bedrock with a layer of bentonite clay more than about 10 feet below the ground surface.

- The bentonite clay layer separates the alluvial aquifer from the bedrock aquifer and also creates semi-confining aquifer conditions that result in the artesian conditions observed at a number of the historical drill holes in the southern, lower portion of the Project Area where the bedrock is consistently covered with soil.
- As the surface water percolates through the fractured and mineralized bedrock within the upper reaches of the Project Area, some of the metals such as arsenic to go into solution. The elevated arsenic may also be partially related to the presence of the east-west-trending fault that intersects a number of the historical drilled holes. Therefore, the elevated arsenic appears to be reflective of the site-specific background concentrations.
- The elevated copper within the surface water drainages appears to be related to the historic mine adits where acid conditions are created as a result of the oxidation of pyrite and seasonal accumulation of metal salts within the underground mine openings that are dissolved into solution during the spring freshet. The elevated copper may also be representative in part of site-specific background conditions.



Source: Ascot Resources Ltd, 2011

Figure 11
Conceptual Site Model – Geologic Cross Section B-B'

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

3.0 GROUNDWATER IMPACT ANALYSIS

3.1 SUMMARY OF PROPOSED ACTION

As described in the EA, the Proposed Action includes a total of 63 rock core boreholes that would be completed from 23 drill pads to collect rock core samples in order to better characterize the existing geological and mineralogical information (Figure 4, Project Area). The maximum diameter and depths of the borings would be about 4 inches and 1,000 to 1,300 feet, respectively. Activities included in the Proposed Action are:

- Exploratory drilling within Mineral Survey (MS) parcels 708, 774, 1329, and 1330 adjacent to existing and former logging and other USFS decommissioned non-system roads
- When necessary for access, temporary reactivation of existing decommissioned roads, including removal of trees and other vegetation that have sprouted on the roads since reclamation
    - Approximately 1.69 miles (about 3.07 acres) of decommissioned roads would be used for access
    - This includes 1.35 miles (2.45 acres) of reactivated decommissioned roads from the 2010 drilling program; and 0.34 miles (0.62 acres) of decommissioned roads that would be newly reactivated
- Limiting on-site groundwater use to 5,000 gallons per day
- Installation of new and reactivation of existing drill pads
- Implementation of runoff and sediment controls
- Installation of temporary sumps to contain drilling fluids
- Use of drilling fluids consisting of a mixture of water and additives
- Removal of rock core samples for off-site laboratory analysis
- Site reclamation

Details regarding the proposed drilling method and supporting activities such as access road and drill pad construction are presented in the EA.

3.2 GROUNDWATER-RELATED IMPACTS

Based on the above result of the hydrogeologic analysis, the potential impacts of the Proposed Action on the groundwater resource would include the following:

- Disturbance of Bedrock Aquifer

- Effects of Drilling Fluid Filtrate Mixing with Groundwater
- Mixing of Groundwater and Surface Water
- Effects on Water Quantity
- Artesian Conditions
- Drilling Fluid Loss & Gain
- Borehole Abandonment

A more detailed discussed of each of the above topics is presented hereafter.

3.2.1 Disturbance of Bedrock Aquifer

The drilling program would include installing drill casing through the alluvial aquifer, so adverse impacts to the alluvial aquifer are not anticipated. However, when drilling through the bedrock aquifer, the pressure exerted by the column of drill mud within the borehole (the hydrostatic head) would exceed the water pressure into the aquifer. Due to this pressure differential, the mud would have the potential to seep out of the borehole and into the geologic formation. The likelihood of this occurring would be highest when drilling through fractured bedrock. The interconnected pore spaces within the fractured material would act as a filter to trap the bentonite particles along with the entrained drill cuttings (sand-sized particles) and to form a coating on the surface of the borehole known as “filter cake”(Plate 3, Campbell and Gray 1975). It is the filter cake that confines most of the drilling mud to the borehole[8]. Seepage of fluid through the filter cake is discussed in more detail in the subsequent groundwater effects section.

[8] It should be noted that the pressure exerted into the bedrock during rock coring should not be confused with the type pressure that is utilized during hydraulic fracturing or hydrofracking in the oil and gas industry. Core drilling normally uses pressures on the order of hundreds of pounds per square inch (psi) versus hydrofracking that utilizes pressures upwards to 15,000 psi or more. The goal of core drilling is to utilize the lowest possible pressures necessary in order to stabilize or maintain lateral pressures to maintain the site walls of the borehole and complete the bore hole, versus hydrofracking that has the goal of fracturing the geologic formation in order to release trapped oil and gas.

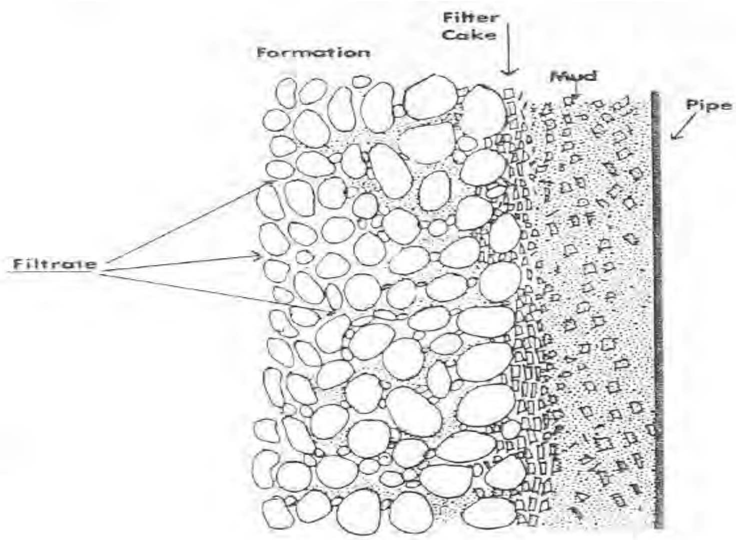


Plate 3 – Formation of Filter Cake (Campbell and Gray 1975)

Water could also flow into a borehole from the geologic formation due to hydrostatic head within the aquifer and it may exceed that of the mud column, as would be the case with a confined aquifer. Minor losses through the filter cake and gains of water due to artesian conditions during the drilling process are not uncommon, but pose no environmental harm. More substantial inflows to or outflows from the borehole would be sealed off, as discussed below.

The higher permeability fracture and fault zones that would be encountered in some of the proposed bore holes would be the most likely areas to produce drilling fluid losses or gains. However, the adverse effects of drilling on the hydraulic properties or water quality of an aquifer would likely be negligible and temporary and therefore insignificant.

In order to assess this reasonable worst-case scenario, an analysis was completed that assumed seven bore holes (at pads 10, 11, 12, 22, 23, 24, and 25; which is about 10 percent of the total boreholes to be completed under the Proposed Action) would be completed along the strike of the mapped east-west trending non-active fault within the Project Area, which would represent the most fractured bedrock within the Project Area (Figures 6 and 10). This also represents the zone where artesian bedrock groundwater would likely be encountered.

Based on a review of the surface and cross-sectional geology, the fault zone was estimated to be less than 100 feet wide. The distribution of groundwater within the fault zone was assumed to be a discrete aquifer, which is a conservative assumption. Based on a review of the geologic information, continuous hydraulic connectivity along the entire strike of the fault is unlikely. In consideration, a strike length of 1000 feet was used. Utilizing a 1000 foot-long average hole depth as a vertical boundary, and an assumed fault zone width of 500 feet, this would yield an aquifer volume on the order of 100 million cubic feet. In the event that the fault zone is actually wider than assumed, the adverse impacts would be less than calculation for the 100-foot-wide fault zone.

The other highly relevant factor that was considered during the analysis was the duration that the boreholes are anticipated to remain open. The boreholes would normally be open for a period of 5 to 9 days, after which they would be abandoned following the procedures described in the Borehole Abandonment section. After abandonment, the borehole and associated plugged lost circulation zones (LCZs) would essentially be considered a relatively impermeable column of clay (or cement if needed to plug artesian flows) within the aquifer. The long-term effects of these columns of clay would be negligible because groundwater would continue to flow around them. There would be an insignificant reduction in bulk permeability, groundwater flow patterns, and total water storage capacity of the aquifer.

During drilling it is possible that there could be minor pressure increases or decreases within the aquifer as a result of encountering lost circulation or water entry zones. If there were springs or seeps nearby, this could result in brief fluctuations in flow if a direct hydraulic connection between the borehole and the discharge point is present. However, based on the results of the water quality testing, there appears to be little if any connection between the springs or seeps observed and the confined groundwater encountered with depth (artesian condition). Such fluctuations in discharge, if detectable, would likely not be outside the typical range of seasonal variability for springs and seeps, and would therefore have negligible effects on these features.

3.2.2 Effects of Drilling Fluid Filtrate Mixing with Groundwater

The proposed drilling program would result in the formation of filter cake and the sealing of lost circulation zones in order to minimize drilling fluid filtrate loss from the borehole and into groundwater.

The effectiveness of the bentonite filter cake at limiting the extent of filtrate migration into an aquifer was analyzed assuming the implementation of drilling-related standard operating procedures (SOPs). The process of filter cake formation has been studied and modeled by a number of authors. The filtration rate of drilling fluid into permeable formations would be controlled primarily by the permeability and thickness of the filter cake (Jaio & Sharma 1994; Wu et. al. 2005). As the filter cake builds up, it would rapidly become less permeable (Plate 4).

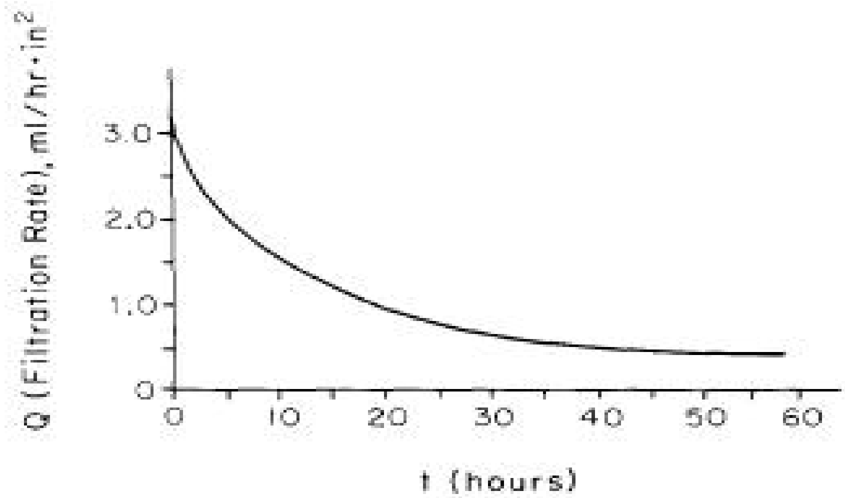


Plate 4 – Graph of Filtrate Infiltration vs. Time (Donaldson & Chernoglazov 1986)

The reported hydraulic conductivity values for filter cake are very low (Campbell and Gray 1975; Jaio & Sharma 1994; Kelessidis et. al. 2006), and are comparable to that of non-fractured granite. Wu et. al. (2005) indicate that this low permeability is reached in a matter of seconds. A wide range of filter cake thicknesses from 1 mm to 1 cm have been reported. The primary constraining factor on filter cake build-up is the flow rate of the mud that acts to erode the filter cake from the borehole wall. For the Proposed Action, a very thin filter cake is expected (probably 1 mm or less) due to the relatively high annular velocity of the mud (over 8 feet per second).

Once the filter cake forms, fluid that passes through it (the filtrate) from either the borehole surface or sealed off LCZs can migrate into an aquifer. As noted above, filter cake thickness and permeability are the main controlling factors that determine how much filtrate is produced and how far it moves away from the borehole. Campbell and Gray (1975) cite a case of filtrate moving two feet in 138 hours. Wu et. al. (2005) modeled a filtrate travel distance of roughly 0.4 m in 2 days for several different permeabilities. Distances such as these likely represent high values for what would be possible within the overburden since surface casing would normally be set within less than one day, after which time no further fluid would migrate into the geologic formation.

In order to illustrate the relative insignifance of the filtrate loss into the geologic formation, a 100 foot-deep borehole (which would be deeper than anticipated under the Proposed Action based on the review of historical borelogs) completed within overburden can be used with the values from Plate 4 to provide a rough estimate of 25 gallons of filtrate loss in 10 hours, which is considered insignificant.

The filtrate chemical composition is perhaps more relevant than volume and distance estimates in assessing potential aquifer impacts. The filtrate would be composed of the water used to mix the drilling mud (make-up water), small amounts of very fine bentonite particles, and small amounts of drilling additives.

The primary sources of make-up water would be the existing onsite drill holes and an offsite source if necessary. The existing drill holes were sampled and analyzed in support of this environmental impact analysis and, as noted in Tables 2 and 3, did not have exceedances of relevant water quality standards, with exception to arsenic levels in the water sampled from the Horse Camp and Pad 21 Drill Holes, which represent background levels as noted above.

Prior to use as make-up water, the water quality of the drill hole water would be confirmed to be consistent with the data presented in Tables 2. If at any time during the regular sampling period the surface water values would exceed those of groundwater, the make-up water would have to be obtained from another source, such as from the community of Randle and which would be subject to relevant water quality standards.

The Proposed Action would include the use of minor quantities of drilling additives that are non-toxic, biodegradable and certified (NSF/ANSI Standard 60) for use in domestic water supply wells. Even though all of the proposed drilling products are in regular usage for water well drilling, the question is commonly raised as to whether differences in the chemical composition of the drilling fluid and the native groundwater could result in significant detrimental effects to an aquifer if substantial mixing were to occur.

Chemical reactions would take place due to the mixing of the two chemically-different mud filtrate and groundwater. Some of the properties that may differ between the drilling fluid and groundwater are: pH, dissolved oxygen, cation exchange capacity, biochemical oxygen demand, total organic carbon, suspended solids, dissolved ions, and bacteria.

The existing literature on the topic of water quality changes resulting from filtrate/groundwater mixing is sparse. However, Campbell and Grey (1975) discuss a multitude of physical, chemical, and biological processes involved in the mixing of drilling fluids and conclude that "…the mobility of drilling fluids in the ground-water system is clearly of very limited extent because of a variety of physical, chemical, and biological factors." However, as with many hydrogeological studies, their conclusions are based on the behavior of fluids in porous media, and may not necessarily be directly applicable to flow in fractured rock aquifers. Nevertheless, many of the attenuation processes they cite are still valid in this context.

3.2.3 Mixing of Groundwater and Surface Water

There are two mixing situations that were evaluated as part of this environmental impact analysis: a scenario where surface water would be the contributing source and the groundwater is the receiving water, and vice-versa.

The flow of surface water down the borehole would not occur during active drilling because all the drill holes would have surface casing that typically rises several feet above the surrounding drill pad surface, which would be graded in order to drain water away from the borehole. In addition, the flow of surface water into an aquifer via the annular space would be prevented by proper sealing of the casing with the approved materials described above. The various material handling measures noted in the drilling procedures section would also prevent spills of hazardous materials stored on the drill pad that could then infiltrate into shallow alluvial aquifers.

Another route by which groundwater could affect surface water would be if it were to become surface water by discharging from a seep or spring. Arsenic rich groundwater could mix with copper rich surface water. However, the low probability of groundwater quality being affected by drilling fluid or aquifer cross-flow described above becomes even lower by the time it reaches a discharge point (assuming a hydraulic connection between the borehole and the discharge point exists). Although Campbell and Gray (1975) acknowledge a host of possible reactions and processes that could occur over the transport path, they single out the attenuating processes of filtration, adsorption, and dilution in their conclusion that "…the mobility of drilling fluids in the ground-water system is clearly of very limited extent…" In addition, there were no observations of this occurring during the historic exploratory drilling programs.

Use of non-toxic drilling fluid additives would prevent impacts to groundwater and surface water quality. Spill containment kits would be kept at fuel storage areas and with the drill, water pump and in the service trucks. A Spill Prevention Plan submitted to the USFS would be followed, and any spills or leaks would be immediately reported and promptly cleaned up.

3.2.4 Impacts on Water Quantity

The Proposed Action would use groundwater available from previous drill holes within the Project Area as the primary source of water for drilling fluids. The Project Area is located entirely within the Green River watershed. According to on-line information from Ecology, two users have water rights on the Green River, including the Washington Department of Fish and Wildlife and Weyerhaeuser. The two users are listed; however, their status is listed as inactive.

Accounting for only the active water users, a total of 48.5 cfs, or 21,800 gallons per minute (gpm), is allocated for use. Water requirements for the Proposed Action are estimated to average approximately 5 gpm with a potential peak use of 20 gpm. Actual water use may average lower based on conditions experienced in 2010 (possibly as little as 2,400 gpd or approximately 360,000 gallons over the five month project).

Most of water used, with the exception of a negligible amount lost to evaporation, would be returned to the subsurface during drilling or through infiltration in the drill sump unless the sump is lined with an impermeable liner. Assuming conservatively that the peak water use is consumed during drilling; only 0.09 percent of the allocated water would be used on a per minute basis. This is a negligible amount of water that would not affect allocated uses.

As noted earlier in this report, a USGS gauging station is located along the Green River downstream from the Project Area. Flow data records were available from September 8, 1980 through September 30, 1994. Average flow recorded at the station for this period was 476 cfs (213,630 gpm), with maximum and minimum flow rates of 7,310 and 32 cfs (3,281,000 and 14,360 gpm) respectively. Low flows were generally observed in July through September while higher flows were observed during the spring melt. Maximum (peak) estimated water use for the Proposed Action (20 gpm) would be approximately 0.1 percent of the minimum and 0.01 percent of the average flows recorded for the gauging station (on a per minute basis).

The estimated average water use of the Proposed Action (5 gpm) is 0.03 percent, and 0.002 percent of the minimum and average recorded flows (on a per minute basis). Given that water use for the project represents fractions of a percent of allocated and available water within the watershed; and since most water used during drilling would be discharged back into the watershed, the effects of water withdrawal are expected to be negligible. Furthermore, if additional water is needed, it has been proposed that groundwater be supplemented by hauling it by truck from off-site sources. Off-site water, following use in drilling fluid, would be returned to the watershed, further mitigating local groundwater water use.

It should be noted that even if relevant permits could be acquired, the on-site surface could not be utilized as a water source for drilling due to the elevated concentrations of copper about relevant water quality criteria, and the recorded absence of copper within the Project Area groundwater.

Groundwater use would be allowed under an Ecology groundwater withdrawal exemption where up to 5,000 gpd could be withdrawn for industrial purposes, including mineral exploration. Use of groundwater by the Proposed Action from on-site sources would be limited to 5,000 gpd. If more than 5,000 gpd per day were to be used either an Ecology groundwater

water right permit would be required or the additional water would be obtained from off-site potable sources.

By limiting on-site groundwater use to 5,000 gallons per day (as required), groundwater use is limited to an amount that is negligible to watershed allocated use and water availability. Depending on the volume of discharged water, the water used would either be infiltrated back into the substrate through down-hole loss (which may be limited due to the presence of the filter cake), which would further minimize the loss of water from the area.

3.2.5 Artesian Conditions

In the event of artesian conditions (the natural condition under which groundwater could discharge from the borehole due to the aquifer being under pressure as a result of confining conditions) borehole fluids could flow into and mix with nearby surface water. This possibility would be minimized by the SOPs described for dealing with artesian flow, including the prompt abandonment of flowing artesian drill holes.

All of the proposed boreholes would likely penetrate bedrock aquifers. Crystalline bedrock in general is usually quite heterogeneous with respect to hydraulic properties. As Gustafson and Krasny (1994) put it:

> *The most striking hydrogeological feature of a fractured crystalline rock is the overwhelming variability of its properties. A parameter such as the hydraulic conductivity determined by classical field methods normally varies by several orders of magnitude within the same rock unit and often with short distances. The reason for this is that it is not the rocks themselves which transmit the groundwater, but the fractures and fissures that form conductive openings through the basically impervious rock matrix.*

Figures 5 through 9 show the relative fracture distribution beneath the Project Area. As a conceptual model, this may be useful in explaining some of the observed occurrences of bedrock groundwater within the Project Area. The Project Area geology consists of a core of relatively massive bedrock that is surrounded by fractured rock. In addition, artesian conditions have been encountered in a number of the existing boreholes that penetrated through the primary east-west-trending fault.

Therefore, the east-west-trending fault zone that crosses near the middle of the Project Area likely has the highest probability of encountering artesian groundwater conditions and resulting potential for cross-aquifer flow. However, it should be noted that relative to other more productive aquifers within the state, these localized fault zone aquifers are of very limited importance from the standpoint of beneficial uses.

Water samples associated with these bedrock fault zone aquifers have elevated levels of arsenic. In the Pad 10 Drill Hole, arsenic is present, but below the state standard, while arsenic in the Pad 21 Drill Hole is slightly over the state standard and five times the state standard in the Horse Camp Drill Hole.(Table 2). However, elevated arsenic was not detected in the seeps, springs and other surface water. In contrast, elevated copper was detected in several of the surface water bodies.

The occurrence of elevated arsenic in groundwater in association with fault zones is not surprising, since the fault zones act as primary conduits for mineralizing fluids Arsenopyrite and the natural oxidation of these minerals releases dissolved arsenic into the groundwater. It is likely that the more strongly fractured and mineralized portions of the fault zone have higher concentrations of dissolved metals than those sections that are less so.

Groundwater containing elevated levels of arsenic would likely be encountered to some extent during the drilling of exploration boreholes that penetrate bedrock fault zones in the area, and some of those boreholes would likely encounter artesian conditions. The drilling procedures described below would minimize the mixing of waters from different sources.

3.2.6 Drilling Fluid Loss & Gain

Normally the development of filter cake is quite rapid. However if a zone of very high permeability and low relative pressure (e.g. a coarse gravel lens, or highly fractured bedrock) is encountered, the drilling fluid would flow farther into the formation before a filter cake can form. This is referred to as “lost circulation”. It is necessary to prevent substantial fluid losses to LCZs, otherwise there is an increased risk of problems such as binding of the drill string from sloughing and an inability to circulate cuttings out of the hole.

Lost circulation would be recognized by the driller who would watch the mud return flow at the top of the hole and the mud pump pressure gauge. If the flow rate was to drop off and the pressure drop, then lost circulation would be known to be occurring. Generally a gain or loss of 10% (approximately 25 gallons in a 1000 foot-deep borehole) or more of the drilling fluid alerts the driller to an inflow/outflow condition. The speed and duration of mud loss would be dependent upon the fracture density and related permeability and the pressure differential. The zone would be interpreted as being sealed if mud flow is observed at the ground surface and full mud flow returns.

Several mechanisms would act to promote sealing of moderate circulation loss. As the drill cuttings in the mud are carried into the formation, individual particles or aggregates become stuck at points where they form bridges spanning various apertures in the flow paths. These plugs then act to filter out the even smaller bentonite particles to form localized areas of filter cake. Additionally, bentonite muds are thixotropic which means that they coagulate into a highly viscous gel when not subjected to shear stresses (e.g. pumping). Thus, when "dead zones" in the flow form within the formation they tend to gel and flow no further.

If a LCZ is encountered where the driller observes a strong pressure loss and a complete cessation of mud flow at the surface (referred to as a "loss of returns") then a different approach is called for. Drilling stops and mud is circulated in an effort to allow the zone to seal which is indicated by the resumption of mud flow at the surface. If the driller hasn't gotten returns back within about three minutes, they stop circulating and prepare a 25-40 gallon slug of lost circulation material.

There are many types of lost circulation material available, but high-solids bentonite grouts (Holeplug®, Quik-Grout®) would primarily be used for this project. Unlike standard bentonite drilling mud which has a solids content of 10-20%, the bentonite grouts have a solids content of 70%+, which produces a highly viscous fluid with the approximate consistency of peanut butter. Usually this successfully seals the LCZ.

If the lost circulation material still doesn't control fluid loss, then a variety of more aggressive methods would be used. The LCZ can be cemented and drilled through, or the existing drill string can be used as casing and cemented in through the LCZ. In the latter case, a smaller drill bit and pipe would be used inside the new casing to drill onward. This stepping down of pipe sizes would be done more than once if necessary.

During the review of the historical drill logs, there were no reports of substantial loss of circulation that resulted in drilling mud be discharged at the ground surface downslope of the boreholes.

If water entry from the bedrock aquifer into the borehole is significant enough to result in artesian flow at the surface, then the well would be promptly abandoned as described below in the Borehole Abandonment Section. During the time it takes to abandon the hole, artesian flow at the surface would be routed into the mud sump. Should there be enough flow to exceed the sump capacity, emergency measures would entail routing any overflow to portable tanks, to the ground surface in a hand dug trench, or to an area away from active waterways or wetlands with the most available obstructions to flow (e.g. embedded logs, thick grass or brush). Emergency packers are also available on all drill rigs and would be used as necessary to stem artesian flow.

3.2.7 Borehole Abandonment

Once drilling is completed the drilling mud would be pumped into the on-site sumps for disposal. The sumps would be lined with bentonite clay to prevent adverse impacts to groundwater quality. The drilling mud within the sumps would be allowed to dry out prior to being removed to a suitable disposal facility. The sump area along with the rest of the drill pad would then be reclaimed.

Sumps would not be located on steep slopes or within areas where groundwater levels could rise above the bottom of the sump. Drilling mud from holes in such areas would be contained in portable mud tanks during drilling and then ultimately disposed of in sumps located elsewhere.

Completed boreholes would be promptly abandoned as required by Washington State Standards and National Best Management Practices for Water Quality Management after reaching their total planned depth. Borehole abandonment would generally take place within hours of borehole completion to avoid the need to bring the drilling rig back to the site. If the annular space of the casing has been sealed with cement (as is the case with boreholes expected to encounter artesian conditions), the casing would be left in place. If the annular seal is bentonite, the temporary surface casing would be removed before abandonment.

Borehole abandonment entails plugging the boreholes from bottom to top with a low-permeability bentonite-based grout (Benseal®) that seals off all water transmission. In order to ensure a continuous seal throughout the hole the grout is pumped down the hollow drill string starting at the bottom of the hole (Plate 5). As the hole is filled the drill string is withdrawn, but never pulled above the surface of the ascending column of grout, as this could produce voids.

When the grout has risen to within approximately three feet of the ground surface and has set up, the remainder of the hole would be plugged with cement. In the case of abandonment of a flowing artesian drill hole, neat cement grout would be used to seal the entire borehole instead of bentonite grout. If cement grout cannot be emplaced due to excessive flow from the borehole, inflatable packers would be used to seal the hole prior to placing the cement grout.

The sealing of the boreholes with high-solids bentonite grout and/or bentonite/cement mixtures such as described in Washington State Minimum Standards for Construction and Maintenance of Wells (WAC 173-160) (WAC 173-160-251(4) and (5) for abandoning artesian wells) would prevent groundwater discharges from drill holes, and would prevent flow of water between zones of differing water pressures. Grout sealing would prevent water loss and further prevent ARD generating reactions with sulfide minerals from occurring.

Portions of the rock core samples would be transported to the off-site laboratory for analysis. The remainder of the rock core samples would be transported off-site for long-term storage.

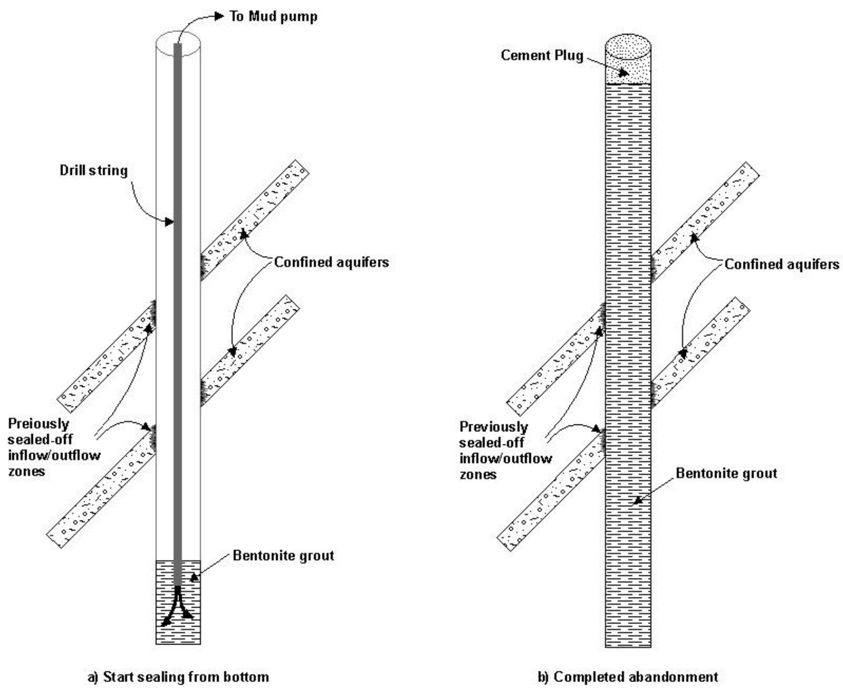


Figure 5 – Borehole abandonment

3.2.8 Monitoring

Since the effective protection of groundwater resources is strongly dependent upon the proper implementation of a monitoring plan would be prepared and implemented. The monitoring plan would include the following items:

- Regular review of relevant drilling data gathered by Ascot (e.g. drilling fluid losses, water entries, borehole abandonment records, etc.).
- Periodic site inspection by a USFS minerals administrator or BLM certified mineral examiner for compliance with BMPs and effectiveness of implementation.
- Review of water chemistry trends from baseline monitoring wells.

Reporting of Hydrogeological Data during Exploratory Drilling

Hydrogeological information would be collected during the drilling program in order to provide additional baseline data for evaluation of possible future exploration drilling or mining plans of operation. Most of the data would be collected by the drilling contractor or site geologist in a logbook or on the geologic logs of the drill holes. The information would include:

- Aquifer type(s)
- Depth to first water zone, and depths to additional water zones

- Lithology and structural geology (fracture zones, faults, rock jointing, oxidized zones, geologic contacts, etc.)
- Standing water levels several hours after completion
- Significant losses of circulation while drilling
- Records of Borehole Abandonment Procedures, including:
    - Groundwater conditions
    - Depth sealed and methods used
    - Quantity and type of sealing materials used
    - Casing details
    - Surface seal details
    - Changes made to the drill hole during abandonment

Some of these data could be perceived as proprietary by Ascot, therefore, the types of information to be shared would be agreed to up front before the project begins.

Site Monitoring

Monitoring of exploration drilling operations would consists of site visits and inspections by the relevant agency staff to verify that the agreed upon drilling procedures, drill hole abandonment procedures, monitoring, and BMPs (USDA Forest Service 2012)are being followed. The monitoring data would be used to assess how the drilling operation affects groundwater quality/quantity compared to established baseline data and used to determine any adaptive management necessary to mitigate impacts.

Groundwater Monitoring

The draft Working Guide “Evaluating Groundwater Resources for Mineral Exploration Drilling” prepared by the USFS and dated August 2014 strongly discourages the conversion of drill holes into monitoring wells due to limited diameter of the holes and limitations in terms of isolating the groundwater aquifers for collecting representative data. However, because the three drill holes present on site are flowing, problems with downhole purging and sampling are eliminated. These drill holes were sampled during the baseline groundwater quality assessment and will be sampled periodically during the project to track changes in groundwater conditions.

Monitoring the known groundwater conditions at select sampling sites before, during, and after drilling would be conducted. The monitoring data would be utilized in conjunction with surface expressions of groundwater and site specific geologic conditions that could control ground water movement to confirm the groundwater conceptual model described in the report. The groundwater conceptual model along with water quality monitoring data would be used to evaluate the impacts of the proposed drilling exploration program.

The information collected during the drilling exploration program could be used to determine the need and configuration of more permanent monitor wells if additional delineation or refinement of a potential mineral resource is identified.

4.0 CUMULATIVE IMPACTS

The cumulative impacts analysis included the evaluation of the relevant past and future actions with respect to the groundwater resources that focused on historical mining and drilling exploration-related activities and the proposed drilling exploration program. Assuming that the Proposed Action is completed in accordance with the relevant and appropriate best management practices (BMPs) and regulations that protect groundwater quality, the cumulative effects to groundwater flow or quality as a result of the proposed project are expected to be insignificant when considered in combination with other past, ongoing, or reasonably foreseeable actions. This conclusion is based on:

- The minimal impact to the groundwater resources resulting from the infiltration of the drilling fluids into the geologic formations from the boreholes, which would be less than a few feet based on the duration of the drilling and the geologic conditions.
- Past activities that may have affected groundwater resources include previous mining projects within the St. Helens mining district and more recently, previous exploratory drilling projects conducted by several companies. The past mining activities may have contributed to the presence of elevated copper within select streams. The widespread occurrence of copper in surface water suggests that it may be, in part, natural background concentrations related to the local copper-rich porphyry bedrock. However, elevated copper was not discovered in the drilled holes that were sampled. Therefore, the Proposed Action would likely not contribute to additional releases of the copper to surface water or groundwater.
- Several of baseline groundwater samples detected elevated arsenic, which would likely be encountered during the Proposed Action. The water would not be allowed to discharge directly into surface water and therefore would not impact the related water quality.
- The previous exploratory drilling programs involved the installation of about 100 drill pads and the drilling of associated boreholes. The Proposed Action would include the re-use of some of the access roads and drill pads. All of the related earthworks would be completed in accordance with BMPs (USDA Forest Service 2012 and 2014) that are protective of the surface water and groundwater.
- Despite the likely impacts of the previous mining activities on the surface water quality, the Proposed Action would not include actions that would lead to additional cumulative effects.

- The project will contribute to GHG emission from the use of fossil fuels for equipment operation.

5.0 CONSULTATION AND COORDINATION

LIST OF PREPARERS

Name	Title/Discipline	Agency or Firm	Years of Experience
Anthony Palmieri, LG	Geologist	URS	8
Keith O'Connell, PE	Engineer/Geologist	URS	32
Richard Langendoen, LG, LHG	Geologist/Hydrogeologist	URS	32

6.0 LIMITATIONS

This baseline and environmental impact is intended to provide an understanding of the probable impacts of the Proposed Action with respect to the groundwater resources. The objective of this analysis was to perform the work with care, exercising the customary thoroughness and competence of earth science, environmental and engineering consulting professionals, in accordance with the standard for professional services at the time these services are provided. This report was based upon data and information reviewed as outlined herein and obtained during a reconnaissance of the subject property. The interpretations and conclusions contained in this report are based on the expertise and experience of conducting other similar assessments.

7.0 REFERENCES

Ascot Resources Ltd. 2011. Mt. Margaret Project, Drill Cross Sections and Boring Logs

Bookstrom, A.A., B.R. Johnson, T.M. Cookro, K. Lund., K.C. Watts, H.D. King, M.D. Kleinfkopf, J.A. Pitkin, J.D. Sanchez, and J.D. Causey. 1998. Potential Mineral Resources, Payette National Forest, Idaho: Description and Probabilistic Estimation. Open-File Report 98-219a, U.S. Department of Interior, U.S. Geological Survey. 270 pages.

Campbell M.D., and G.R. Gray. 1975. Mobility of Well-Drilling Additives in the Ground-Water System. In Conference Proceedings, Environmental aspects of Chemical Use in Well-Drilling Operations. Office of Toxic Substances, Environmental Protection Agency: 261-284.

Cookro, T.M., M.L. Silberman, and B.R. Berger. 1987. Gold-Tungsten-Bearing Hydrothermal Deposits in the Yellow Pine Mining District, Idaho. In Schafer, R.W., et. al., 1988, Bulk Mineable Precious Metal Deposits of the Western United States, Symposium Proceedings: 577-624.

Cooper, J.R. 1951. Geology of the Tungsten, Antimony, and Gold Deposits near Stibnite, Idaho. Geological Survey Bulletin 969-F, U.S. Government Printing Office.

Dewandel, B., P. Lachassagne, R. Wyns, J.C. Marechal, N.S. Krishnamurthy. 2006. A Generalized 3-D Geological and Hydrogeological Conceptual Model of Granite Aquifers Controlled by Single or Multiphase Weathering. Journal of Hydrology (2006) 330, 260– 284.

Donaldson, E.C., and V. Chernoglazov. 1987. Characterization of Drilling Mud Fluid Invasion. Journal of Petroleum Science and Engineering (1987) 1, 3-13.

Driscoll, F.G. 1986. Groundwater and wells (2d ed.): St. Paul, Minnesota, Johnson Filtration Systems, Inc., 1089 p.

Duval Corporation, 1970. Structure and alteration map. Prepared by Duval Corp. Exploration Department. October 1970.

Duval Corporation. 1971-1983. Geology-Assay Composite Drill Hole Logs. Duval Corporation. 1980. Margaret Project, Drill Log Summaries. January 11, 1980.

Edil, T.B., M.M.K. Chang, L.T. Lan, and T.V. Riewe. 1992. Sealing Characteristics of Selected Grouts for Water Wells. Ground Water, Vol. 30, No. 3, 351-361.

Empsall, John S. 1992. Geology and Exploration of the Margaret Copper Deposit. Prepared by the Exploration Manager of Pennzoil Sulphur Company, Houston, Texas and presented at the 1992 Northwest Mining Association Short Couse "Porphry Copper Model -

Regional Talks and Settings", Tuscon, Arizona and Spokane, Washington, November 28 - December 1, 1992.

General Moly. 2007. Margaret, Skamania County, Washington. December 2007 (revised May 2008).

Gifford Pinchot Task Force v. Perez et al, Opinion & Order, July 2014

Gustafson, G. and J. Krasny. 1994. Crystalline Rock Aquifers: Their Occurrence, Use, and Importance. Applied Hydrogeology, 2/94, 64-75.

Jiao, D. and M.M. Sharma. 1994. Mechanism of Cake Buildup in Crossflow Filtration of Colloidal Suspensions. Journal of Colloid and Interface Science (1994) 162, 454-462.

Kelessidis, V.C., D. Tsamantaki, N. Pasadakis, E. Repouskou, and E. Hamilaki. 2006. Permeability, porosity and surface characteristics of Filter Cakes from Water-Bentonite Suspensions. Paper to be presented at the 6th International Conference on Advances in Fluid Mechanics, 8-10 May, 2006, Skiathos, Greece.

Lasmanis, R. 1995. Regional geological and tectonic setting of porphyry deposits in Washington State, in Schroeter, T.G., ed., Porphyry deposits of the northwestern Cordillera of North America: Canadian Institute of Mining, Metallurgy and Petroleum Special Volume 46, pp. 77-100.

Natural Resources Conservation District (NRCS). 1990. Soil Survey of Skamania County Area, Washington. October 1990.

Naylor, P. 2012. Review of Known Hydrogeologic Conditions at the Midas Gold – Golden Meadows Project Area. Technical Memorandum, MWH Global.

Papp, J.E. 1996. Sodium Bentonite as a Borehole Sealant. In Sealing of Boreholes and Underground Excavations in Rock. Edited by K. Fuenkajorn and J.J.K. Daemen. Chapman & Hall: 280-297.

Schwartz. 2013. Analysis of the Potential Effects to Groundwater Resources from the Proposed Golden Meadows Exploration Project

State of Washington. 2008. Washington State Minimum Standards for Construction and Maintenance of Wells (WAC 173-160 and 173-162).

Stichman, R.W. 1990. Methods of Borehole Stabilization to Avoid Groundwater Contamination. Paper presented to Toronto, Ontario HAZTECH/CANADA Conference, May 16, 1990.

US Department of Agriculture (USDA) and US Department of Interior (USDOI). 1994. Northwest Forest Plan Record of Decision (NWFP ROD), Attachment A – Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl, April 1994.

US Environmental Protection Agency (USEPA). 2015. Drinking Water Contaminants (includes a List of Contaminants and Their Maximum Contaminant Levels. Accessed on the web February 3, 2015. http://water.epa.gov/drink/contaminants/#ListUSDA Forest Service, 2012a. National Best Management Practices for Water Quality Management on National Forest System Lands," FS-990a, US Forest Service Best Management Practices (BMP) Technical Guide. Pages 65-67, 75, 77 and 144.

USDA Forest Service, 2012b. East Spirit Lake quadrangle 7.5-minute topographical map. March 27, 2012.

USDA Forest Service, Boise National Forest. 2013. CuMo Exploration Project, Boise County, ID, Groundwater Supplement to the Geologic Hazards, Soils, and Water Resources Technical Report, August 2013.

USDA Forest Service, Gifford Pinchot National Forest. 1995. Gifford Pinchot National Forest Land Management Plan with Standards and Guidelines, Amendment 11 of the Northwest Forest Plan.

United States Department of Agriculture, Forest Service, 2012. National Best Management Practices for Water Quality Management on National Forest System Lands, FS-990a.

United States Department of Agriculture, Forest Service, Minerals and Geology Management. 2014. Working Guide – Evaluating Groundwater Resources for Mineral Exploration Drilling.

Washington State Department of Ecology (Ecology). 2002. Second Screening Investigation of Water and Sediment Quality of Creeks in Ten Washington Mining Districts, with Emphasis on Metals. Publication No. 02-03-024. June 2002.

Western Regional Climate Center. 2015. Meteorological data. Accessed on the web February 3, 2015. http://www.wrcc.dri.edu/

Wu, J., C. Torres-Verdin, K. Sepehrnoori, and M.A. Proett. 2005. The Influence of Water-Base Mud Properties and Petrophysical Parameters on Mudcake Growth, Filtrate Invasion, and Formation Pressure. Petrophysics, (February 2005), Vol. 46, No. 1, p. 14-32.

Zahra, N., S.T. Sheikh, A. Mahmood, and K. Javed. 2009. Removal of Arsenic From Wastewater Using Bentonite. Bangladesh J. Sci. Ind. Res. 44(1): 81-86.

APPENDIX A – SITE PHOTOGRAPHS

Pad 10 Drill Hole

Horse Camp Drill Hole

Pad 21 – Drill Hole

NHD-2X sampling location

Flow from the Polar Star Adit

Dry channel downstream of the Polar Star Adit

Polar Star stream crossing

Culvert at NHD 1

APPENDIX B – GLOSSARY OF TERMS

Acid rock drainage: An acidic solution derived from the oxidation of sulfide minerals.

Adsorption: When a dissolved ion, molecule, or colloid becomes attached to the surface of a pre-existing solid substrate.

Alluvium: Sediments deposited by or in conjunction with running water in rivers, streams, or sheetwash and in alluvial fans.

Annular space: The opening between an inner and outer cylindrical body, often used to describe the space between the well casing or drill pipe and the surface of the borehole.

Aperture: The distance between the two surfaces of a fracture.

Aquifer cross-flow: Vertical groundwater flow from one hydrostratigraphic unit to another.

Aquifer: A consolidated or unconsolidated geologic unit (material, stratum, or formation) or set of connected units that yields water of suitable quality to wells or springs in economically usable amounts.

Arsenopyrite: Iron arsenic sulfide (FeAsS).

Artesian water: Any water that is confined in an aquifer under pressure so that the water will rise in the well casing or drilled hole above the elevation where it was first encountered. This term includes water of flowing and non-flowing wells.

Attenuation: The gradual loss in intensity of any kind of flux through a medium.

Augite: A dark green or black aluminosilicate mineral of the pyroxene group.

Barite: A mineral consisting of barium sulfate ($BaSO_4$).

Baseflow: Water that seeps into a stream through a permeable rock or sediment unit that outcrops in the bottom or banks of the stream.

Basement: The igneous and metamorphic rocks that exist below the oldest sedimentary cover.

Bedrock: Consolidated rock at various depths beneath the Earth’s surface.

Bentonite: An absorbent aluminum phyllosilicate, essentially impure clay consisting mostly of montmorillonite.

Biotite: A black, dark brown, or greenish black variety of mica

Casing: A pipe installed in a borehole to maintain the opening and, along with cementing, to confine the groundwaters to their zones of origin and to prevent the entrance of surface contaminants.

Colluvium: Unconsolidated sediments that have been deposited at the base of hill slopes by either rainwash, sheetwash, slow continuous downslope creep, or a variable combination of these processes.

Confined aquifer: An aquifer that is immediately overlain by a low-permeability unit (confining layer). A confined aquifer does not have a water table.

Dendritic: Having multi-branching tree-like form.

Diorite: A granular crystalline igneous rock commonly of acid plagioclase and hornblende, pyroxene, or biotite

Dissolved oxygen: A relative measure of the amount of oxygen that is dissolved or carried in a given medium.

Evapotranspiration: All methods of water moving from a liquid to water vapor in nature. The combination of evaporation and transpiration.

Fault: A fracture which has experienced translation or movement of the fracture walls parallel to the plane of the fracture.

Feldspar: An abundant rock-forming mineral typically occurring as colorless or pale-colored crystals and consisting of aluminosilicates of potassium, sodium, and calcium.

Filter cake: Layer of bentonite and cuttings deposited on the surface of a borehole.

Filtrate: The liquid that passes through bentonite filter cake.

Flowing artesian borehole: A borehole in which groundwater rises above the top of the surface casing and flows at the ground surface.

Formation: A body of rock strata that consists of a certain lithology or combination of lithologies; a lithologically mappable unit.

Fracture: A subplanar discontinuity in a rock or soil formed by mechanical stresses. A fracture is visible to the naked eye and is open (i.e., not filled with minerals).

Granodiorite: An intrusive igneous rock similar to granite, but containing more plagioclase than orthoclase-type feldspar.

Grout: Bentonite- or cement-based material used to create a water-tight seal in voids.

HDPE liner: High-density polyethylene sheeting material.

Hydraulic: Dealing with the mechanical properties of liquids.

Hydrostatic head: The pressure at a given point in a liquid measured in terms of the vertical height of a column of the liquid needed to produce the same pressure.

Lost circulation: A condition which occurs when drilling fluid flows into one or more geological formations instead of returning up the annular space.

Make-up water: Water used to mix drilling fluid.

Monzonite: A granular igneous rock composed of plagioclase and orthoclase in about equal quantities usually together with augite and biotite

Mud sump: Excavated pit where drilling cuttings are allowed to settle out of the mud.

Neat cement: A mixture of water and cement in the ratio of not more than six (6) gallons of water to ninety-four (94) pounds of Portland cement.

Orthoclase: A potassium-rich alkali feldspar.

Packer: An inflatable tool on a drill string that is used to seal off certain lengths of a borehole.

Permeability: The ease with which a porous medium can transmit water or other fluids.

pH: A measure of the acidity of a solution, based upon the negative logarithm of the hydrogen ion concentration.

Plagioclase: A typically white feldspar consisting of aluminosilicates of sodium and/or calcium, common in igneous rocks.

Porous media: A material containing void spaces within a matrix.

Pumice: A very light and porous volcanic rock.

Recharge: The process by which water enters the groundwater system or, more precisely, enters the phreatic zone.

Scoria: A cindery, vesicular basaltic lava, typically having a frothy texture.

Sulfide: A class of minerals containing sulfide (S^{2-}) as the major anion.

Tephra: Rock fragments and particles ejected by a volcanic eruption.

Thixotropic: Having a viscosity that decreases when a shear stress is applied

Unconfined aquifer: The upper surface of the aquifer is the water table. Unconfined aquifers are directly overlain by an unsaturated zone or a surface water body.

Water table: A surface at or near the top of the phreatic zone (zone of saturation) where the fluid pressure is equal to atmospheric pressure. In the field, the water table is defined by the level of water in wells that barely penetrate the phreatic (saturated) zone.

APPENDIX C – PIPER DIAGRAMS

All Sample Locations

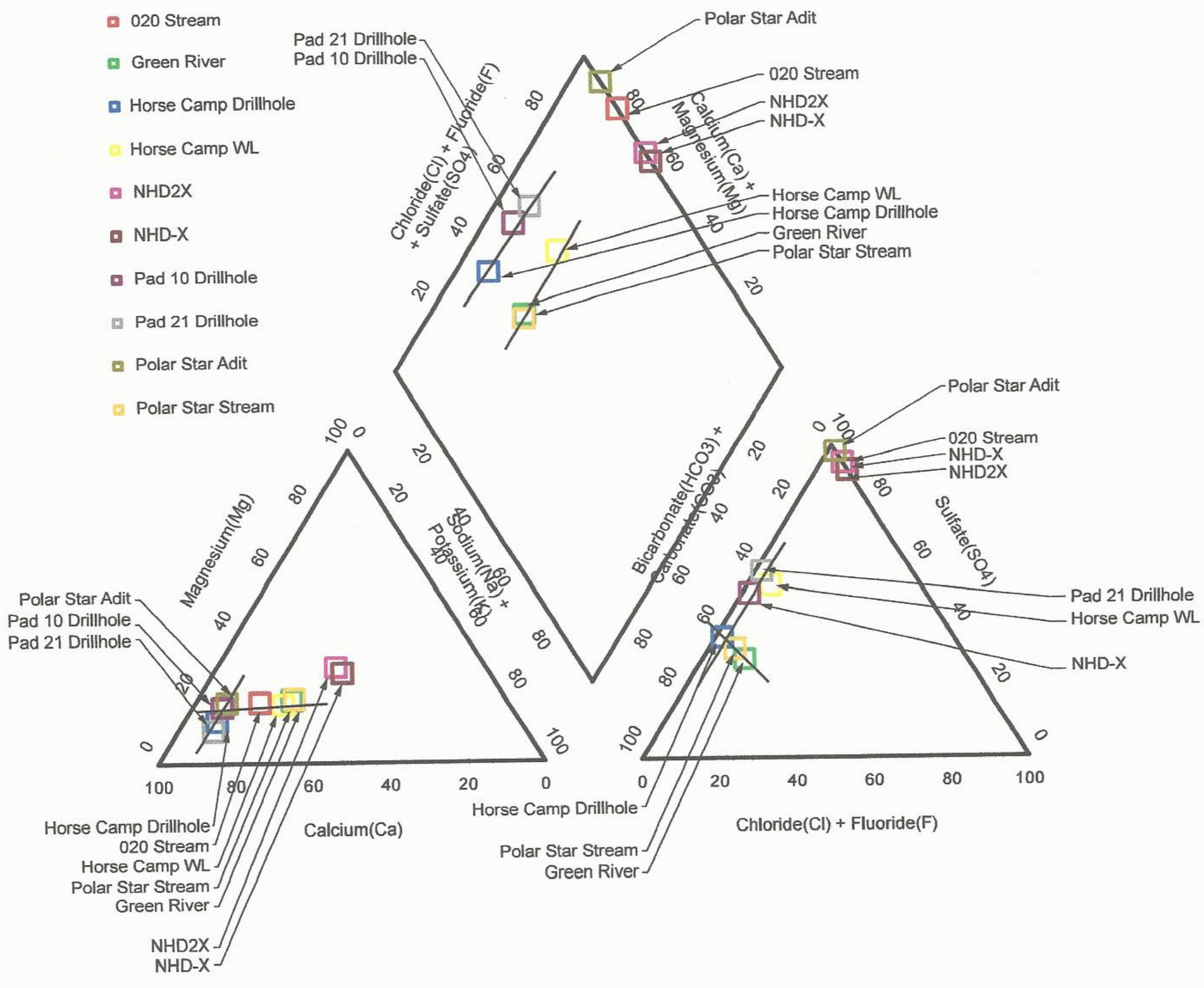
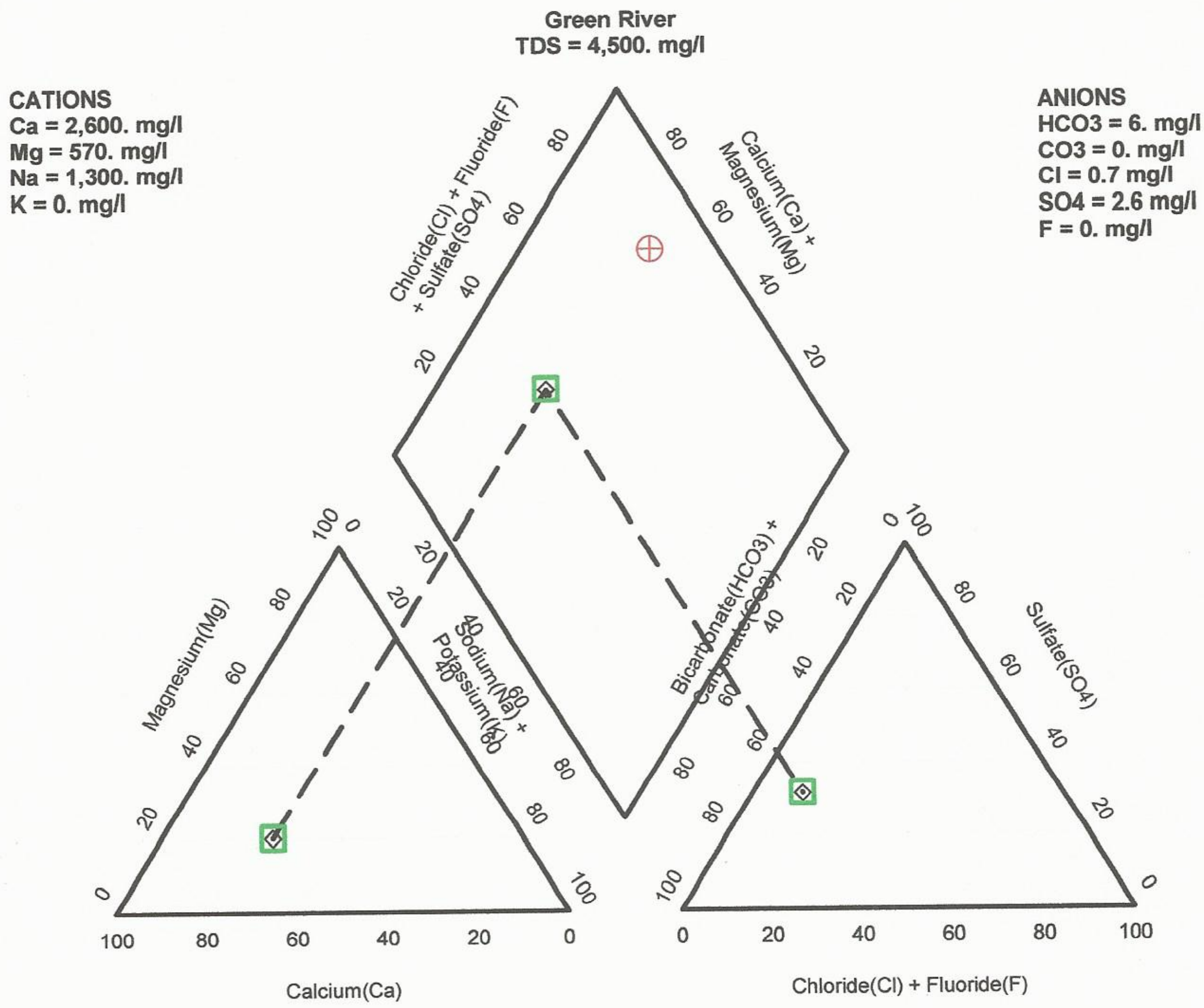


Plate 2

Piper Diagram of Project Area Surface Water and Groundwater (2014)

Goat Mountain Prospecting Permit Application
Environmental Assessment
Gifford Pinchot National Forest, Washington

Piper Plot



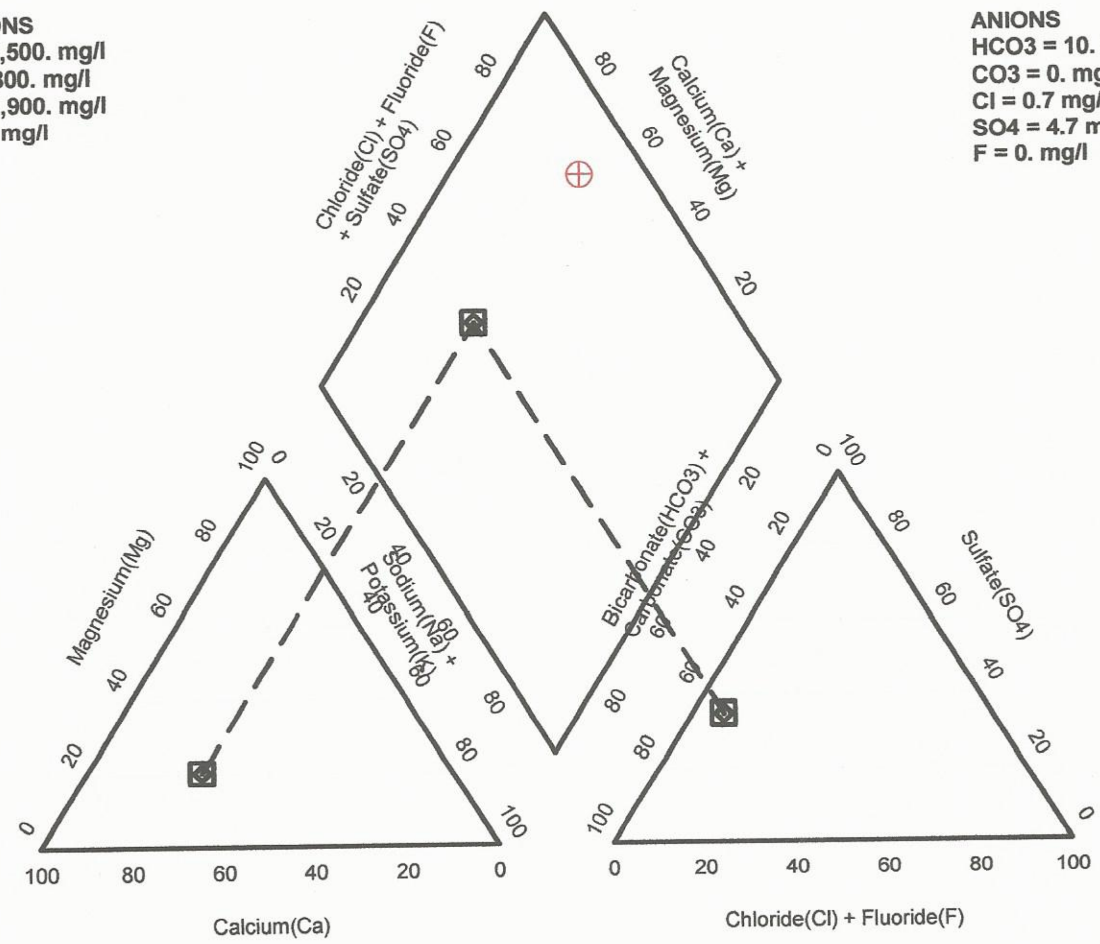
Green River
TDS = 4,500. mg/l
CATIONS
Ca = 2,600. mg/l
Mg = 570. mg/l
Na = 1,300. mg/l
K = 0. mg/l
ANIONS
HCO3 = 6. mg/l
CO3 = 0. mg/l
Cl = 0.7 mg/l
SO4 = 2.6 mg/l
F = 0. mg/l
Chloride(Cl) + Fluoride(F) + Sulfate(SO4)
Calcium(Ca) + Magnesium(Mg)
Magnesium(Mg)
Sodium(Na) + Potassium(K)
Bicarbonate(HCO3) + Carbonate(CO3)
Sulfate(SO4)
Calcium(Ca)
Chloride(Cl) + Fluoride(F)

Piper Plot

Polar Star Stream
TDS = 6,200. mg/l

CATIONS
Ca = 3,500. mg/l
Mg = 800. mg/l
Na = 1,900. mg/l
K = 0. mg/l

ANIONS
HCO3 = 10. mg/l
CO3 = 0. mg/l
Cl = 0.7 mg/l
SO4 = 4.7 mg/l
F = 0. mg/l

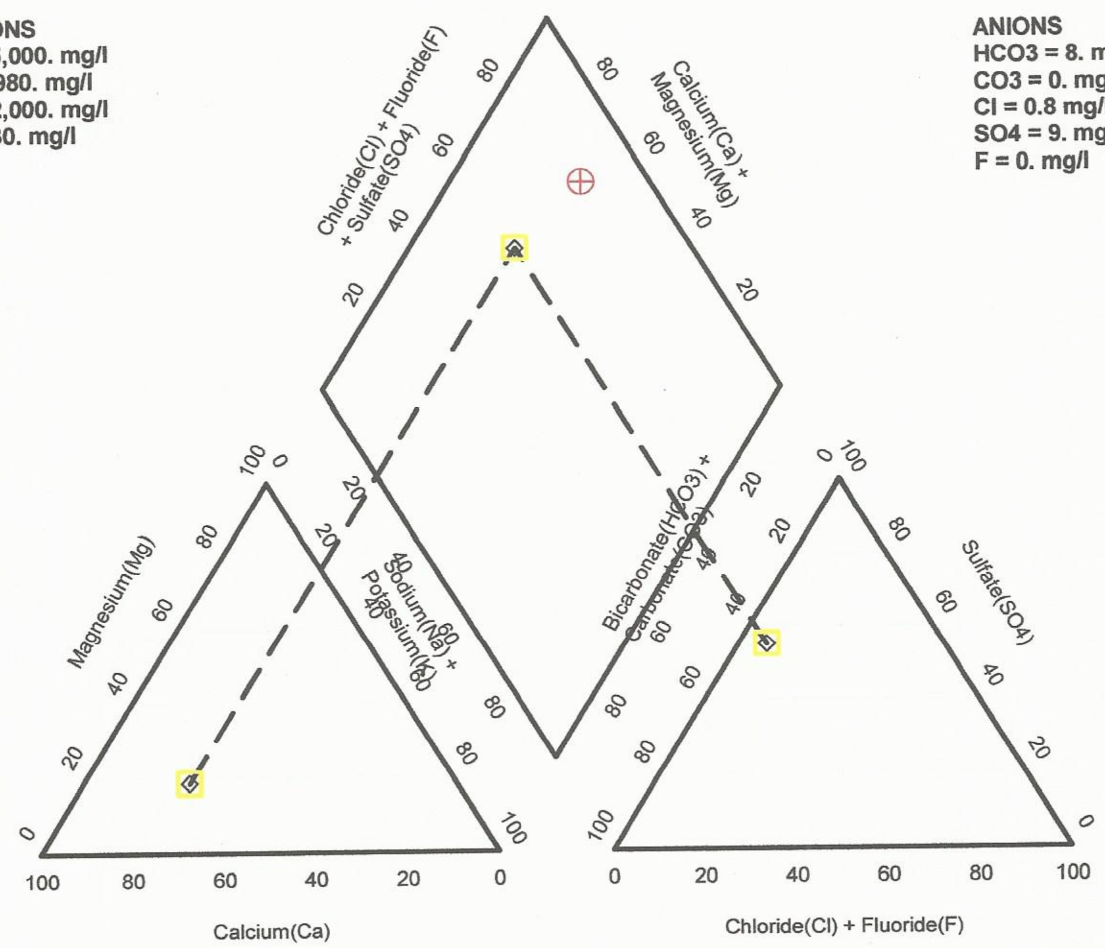


Piper Plot

Horse Camp WL
TDS = 8,500. mg/l

CATIONS
Ca = 5,000. mg/l
Mg = 980. mg/l
Na = 2,000. mg/l
K = 530. mg/l

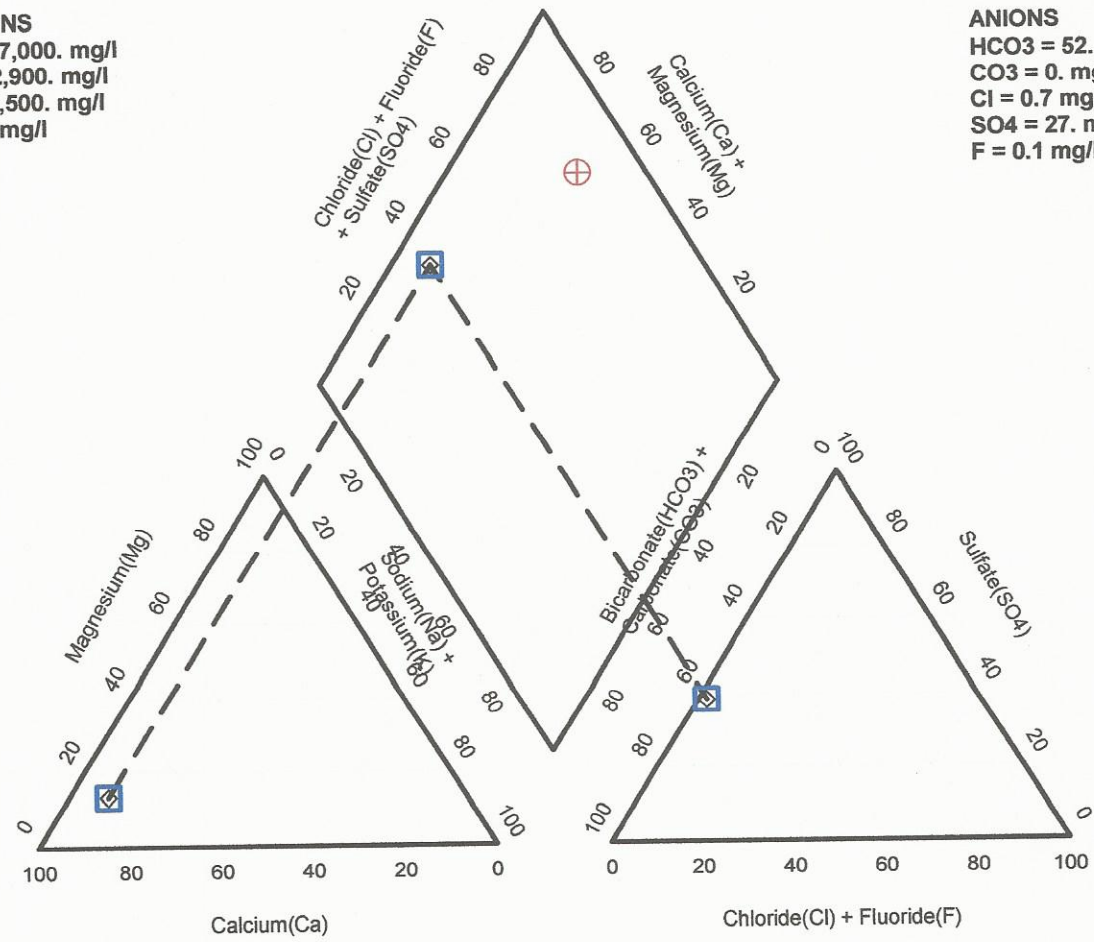
ANIONS
HCO3 = 8. mg/l
CO3 = 0. mg/l
Cl = 0.8 mg/l
SO4 = 9. mg/l
F = 0. mg/l



Horse Camp Drillhole
TDS = 34,000. mg/l

CATIONS
Ca = 27,000. mg/l
Mg = 2,900. mg/l
Na = 3,500. mg/l
K = 0. mg/l

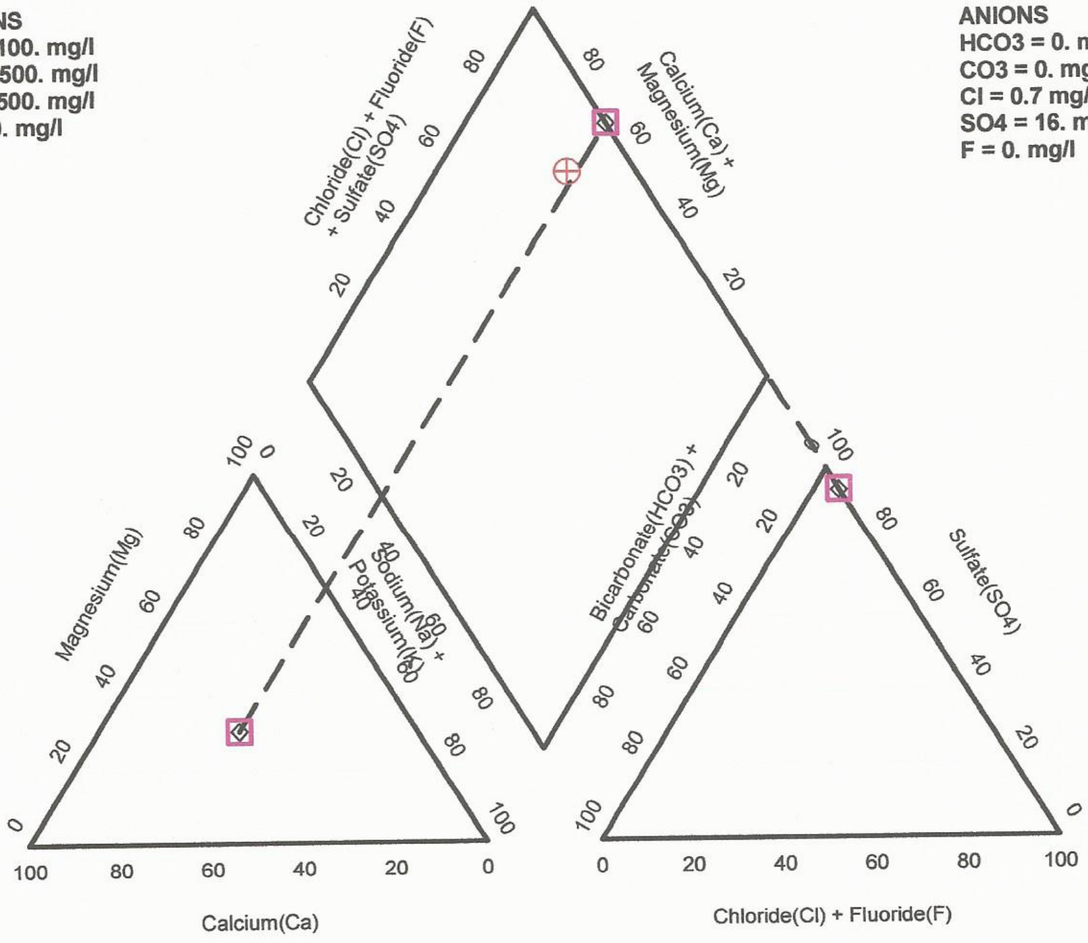
ANIONS
HCO3 = 52. mg/l
CO3 = 0. mg/l
Cl = 0.7 mg/l
SO4 = 27. mg/l
F = 0.1 mg/l



NHD2X
TDS = 7,700. mg/l

CATIONS
Ca = 3,100. mg/l
Mg = 1,500. mg/l
Na = 2,500. mg/l
K = 560. mg/l

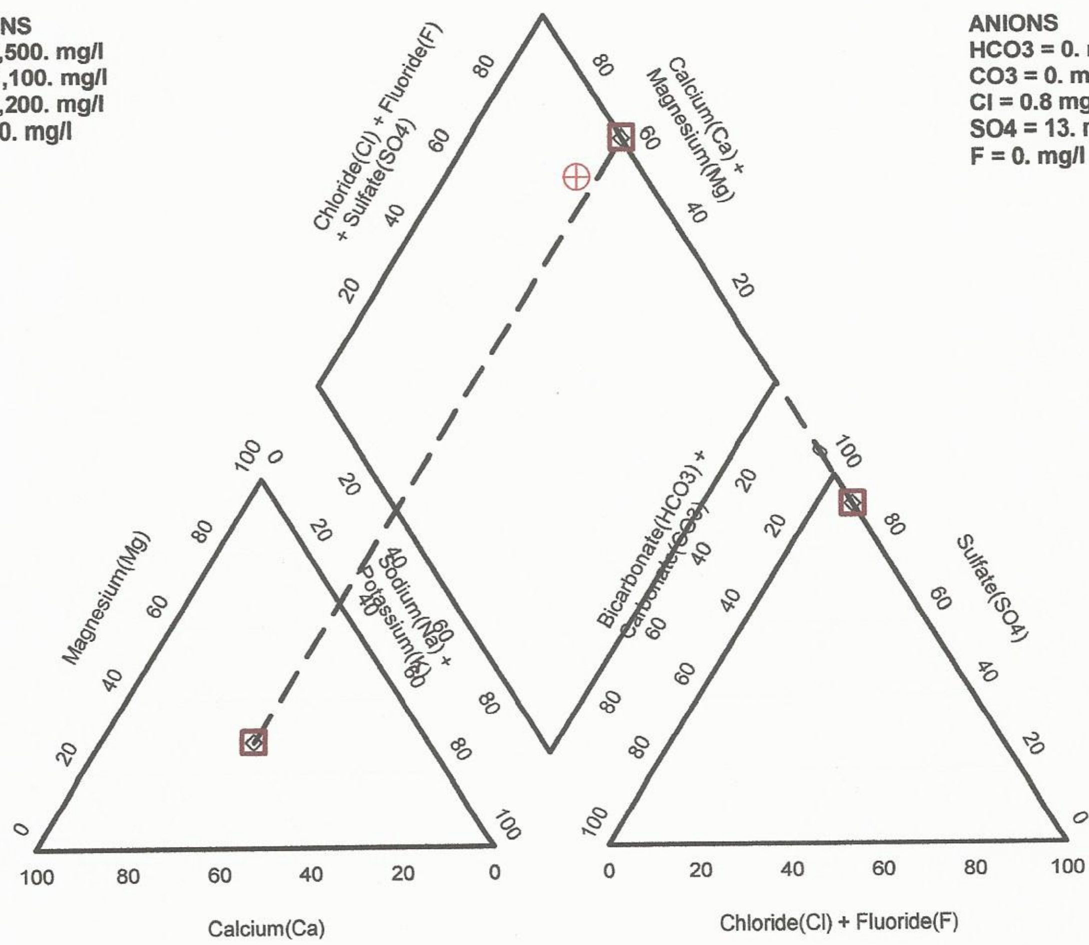
ANIONS
HCO3 = 0. mg/l
CO3 = 0. mg/l
Cl = 0.7 mg/l
SO4 = 16. mg/l
F = 0. mg/l



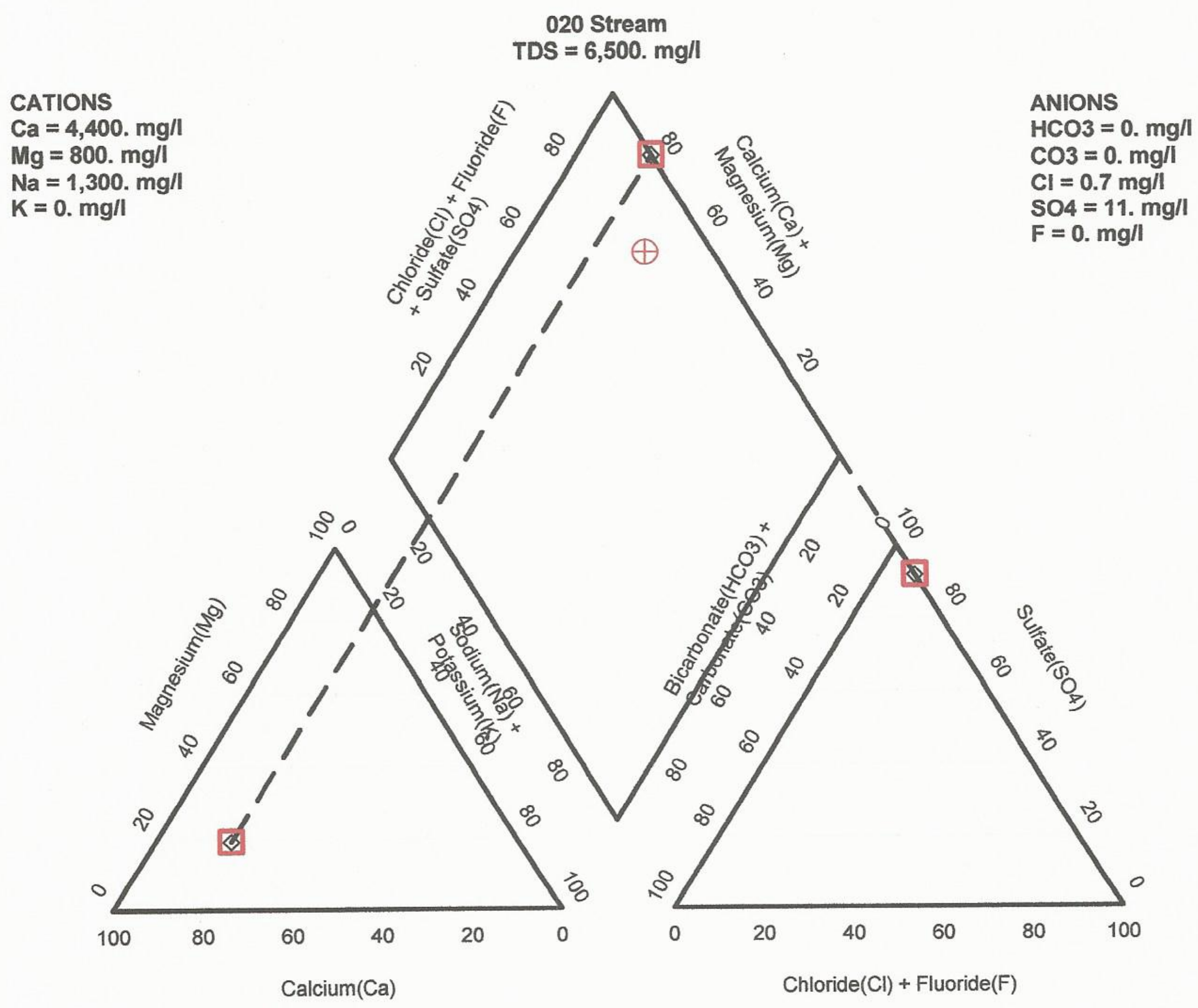
NHD-X
TDS = 6,300. mg/l

CATIONS
Ca = 2,500. mg/l
Mg = 1,100. mg/l
Na = 2,200. mg/l
K = 560. mg/l

ANIONS
HCO3 = 0. mg/l
CO3 = 0. mg/l
Cl = 0.8 mg/l
SO4 = 13. mg/l
F = 0. mg/l



Piper Plot

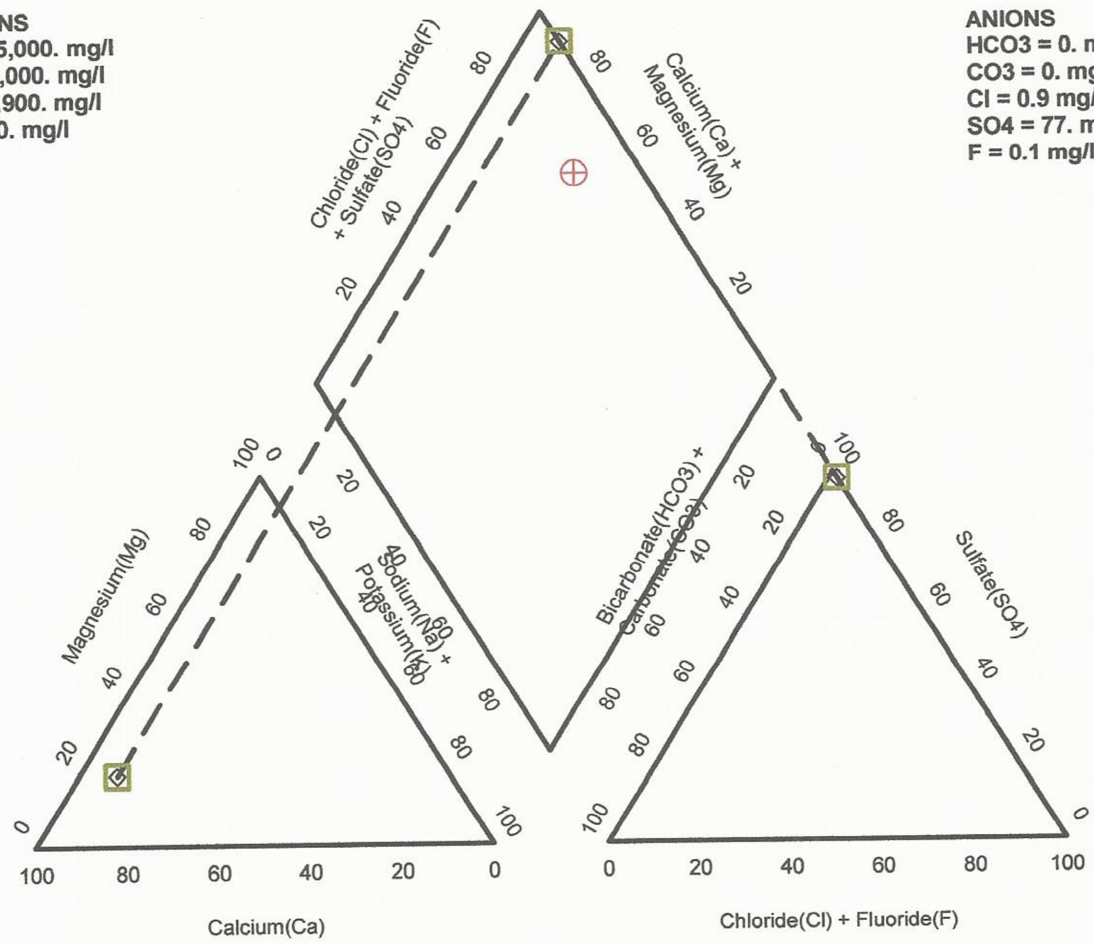

020 Stream
TDS = 6,500. mg/l
CATIONS
Ca = 4,400. mg/l
Mg = 800. mg/l
Na = 1,300. mg/l
K = 0. mg/l
ANIONS
HCO3 = 0. mg/l
CO3 = 0. mg/l
Cl = 0.7 mg/l
SO4 = 11. mg/l
F = 0. mg/l
Chloride(Cl) + Fluoride(F) + Sulfate(SO4)
Calcium(Ca) + Magnesium(Mg)
Magnesium(Mg)
Sodium(Na) + Potassium(K)
Bicarbonate(HCO3) + Carbonate(CO3)
Sulfate(SO4)
Calcium(Ca)
Chloride(Cl) + Fluoride(F)

Piper Plot

Polar Star Adit
TDS = 32,000. mg/l

CATIONS
Ca = 25,000. mg/l
Mg = 4,000. mg/l
Na = 2,900. mg/l
K = 680. mg/l

ANIONS
HCO3 = 0. mg/l
CO3 = 0. mg/l
Cl = 0.9 mg/l
SO4 = 77. mg/l
F = 0.1 mg/l

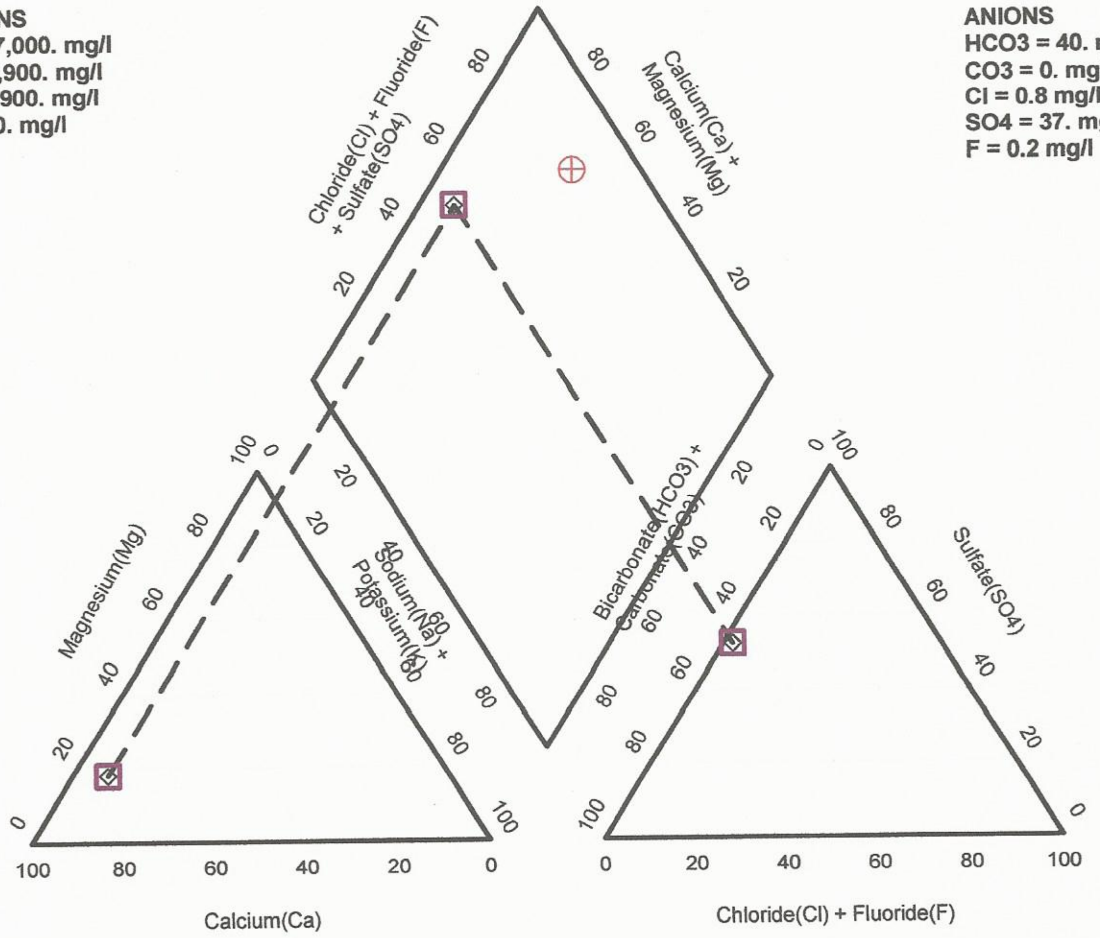


Piper Plot

Pad 10 Drillhole
TDS = 34,000. mg/l

CATIONS
Ca = 27,000. mg/l
Mg = 3,900. mg/l
Na = 2,900. mg/l
K = 510. mg/l

ANIONS
HCO3 = 40. mg/l
CO3 = 0. mg/l
Cl = 0.8 mg/l
SO4 = 37. mg/l
F = 0.2 mg/l



Pad 21 Drillhole
TDS = 60,000. mg/l

CATIONS
Ca = 49,000. mg/l
Mg = 3,900. mg/l
Na = 5,900. mg/l
K = 870. mg/l

ANIONS
HCO3 = 57. mg/l
CO3 = 0. mg/l
Cl = 0.7 mg/l
SO4 = 69. mg/l
F = 0.4 mg/l