# CHAPTER 4

# ENVIRONMENTAL CONSEQUENCES

# TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES



## LIST OF APPENDICES

This page intentionally left blank.

# CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

## 4.1 INTRODUCTION

This chapter presents the results of environmental impact analyses for the various resources introduced in **Chapter 3** of this EIS. **Section 4.1** provides an introduction to the chapter and the definitions for terms used to describe environmental effects. **Sections 4.2** through **4.14** discuss the environmental consequences, the irreversible and irretrievable commitments of resources, the relationship between short-term uses and long-term productivity of resources, and the unavoidable (residual) adverse impacts for each resource brought forward for analysis. Tables summarizing conformance with the CNF RFP (USFS 2003a) and the BLM ARMP (2012) are provided in **Appendix 4A**.

### 4.1.1 Impact Assessment

The Proposed Action and alternatives outlined in **Chapter 2** may cause, either directly or indirectly, changes in the human environment. This EIS assesses and analyzes these potential changes and discloses the effects to the decision-makers and public. This process of disclosure is one of the fundamental aims of NEPA.

Many concepts and terms used when discussing impacts assessment may not be familiar to the average reader. The following sections attempt to clarify some of these concepts.

#### 4.1.1.1 Effects/Impacts

The terms “effect” and “impact” are synonymous under NEPA. Effects may refer to ecological, aesthetic, historical, cultural, economic, social, or health-related phenomena that may be caused by the Proposed Action or any of the alternatives. Effects may be direct, indirect, or cumulative in nature. Cumulative effects are analyzed in **Chapter 5**.

#### 4.1.1.2 Direct and Indirect Effects

A direct effect occurs at the same time and place as the action. Indirect effects are reasonably foreseeable effects that occur later in time or are removed in distance from the action. Direct and indirect effects are discussed in combination under each affected resource.

#### 4.1.1.3 Mitigation for Impacts

Where applicable, mitigation measures are proposed in this document. If residual effects remain after the mitigation is applied, those effects are described as well. Mitigation measures are means to address environmental impacts that are applied in the impact analysis to reduce intensity or eliminate the impacts.

#### 4.1.1.4 Irreversible and Irretrievable Commitment of Resources

An irreversible commitment of resources occurs if the commitment cannot be changed once made. An irreversible commitment of resources occurs when resources are used, consumed, destroyed, or degraded during Project construction and operation and cannot be reused or recovered. It effectively removes the option of future resource use. Irretrievable commitments of resources occur when there are long-term losses of resource production or use. These losses are not permanent and can be reversed in the long term if Project facilities or land uses change.

#### 4.1.1.5 Relationship of Short-term Uses and Long-term Productivity of Resource

The relationship between short-term uses and long-term productivity describes the effects of the short-term use of the resource for the Project, and whether that use is likely to adversely affect the long-term productivity and sustainability of the resource.

#### 4.1.1.6 Significance

The word "significant" has a very particular meaning when used in a NEPA document. Significance is defined by CEQ as a measure of the intensity and context of the effects of a major federal action on, or the importance of that action to, the human environment. Significance is a function of the beneficial and adverse effects of an action on the environment.

Intensity refers to the severity or level of magnitude of impact. Public health and safety, proximity to sensitive areas, level of controversy, unique risks, or potentially precedent-setting effects are all factors to be considered in determining intensity of effect. This EIS will primarily use the terms major, moderate, minor, or negligible in describing the intensity of effects.

Context means that the effect(s) of an action must be analyzed within a framework, or within physical or conceptual limits. Resource disciplines; location, type, or size of area affected (e.g., site-specific, local, regional, national); and affected interests are all elements of context that ultimately determine significance. Both long- and short-term effects are relevant to context.

#### 4.1.1.7 Indicators

An impact indicator is an element or parameter used to determine change (and the intensity of change) in a resource. Working from an established existing condition (i.e., baseline conditions described in **Chapter 3**) an indicator is used to predict or detect change in a resource related to causal effects of the Proposed Action. Use of the term "significant" when referring to effects indicates some threshold for a particular impact indicator has been exceeded.

#### 4.1.1.8 Environmental Effect Categories

The following environmental effect categories (**Table 4.1-1**) are presented to define relative levels of effect intensity and duration and to provide a common language when describing effects. The definitions in the following table are general. Descriptors are specifically defined for certain resources when the general definitions presented in this table are inadequate.

**Table 4.1-1 Summary of Terms Used to Describe Effects in the EIS**

| ATTRIBUTE OF EFFECT | | DESCRIPTION |
|---|---|---|
| Magnitude (Intensity) | Negligible | No measurable change in current conditions. |
| | Minor | A small but measurable change in current conditions. |
| | Moderate | An easily discernible and measurable change in current conditions. |
| | Major | A large, easily measurable change in current conditions. |
| Duration | Short-term | Less than 12 years. |
| | Long-term | More than 12 years. |

## 4.2 GEOLOGY, MINERALS, AND PALEONTOLOGY

### 4.2.1 Issues and Indicators

*Issue: Physical and chemical characterization of ore and solid wastes and wastewater should be determined to provide projections and potential impacts of wastewater and solid wastes from the Project.*

*Indicator:*

- Estimates of waste rock and ore volumes generated from the Project and the chemical characterization.

### 4.2.2 Direct and Indirect Impacts

#### 4.2.2.1 Proposed Action

Under the Proposed Action, geology and mineral resources would be directly affected by the removal of phosphate ore and overburden. Ore would be removed and processed, then hauled offsite. The leased deposit would become economically depleted of ore, representing a major and long-term impact. The recovered phosphate resources would be available to meet regional and national requirements for this commodity.

As described in **Section 2.4.3.1**, 60.2 million BCY of overburden would be removed from the pit area as part of exposing the mineral resource, and then either placed back in the East Smoky Panel pit or be added to the already mined Panel B area. This would be a long-term, major, local impact on geologic resources.

Chemical and physical alteration of the overburden, including its ability to transmit water and change water chemistry (especially regarding selenium mobilization), were analyzed during geochemical baseline studies, as described in **Section 3.2.3**. Acid Base Accounting data indicate that overburden would not present a significant risk of Acid Rock Drainage. COPCs that are flushed from the overburden during weathering are available to be transported from the overburden by surface runoff water and/or infiltration. The Proposed Action describes the process by which the more geochemically reactive portion of the overburden (i.e., the center waste shales) would be quickly covered during backfill operations to minimize the effects of exposure, as well as other techniques to minimize infiltration, etc. These actions would further reduce potential geochemical effects from the overburden on water resources, which would be an indirect effect. These effects are described in **Section 4.5**.

Operational practices have been developed to address pit wall and road cut stability. The Smoky Canyon Mine has over 30 years of experience with constructing stable cut and fill slopes. Reclamation of inactive overburden fills to stable slopes would be performed concurrently with mining. Pit backfilling would bury most of the excavated pit highwalls, eliminating the long-term stability issue for these cuts. The remaining exposed highwalls, which would be on private land (covering an area of approximately 1,600 by 200 feet, or approximately 12 acres), would be expected to remain in a stable condition.

Topographic alterations would occur over the approximately 850 acres that would be modified by the disturbance. During reclamation, overburden would be replaced as pit backfill in the East Smoky Panel pit, and also within the existing Panel B pit to provide additional backfill. Both of these actions would reduce topographic impacts. Final reclamation topography for the Proposed Action is shown in **Figure 2.4-5**. Final reclaimed configurations would mimic the pre-mining landforms and slope aspects. This would be a minor but long-term impact.

Effects to paleontological resources could occur from the disturbance of the ore and overburden removal during mining, along with road construction and other miscellaneous disturbance activities. Rock units disturbed would be in the Dinwoody Formation, various members of the Phosphoria Formation, Wells Formation, and alluvium. Invertebrate fossils in the geologic units that would be disturbed are not likely to be unique and the type of fossils are not restricted only to the Smoky Canyon area. They are likely to be found throughout the outcrop area of these formations in Southeastern Idaho. Any vertebrate fossils encountered would be managed as described in **Section 2.5.1**. This is expected to present a negligible impact.

#### 4.2.2.2 Alternative 1 Reduced Pit Shell with Soil-only Cover

Geological effects would be similar or improved compared to those predicted for the Proposed Action. Although the pit would have a smaller footprint, by 78 acres, it would be deeper and have steeper side slopes to allow a similar amount of ore removed. Less overburden would be removed to obtain this ore. This pit configuration with steeper sides has been analyzed and determined to be stable (CNI 2017), and thus does not represent any increased geotechnical hazard compared to the Proposed Action. These pit slopes are not steeper than slopes typically constructed at other pits at the Smoky Canyon Mine.

The smaller pit footprint avoids disturbance of the Cherty Shale materials which contain elevated contaminants of concern, thereby improving the geochemical characteristics (see **Section 4.5**) of overburden and pit walls, compared to the Proposed Action. However, any additional disturbances resulting from unanticipated slope instability requiring potential laybacks are accounted for by the conservatively-sized miscellaneous disturbance areas shown on **Figure 2.6-2**.

Final reclamation contours would have a somewhat more natural topography than under the Proposed Action, and a somewhat smaller area of highwall would remain unreclaimed (approximately 9 acres).

#### 4.2.2.3 No Action Alternative

Under the No Action Alternative, Simplot would not be allowed to proceed with mining ore in the East Smoky Panel until an M&RP acceptable to the BLM and USFS were developed and approved. Simplot already possesses leases IDI-012890, IDI-015259, and IDI-015259 that grants them "exclusive development rights" for phosphate within the lease boundaries. BLM would have to show good cause for not allowing the rights to ultimately be exercised.

Under the No Action Alternative, there would be no direct impacts to geologic, mineral, and topographic resources of the Project Area, because the phosphate ore and overburden that were proposed for removal would not be mined at this time. This ore would be available for mining in the future.

The No Action Alternative would not result in any alteration to topography or paleontological resources at the East Smoky Panel until a M&RP is approved. It would result in currently approved Panel B topography, rather than the more ideal topography that would occur in this area under the Proposed Action, due to backfilling from the East Smoky Panel.

### 4.2.3 Mitigation Measures

Project design features, BMPs, and the proposed Reclamation Plan are elements of the Proposed Action and Alternative 1 designed to reduce environmental impacts to topography and paleontological resources. Additional mitigation measures specific to this Project and for geology, minerals, and paleontology have not been identified.

### 4.2.4 Unavoidable (Residual) Adverse Impacts

The 12 acres of unreclaimed highwall under the Proposed Action and 9 acres under Alternative 1 would present localized permanent topographic modifications that would diverge from the natural topography.

### 4.2.5 Relationship of Short-term Uses and Long-term Productivity

Recovery of the phosphate ore, presently determined to be an economic resource, mined from the East Smoky Panel, would be short-term use. This would result in ongoing employment and other short-term economic benefits to the local and regional economies affected by the Smoky Canyon Mine and the Don Plant in Pocatello. It would also provide fertilizer for the agricultural areas supplied by the Don Plant. It would also reduce the long-term productivity of the resource as it would no longer be available.

### 4.2.6 Irreversible and Irretrievable Commitment of Resources

Phosphate ore would be removed from the Smoky Canyon ore reserves, and this would be an irreversible and irretrievable commitment of mineral resources.

Impacts to the local natural topographic conditions under the Proposed Action and the Alternative 1 would be irreversible and irretrievable. Reclamation activities would restore disturbed sites to topographic contours that mimic pre-mining conditions and permanently reduce the impacts to local topography. Disturbed areas that are not regraded during reclamation would have permanent impacts to topography.

Any loss of paleontological resources that occurred under the Proposed Action or Alternative 1 would be negligible and would be considered irreversible and irretrievable. This is because any paleontological resources discovered and properly documented by the Agencies during mining would not be lost. Furthermore, without mining, the resource would likely not have been discovered.

## 4.3 AIR RESOURCES

### 4.3.1 Issues and Indicators

*Issue: The Project has the potential for emission of air pollutants including those associated with airborne particulate matter from mining activities and exhaust emissions from haul trucks and other mining equipment.*

*Indicators:*

- Increase in emissions of air pollutants including fugitive dust (airborne particulate matter) from proposed mining activities and exhaust emissions from haul trucks and other mining equipment.

*Issue: The Project has the potential to increase emissions from construction and operation and release greenhouse gas (GHG) emissions including $CO_2$, $N_2O$, and methane ($CH_4$) from proposed mining activities.*

*Indicators:*

- Increase in emissions of GHG including $CO_2$, $N_2O$, and $CH_4$ from proposed mining activities.

### 4.3.2 Direct and Indirect Impacts

#### 4.3.2.1 Proposed Action

**Air Quality**

Air quality impacts associated with the Proposed Action would primarily be due to the emission of air pollutants resulting from mining in the East Smoky Panel. Mining activities would include drilling, blasting, excavation, materials handling, vehicle operations, haul road use, and ore/overburden transportation. Additional emission sources associated with the Proposed Action that would cause air quality impacts include wind erosion; construction of haul roads, topsoil stockpiles, material borrow areas, stormwater ponds and ditches, and a dewatering pipeline (if needed); relocation of two existing power lines; and additional backfill in a portion of the Panel B pit.

Emissions from these types of sources are controlled by fugitive dust control plans per IDAPA 58.01.01.799 (Rules for Nonmetallic Mineral Processing Plant Fugitive Dust Best Management Practice) and, for vehicles, regulated by manufacturer's emission standards. Fugitive dust emission standards are based on the SIP and adherence to IDAPA 58.01.01.650 (Rules for the Control of Fugitive Emissions), which are regulated based on visible emissions standards.

The current Smoky Canyon Mine operations and facilities provide the infrastructure that would be needed for the Proposed Action. All necessary facilities, utilities, equipment, staff, and procedures are present to recover the phosphate ore reserves in the East Smoky Panel. The ore in the East Smoky Panel is readily accessible to the existing operations through the extension of the mining operation east from the trend of the previously and currently mined ore bodies in Panels A through E. Due to the use of existing facilities and equipment, mining activities associated with the Proposed Action would be similar to current operations and therefore emissions are expected to be comparable.

The Proposed Action would result in the emission of the following regulated air pollutants: (a) $PM_{10}$; (b) $PM_{2.5}$; (c) CO; (d) $NO_X$; (e) $SO_2$; and (f) VOC. The majority of emissions are and would continue to be from fugitive dust and mobile equipment (tailpipe) sources. Processing the ore at the mill produces very little particulate matter. The ore usually has moisture content greater than 15 percent and enters the wet process through a below-grade grizzly. The mill operates at an annual rate of 2.7 million tons per year. Annual emissions from the mill would remain essentially constant for the Proposed Action.

Estimated controlled air emissions for the Proposed Action are presented in **Table 4.3-1**. The emissions totals are for the entire duration of the Proposed Action. The emissions were estimated to be equal to the emission estimates presented in Smoky Canyon Mine's 2007 EIS for Panels F and G, which were calculated assuming adherence to the State of Idaho's IDAPA 58.01.01.651

and 799 for fugitive dust controls. Most of the emissions associated with the Proposed Action are fugitive in nature. These include mining, transportation activities, and blasting. These sources of emissions are controlled by implementing BMPs and adhering to all applicable requirements for reducing fugitive dust at the mine. This results in representative but conservative emission estimates for the Proposed Action because of the following reasons.

- The life of the Proposed Action is up to 12 years, which is less than the total life of Panels F and G (Panel F has a life of 6-7 years and Panel G has a life of 8 years). Consequently, overall emissions for the Proposed Action would be expected to be less than emissions from Panels F and G.
- There would be no disposal of overburden in external overburden piles from the Proposed Action. Instead the mined overburden would either be used for concurrent backfilling and/or low seleniferous overburden used for road construction. Panels F and G were planned to have associated external overburden placement. Emissions from the placement of the overburden back into the pit during the Proposed Action would be expected to be similar as emissions from the placement of overburden into external stockpiles. However, wind erosion emissions associated with the overburden in the pit would be expected to be less than wind erosion emissions from the external overburden stockpiles due to the overburden being located within the pit and therefore less susceptible to the effects of the wind.
- The mobile equipment that is currently used at the Smoky Canyon Mine would be redirected from current operations in Panels B, F, and G to work on the Proposed Action (i.e., no new equipment would be used for the Proposed Action). Consequently, emissions from the mobile equipment used in the Proposed Action would be expected to be comparable to emissions from the currently used mobile equipment. Although the mobile equipment would have a greater age, engine replacements, rebuilds, and preventative maintenance would result in negligible differences in emissions.
- Mining operations would continue to operate continuously (24 hours/day).
- Stationary equipment would remain in its current place during the Proposed Action with no modifications and would be used at approximately the same rates.

**Table 4.3-1 Total Project Lifetime Potential Controlled Emissions, Proposed Action**

| POLLUTANT | TOTAL (TONS) [1] |
|---|---|
| $PM_{10}$ | 3,376 |
| $PM_{2.5}$ [2] | 506 |
| CO | 2,598 |
| $NO_X$ | 4,354 |
| $SO_2$ | 404 |
| VOC | 401 |

Source: 2007 EIS for Smoky Canyon Mine Panes F and G
[1]Units are in short tons (tons).
[2]$PM_{2.5}$ emissions are estimated to be 15% of $PM_{10}$ emissions based on EPA air pollutant emission factors known as AP-42 (EPA 2009) for mining operations.

The air emissions would occur only during active operations. A large percentage of the fugitive particulate emissions generated from mining and transportation activities would settle out quickly near their point of generation. The intensity of the air emission impacts would be minor at the site-specific perspective and negligible at the local and regional perspective.

The air emission estimates shown in **Table 4.3-1** are also comparable to those estimated for the mining operations at the Smoky Canyon Mine in the Final Supplemental EIS for Panels B and C (BLM and USFS 2002b). The EPA-approved Industrial Source Complex Short Term, Version 3 (ISCST3) model was used in 2002 to determine the ambient air impacts from mining activities. The only difference between the modeled mining activities and those for the Proposed Action is that the Proposed Action mining activities would be located further east and southeast. Thus, the local ambient air impacts and associated effects to air quality as determined for Panels B and C would be approximately the same as for the Proposed Action, only relocated further east and southeast.

Air quality impact modeling conducted for the Smoky Canyon Mine EIS for Panels B and C (2002) indicated that particulate matter effects at 5-mile radius receptors from the operations were approximately 6 percent of the NAAQS. With the annual emission estimates for the Proposed Action being similar to the annual quantity of modeled emissions, it is unlikely that the NAAQS thresholds (**Table 3.3-1**) would be approached. The same modeling indicated that Class I PSD increments were not exceeded for the annual and 24-hour averaging periods at the nearest Class I Area (Grand Teton National Park). Due to the proximity of the Proposed Action operations to the Smoky Canyon Mine Panel B and C operations that were evaluated in the 2002 EIS and the similarity in emission rates between the two, the modeling results for the 2002 EIS are considered applicable to the Proposed Action mining operations and are considered to be short-term and negligible. Furthermore, all Federal Class I Areas are greater than 70 miles from the Proposed Action. Consequently, the air quality impacts to these Class I Areas do not require evaluation in more details than what has already been presented given the previous analysis (2007 Panels F and G). Only "very large sources" require further analysis in accordance the Federal Land Managers Guidance. The Smoky Canyon Mine is not considered "very large" as no emissions are changing from 2007.

Metal and other potential pollutants (i.e., selenium) would make up a small percentage of the dust generated from mining operations. A review was completed in 2006 to determine what the effects would be to the environment and potential human health due to the addition of the contaminants (JBR 2006). Calculations were made using local COPC concentrations in ore and overburden. It was determined that the addition of selenium to surface runoff, the soil profile, and vegetation would be negligible to minor for Smoky Canyon Mine's Panel G and even less for Panel F. Given local selenium and mercury concentrations, resultant dust was determined to be 3.5% of the 0.2 milligrams per cubic meter ($mg/m^3$) health standard for selenium and 0.017% of the allowable Association Advancing Occupational and Environmental Health threshold limit value (ACGIH TLV) for mercury (0.025 $mg/m^3$). These effects were considered to be insignificant. Due to the similarity of the Proposed Action mining operations to the Panel F and G mining operations, it is assumed that the Proposed Action would have similar insignificant effects.

**Climate**

GHG emissions associated with the Proposed Action would be generated from combustion of fossil fuels in mining and support equipment and include $CO_2$, $CH_4$, and $N_2O$. Total GHG emissions are expressed as carbon dioxide equivalent ($CO_2e$), which is a standard unit for measuring carbon footprints. Each gas has its own global warming potential (GWP) as a relative measure of warming impacts compared to $CO_2$. $CH_4$ has a GWP of 25, such that 1 unit of $CH_4$ has a $CO_2e$ of 25 units. $N_2O$ has a GWP of 298, such that 1 unit of $N_2O$ has a $CO_2e$ of 298 units. $CO_2$ has a GWP of 1.

In Idaho, the total $CO_2$ emissions from all combustion sources are approximately 37 million metric tons (IDEQ 2008). Mining in Idaho represents less than 1 percent of total $CO_2$ emissions from industrial sources (CCS 2008).

The Proposed Action anticipates identical GHG-emitting sources as the current operations of the Smoky Canyon Mine. There would be periods before, during, and after the active mining period of the Proposed Action to account for construction activities and final reclamation. However, because the Proposed Action does not require any additional fuel burning equipment or activities, there would be no increase to the annual GHG emissions. Instead, the current annual level of GHGs emitted would be extended by approximately 3 years.

Haul truck operations at the Smoky Canyon Mine require approximately four million gallons of diesel fuel annually. Estimated GHG emissions on an annual basis for the Proposed Action haul truck operations are presented in **Table 4.3-2**. Emissions are calculated using emission factors from 40 CFR Part 98, Tables C-1 and C-2 for Distillate Fuel Oil No. 2. Other fuel combustion sources associated with the Proposed Action would also contribute to GHG emissions, but are expected to make up a small fraction of total emissions compared to the diesel fuel combusted in the haul trucks.

**Table 4.3-2 Annual Potential GHG Emissions, Proposed Action**

| POLLUTANT | TOTAL (TONS/YEAR) [1] |
|---|---|
| $CO_2$ | 45,003 |
| $CH_4$ | 1.83 |
| $N_2O$ | 0.37 |
| $CO_2e$ | 45,157 |

[1]Units are in short tons per year (tons/yr).

In a recent Supreme Court decision, Utility Air Regulatory Group v. EPA, No. 12-1146 (June 23, 2014), the majority opinion held that the CAA does not compel a GHG-inclusive interpretation of the term “any air pollutant” that automatically triggers PSD and Title V permitting requirements. The Court held that the PSD and Title V programs must be read so that their applicability is triggered only by potential to emit of conventional pollutants (i.e., $SO_2$, PM, $NO_2$, CO, $O_3$, and Pb) at levels above the 100- to 250-ton-per-year thresholds specified in the CAA. No conventional pollutants associated with the Proposed Action were found to exceed the statutory CAA thresholds for potential to emit (100 to 250 tons per year).

Indirect GHG emissions due to the Proposed Action result from further processing of the phosphate ore at Simplot’s existing fertilizer manufacturing plant (i.e., Don Plant). Currently, the phosphate ore from the Smoky Canyon Mine is pumped through a buried pipeline to the Don Plant. This reduces greenhouse gas emissions, as there is no need to transport the ore via truck or rail. GHG emissions from the Don Plant would not be affected by the Proposed Action. Alternate sources of phosphate ore needed for continuous operation of the Don Plant would be located, as necessary.

The assessment of GHG emissions and their relationship to climate change is in its formative phase. Consequently, it is not yet possible to know with confidence the net impact to climate from the Proposed Action. The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts with a strong degree of certainty. Therefore, climate change analysis for the purpose of this document is limited to accounting and disclosing of factors that contribute to climate change. Recent scientific evidence suggests there is a direct correlation between global warming and emissions of GHGs. Although many of these gases occur naturally in the atmosphere, man-made sources substantially have increased the emissions of GHGs over the past several decades. Of the man-made GHGs, the greatest contribution currently comes from $CO_2$ emissions.

Although it is impossible to connect a single emitter of GHGs to the degree of impact that emitter may have on global climate change, the EPA and the U.S. Global Change Research Program (USGCRP) have predicted that the northwest region of the United States, where the Proposed Action would be located, will experience the following general trends related to climate change (Mote et al. 2014):

- Average annual temperatures will increase, with greater increases expected in the summer than in the winter.
- Precipitation will decrease, including decreases in the amount of total snowfall as well as decreases in the portion of precipitation falling as snow. This will cause a decrease in the moisture content of the soil.
- In basins with significant snow accumulation, warmer temperatures will result in earlier snowmelt, causing an increase in winter streamflow and a decrease in summer streamflow. This will increase flood risks around rivers while also making it difficult in summer to meet the water demands of human and natural sources. Competition for water may increase, such that more tradeoffs may be necessary for conflicting uses of summer water. Additionally, it may be necessary to decrease hydropower production to maintain stream flowrates.
- Summer streamflow reductions will stress freshwater fish species, including salmon, steelhead, and trout. Increases in temperatures will increase disease and mortality in salmon species.
- The number of days with precipitation greater than one inch will increase leading to greater flood risks and stormwater management challenges.
- Sea levels will rise causing:
    - A decrease in the quality and extent of coastal wetlands, tidal flats, and beaches;
    - A negative effect on shorebirds and forage fish; and
    - A greater risk of storms, flooding, and erosion on coastal infrastructure and communities.
- Coastal water temperatures will increase and affect marine species.

- There will be increases in wildfire risk and insect and tree disease outbreaks due to warmer and drier conditions, changes in precipitation, and reduced soil moisture.
- Higher temperatures will increase the chance of heat stress to field crops and tree fruit.
- Reductions in summer streamflows in snow-fed rivers could cause irrigation water shortages.
- Higher temperatures have the ability to change plant diseases, pests, and weeds (although further research is needed to project the specific changes).

The effects of the Proposed Action on GHG emissions and climate change would continue after the mine is closed as a result of the long (estimated 100 years) residence time for certain GHGs in the atmosphere. The effects of the Proposed Action on climate change would be long-term and negligible.

Because current climate models for the northwestern United States indicate that warmer winter temperatures will shift the average timing of snowmelt and surface water runoff to earlier in the year, precipitation causing runoff and infiltration into the proposed store and release cover system is expected to occur earlier in the year. Climate models predict an increase in storms with precipitation greater than 1 inch. This change is predicted to increase the average volume of runoff and infiltration generated by individual storms and may increase the total volume of runoff and infiltration during an average year. These trends are projected starting several decades in the future and extending to the end of the century (i.e. southeastern Idaho is predicted to have a 5 percent increase in precipitation for the years 2075 to 2099). The duration of the Proposed Action would be up to 12 years, which corresponds to approximately three additional years to the overall life of the Smoky Canyon Mine. Projected changes in climate over this period would not be expected to have appreciable impacts on the operation of the mine or initial reclamation activities.

An increase in precipitation may increase the percolation rate of meteoric water into the seleniferous overburden beneath the store and release cover system. However, increased infiltration would also increase groundwater flux, resulting in greater dilution of the soluble selenium compounds mobilized and transported to surrounding areas. For a decrease in precipitation under assumed global climate change, the overall rate of precipitation infiltrating the store and release cover system may be lower, but it may be offset by the increased percentage of storms with precipitation of more than 1 inch. Long-term changes in the frequency and timing of precipitation and snowmelt could affect how the Proposed Action store and release cover system performs, and could cause adjustments in the plant community. These long-term changes are expected to be moderate.

#### 4.3.2.2 Alternative 1 Reduced Pit Shell with Soil-only Cover

This alternative would have impacts to air quality and GHGs that would be indistinguishable from those described for the Proposed Action. There could be fewer overall emissions under this alternative due to the decrease in acres disturbed compared to the Proposed Action, although these potential reduced emissions could be off-set by the increase in equipment operations needed for deepening the pit under this alternative.

#### 4.3.2.3 No Action Alternative

Under the No Action Alternative, impacts to air quality and climate would not occur. Consequently, air quality and the climate in the analysis area would remain at the current ambient levels until the Smoky Canyon Mine concludes operation or federal phosphate leases are developed or modified under a different mine plan.

### 4.3.3 Mitigation Measures

Under the Proposed Action and Alternative 1, EPMs (**Section 2.5**) would be applied to reduce or avoid impacts to air quality. Particulate emissions would be mitigated by application of water (via water trucks) and/or chemical dust suppressants, such as magnesium chloride or calcium chloride, as necessary. The remaining emissions associated with the Proposed Action or Alternative 1 would be controlled by operating equipment according to manufacturers' emission-related written instructions.

The Proposed Action and Alternative 1 includes reclamation activities designed to stabilize disturbed areas which would reduce the potential for emission of particulate matter due to wind erosion. Reclamation activities include backfilling; placing appropriate covers over seleniferous and non-seleniferous backfills; grading to return disturbed areas to more natural contours; removing all mine equipment and facilities; reestablishing drainage patterns; and revegetation. The reclamation activities would apply to both the East Smoky Panel and Panel B portion of the Proposed Action.

### 4.3.4 Unavoidable (Residual) Adverse Impacts

For the Proposed Action and Alternative 1, unavoidable residual adverse impacts to air quality would only occur if revegetation efforts were not successful. Unsuccessful revegetation would result in a greater potential for emission of particulate matter due to wind erosion. Unavoidable residual adverse impacts on climate change are not expected to occur because climate change impacts would cease when the mining activity is complete.

### 4.3.5 Relationship of Short-term Uses and Long-term Productivity

Air emissions and the generation of GHGs, during Project operations would be short-term impacts and uses of the environment, but these uses would not affect the long-term productivity, since when mining ceases, air quality would return to natural conditions. Long-term productivity of the land in the Project Area would not be affected by the mining air emissions and generation of GHGs. Following the completion of the mining activities and subsequent reclamation activities, air quality would return to the current ambient levels.

### 4.3.6 Irreversible and Irretrievable Commitment of Resources

The Proposed Action would include new surface disturbances of 730 acres, plus 119 acres of redisturbance, and Alternative 1 would newly disturb 78 fewer acres. The disturbed areas could potentially generate fugitive dust emissions from wind erosion. To mitigate irreversible air quality impacts from these areas, reclamation activities for the Proposed Action include backfilling, covering, and revegetation of the disturbed areas. Vegetation on the surface of the disturbed areas would reduce the potential of fugitive dust emissions resulting from wind erosion while also minimizing irreversible air quality conditions. Following completion of the mining and subsequent reclamation activities, the air quality would potentially be restored to its natural state. There are no implications leading to irreversible and irretrievable commitment of the air quality.

Due to low GHG emissions, the Proposed Action or Alternative 1 is expected to have negligible impact to irreversible and irretrievable commitments on climate change.

## 4.4 NOISE

### 4.4.1 Issues and Indicators

*Issue: Noise impacts from mine operations, mine traffic on haul roads, and traffic on access roads may affect Project Area residents and wildlife.*

*Indicators:*

- Predicted noise levels (decibels) from mining operations, haul truck traffic, access road traffic, and blasting and the proximity of the noise sources to sensitive receptors.

### 4.4.2 Direct and Indirect Impacts

Sound travels out uniformly from sources unless it is blocked by a solid surface or until it is attenuated (decreased) by passage through geometric divergence, refraction, atmospheric absorption, or ground and vegetation absorption between the source and receptor. The noise impacts from activity during operation of the Project would primarily be generated by drilling, blasting, equipment operation, haul truck, and other vehicle use. The level of noise impact would be similar to the current noise impacts from the existing Smoky Canyon Mine. Neither Caribou County, Idaho nor Lincoln County, Wyoming have direct regulations or ordinances in regard to noise from the Project.

Mining operations would occur 24 hours per day, 7 days per week. Hauling ore to the mill would occur on the same schedule as mining. Blasting would occur only during daylight, typically every 2 to 3 days. However, blasting could occur any day of the week except Sundays and typically around noon or early afternoon. Shift changes for the current mine crew, mill crew, and administration/engineering staff occur at different times during the day. Shift changes for the mine crew occurs at 5:30 AM and 3:30 PM, 7 days per week. Hours for the administration/engineering staff are approximately 7 AM to 4 PM, Monday through Friday. Each of these shift changes would be accompanied by personal vehicle traffic along the access roads to the mining operations. Vendor and visitor vehicles can arrive at the operations at any time but mostly during daylight hours Monday through Friday.

Noise from drilling, blasting, equipment operation, and other vehicle use can affect the environment for humans and wildlife. This includes affecting the quality of the recreational user's experience on a given property. The noise impacts could potentially diminish the quality of that property for a particular endeavor. Noise may also affect wildlife usage of a given property. Chronic or episodic noise-related disturbance may result in wildlife movement away from the source of disturbance. Additionally, noise impacts could affect the quality of wildlife-based recreation for hunting, trapping, and nature study.

The EPA has identified outdoor noise limits to protect against effects on public health and welfare. The noise limits are represented using an $L_{eq}$, which is an average measure over a given time. Outdoor noise is generally acceptable to most people if they are exposed to levels of 65 dBA $L_{eq}$

or less. Outdoor noise is potentially unacceptable if people are exposed to levels of 65 to 75 dBA $L_{eq}$ and unacceptable if exposed to levels of 75 dBA $L_{eq}$ or more (EPA 1981). Since the EPA last issued guidance in 1981, most federal agencies relating to transportation (Federal Highway Administration - FHWA, Federal Transit Administration, Federal Railroad Administration) have generally upheld the EPA guidance with some refining exceptions. For example, the FHWA sets no impact threshold for land uses in the Project Area specific to undeveloped lands or for mining uses. Most people, under optimal listening conditions, can perceive an increase in noise of 3-5 dBA.

To determine whether or not noise from an activity is causing an undesirable impact at a sensitive receptor location, the existing baseline sound levels at the receptor and the sound level at the receptor due to the activity must be compared. If the sound levels of the noise at the receptor are similar to the baseline sound level, the noise does not affect the receptor. If the noise exceeds the baseline sound level, the degree of impact depends on the amount of the exceedance. Sound quality also affects the impact on receptors. For this evaluation, all sound is referred to as "noise", although it is recognized that noise from wind is usually considered an acceptable noise, while the same noise level from a haul truck engine may be unwanted noise.

Predicted noise levels from mining are considered adverse if they are higher than the EPA guideline of 55 dBA $L_{eq}$ at sensitive receptors. Noise levels experienced at outdoor areas where people spend widely varying amounts of time are also considered potentially adverse if they are higher than the EPA guideline of 55 dBA $L_{eq}$ and are considered adverse if they are higher than the EPA threshold of 65 dBA $L_{eq}$.

#### 4.4.2.1 Proposed Action

To predict noise levels associated with the Proposed Action, baseline noise level measurements were made at five sensitive receptors. These baseline measurements are described in **Section 3.4.5**. Additionally, as part of Smoky Canyon Mine's 2007 EIS for Panels F and G, noise measurements were made at the facility for access road traffic, open pit mining, haul truck traffic, and blasting (**Table 4.4-1**). For the Proposed Action, similar types of noises sources would be applicable.

**Table 4.4-1 Sound Levels Associated with Existing Smoky Canyon Mine Activities**

| SOURCE | LEQ DBA | LMAX (DBA) | DESCRIPTION |
|---|---|---|---|
| Access Road Traffic | 47.4 | 66.6 | 120 feet from edge of road |
| Open Pit Mining | 81.7 | 85.9 | 130 feet from drill |
| Haul Truck Traffic | 70.4 | 87.5 | 120 feet from haul truck |
| Blasting | NA | 74.4 | 3,200 feet from blast |

The impacts of the identified noise sources at the sensitive receptors were calculated by mathematically propagating the measured noise levels, using a standard calculation known as the Inverse Square Law of Noise Propagation. This formula states that noise decreases by approximately 6 dBA with every doubling of the distance from the source. The accuracy of this estimation approach depends on intervening vegetation, topography, atmospheric conditions, and noise barriers. Even without attenuation of noise by natural or man-made barriers such as intervening topography, structures or other obstructions, noise levels would be lower than the EPA guideline of 55 dBA $L_{eq}$ for each sensitive receptor at their respective locations. Consequently, the noise effects from the Proposed Action would be short-term and negligible or minor at the closest sensitive receptor due to the distance from the mine.

#### 4.4.2.2 Alternative 1 Reduced Pit Shell with Soil-only Cover

The noise effects would be similar under Alternative 1 as those predicted for the Proposed Action.

#### 4.4.2.3 No Action Alternative

Under the No Action Alternative, noise associated with the Proposed Action would not occur. Consequently, current ambient noise levels would remain unchanged in the analysis area until the Smoky Canyon Mine concludes operation or federal phosphate leases are developed or modified under a different mine plan.

### 4.4.3 Mitigation Measures

Under the Proposed Action or Alternative 1, mitigation measures to reduce or avoid noise impacts include using physical attachments on individual noise sources. Mufflers on engines, shields on particular pieces of equipment, and enclosures surrounding specific operation areas are all examples of mitigation measures for noise that are currently being implemented as part of current operations at the Smoky Canyon Mine. The mine utilizes hearing protection equipment and other methods to protect hearing of miners and operators.

### 4.4.4 Unavoidable (Residual) Adverse Impacts

For the Proposed Action and Alternative 1, unavoidable residual adverse impacts on noise are not expected to occur because noise impacts would cease when the mining activity is complete.

### 4.4.5 Relationship of Short-term Uses and Long-term Productivity

Noise impacts associated with the Proposed Action and Alternative 1 would be temporary. Following the completion of the mining activities and subsequent reclamation activities, no noise impacts would be expected.

### 4.4.6 Irreversible and Irretrievable Commitment of Resources

Noise impacts from the Proposed Action or Alternative 1 are expected to be short-term and negligible or minor at the closest sensitive receptors to the mine. Once the mining activity is complete, the noise condition would be restored to its natural state, and there would be no irreversible and irretrievable commitment of resources.

## 4.5 WATER RESOURCES

### 4.5.1 Issues and Indicators

*Issue: Impacts may occur from further deposition of selenium into the environment. Impacts may occur from the potential for increased selenium rich runoff from all aspects of the site – roads, stockpile areas, and active and reclaimed surfaces.*

*Indicators:*

- Predicted changes in water quantity and quality based on water and contaminant transport modeling.

*Issue: The mining operations and related transportation activities may cause changes to the quantity and quality of surface water or groundwater in the Project Area and within the affected watershed area.*

*Indicators:*

- Current status of groundwater and surface water quantity and quality in the Project Area.
- Acreage and percentage of hydrologic disturbance within the affected watershed (i.e., those portions of the 6th level HUC watersheds in the Study Area that are on NFS lands).
- Predicted changes to quantity and quality of groundwater and surface water from the Project.
- Predicted performance of cover systems and resulting impacts to water quality and quantity.

*Issue: The Project could influence the production of natural springs, the water resources of the area, and the supporting hydrology to fully assess the potential impacts of the Project on the adjacent springs and streams as well as groundwater recharge.*

*Indicators:*

- Identification of springs and streams that would be impacted by the Project.
- Predicted changes to the quantity and quality to springs and streams.

*Issue: The Project may result in water rights being obtained and impacted and potential water diversions.*

*Indicators:*

- Water rights are described and compliance of the Project with rights determined.
- Analysis of impacts from any water diversion. Estimated flows at key locations.

*Issue: The Project may result in: (1) changes in the volume and timing in surface runoff water caused by the operations; (2) increases in selenium, temperature, sediment, turbidity, and contaminants of concern in downgradient streams, ponds, and other surface waters, with regards to applicable surface water quality standards; (3) reduction in available groundwater to supply existing baseline flow of streams and springs in the Project Area from pumping water supply well(s).*

*Indicators:*

- Changes in the volume and timing in surface water runoff caused by the Project.
- Increases in suspended sediment, turbidity, and COPCs in downgradient streams, ponds, and other surface waters, with regards to applicable surface water quality standards.
- Reduction in available groundwater to supply existing baseline flow of streams and springs in the Project Area from pumping of any water supply well(s).
- Project-related impacts affecting the 303(d) listing and TMDLs.

### 4.5.2 Direct and Indirect Impacts

The Proposed Action and Alternative 1 could potentially impact water resources within the Project Area and beyond by disturbance of geologic materials that influence groundwater flow and quality to downgradient groundwater, springs and streams due to mining and related activities. These potential direct and indirect impacts to water resources include: groundwater flow to open pits, groundwater recharge/infiltration rates, alterations to streamflow and baseflow, changes to stormwater runoff configurations and quality, infiltration through reclaimed mine panels and potential mobilization of COPCs to downgradient groundwater and surface water bodies.

To evaluate potential impacts to surface water and groundwater resources from the Project, a computer model was used to simulate groundwater recharge and flow (HGG 2018). The model was also used to predict the change in groundwater chemistry over time for the Proposed Action and Alternative 1 caused by the addition of COPCs to the groundwater that are leached from the pit backfills. Consistent with the 2015 Plan of Study (HGG 2015), groundwater flow modeling was completed using a public domain version of the computer code MODFLOW-NWT (Niswonger et al. 2011). Fate and transport modeling was completed using MT3D-USGS (Bedekar et al. 2016). Initially, deterministic modeling was used to estimate preliminary groundwater flow and contaminant fate and transport (Stantec 2017d; 2017e). Deterministic models are inherently based on a single set of model parameters and predict a single outcome. Because of the wide variability in possible scenarios for the model parameters based on the existing data and the desire to test several percolation rates for both the Proposed Action and Alternative 1, a stochastic modeling approach was used to evaluate water quality impacts for the EIS. The stochastic modeling approach was used to predict the fate and transport of selenium, sulfate, TDS, and manganese using approximately 2,000 individual fate and transport simulations to evaluate stochastically the projected impacts associated with potential leaching into the underlying aquifers as a result of proposed mining operations. These four constituents were COPCs that exceeded the groundwater standard as described in the Chemistry Seepage discussion below. The selenium standard is the only one of the four that is a primary groundwater standard protective of human health; the other three (sulfate, TDS, and manganese) are secondary groundwater standards reflecting aesthetic qualities. A stochastic modeling approach is one where model parameters that are not well defined (e.g., storage, longitudinal dispersivity, ratio of horizontal transverse dispersivity to longitudinal dispersivity, and ratio of vertical transverse dispersivity to longitudinal dispersivity) are varied randomly within a reasonable range based on known conditions, and the results from multiple model runs are analyzed statistically.

The stochastic approach included evaluation of two different flow calibration models, three percolation rates (2 inches, 7 inches, and 15 inches) over a period of 300 years for the four COPCs, and for two different saturated thicknesses for the Wells Formation (approximately 200 and 800-1000 feet). The two calibration models represent end members of the allowable water balance that still meets the model calibration requirements, with the main difference being that one of the models basically allows more groundwater to enter the model across the East Sage Valley Branch Fault in order to account for differing interpretations of available information. This results in slightly different water impact plume development, which is expected based upon resultant mixing characteristics. Separate model runs were used to represent the Proposed Action and Alternative 1 for the three percolation rates and using both calibration models. The results of all these model runs were combined to support the statistical evaluations of the stochastic modeling approach.

The stochastic modeling approach generates many outcomes; therefore, the final results were presented using a statistical approximation based on the 95% upper confidence limit (UCL). The 95% UCL values were based on the arithmetic mean of COPC concentrations in the Wells Formation groundwater and calculated using the Student's-t statistic, assuming a normal data distribution. The UCL is the value that when calculated for a random data set equals or exceeds the true mean 95% of the time, and is therefore, inherently conservative. For environmental assessments, the 95% UCL of a data set is commonly used for comparison to regulatory levels and during evaluations conducted for risk assessments under EPA guidance (EPA 2014). The results of the modeling are provided in the Numerical Model Report, dated January 2018 (HGG 2018). A summary of the results is provided below.

#### 4.5.2.1 Proposed Action

**Groundwater**

*Groundwater Flow to Open Pits*

Groundwater data suggest there are five geologic units that are variably saturated within some portions of the Study Area, including: the Wells Formation, Dinwoody Formation, Salt Lake Formation, Rex Chert Member of the Phosphoria Formation, and Quaternary Alluvium. The Salt Lake Formation, Rex Chert, and Quaternary Alluvium are thought to be limited in their area of saturation, have limited ability to transmit large fluxes of groundwater, and/or are generally separated from the saturated geologic units that would receive direct recharge during and after mining (Stantec 2016d). Drilling records indicate that measurable groundwater was typically not encountered while drilling through the uppermost geologic units in the vicinity of the proposed pit. Several monitoring wells that intercepted fault zones in the Phosphoria Formation shale encountered groundwater within the Rex Chert member (**Figure 3.5-1**). The relatively low hydraulic conductivity and the perched water table elevations measured in the monitoring wells indicate that some minor perched groundwater flow in the Alluvial system could occur from the hanging walls of the proposed pit excavation. This flow would be observed as small seeps along the highwalls that are thought to drain isolated fractures and perched saturated zones near the highwalls, if present. The amount of water added to the open pits from these potential seeps is considered to be negligible compared with the net percolation through the surface of the pit backfills.

The Smoky Canyon Mine has continuously conducted open pit mining operations in the same formations and similar hydrogeologic conditions since 1985, and has not encountered any sustained, measurable groundwater inflow to the open pits from the highwalls. This is expected to also be the case for the East Smoky Panel.

Changes in flow in the Alluvial, Dinwoody, and Phosphoria Formation groundwater systems within the Project Area and across the East Sage Valley Branch Fault are expected during the period of pit disturbance. Because outcrops and thus recharge areas to these systems would be removed during pit excavation, groundwater flow is expected to be reduced and could potentially impact the flow of springs downgradient from the Project Area. However, the degree of impact of the younger groundwater systems by the pit disturbance is unknown because of the isolated and perched nature of the groundwater systems, but is likely negligible as previously stated.

Data collected during exploration drilling and from groundwater monitoring wells in comparison to the pit base contours provided by Simplot for the Proposed Action (Simplot 2013; 2015) indicate that the bottom of the proposed mine pit disturbance would be about 110 to 170 vertical feet above the Wells formation aquifer in the majority of the Project Area, so groundwater from the regional aquifer would not flow into the open pits. However, during mining of the lower benches of Phases 6 and 7, pit excavation could seasonally intersect the saturated portion of the Wells Formation where mean groundwater elevations at Wells GW-16 and GW-29 are within 5 to 10 feet below the base of the proposed pit excavation. In this limited situation, groundwater could be encountered and then pumped out of the mining area in a closed pipe system to the tailings pond.

*Groundwater Recharge*

The areas identified for pit disturbance for the Proposed Action are primarily within the existing outcrop area of the Phosphoria Formation and overlying Salt Lake Formation and Alluvium. Wells Formation outcrops are also within the pit disturbance area on the western portion of the Project Area to the west of the West Sage Valley Branch Fault. As described in **Section 3.5.1**, the Meade Peak member of the Phosphoria Formation is considered to be an aquitard that covers the underlying Wells Formation and Brazer Limestone, and essentially limits recharge from areas overlying the base of the Meade Peak. Limited amounts of groundwater in the Meade Peak member are known to occur within fractures in the shale, but these yield little groundwater to wells or mine pits (Ralston 1979).

Removal of Phosphoria Formation rocks in the footprint areas of the proposed pit would remove the aquitard formed by these rocks. Removal of the aquitard would allow additional groundwater recharge of the Wells Formation to occur in the proposed open pit area (303-acres for the Proposed Action). This would be approximately a 3 percent increase in the local recharge area (10,536 acres) of the Wells Formation and Brazer Limestone.

To reduce potential impacts to groundwater resources, a store and release cover over the top of the pit backfill would be used as part of the Proposed Action. The intent of the cover is to reduce the infiltration rate of precipitation into the pit backfills and thus, the amount of water contacting the backfill material. This, in turn, would reduce the potential for COPCs to leach from the backfill and eventually impact the underlying groundwater quality.

The proposed pit disturbance intersects the western edges of the outcrops for the Dinwoody, Rex Chert, and younger units, and the eastern edge of the Wells Formation. All the materials within the boundaries of the open pit would be removed during mining. This would eliminate the potential for groundwater in the Dinwoody Formation, Rex Chert, and younger units to flow into the open pit from the west, in addition to the perched or isolated nature of the groundwater flow in these units. Groundwater recharged in the Rex Chert and younger units (Dinwoody, Salt Lake Formation, Alluvium) likely supports a number of small springs (URS, ESS-1, ESS-2, LinS) downgradient of the pit area (**Figure 3.5-13**). Potential effects of reduced recharge to these springs are discussed in the Surface Water impacts section below.

*Groundwater Extraction*

The Proposed Action conservatively assumes that the existing industrial well (GW-IW) would continue to be used for mine operations at a pumping rate of 500 gpm. This rate was used for the groundwater modeling predictions. Although GW-IW has been pumping at 300 gpm for the past 2-3 years and pumping will continue to satisfy the processing needs of the mill at the Smoky Canyon Mine. However, based on the fate and transport model predictions, pumping of the industrial well does not significantly impact the migration of the COPCs. Pumping of the culinary well is not expected to impact groundwater flow for the East Smoky Panel because it is being pumped from the Dinwoody Formation. Both of these wells would continue to pump as they currently do.

*Percolation through Reclaimed Mine Panels*

Infiltrating precipitation into the overburden pit backfill can cause leaching of COPCs and potentially impact underlying Wells Formation groundwater. The total backfill volume includes a range of solid particle sizes packed together with open space (pores) between the particles where water can flow. The total volume of this open space is called a “pore volume”. There is some uncertainty in the net infiltration rate through the Proposed Action store and release cover for the East Smoky Panel pit backfill as described in the cover modeling report, "Unsaturated Flow Modeling for the East Smoky Panel Mine Proposed Action Cover" (Stantec 2017f). As reported in that document, unsaturated flow modeling conducted in 2015 and 2016, using a range of measured material characteristics for the earth materials that would be used to construct the cover, indicated that percolation through the Proposed Action store and release cover would range from about 2 to 3 inches per year up to about 6 to 7 inches per year. These rates are for a Proposed Action cover design of 12 inches of topsoil over 3 feet of Salt Lake Formation material at 85% relative compaction, over 2 feet of chert.

The stochastic modeling approach allows a range of many simulations to be produced that can be used to test the sensitivity of the results for a range of percolation rates while holding the chemistry of the recharge to the groundwater constant. Using the stochastic modeling approach, three annual percolation rates (2-inch, 7-inch, and 15-inch) through the pit backfill covers were evaluated for the Proposed Action store and release cover. The 2-inch percolation rate is the lowest annual percolation rate that is potentially achievable for the Proposed Action cover, and the 7-inch percolation rate is considered to be the reasonably foreseeable long-term average percolation rate for that cover.

As described in the October 2017 source term memorandum (Stantec 2017g), column testing was conducted to determine the chemistry of percolating water after it has moved through the overburden material packed in the columns. The column testing of the different overburden lithologies and ROM column, were conducted as sequential cycles of wetting followed by drainage. The different cycles were related to volumes of water equivalent to the pore volumes (PVs) of the samples in the columns. The time required for each PV of water to transit the solid material in the test columns was measured in days. To relate the findings of the column testing to the field scale it is necessary to determine the time calculated for a PV of recharge water to transit the field-scale pit backfills. Based on cross sections provided in the M&RP for the East Smoky Panel, the average depth of the Proposed Action backfill across the entire East Smoky Panel is approximately 289 feet.

Following the convention established by the Agencies, it is assumed that approximately 15 percent of the total backfill volume at the field scale will support unsaturated water flow and be subject to leaching. This is because infiltrating water at the field scale is known to develop preferential flow paths such that only a fraction of the total solid volume actually comes in contact with percolating water. The time for each PV to pass through the backfill depends on the water recharge rate into the top surface of the backfill, which is the same as the percolation rate through the cover (see above). The time for each PV for each of the percolation rates is calculated by:

(289 feet x 0.15)/(inch per year percolation rate/12)

The calculated times for the PVs to transit the pit backfill for each percolation rate are shown in **Table 4.5-1**.

**Table 4.5-1 Calculated Pit Backfill Transit Times**

| PERCOLATION RATE (INCH/YEAR) | PORE VOLUME TRANSIT TIME (YEARS) |
|---|---|
| 2 | 260 |
| 7 | 74 |
| 15 | 35 |

Following the convention established by the Agencies, the chemistry of each PV was held constant during the fate and transport modeling for the length of time calculated for the PV to transit the backfill and the modeling was conducted for a total period of 300 years.

*Seepage Chemistry*

The chemistry of the seepage through the East Smoky Panel backfill was determined by leaching columns of drill hole cuttings of the overburden lithologies from the East Smoky Panel site. The methods and findings of this testing are described in the Final East Smoky Panel Baseline Geochemistry Study Report (Whetstone 2017). Per that report, the recommended leachate chemistry to be used for the East Smoky Panel, Proposed Action pit backfill is that for the ROM columns. Whetstone provided the results of the column leaching for use in determining the chemistry component of the source term (Stantec 2017g).

A lengthy list of potential water chemistry solutes was included in the laboratory analyses of the column leaching solutions. This list was based on past practices with other phosphate mining EISs in Idaho. The results of all these laboratory analyses were reported in the Geochemistry Study Report (Whetstone 2017). Samples of the column leachates were taken at specified aliquots that are related to pore volume of the solid material in the columns. These aliquots are the same as the previously described PVs. Based on past practice, it was known that concentrations of solutes typically become very low and nearly constant by three pore volumes (PV3) so analyses were terminated with PV3, except for the ROM columns where an additional, confirmatory PV sample was obtained. The concentrations of all the solutes in the various PVs were then compared to applicable standards for protection of groundwater and surface water in Idaho. The only solutes that were found to exceed any such standards in any of the PVs were sulfate (250 mg/l), TDS (500 mg/l), cadmium, manganese (0.05 mg/l), nickel (0.052 mg/l), selenium (0.005 mg/l), and thallium (0.00024 mg/l). The surface water standard for cadmium is based on hardness of the water. For a Hoopes Spring water hardness of 247 mg/l (the lowest, and thus most conservative, hardness reported during the baseline study) the surface water standard would be 0.0096 mg/l. Cadmium, selenium, and nickel standards are surface water criteria for the protection of aquatic life. Sulfate, TDS, and manganese standards are secondary groundwater standards that reflect aesthetic values. The thallium standard is a surface water criterion established as protective of human consumption of fish. These seven solutes were then considered potential COPCs for the groundwater modeling.

These potential COPCs for the groundwater impact modeling and their concentrations are shown in **Table 4.5-2**. The values for the Proposed Action are measured from a ROM column that contained a mixture of the different waste rock lithologies in the same proportion as the material balance in the M&RP. This set was run for four full PVs. The values for the other combinations of lithologies are weighted averages calculated with the relative proportions of the lithologies in the mixtures and based on the leachate chemistry of the monolithologic test columns of these different lithologies. These columns were run for three sequential PVs. Shading in **Table 4.5-2** marks values greater than the lower of either the groundwater or surface water standard for the analyte.

**Table 4.5-2 COPCs for Groundwater Modeling, Proposed Action and Alternative 1**

| COLUMN | PV | $SO_4$[1] | TDS[1] | CD | MN[1] | NI | SE | TL |
|---|---|---|---|---|---|---|---|---|
| **Proposed Action** | | | | | | | | |
| ROM-U1 | 1 | 261 | 813 | 0. 0004 | 2. 1320 | 0. 0227 | 0. 0760 | 0. 0001 |
| ROM-U1 | 2 | 55 | 312 | 0. 0001 | 1. 7143 | 0. 0086 | 0. 0060 | 0. 0001 |
| ROM-U1 | 3 | 17 | 229 | 0. 0002 | 1. 8370 | 0. 0100 | 0. 0031 | 0. 0001 |
| ROM-U1 | 4 | 10 | 236 | 0. 0002 | 1. 8015 | 0. 0081 | 0. 0021 | 0. 0001 |
| **Alternative 1** | | | | | | | | |
| SLF-U1+REX-U1+MPW-U1+LST-U1 | 1 | 117 | 715 | 0. 0019 | 0. 8431 | 0. 042 | 0. 0526 | 0. 0003 |
| SLF-U1+REX-U1+MPW-U1+LST-U1 | 2 | 15. 4 | 285 | 0. 0008 | 0. 5205 | 0. 019 | 0. 0081 | 0. 0002 |
| SLF-U1+REX-U1+MPW-U1+LST-U1 | 3 | 16. 8 | 225 | 0. 0009 | 0. 6378 | 0. 022 | 0. 0062 | 0. 0002 |

All concentrations in mg/L. All metal concentrations are totals. Shaded values exceed a GW or SW standard.
$SO_4$=sulfate; TDS=total dissolved solids; Cd=cadmium; Mn=manganese; Ni=nickel; Se=selenium; Tl=thallium
[1] The relevant standard for this constituent is a secondary standard.

The initial overburden mined from the East Smoky Panel would be backfilled within the Panel B pit. The impact of mine overburden on the underlying Wells Formation aquifer in the Panel B area was previously evaluated in the Panels B&C EIS (BLM and USFS 2002a) and will not be remodeled in this effort. The effect of adding the East Smoky Panel overburden to the top of the already permitted B-Panel backfill was evaluated by comparing the column testing results for the Panels B&C EIS with the recent results from Whetstone for the East Smoky Panel. The PV concentrations of selenium and cadmium for the Panels B&C backfill is compared to the overburden from the East Smoky Panel in **Table 4.5-3**.

**Table 4.5-3 Comparison of PV Concentrations – Selenium and Cadmium**

| MATERIAL SOURCE | SELENIUM (MG/L), PV 1, 2, 3 | CADMIUM (MG/L), PV 1, 2, 3 |
|---|---|---|
| Panels B&C Weighted Avg. | 0.181, 0.064, 0.047 | 0.0023, 0.001, 0.0008 |
| East Smoky Proposed Action | 0.0760, 0.0060, 0.0031 | 0.0004, 0.0001, 0.0002 |
| East Smoky Alternative 1 | 0.0526, 0.0081, 0.0062 | 0.0019, 0.0008, 0.0009 |

As can be seen from **Table 4.5-3**, the selenium and cadmium leach column concentrations for the East Smoky Panel overburden are significantly lower than for the previous Panels B&C project. The main reason for this difference is the high-angle or overturned nature of the rock bedding in the East Smoky Panel pit which results in a dramatically different overburden mixture containing much less Meade Peak member compared to the other mine panels at the Smoky Canyon Mine. Consequently, the selenium and cadmium concentrations of the backfill itself are less than other mines so the column leachate concentrations are also lower. Additionally, the Meade Peak material in the East Smoky Panel may be more weathered than the other panels, which typically results in lower selenium concentrations in the column leachates.

Adding overburden from the East Smoky Panel Proposed Action or Alternative 1 to the Panel B backfill would not increase the selenium or cadmium concentrations of seepage through the Panel B backfill, so additional groundwater impact analysis of this change to the Panel B backfill is not required.

The manganese column test results for the Panels B&C EIS and the East Smoky Panel are shown in **Table 4.5-4**. The manganese column test results for the East Smoky Panel Proposed Action are greater than the Panels B&C results.

**Table 4.5-4 Comparison of PV Concentrations - Manganese**

| MATERIAL SOURCE | MN (MG/L), PV 1, 2, 3 |
|---|---|
| Panels B&C Weighted Avg. | 0.164, 0.102, 0.054 |
| East Smoky Panel Proposed Action | 2.132, 1.7143, 1.8370 |
| East Smoky Panel Alternative 1 | 0.8431, 0.5205, 0.6378 |

The currently permitted Panel B backfill volume is 20.9M loose cubic yards (LCY). The volume of the proposed East Smoky Panel overburden to be added to the Panel B backfill from the East Smoky Panel Proposed Action is 9.1M LCY. The effect of these added concentrations to the Panel B backfill were evaluated by looking at the weighted average concentration of manganese in the column leachates as described below (**Table 4.5-5**).

**Table 4.5-5 Weighted Average Manganese Concentrations in Panel B Backfill**

| PROPOSED ACTION – WEIGHTED MN CONCENTRATIONS | | | | | |
|---|---|---|---|---|---|
| Material Source for Panel B Backfill | M LCY | % | PV1 | PV2 | PV3 |
| Panels B&C | 20.9 | 69.67 | 0.114 | 0.071 | 0.037 |
| East Smoky Panel | 9.1 | 30.33 | 0.647 | 0.520 | 0.557 |
| Total | 30 | 100 | 0.761 | 0.590 | 0.594 |
| **REDUCED PIT SHELL ALTERNATIVE – WEIGHTED MN CONCENTRATIONS** | | | | | |
| Panel B | 20.9 | 62.39 | 0.102 | 0.064 | 0.034 |
| East Smoky Panel | 12.6 | 37.61 | 0.317 | 0.196 | 0.240 |
| Total | 33.5 | 100 | 0.419 | 0.26 | 0.274 |

The weighted average concentrations for manganese in the Panel B leachate for the Proposed Action is greater than that already analyzed in the Panels B&C EIS because there would be an additional source coming from the East Smoky Panel. However, manganese has a secondary groundwater standard of 0.05 mg/L, which is related to aesthetics, not human health.

For the Proposed Action, neither cadmium or thallium concentrations in the column leachates exceeded any applicable standards and so are not recommended for that groundwater modeling scenario. The concentrations of these solutes in all PVs of Alternative 1 are well below the applicable groundwater standards and slightly above their surface water standards for PV1 only. Because of the relative closeness of these PV1 leachate concentrations to the applicable standards and the fact that their concentrations were below the standards for the subsequent PVs it can be assumed that adding these low concentrations to the underlying groundwater will result in mixed concentrations below the applicable surface water standards.

For all the reasons stated above, the COPCs carried forward for groundwater fate and transport modeling for the Proposed Action and Alternative 1 are sulfate, TDS, manganese, and selenium.

*Potential Mobilization of COPCs/Impact to Wells Formation*

The primary potential pathway of contamination to the Wells Formation aquifer would be vertical percolation of recharge via the pit backfills. The fate and transport modeling establishes changes in groundwater chemistry over time caused by the addition of COPCs to the groundwater that leaches from the pit backfills. Fate and transport of COPCs was evaluated for the Proposed Action and Alternative 1 at the three percolation rates described above for the stochastic modeling approach. The potential impacts under Alternative 1 are described in **Section 4.5.2.2**.

Model-simulated impacts to groundwater quality in the Wells Formation are generally greatest near the backfilled pit excavations. Away from the pit backfilling, these impacts diminish. Flatter water table gradients, such as the case for the Project Area, slow the mixing of COPCs and groundwater, minimizing the dilution of contaminant concentrations within the impact plume. Overall, local gradients emanating from the groundwater recharge mound influence peak concentrations in close proximity to open pits; whereas the regional gradients have more influence on the overall shape and extent of water quality impacts and maintain a level of control on reducing concentrations within the plume (HGG 2018). Some northern transport of COPCs is evident in the modeling results with some very low concentration selenium plumes migrating in the Wells Formation aquifer as far north as Salt Lick Creek. As previously described, there is no flow connection between the Wells Formation aquifer and these northern streams so there is no risk of water quality impacts to these streams from the modeled plumes.

For the East Smoky Panel stochastic analysis, multiple model results for each COPC in the Wells Formation over a period of 300 years were generated (HGG 2018). COPC concentrations were evaluated at six monitoring locations: two generated by the model (OBS-1, OBS-2), one downgradient monitoring well (GW-27), the industrial well (GW-IW), and two surface water monitoring locations Hoopes Spring (HS) and Lower South Fork Sage Creek Springs (LSS) (**Figure 4.5-1**). A summary of the results for the stochastic analysis is provided in the following sections. Plume maps for the 100-year and 300-year time periods are included for selenium (**Figures 4.5-2** and **4.5-3**) and manganese (**Figures 4.5-4** and **4.5-5**) for reference. Additionally, only the reasonably foreseeable conditions of the 7-inch percolation rate is considered relevant for presentation of potential impacts from the Proposed Action for the EIS. The HGG modeling report provides the full range of results for all scenarios (HGG 2018).

The stochastic results of the fate and transport model estimates for COPC concentrations in the Wells Formation under the reasonably foreseeable 7-inch percolation rate for the Proposed Action is summarized at selected time steps in **Table 4.5-6** at the groundwater model observation points.

**Table 4.5-6 Model Predictions of COPC Concentrations – Proposed Action**

| COPC GROUNDWATER | STANDARD | YEARS | MODEL OBSERVATION POINTS (ONLY GROUNDWATER LOCATIONS)* | | | |
|---|---|---|---|---|---|---|
| | | | OBS-1 | OBS-2 | GW-27 | GW-IW |
| Selenium, total (mg/L) | 0.05 | 10 | 0.000 | 0.007 | 0.000 | 0.000 |
| | | 50 | 0.015 | 0.034 | 0.001 | 0.000 |
| | | 100 | 0.012 | 0.023 | 0.003 | 0.000 |
| | | 200 | 0.008 | 0.017 | 0.002 | 0.000 |
| | | 300 | 0.006 | 0.014 | 0.002 | 0.000 |
| Manganese, total (mg/L) | 0.05 | 10 | 0.006 | 0.205 | 0.000 | 0.000 |
| | | 50 | 0.409 | 0.964 | 0.032 | 0.000 |
| | | 100 | 0.456 | 1.045 | 0.073 | 0.000 |
| | | 200 | 0.493 | 1.151 | 0.093 | 0.000 |
| | | 300 | 0.508 | 1.195 | 0.101 | 0.000 |
| Sulfate, total (mg/L) | 250 | 10 | 1 | 25 | 0 | 0 |
| | | 50 | 50 | 118 | 4 | 0 |
| | | 100 | 43 | 89 | 10 | 0 |
| | | 200 | 30 | 64 | 8 | 0 |
| | | 300 | 25 | 53 | 7 | 0 |
| Total Dissolved Solids (mg/L) | 500 | 10 | 2 | 78 | 0 | 0 |
| | | 50 | 156 | 369 | 12 | 0 |
| | | 100 | 146 | 313 | 30 | 0 |
| | | 200 | 124 | 274 | 28 | 0 |
| | | 300 | 114 | 258 | 27 | 0 |

Notes:

* Surface Water Monitoring Points HS and LSS are not included in the table, but discussed in the following sections/Surface Water.

1) COPC concentrations are the 95% upper confidence limit based on the population mean as predicted by the model.

2) Shaded cells have concentrations that exceed the applicable groundwater standard (note that manganese exceedances are above the secondary standard governing aesthetics, not health).

3) Observation Locations:

OBS-1 & OBS-2 are model-derived observation points.

GW-27 is an existing Wells Formation monitoring well located approximately downgradient of the proposed pit excavation.

GW-IW is the existing industrial well located to the west of the proposed pit excavation that would be used for water supply, estimated at 500 gpm.

At about 90 years, selenium concentrations of 0.001 mg/L arrive at Hoopes Spring, and this concentration stabilizes there until about 180 years when values begin to decrease reaching 0.0008 mg/L at the end of the simulation. These concentrations are well below any Clean Water Act standards for Sage Creek downstream of Hoopes Spring but are shown to indicate the numerical value of the negligible impacts predicted by the modeling. No impacts were observed at Lower South Fork Sage Creek Springs during the entire simulation. Hoopes Spring and Lower South Fork Sage Creek Springs are not shown in **Table 4.5-6**, but are discussed further in the Surface Water section.

As described previously, the explanation for these relatively low concentration groundwater impacts is that the column leachate selenium concentrations for East Smoky Panel are much less than for prior Smoky Canyon mine panels.

*Manganese*

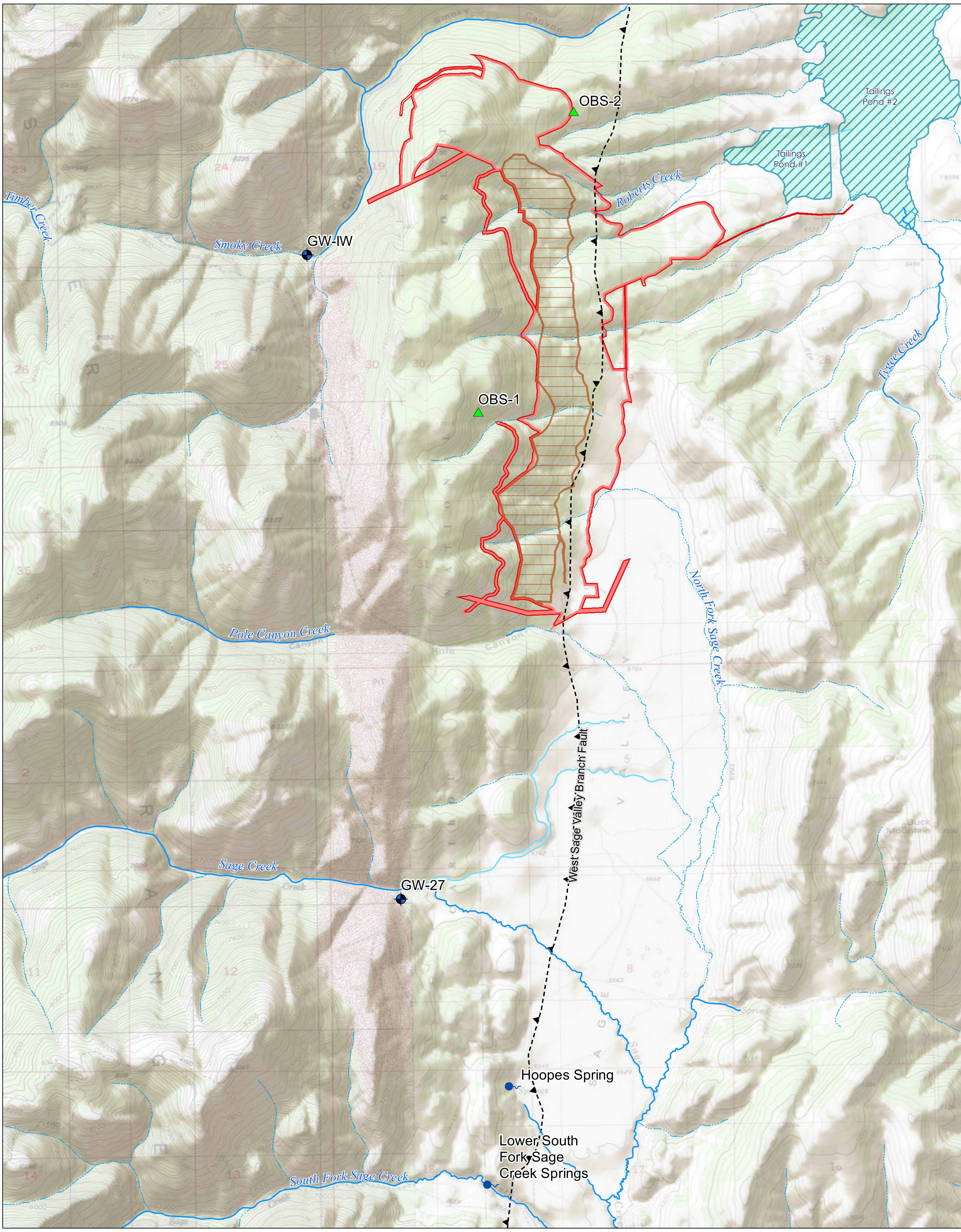
Fate and transport modeling for the East Smoky Panel backfill for the Proposed Action (7-inch percolation rate) showed a large manganese plume greater than the existing condition of 0.004 mg/L at the observation point GW-27 and the groundwater secondary standard of 0.05 mg/L extending from the East Smoky Panel west under much of Panel B and down to Hoopes Spring. The >0.05 mg/L plume for manganese in the Wells Formation developed rapidly below and south of the pit backfill and then gradually continued to move south during the simulation. Predicted groundwater concentrations were greater than the groundwater secondary standard (0.05 mg/L) at the end of the 300-year simulation at both of the model observation points and at the downgradient monitoring well, with a concentration of 0.101 mg/L at GW-27. The maximum manganese concentration at Hoopes Spring was 0.047 mg/L at the end of the 300-year modeling simulation. No impacts were observed at Lower South Fork Sage Creek Springs during the entire simulation.

Because manganese is prevalent in the waste rock leachates of all the pit backfills at Smoky Canyon, and the secondary standard for manganese is relatively low, it is likely that a wide area of Wells Formation aquifer would be impacted above the groundwater secondary standard in the Smoky Canyon Mine area. The addition of the East Smoky Panel overburden to the Panel B backfill volume does not change this impact.

It should also be noted that the groundwater standard for manganese is a secondary standard, not based on protection of human health like a primary standard, but instead based on aesthetics, specifically water color, staining household fixtures, and taste.

*Sulfate*

For most of the modeled simulations for sulfate, groundwater concentrations in the Wells Formation are much less than the existing condition of 26 mg/L at the observation point GW-27 and the 250 mg/L groundwater secondary standard. The maximum sulfate concentration of about 250 mg/L is observed under the pit backfill at about 75 years at the end of PV1 and then gradually decreases thereafter. By 150 years, the concentration under the backfill is about 100 mg/L and decreases to about 50 mg/L at the end of the 300-year modeled period.




**Legend**

Thrust Fault
Stream/River
Intermittent Stream
Other Waterway
Existing Tailings Pond
Project Area Boundary
Proposed Pit Disturbance

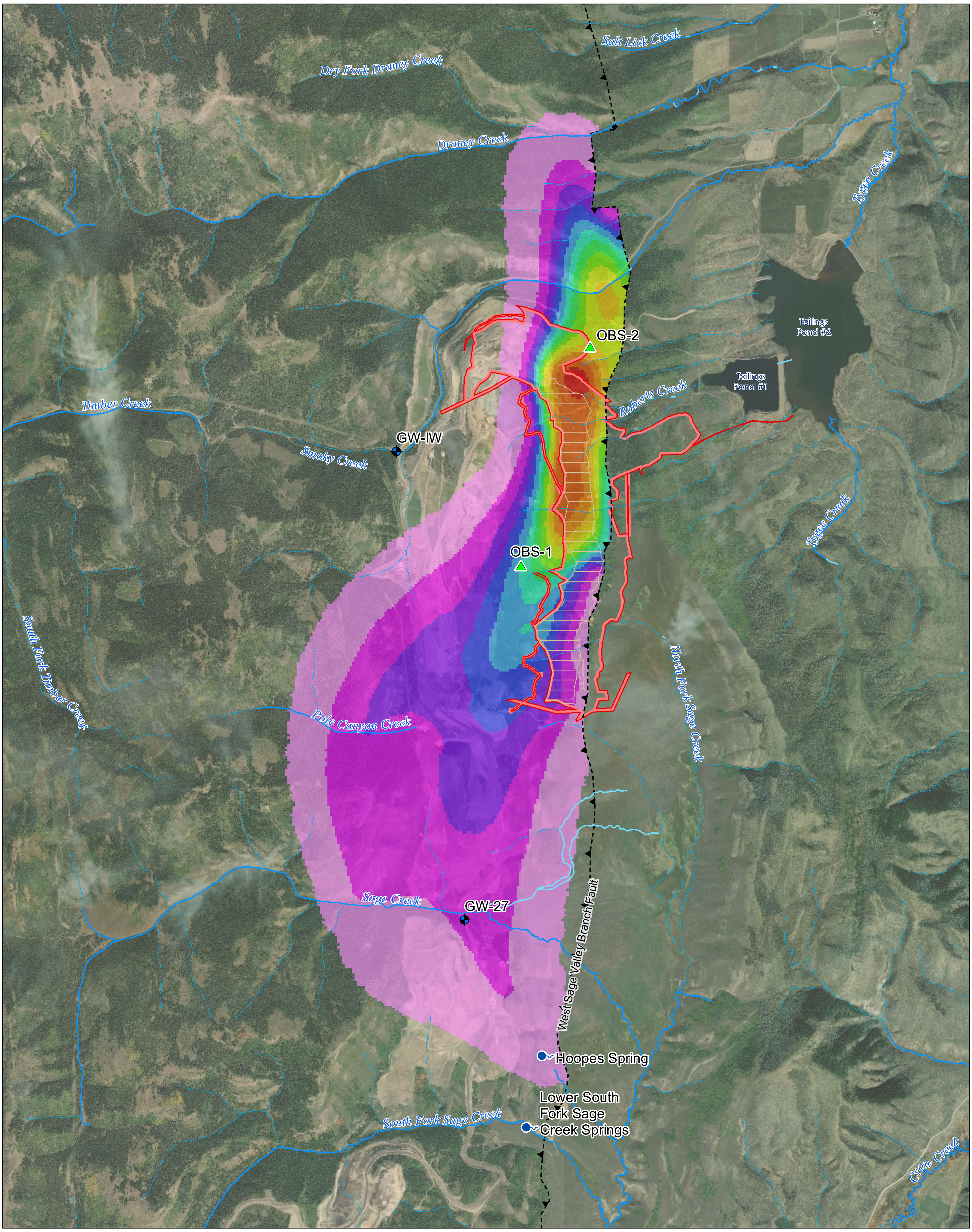
**Observation Location**

Wells Formation Groundwater Monitoring Well Location
Model Observation Location
Spring/Seep

**Notes**
**1.** Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet
**2.** Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed
Sources: Esri, USGS, NOAA
**3:** Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
**4:** Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 0.5 1
Mile
1:32,000 (at original document size of 11x17)
N

**Figure 4.5-1**
**Model Observation Locations**
**East Smoky Panel Mine EIS**




**Legend**

Stream/River

Intermittent Stream

Other Waterway

Thrust Fault

Project Area Boundary

Proposed Pit Disturbance

**Observation**

Wells Formation Groundwater Monitoring Well Location

Model Observation Location

Spring/Seep

**Model-Predicted Selenium Concentrations at 100 Years milligrams per Liter (mg/L)**

0.05

0.025

0.015

0.007

0.001

Note: Primary groundwater standard for selenium is 0.05 mg/L.

**Notes**

**1.** Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet

**2.** Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**3:** Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.

**4:** Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 0.5 1

Mile

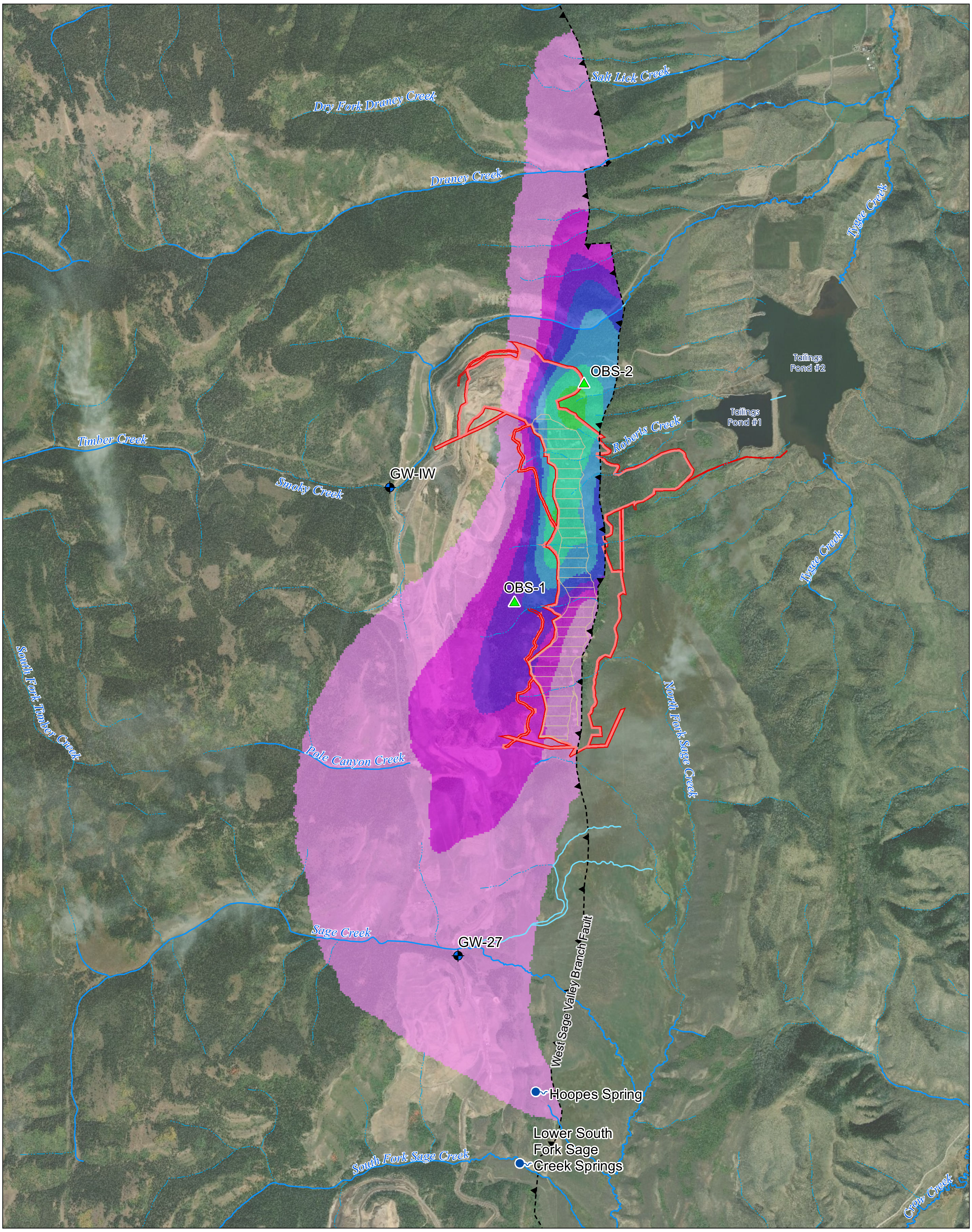
1:44,000 (at original document size of 11x17)

N

**Figure 4.5-2**

**Proposed Action, Model-Predicted Selenium Concentrations at 100 Years**

**East Smoky Panel Mine EIS**




**Legend**

Stream/River

Intermittent Stream

Other Waterway

Thrust Fault

Project Area Boundary

Proposed Pit Disturbance

**Observation Location**

Wells Formation Groundwater Monitoring Well Location

Model Observation Location

Spring/Seep

**Model-Predicted Selenium Concentrations at 300 Years milligrams per Liter (mg/L)**

0.05

0.025

0.015

0.007

0.001

Note: Primary groundwater standard for selenium is 0.05 mg/L.

Notes

1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet

2. Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.

4: Project Location: T8S R46E, T9S R46E Caribou County, Idaho

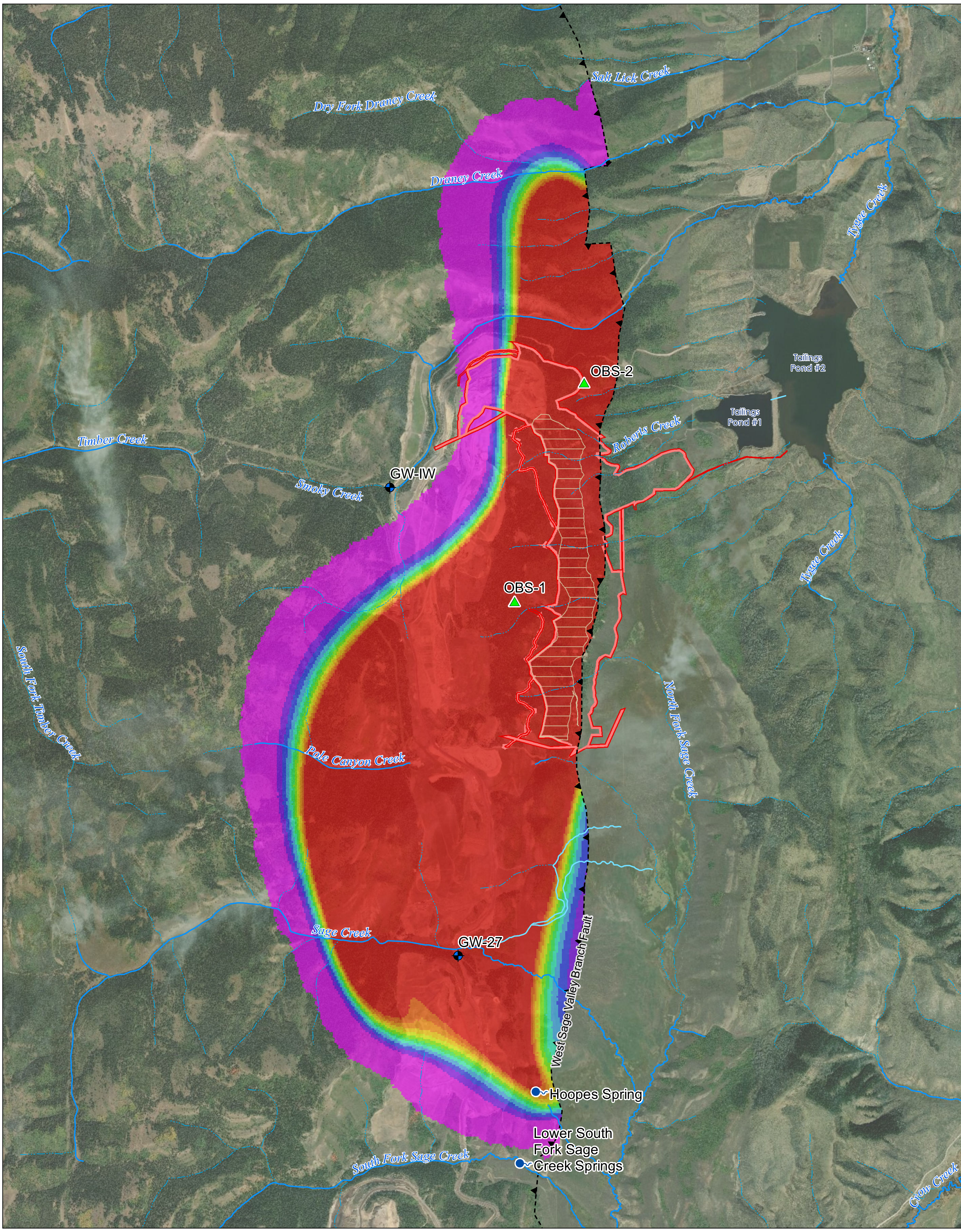
0 0.5 1

Mile

1:44,000 (at original document size of 11x17)

N

**Figure 4.5-3**
**Proposed Action, Model-Predicted Selenium Concentrations at 300 Years**
**East Smoky Panel Mine EIS**




**Legend**

- Stream/River
- Intermittent Stream
- Other Waterway
- Thrust Fault
- Project Area Boundary
- Proposed Pit Disturbance

**Observation**

- Wells Formation Groundwater Monitoring Well Location
- Model Observation Location
- Spring/Seep

**Model-Predicted Manganese Concentrations at 100 Years**
**milligrams per Liter (mg/L)**

0.05
0.025
0.015
0.007
0.005

Note: Secondary groundwater standard for manganese is 0.05 mg/L.

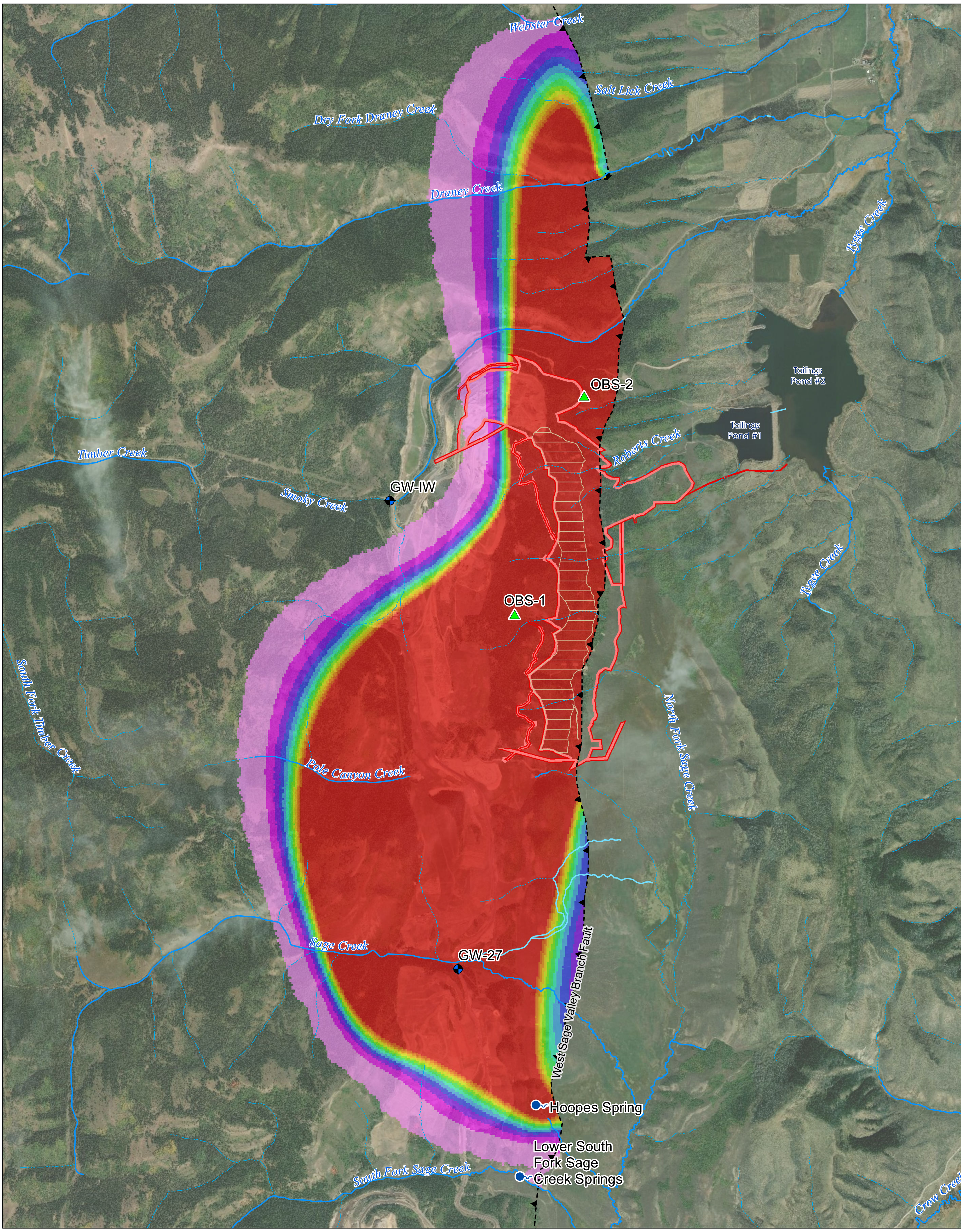
**Notes**

**1.** Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet
**2.** Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
**3:** Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
**4:** Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 0.5 1
Mile
1:44,000 (at original document size of 11x17)

N

**Figure 4.5-4**
**Proposed Action, Model-Predicted Manganese Concentrations at 100 Years**
**East Smoky Panel Mine EIS**




**Legend**

- Stream/River
- Intermittent Stream
- Other Waterway
- Thrust Fault
- Project Area Boundary
- Proposed Pit Disturbance

**Observation**

- Wells Formation Groundwater Monitoring Well Location
- Model Observation Location
- Spring/Seep

**Model-Predicted Manganese Concentrations at 300 Years**
**milligrams per Liter (mg/L)**

0.05
0.025
0.015
0.007
0.005

Note: Secondary groundwater standard for manganese is 0.05 mg/L.

__Notes__

**1.** Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet
**2.** Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
**3:** Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
**4:** Project Location: T8S R46E, T9S R46E Caribou County, Idaho

0 0.5 1
Mile
1:44,000 (at original document size of 11x17)
N

__**Figure 4.5-5**__
**Proposed Action, Model-Predicted Manganese Concentrations at 300 Years**
**East Smoky Panel Mine EIS**

Sulfate concentrations of about 1 mg/L reach Hoopes Spring at about 50 years and increase to about 4 mg/L at 100 years after which time the concentration stabilizes to between 3 and 4 mg/L for the rest of the simulation. No impacts were observed at Lower South Fork Sage Creek Springs during the entire simulation. The groundwater standard for sulfate is a secondary standard, not based on protection of human health like a primary standard, but instead based on aesthetics, specifically water color, staining household fixtures, and taste.

*Total Dissolved Solids*

TDS concentrations in Wells Formation groundwater are typically much less than the existing condition of 352 mg/L at the observation point GW-27 and the 500 mg/L groundwater secondary standard during the model-simulated time period. However, initially by about 20 years, a greater than 500 mg/L plume has begun to develop under the pit backfill. This plume increases in size for about 70 years after which it begins to degrade due to ongoing recharge through the cover. By about 100 years, the concentrations under the backfill decrease to less than 500 mg/L and continue to gradually decrease, reaching 400 mg/L by about 150 years and around 300 mg/L by the end of the simulation of 300 years.

Groundwater concentrations of about 1 mg/L reach Hoopes Spring by about 40 years, increase to about 13 mg/L at about 170 years, and then decrease to about 12 mg/L at the end of the simulation. No impacts were observed at Lower South Fork Sage Creek Springs during the entire simulation.

The groundwater standard for TDS is a secondary standard, not based on protection of human health like a primary standard, but instead based on aesthetics, specifically water color, staining household fixtures, and taste.

*Water Rights and Groundwater Use*

As described in the Water Resources Technical Report (Stantec 2016d), within the Smoky Creek, Roberts Creek, and Pole Canyon watersheds, there are three water rights associated with groundwater. All three of these groundwater rights are for industrial use, owned by Simplot, and associated with the Smoky Canyon Mine. As such, predicted changes in groundwater quality would not be considered an impact to these water rights. Further, as described in Stantec (2016d), there are several wells not included in the water rights records: four wells are described as domestic wells, one well is described as a domestic/stock well, and one well does not have a specific recorded use. These are located at least three miles to the northeast and upgradient of the East Smoky Panel Project Area. Flow modeling conducted as part of the groundwater modeling effort for the East Smoky Panel has shown that the mining would not impact groundwater levels to any noticeable degree, thus there would be no impact to these wells.

The surface and groundwater directed to the tailings pond for the duration of mining activities would be available for ongoing use in the processing mill and pipelines instead of pumping groundwater from the existing industrial well.

No new rights to groundwater, and no changes to existing groundwater rights (such as place of use, point of diversion, or nature of use) would be needed.

**Surface Water**

*Watershed Area Disturbance*

The Proposed Action would create disturbances on NFS lands in two HUC 6 watersheds. As described in **Section 3.5.2.1**, no more than 30 percent of NFS lands within a watershed or subwatershed should be in a hydrologically disturbed condition. The Proposed Action would add to the already existing and defined disturbances given in **Table 3.5-1**. **Table 4.5-7** provides this information. Once reclamation has been successfully completed, the amount of hydrologically disturbed mining areas associated with the Project would be greatly reduced over time. This impact is considered minor but long-term.

**Table 4.5-7 Hydrologically Disturbed Areas**

| WATERSHED | HUC | TOTAL AREA (ACRES) | HUC AREA ON NFS LANDS (ACRES) | PROPOSED DISTURBED (ACRES) | PERCENT OF TOTAL HUC DISTURBED WITH PROPOSED ADDED | PROPOSED DISTURBED (ACRES) ON NFS LANDS | PERCENT OF HUC DISTURBED ON NFS WITH PROPOSED ADDED |
|---|---|---|---|---|---|---|---|
| Tygee Creek | 170401050204 | 24,284 | 13,012 | 495 | 15.5 | 414 | 11.8 |
| Sage Creek | 170401050103 | 15,149 | 10,617 | 354 | 16.4 | 114 | 20.3 |

In general, the better condition a watershed and its stream channel are in, the more resilient it is to the effects of disturbance. As described in **Section 3.5.2.1**, the CNF RFP EIS (USFS 2003b) considered the Salt River watershed (4th scale HUC) overall to have a "low vulnerability to additional stressors such as pollutant loadings." This could indicate that the Salt River watershed as a whole may have a better ability to absorb the proposed disturbances than would a different watershed with a higher vulnerability rating.

However, the Tygee and Sage creeks 6$^{th}$ level HUCs, according to a different, more recent assessment (USFS 2017a) known as the WCF, indicates that these two basins are at risk. As noted in **Section 3.5.2.1**, the WCF classed both the Tygee Creek basin and the Sage Creek basin as impaired. Given that rating, these two individual HUCs likely have a lower "ability to absorb the proposed disturbances" than the Salt River watershed as a whole.

*Streamflow Alterations*

On a local scale, streamflows in several smaller basins would potentially be altered compared to current conditions. These basins include Smoky Creek, Roberts Creek, North Sage Valley, and Pole Canyon Creek. Streamflow effects could occur due to: (1) reductions or increases in stormwater runoff due to rerouting and/or capture in open pits and sedimentation ponds; and/or (2) reduction in baseflows due to disruption of springs or other groundwater discharges such as gaining stream reaches. Each of these is discussed below.

The Proposed Action would not physically alter any perennial stream channels so Stream Alteration Permits would not be required. Predicted effects on water rights due to stormwater runoff routing or baseflow reductions are discussed under the *Water Rights and Water Use* heading, below.

*Stormwater Runoff Changes*

During operations, runoff from precipitation that falls up-gradient of the East Smoky Panel would be collected and rerouted around the disturbances via a run-on diversion. Depending upon the phase of mining, some of this runoff would be released to a different drainage area than where it originated because the run-on diversions are designed to direct stormwater southward along the west side of the pit before releasing it to continue eastward (**Figure 2.4-1**). In addition, precipitation falling within the footprint of open pits would not contribute to stormwater runoff because it would be confined within the pit. Runoff generated from precipitation falling within the other Project disturbance areas would be directed to - and retained in - constructed stormwater ponds. These ponds would contain the expected runoff from storm events up to the 100-year, 24-hour precipitation depth. The net effect of the diversions and containments would be to alter the contributing watershed areas of the four drainages listed above, which in turn would alter expected runoff amounts.

All four basins are already subject to flow alterations from existing mining disturbances. Runoff has been withheld from approximately 880 acres of the 4,200-acre Smoky Creek drainage (i.e., about 22 percent). The Proposed Action would reduce Smoky Creek's contributing area by another 125 acres (3 percent). Runoff has already been withheld from approximately 180 acres of the 1,600-acre Robert's Creek drainage (i.e., about 11 percent). The Proposed Action would reduce Robert's Creek's contributing area by another 530 acres (33 percent). Runoff has already been withheld from approximately 150 acres of the 2,000-acre North Sage Valley drainage upstream of the confluence with Pole Canyon Creek (i.e., about 8 percent). The Proposed Action would reduce the North Sage Valley's contributing area by another 335 acres, but it would also add to it by redirecting flows into this drainage from the north via the run-on diversion, for a net effect of increasing the watershed area by about 120 acres (i.e., about 6 percent). Last, a negligible amount of Project runoff would be generated in the Pole Canyon Creek watershed and contained by stormwater ponds, but runoff from about 260 acres to the north would be directed into Pole Canyon Creek via a run-on ditch. In addition, note that the drainage area between Smoky and Roberts creeks that contributes flow to the existing tailings pond would also be reduced, but that is not relevant here because the tailings pond is a closed system that does not function as a water resource.

Changes in contributing areas suggest a similar change in runoff peak or volume. Once reclamation has been successfully completed, ditches would generally remain, but ponds would be removed, allowing the disturbed and reclaimed areas to again function as part of the watershed and regularly contribute runoff to streams. In general, the impacts to runoff are considered to be minor to moderate, local, and have long-term durations limited to the mining period.

*Baseflow Reductions*

Streamflows that are supported at least partially by groundwater discharge from aquifers that are predicted to be affected by the Proposed Action could be reduced. Impacts to aquifers were discussed in the groundwater section above. Wells Formation, Dinwoody Formation, Salt Lake Formation, and alluvium all support springs or stream reaches in the vicinity of the East Smoky Panel (**Section 3.5.3**).

Smoky Creek is located very close to Project disturbances and is supported by Dinwoody Formation groundwater (BLM and USFS 2002). However, as described in the groundwater section above, contributions to Smoky Creek from that aquifer are not predicted to be diminished. Thus, Smoky Creek baseflows would not likely be impacted by the Proposed Action, nor would there be injury to any water rights on Smoky Creek.

Roberts Creek flows appear to originate from alluvium, Salt Lake Formation groundwater, and/or Dinwoody Formation groundwater, primarily via discharge from a spring designated as URS (**Figure 3.5-13**). However, the source of water for the spring is not well understood and is thought to consist of perched groundwater in the Salt Lake or Dinwoody Formations. If the water for the spring is flowing from the north, the opening of the East Smoky Panel would have negligible impact on the spring. If the water flow is from the west, the impact described in the current narrative would be possible and would be more serious than if the water flow is from the north.

URS, as well as other nearby alluvium/Salt Lake Formation springs ESS-1, ESS-2, and LinS, would likely lose some or all flow with the disruption of much of the up-gradient area. Given the reduction in their recharge areas as well as reduction in their watershed areas, the assumption for this analysis is that URS, ESS-1, ESS-2, and LinS would all cease to flow. Because all four of these water sources contribute to Tygee Creek via the Roberts Creek Diversion, it is further assumed that Tygee Creek flows would be diminished to some extent due to these spring flow losses. These losses are quantified as follows. This analysis would be a conservative assessment if URS and Roberts Creek are supported solely by Dinwoody Formation groundwater to the north. The implication of potential losses to water rights is discussed in a later subsection called *Water Rights and Water Use*.

According to water monitoring data collected during the two-year baseline study for this EIS (**Section 3.5.2.2**), URS, ESS-1, and ESS-2 flow perennially. LinS flowed until midway through the monitoring period but dried up at the source after the water right holder installed new piping and performed earthwork; it has been excluded from this evaluation of Project-related flow decreases. While the presence of flows was noted and samples were collected at URS, ESS-1, and ESS-2, flow rates were generally not measurable due to lack of a confined channel to convey the flow, a diffuse flow path, and/or other prohibitive condition. In contrast, UR-3 is located a short distance downstream of URS and flows were always measurable. Therefore, UR-3 is used as a stand-in for URS flow data. In addition, UR-3 data were used to estimate baseflow rates at ESS-1 and ESS-2.

Considering the September and November flow measurements at UR-3 to represent baseflow conditions (average 0.27 cfs) and the May and July measurements as high flow conditions (average 0.31 cfs), the ratio of the average high flow to the average baseflow is 1.12. Applying that ratio to the high flow measurements at ESS-1 and ESS-2 (0.10 and 0.09 cfs, respectively), the combined estimated baseflow rate of these two springs is 0.17 cfs. In total, the estimated baseflow loss from URS, ESS-1, and ESS-2 that would no longer contribute to Tygee Creek is 0.44 cfs (0.27 + 0.17). Tygee Creek downstream of the mouth of the Roberts Creek diversion (**Figure 3.5-13**; LT-3) had an average baseflow of 0.56 cfs during the two-year baseline monitoring study. Subtracting 0.44 cfs from 0.56 cfs, the estimated impact to Tygee Creek as a result of the loss of flow in the aforementioned springs is a 79 percent reduction in flow at LT-3. Downstream of LT-3, Tygee Creek receives flow from several tributaries (Smoky, Draney, Salt Lick, Webster Canyon, and Spring creeks). At the mouth of Tygee Creek, baseflow is estimated at 13.23 cfs (based upon data collected at LT-6). A reduction of 0.44 cfs at this location has an estimated impact of a 3 percent decrease in baseflow. At LT-3 this impact would be significant, but at LT-6, negligible. Note that these estimates are based upon data collected during a two-year study, which may not reflect longer term flow conditions. Note that the flow estimate methods represent estimates only, and may under- or overestimate the actual flows at ESS-1 and ESS-2. Also note that Simplot has a prior continuing water right that allows them to divert flows from Roberts Creek to the tailings pond, which presumably also causes near-dewatering at LT-3 at times.

Stream flows in Pole Canyon are supported by runoff, springs, and groundwater contributions from the west and up-gradient of Project groundwater flow impacts. The majority of this flow is conveyed in the existing by-pass pipeline that conveys flow from the upstream part of the drainage around the ODA and releases it downstream of the of the mine disturbance. Thus, Pole Canyon baseflow would not be altered by the Proposed Action.

*Sediment and TSS in Runoff*

There are no numeric TSS criteria for aquatic life or other beneficial uses given in Idaho's Water Quality Standards. However, as noted in **Section 3.5.2.3**, sediment/siltation is a stressor that can be the basis of a beneficial use impairment under Idaho's 303(d) list, and TMDLs can be developed for sediment. In addition to - or instead of - TSS concentrations, turbidity measurements and/or streambed substrate pebble counts can be used to indicate sediment impairment (IDEQ 2017b). Turbidity and TSS are typically correlated, and the turbidity water quality standard of 25 nephelometric turbidity units above background was used in IDEQ's TMDL for the Salt River Basin (IDEQ 2017b) to derive a TSS target of 44.5 mg/L for the Smoky Canyon Mine WLA. **Table 3.5-3** notes several Study Area streams that are listed for sediment/siltation impairment in the latest approved (2014) Integrated Report, including Smoky Creek and Tygee Creek. TMDLs were subsequently developed and Simplot was assigned a Smoky Creek TSS wasteload allocation that varies by month (IDEQ 2017c), as described in **Section 3.5.2.3**. The allocation is managed through Simplot's stormwater permit. Under the Proposed Action, potential sediment contributions to Smoky Creek would not increase because stormwater management features route flows to other drainages (**Figure 2.4-1**).

As noted in **Section 2.4.5.2**, stormwater ponds would be constructed and operated to retain sediment and runoff generated from mining disturbance (excluding roads) from all events up to and including the 100-year, 24-hour precipitation depth. Stormwater ponds would discharge in a controlled manner when full, as allowed under the stormwater permit and Simplot's associated SWPPP. In addition, stormwater ditches and diversion channels would be designed to dissipate energy as needed in steep sections, transitions, etc. so that erosion would be minimized in these areas. Thus, it can be assumed that in normal circumstances, most sediments would have settled out of the runoff and be retained in the stormwater ponds (**Section 2.5.5**).

Any discharge from the stormwater ponds treating the north half of the Project Area would either flow toward the tailings pond (which does not discharge) or the existing Roberts Creek Diversion. Sediments deposited upstream of or in the tailings pond would not continue downstream to reach Tygee Creek. Sediments conveyed to the Roberts Creek Diversion would have to be conveyed around the tailings pond in the very low gradient and two-plus mile-long diversion channel before reaching Tygee Creek. Any discharge from the stormwater ponds treating the south half of the Project Area would flow into North Sage Valley. Sediments would have to be conveyed across the valley and into the low-gradient channel on the east side of the valley before continuing south into the main Sage Creek channel.

Given these physical characteristics, combined with the operational management of stormwater runoff, sediments generated from the Proposed Action mining disturbance during operations would not likely increase sedimentation levels in either Tygee Creek or Sage Creek. Once closure and reclamation occurs, on-site sediment sources would be reduced as revegetation and stabilization take place and most ponds would no longer be needed and would be removed.

Further, sediment monitoring would continue to be required of Simplot as part of their stormwater permit conditions. The mineral mining sector-specific monitoring requirement is that stormwater discharges be sampled and analyzed for TSS. The related TSS benchmark is 100 mg/L. This is not a regulatory effluent limit; instead it allows Simplot to assess the effectiveness of its stormwater management and controls, and make improvements if the benchmark is not met. In addition, under the recently approved TMDL (IDEQ 2017b), Simplot must comply with the established WLA for sediment by meeting load requirements.

In sum, sediment and TSS impacts downstream of the stormwater ponds would be negligible and short term.

*Selenium and other COPCs in stream flow*

As described under the groundwater section, the groundwater model under the Proposed Action was evaluated for three percolation rates through the final overburden cover: 2-, 7-, and 15-inches per year. Unsaturated model analysis, and experience with geologic store-and-release cover (or similar evapotranspiration cover) monitoring at the Smoky Canyon Mine suggests that the 7-inch per year percolation rate through the Proposed Action cover is reasonably foreseeable and the groundwater impact modeling for this percolation rate has been selected to evaluate impacts to downgradient surface water. For that percolation rate, the model predicts that the 95% UCL selenium concentration contribution from the Proposed Action would increase to 0.001 mg/L at Hoopes Spring at about 80 years after mining. It would remain at that concentration until at least 300 years after mining. This value represents only the selenium concentration at Hoopes Spring that would be transported in groundwater from beneath the East Smoky Panel. Hoopes Spring receives additional Wells Formation groundwater from other sources, including groundwater that has already been impacted from previous mining activities (Pole Canyon ODA, Panel D, and Panel E). **Table 3.5-4** in **Section 3.5.2.3** reports that during the two-year baseline study for the Project, selenium concentrations at Hoopes Spring ranged from 0.108 mg/L to 0.134 mg/L. The model predicts that no selenium from the East Smoky Panel would reach South Fork Sage Creek Springs (Site LSS) under the 7-inch percolation rate condition for the Proposed Action. **Table 3.5-4** in **Section 3.5.2.3** reports that during the two-year baseline study for the Project, selenium concentrations ranged from 0.013 mg/L to 0.021 mg/L at South Fork Sage Creek Springs.

To evaluate the direct and indirect impacts of selenium releases at Hoopes Spring 80 years after the onset of mining in the East Smoky Panel, the Year 2050 selenium concentrations that were predicted by the RI/FS (Formation Environmental 2014) were selected for the baseline condition at the springs. By 2050, the RI/FS predicted that the selenium concentration would have already peaked and essentially would have reached near steady-state condition. The RI/FS-predicted equilibrium selenium concentrations are approximately 0.025 mg/L for Hoopes Spring and approximately 0.005 mg/L for South Fork Sage Creek Springs (Formation Environmental 2014). The chronic aquatic life criterion for selenium is 0.005 mg/L.

The East Smoky Panel model-predicted selenium concentrations were added to the RI/FS predictions to derive a combined concentration. For Hoopes Spring, the resulting concentration after the Proposed Action groundwater is added would be 0.026 mg/L (0.025 + 0.001), a very small increase. For South Fork Sage Creek Springs, the concentration would be 0.005 mg/L (0.005 + 0.000), or no increase. Therefore, under the aforementioned assumptions, the Proposed Action would have a minor selenium impact at Hoopes Spring and no selenium impact at South Fork Sage Creek Springs. Based upon the model-predicted selenium concentrations and with implementation of the Adaptive Management Plan (AMP) described in **Section 4.5.3** and provided in **Appendix 4B**, the Project should be in compliance with the Clean Water Act. Expected concentrations at both would remain at (for South Sage Fork Creek Springs) or well above (for Hoopes Spring) the chronic aquatic life criterion for selenium.

Discharges from Hoopes Spring and South Fork Sage Creek Springs each continue downstream, eventually joining Sage Creek. The mouth of Sage Creek is represented by LSV-4 in both the Project baseline data and the RI/FS. Sage Creek flows into Crow Creek and two sites downstream of that confluence are considered (CC-1A and CC-WY-01). The baseline monitoring study reported LSV-4 selenium concentrations ranging from 0.023 mg/L to 0.051 mg/L (**Table 3.5-4** in **Section 3.5.2.3**) and the RI/FS reported Year 2050 equilibrium selenium concentrations of 0.014 mg/L during the low-flow scenario (18.02 cfs) and 0.006 mg/L during the high-flow scenario (40.46 cfs) (Formation Environmental 2014). Of these values, the RI/FS low-flow selenium concentration (0.014 mg/L) was chosen to represent the baseline condition at LSV-4. The analogous selenium values for the two Crow Creek sites are 0.006 mg/L at CC-1A and 0.005 mg/L at CC-WY-01. (The high-flow values represent a less conservative, short-term seasonal condition so they were not considered further.) **Table 3.5-4** shows that selenium concentrations measured at these two Crow Creek sites during the low flow seasons of the two-year baseline study were approximately 0.02 mg/L.

In sum, both the current and the predicted Year 2050 selenium concentrations at LSV-4 and CC-1A are above the 0.005 mg/L chronic aquatic life criterion. With or without the addition of the Proposed Action load, they would remain above that criterion for the long term due to loading from past mine operations that would continue. At the Idaho-Wyoming State Line (CC-WY-01), the RI/FS equilibrium condition predicted a selenium concentration of 0.005 mg/L would remain essentially unchanged with the addition of the Proposed Action loading.

In addition to selenium, HGG (2017) modeled the fate and transport of sulfate, TDS, and manganese. However, the RI/FS (Formation Environmental 2014) modeling focused solely on selenium. That effort did not include other COPCs because the RI found selenium to be the principal COPC at the Smoky Canyon Mine and an indicator for other COPCs. Therefore, the HGG predictions are only compared to baseline data collected over the two-year monitoring program for the East Smoky Panel (Stantec 2017a) to assess surface water impacts from the Project. Further, there are no Idaho aquatic life criteria for these three constituents. Although not strictly applicable to the area streams, the same EPA secondary drinking water standards that are used for the groundwater analysis were used as a means of comparison for baseline surface water quality data in **Section 3.5** and are referenced below as well. These were used to provide a measure of conservatism as well as continuity with the groundwater analysis.

Under the Proposed Action 7-inch percolation rate condition, HGG (2018) predicted no sulfate, TDS, or manganese load reaching Lower South Fork Sage Creek Springs from the Project over the model simulation period of 300 years. That same analysis predicted a maximum added sulfate concentration of 3 mg/L, a TDS concentration of 13 mg/L, and a manganese concentration of 0.047 mg/L at Hoopes Spring. Comparing the first two values to Hoopes Spring sulfate and TDS concentrations measured during the two-year baseline monitoring program, as shown in **Figure 3.5-17** and **Table 3.5-2**, indicates that the Proposed Action contribution of those two constituents to Hoopes Spring would be a 4 to 5 percent increase over current concentrations. There are no surface water quality standards for sulfate or TDS.

For manganese, the predicted 0.047 mg/L concentration contributed from the Proposed Action to Hoopes Spring at 300 years represents a greater increase over the baseline condition than sulfate or TDS. As reported in Stantec (2017a), the baseline manganese concentration for Hoopes Spring ranged from 0.00021 mg/L (between the detection limit of 0.000019 mg/L and the reporting limit of 0.001 mg/L) to 0.003 mg/L. Thus, the predicted concentration arriving at 300 years at Hoopes

Spring from the Project is one or more orders of magnitude greater than the measured manganese values at Hoopes Spring over the past two years. Further downstream, at the mouth of Sage Creek (LSV-4), manganese concentrations ranged from 0.0068 mg/L to 0.0159 mg/L during the baseline study (Stantec 2017a). Because of the predicted added manganese at Hoopes Spring, manganese concentrations in Sage Creek would likely increase. However, the maximum baseline manganese concentration of 0.0159 mg/L at LSV-4 and the predicted concentration of 0.047 mg/L at Hoopes Spring are both less than EPA's secondary drinking water standard of 0.05 mg/L and there is no aquatic life standard for manganese. No exceedance of an EPA or state water quality standard is predicted to result from the increased manganese load coming from Hoopes Spring.

*Other Pollutants*

Accidental releases of materials associated with mining such as oils and chemicals represent potential impacts to surface water quality during the life of the mining activity.

Potential hydrocarbon-related effects to water quality would be minimized through non-structural BMPs in the SWPPP and secondary containment and other procedures in Simplot's SPCC Plan. Vehicle accidents, which would presumably be rare, could also release fuel, oil, or other substances to the road drainage network. In the event of any such releases, standard response and cleanup practices would occur, but there could be some short-term effects on water quality and biotic stream components if spilled materials reached nearby streams. The potential for such spills to occur would be low and the potential for stream impact even less so. These impacts are considered to be negligible to minor, site-specific, and short-term.

*Water Rights and Water Uses*

There are two ways in which water rights to surface waters could be affected: by reducing or eliminating spring discharge or streamflows; or by impacting water quality in a manner that would preclude the beneficial uses for which the right is granted. USFS's Smoky Creek stockwater rights (#24-10097, #24-10098) would not be affected as there are no impacts predicted to that stream's water quantity or quality. Roberts Creek water rights are held by Simplot and thus any loss of flow would be borne by them and not considered a water right impact. Pole Canyon water rights down gradient of the East Smoky Panel (#24-4078) are held by Simplot and thus any water quality degradation would be borne by them and not considered a water right impact.

LinS is a spring sourced in the alluvium and/or Salt Lake Formation downgradient of the East Smoky Panel pit. It has a water right (#24-7183) held by Crow Creek Ranches for stock watering. Water at the source dried up mid-way through the baseline monitoring study due to earthwork initiated by the water right holder, presumably to develop and direct more spring flow to their place of use. LinS was therefore not included in the previous prediction of decreases in flow to Tygee Creek. However, it is possible that this water right could be impacted by the Proposed Action and may require mitigation as discussed in **Section 4.5.3**.

A stockwatering right (#24-10389) is held by BLM in Tygee Creek downstream of the Roberts Creek diversion and upstream of Smoky Creek. It is for 0.02 cfs, and based upon the impact noted above for this reach of Tygee Creek, could be negatively impacted by the Proposed Action.

Simplot would not need to obtain any new surface water rights, nor would any changes to their existing surface water rights (such as place of use, point of diversion, nature of use) be needed.

Regarding water use that may be affected, the RFP (USFS 2003a) states that "Loss of available surface water sources for uses such wildlife or grazing, as a consequence of mining operations shall be replaced or mitigated…”. This statement implies that Simplot would have to replace all lost waters that have such uses, even if they are unattached to a water right. Thus, mitigation measures described in **Section 4.5.3** would need to be implemented and result in impacts to water rights being minor, site-specific, and short-term.

#### 4.5.2.2 Alternative 1 Reduced Pit Shell with Soil-only Cover

**Groundwater**

Alternative 1 includes steeper pit slopes than the Proposed Action which would allow mining activities to avoid including Cherty Shale overburden in the pit backfill. Geotechnical evaluation (CNI 2017) has indicated that these steeper slopes should be stable. However, in the unexpected case where some slope instability was experienced on the east side of the pit, it may be necessary to layback the unstable part of the slope which could, in turn, require mining the Cherty Shale in the affected area. Depending on the amount of Cherty Shale that would be involved in the layback, the relative amount of Cherty Shale incorporated into the pit backfill would range between the amount included in the Alternative 1 (0%) to that of the Proposed Action (2.7%) (Stantec 2017e). Further, the material balance for Alternative 1 contains relatively less Salt Lake Formation, Dinwoody Formation, and Rex Chert than the Proposed Action. It also contains relatively more Meade Peak Waste and Limestone than the Proposed Action.

As noted in **Section 4.5.2** and **4.5.1.1**, the same modeling approach and methodology were used for Alternative 1 as for the Proposed Action. As with the Proposed Action modeling, three annual percolation rates (2-inch, 7-inch, and 15-inch) through the pit backfill covers were evaluated for Alternative 1 (soil only cover over overburden) using the stochastic modeling approach. The cover modeling indicated the annual percolation rate was about 13 to 14 inches per year for the case where high permeability sand was located below the topsoil layer. The 15-inch percolation rate is, in effect, the rate applicable to a simple soil layer over the overburden and is considered the reasonably foreseeable long-term average percolation rate for Alternative 1 based upon ongoing monitoring that Simplot conducts. Based on this, it was concluded that an annual recharge under Alternative 1 of 15 inches per year would be the basis for impact assessment, compared to 7 inches per year for the Proposed Action.

A conservative evaluation of the impact of this occurrence to groundwater quality and on Hoopes Spring was done by modeling the effect of a 15-inch per year percolation rate on the Proposed Action. The water quality results of this model are compared to the model results for Alternative 1 in **Table 4.5-8**.

**Table 4.5-8 Comparison of 15-inch Percolation for Proposed Action and Alternative 1**

| ALTERNATIVE 1 WITH 15-INCH PERCOLATION | | |
|---|---|---|
| Max Se at Hoopes Spring | 0.0007 mg/L | 80 years |
| Max Se Under Pit | 0.051 mg/L | 35 years |
| **PROPOSED ACTION WITH 15-INCH PERCOLATION** | | |
| Max Se at Hoopes Spring | 0.002 mg/L | 60 years |
| Max Se Under Pit | 0.07 mg/L | 74 years |

Continued flushing of the pit backfills reduces the selenium concentrations over time. The peak selenium concentrations under the pit backfill for Alternative 1 decreases to less than 0.03 mg/L by around 40 years and continues to decrease to below 0.02 mg/L by 50 years. For the 15-inch percolation case with the Proposed Action pit backfill, the selenium concentration under the pit is less than 0.04 mg/L by 40 years and below 0.02 mg/L by 60 years.

Based on the above analysis, if there was a need to mine Cherty Shale under Alternative 1 as a result of unexpected pit slope stability and an associated layback on the east side of the pit, and that Cherty Shale were incorporated into the pit backfill, the maximum selenium concentration under the pit backfill would range from 0.05 and 0.07 mg/L. Under this same scenario, the selenium contribution to Hoopes Spring would range from 0.0007 mg/L and 0.002 mg/L.

The benefit of Alternative 1 largely derives from eliminating the contribution of selenium and manganese from the Cherty Shale (PV1: 2.07 and 9.13 mg/L, respectively) to the backfill mix relative to the Meade Peak Waste (PV1: 0.1448 and 0.83 mg/L, respectively). However, the increased percentage of Meade Peak Waste under the Alternative 1 material balance (33.6 percent compared to 25.55 percent) does contribute additional amounts of other COPCs compared to the Proposed Action, most notably total cadmium and thallium. For reasons described previously under the Proposed Action *Seepage Chemistry* subsection, cadmium and thallium were not carried through for fate and transport modeling due to the closeness to the applicable standard for PV1 only.

*Groundwater Flow to Open Pits*

Based on the information provided by Simplot (2017), the pit base contours for Alternative 1 would range from about 30 to 140 vertical feet above the Wells Formation aquifer in the Project Area, so groundwater from the regional aquifer would not flow into the open pits. However, during mining of the deeper benches of Phases 6 and 7, pit excavation could seasonally intersect the upper portion of the Wells Formation where mean groundwater elevations at wells GW-16 and GW-29 are within 5 to 10 feet of the base of the proposed pit excavation.

Similar to the Proposed Action, because of the relatively low hydraulic conductivity and the perched water table conditions in the shallow groundwater systems that would be intercepted during the pit disturbance for Alternative 1, the amount of water added to the open pits from potential seeps is considered to be negligible compared with the net percolation through the surface of the pit backfills. Also, similar to the Proposed Action, because of the pit disturbance, groundwater flow in the shallow systems is expected to be reduced and could potentially reduce flow in springs downgradient from the Project Area, although the degree of the impact is unknown due to the uncertainty of groundwater flow direction supporting these springs.

*Groundwater Recharge*

For Alternative 1, the footprint of the pit disturbance decreases approximately 78 acres compared to the Proposed Action. The reduction is accomplished by steepening the pit wall slopes, as provided in Simplot's mining alternative memorandum (Simplot 2017). By decreasing the footprint of the pit, the total recharge area is also reduced thus contributing less infiltration into the underlying groundwater system compared to the Proposed Action. Groundwater recharge of the Wells Formation in the proposed pit area would be approximately a 2 percent increase in the local recharge area (10,536 acres) of the Wells Formation and Brazer Limestone from current conditions, and about 1 percent less than the recharge area for the Proposed Action (303 acres).

*Groundwater Extraction*

Pumping of the industrial well and culinary well are expected to be the same for Alternative 1 as for the Proposed Action.

<u>Seepage Chemistry</u>

The chemistry of the seepage through the East Smoky Panel backfill under Alternative 1 was determined as described for the Proposed Action. **Tables 4.5-2**, **4.5-3**, **4.5-4**, and **4.5-5** provided results for both the Proposed Action and Alternative 1, so that the two could easily be compared. As with the Proposed Action, adding overburden from Alternative 1 to the Panel B backfill would not increase the selenium or cadmium concentration of seepage through the Panel B backfill (**Table 4.5-3**), so additional groundwater impact analysis of this change to the B-Panel backfill is not required for this Alternative either. The manganese column test results in **Table 4.5-4** for Alternative 1 are greater than the Panels B&C results. Last, the volume of Alternative 1 overburden to be added to the Panel B backfill from the East Smoky Panel is 12.6M LCY (**Table 4.5-5**).

*Potential Mobilization of COPCs/Impact to Wells Formation*

As with the Proposed Action, the stochastic model generated multiple model results for each COPC in the Wells Formation over a modeled period of 300 years for Alternative 1 (HGG 2018). Plume maps for the 100 year and 300 year-time periods are included for selenium (**Figures 4.5-6** and **4.5-7**) and manganese (**Figures 4.5-8** and **4.5-9**) for reference. Additionally, as mentioned earlier, only the reasonably foreseeable condition (15-inch percolation rate for Alternative 1) is considered relevant for presentation of potential impacts for the EIS. The HGG (2018) modeling report provides the full range of results for all scenarios.

The stochastic results of the fate and transport predictions for COPC concentrations in the Wells Formation under the reasonably foreseeable condition of the 15-inch percolation rate for Alternative 1 is summarized at selected time steps in **Table 4.5-9** below at the groundwater model observation points.

*<u>Selenium</u>*

Selenium does not exceed the groundwater standard (0.05 mg/L) at any time during the 300-year model simulation time frame for the Alternative 1 simulation (15-inch percolation rate).

Selenium concentrations exceed 0.03 mg/L after 10 years directly beneath the pit backfill and continue to increase for the duration of PV1. After 35 years, selenium concentrations decrease rapidly as a result of continued percolation and by 50 years all concentrations under the backfill are less than 0.04 mg/L. At 80 years, concentrations under the backfill have decreased below 0.01 mg/L and continue to decrease in concentration for the duration of the 300-year simulation. By the end of the modeled period, concentrations under the backfill are about 0.007 mg/L.

Throughout the plume, selenium concentrations decrease with time with the exception of the very lowest concentration (0.001 mg/L), which continues to spread southward and northward. The selenium concentration peaks at just over 0.0007 mg/L at Hoopes Spring at 80 years and then gradually decreases. During the entire simulation, the selenium concentration at Hoopes Spring remains at less than 0.001 mg/L. No impacts were observed at Lower South Fork Sage Creek Springs during the entire simulation. Hoopes Spring and Lower South Fork Sage Creek Springs are not shown in **Table 4.5-9**, but are discussed further in the Surface Water section.

## Table 4.5-9 Model Predictions of COPC Concentrations – Alternative 1

| COPC GROUNDWATER | STANDARD | YEARS | MODEL OBSERVATION POINTS (ONLY GROUNDWATER LOCATIONS)* | | | |
|---|---|---|---|---|---|---|
| | | | OBS-1 | OBS-2 | GW-27 | GW-IW |
| Selenium, total (mg/L) | 0.05 | 10 | 0.001 | 0.016 | 0.000 | 0.000 |
| | | 50 | 0.012 | 0.022 | 0.001 | 0.000 |
| | | 100 | 0.008 | 0.016 | 0.002 | 0.000 |
| | | 200 | 0.006 | 0.013 | 0.001 | 0.000 |
| | | 300 | 0.006 | 0.012 | 0.001 | 0.000 |
| Manganese, total (mg/L) | 0.05 | 10 | 0.009 | 0.259 | 0.000 | 0.000 |
| | | 50 | 0.242 | 0.503 | 0.020 | 0.000 |
| | | 100 | 0.251 | 0.525 | 0.033 | 0.000 |
| | | 200 | 0.264 | 0.556 | 0.040 | 0.000 |
| | | 300 | 0.268 | 0.565 | 0.042 | 0.000 |
| Sulfate, total (mg/L) | 250 | 10 | 1 | 36 | 0 | 0 |
| | | 50 | 26 | 49 | 3 | 0 |
| | | 100 | 17 | 36 | 3 | 0 |
| | | 200 | 14 | 31 | 3 | 0 |
| | | 300 | 13 | 28 | 3 | 0 |
| Total Dissolved Solids (mg/L) | 500 | 10 | 7 | 220 | 0 | 0 |
| | | 50 | 184 | 368 | 17 | 0 |
| | | 100 | 151 | 314 | 25 | 0 |
| | | 200 | 135 | 285 | 25 | 0 |
| | | 300 | 128 | 271 | 24 | 0 |

Notes:

* Surface Water Monitoring Points HS and LSS are not included in the table, but discussed in the following sections/Surface Water.

1) COPC concentrations are the 95% upper confidence limit based on the population mean as predicted by the model.

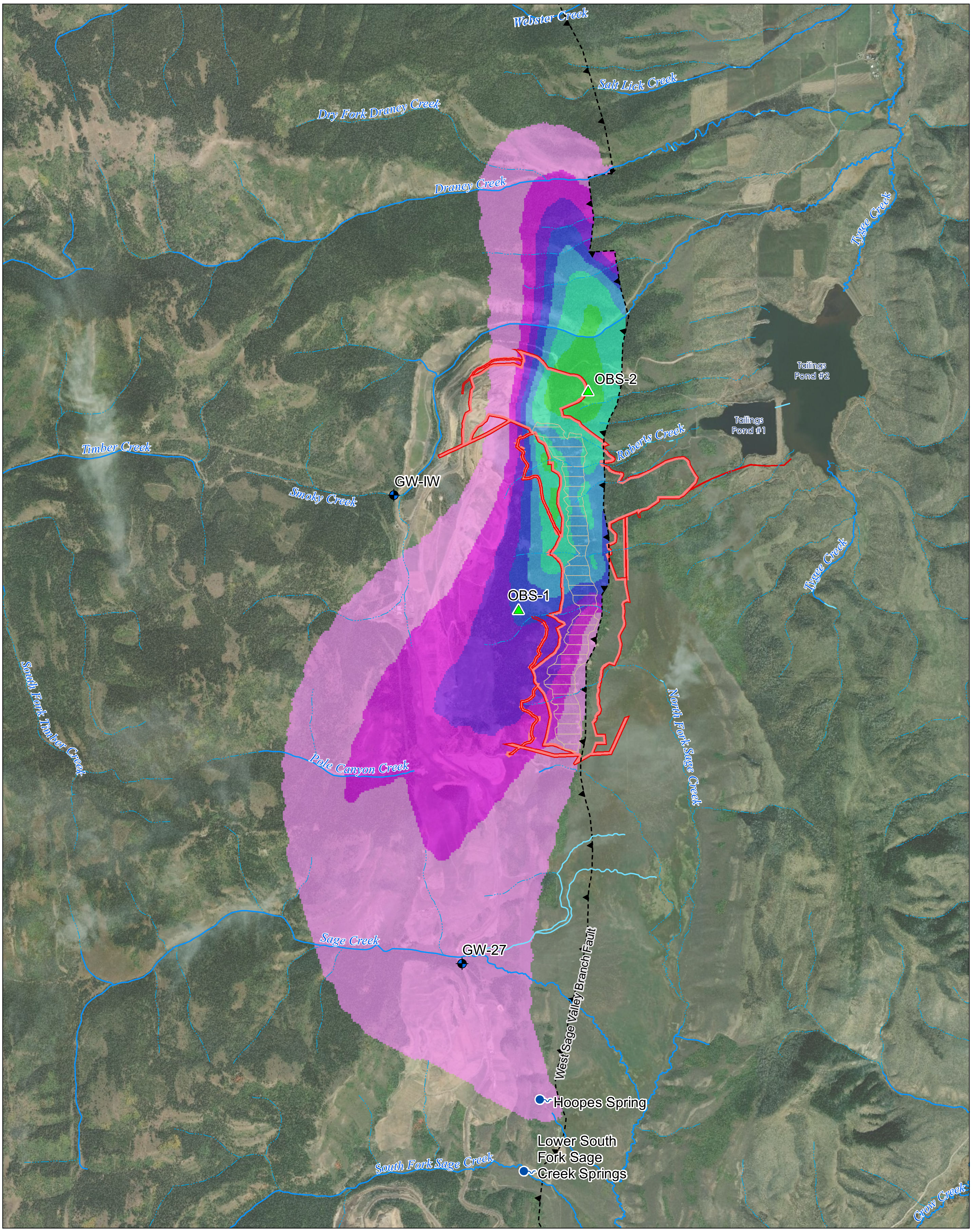
2) Shaded cells have concentrations exceed the applicable groundwater standard (note that manganese exceedances are above the secondary standard governing aesthetics, not health).

3) Observation Locations:

OBS-1 & OBS-2 are model-derived observation points.

GW-27 is an existing Wells Formation monitoring well located approximately downgradient of the proposed pit excavation.

GW-IW is the existing industrial well located to the west of the proposed pit excavation that would be used for water supply, estimated at 500 gpm.



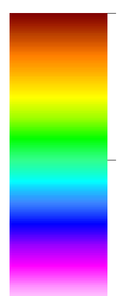

**Legend**

- Stream/River
- Intermittent Stream
- Other Waterway
- Thrust Fault
- Project Area Boundary
- Alternative 1 Pit Disturbance

**Observation**

- Wells Formation Groundwater Monitoring Well Location
- Model Observation Location
- Spring/Seep

**Model-Predicted Selenium Concentrations at 100 Years milligrams per Liter (mg/L)**




Note: Primary groundwater standard for selenium is 0.05 mg/L.

**Notes**

**1.** Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet
**2.** Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
**3:** Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
**4:** Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

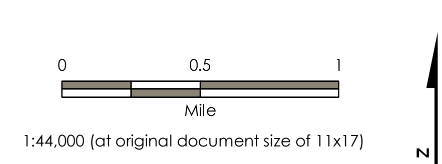
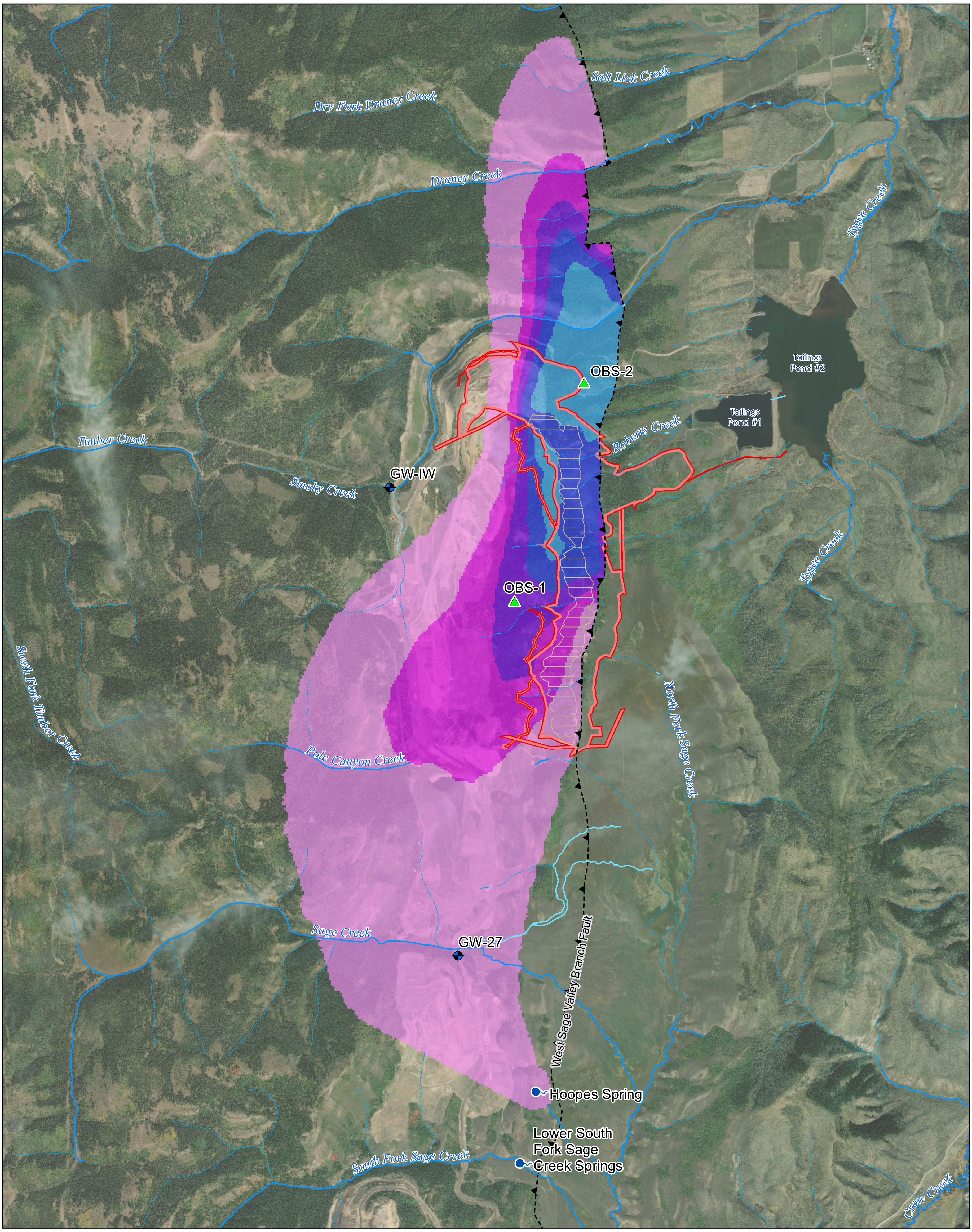



**Figure 4.5-6**
**Alternative 1 - Reduced Pit Shell, Model-Predicted Selenium Concentrations at 100 Years East Smoky Panel Mine EIS**




**Legend**

Stream/River

Intermittent Stream

Other Waterway

Thrust Fault

Project Area Boundary

Alternative 1 Pit Disturbance

**Observation**

Wells Formation Groundwater Monitoring Well Location

Model Observation Location

Spring/Seep

**Model-Predicted Selenium Concentrations at 300 Years milligrams per Liter (mg/L)**

0.05

0.025

0.015

0.007

0.001

Note: Primary groundwater standard for selenium is 0.05 mg/L.

Notes

**1.** Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet

**2.** Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**3:** Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.

**4:** Project Location: T8S R46E, T9S R46E Caribou County, Idaho

0 0.5 1

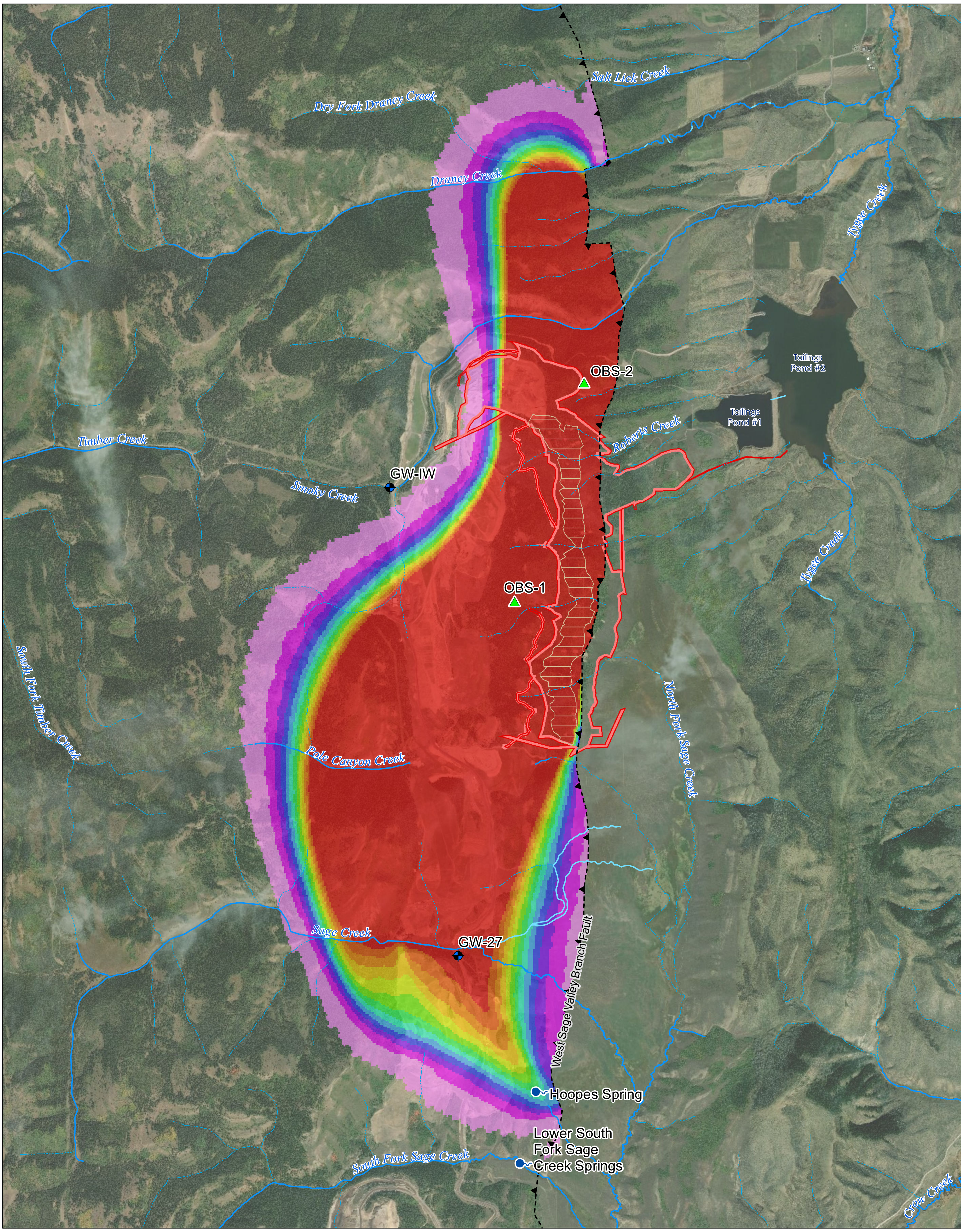
Mile

1:44,000 (at original document size of 11x17)

N

**Figure 4.5-7**

**Alternative 1 - Reduced Pit Shell, Model-Predicted Selenium Concentrations at 300 Years East Smoky Panel Mine EIS**




**Legend**

- Stream/River
- Intermittent Stream
- Other Waterway
- Thrust Fault
- Project Area Boundary
- Alternative 1 Pit Disturbance

**Observation**

- Wells Formation Groundwater Monitoring Well Location
- Model Observation Location
- Spring/Seep

**Model-Predicted Manganese Concentrations at 100 Years milligrams per Liter (mg/L)**

0.05
0.025
0.015
0.007
0.005

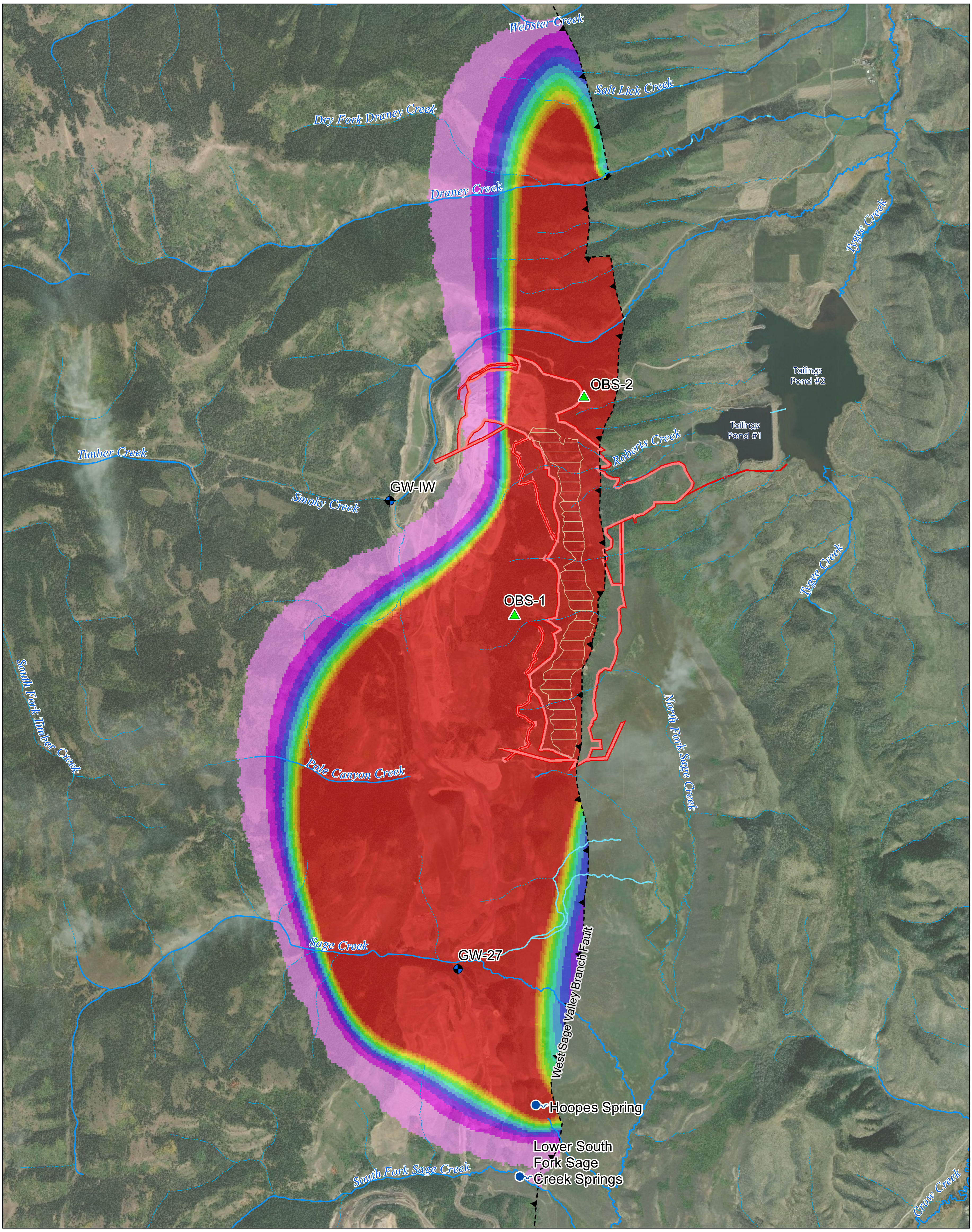
Note: Secondary groundwater standard for manganese is 0.05 mg/L.

Notes

1. Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet
2. Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
3: Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4: Project Location: T8S R46E, T9S R46E Caribou County, Idaho

0 0.5 1
Mile
1:44,000 (at original document size of 11x17)
N

**Figure 4.5-8**
**Alternative 1 - Reduced Pit Shell, Model-Predicted Manganese Concentrations at 100 Years East Smoky Panel Mine EIS**




**Legend**

Stream/River

Intermittent Stream

Other Waterway

Thrust Fault

Project Area Boundary

Alternative 1 Pit Disturbance

**Observation**

Wells Formation Groundwater Monitoring Well Location

Model Observation

Spring/Seep

**Model-Predicted Manganese Concentrations at 300 Years**
**milligrams per Liter (mg/L)**

0.05
0.025
0.015
0.007
0.005

Note: Secondary groundwater standard for manganese is 0.05 mg/L.

**Notes**
**1.** Coordinate System: NAD 1983 StatePlane Idaho East FIPS 1101 Feet
**2.** Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
**3:** Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
**4:** Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 0.5 1
Mile
1:44,000 (at original document size of 11x17)

N

**Figure 4.5-9**
**Alternative 1 - Reduced Pit Shell, Model-Predicted Manganese Concentrations at 300 Years**
**East Smoky Panel Mine EIS**

*Manganese*
For the Alternative 1 simulations, manganese concentrations in Wells Formation groundwater exceed 0.6 mg/L after 10 years beneath the pit backfill and move to the south, southwest and north over the simulation period. Manganese concentrations under the backfill peak at the end of the PV1 after 35 years at 0.8 mg/L and then gradually decrease and stabilize at about 0.6 mg/L by the end of the simulation. Manganese concentrations of 0.001 mg/L reach Hoopes Spring after 35 years with the concentration gradually increasing to slightly less than 0.02 mg/L by the end of the simulation. No impacts were observed at Lower South Fork Sage Creek Springs during the entire simulation. There is no surface water standard for manganese.

*Sulfate*
For most of the modeled simulation for sulfate, groundwater concentrations in the Wells Formation are much less than the 250 mg/L groundwater standard. By 10 years, a 200 mg/L sulfate plume develops under the pit backfill. After 35 years at the end of the PV1, the concentration under the backfill rises above 250 mg/L, but then decreases to less than 50 mg/L by the 100-year time period. Concentrations under the pit continue to reduce for the duration of the simulation to about 20 mg/L at 300 years. The sulfate concentration at Hoopes Spring peaks at 2 mg/L in years 80 and 90 and then drops to 1 mg/L for the remainder of the simulation period. No impacts were observed at Lower South Fork Sage Creek Springs during the entire simulation. There is no surface water standard for sulfate.

*Total Dissolved Solids*
TDS concentrations in Wells Formation groundwater are typically much less than the 500 mg/L groundwater standard during the model-simulated time period. However, initially at about 10 years, TDS concentrations exceed 500 mg/L beneath the pit backfill and peak at 670 mg/l after 35 years. By 50 years, the plume under the backfill is mostly less than 400 mg/L and continues to decrease in concentration, reaching less than 300 mg/L by 100 years and about 250 mg/L by the end of the simulation.

TDS concentrations of 1 mg/L reach Hoopes Spring after 35 years. The concentration at Hoopes Spring increases to about 11 mg/L at 210 years, after which it gradually decreases for the duration of the simulation. No impacts were observed at Lower South Fork Sage Creek Springs during the entire simulation. There is no surface water standard for TDS.

## Surface Water

Impacts to surface water resources in regard to watershed disturbances, flow alterations, sediment and TSS loading, accidental release of pollutants such as hydrocarbons, water rights, and water uses, would be similar in level as predicted for the Proposed Action. Surface water impacts from groundwater release from the East Smoky Panel area to Hoopes Spring and Lower South Sage Creek Springs is assessed using the 15-inch percolation rate considered in groundwater modeling to reflect the use of a topsoil-only cover. The model predicted slightly less selenium loading at Hoopes Spring and Lower South Sage Creek Springs as predicted for the Proposed Action 7-inch percolation rate. That same analysis predicted a maximum added sulfate concentration of 1 mg/L, a TDS concentration of 11 mg/L, and a manganese concentration of 0.019 mg/L at Hoopes Spring, which are all slightly lower than under the Proposed Action condition. The weighted average concentrations for manganese in the Panel B leachate for either of the East Smoky Panel action alternatives is greater than that already analyzed in the Panels B&C EIS.

## No Action Alternative

### Groundwater

Existing conditions would continue for the foreseeable futures, which includes elevated selenium concentrations in groundwater at various locations associated with the Smoky Canyon Mine and at downstream locations. No impacts to groundwater from mining the East Smoky Panel would occur as it would not be approved.

### Surface Water

No impacts to surface water from mining the East Smoky Panel would occur as it would not be approved and existing conditions in Project Area would continue in the short term. Beyond those already addressed, predicted, or occurring due to other already permitted activities at the Smoky Canyon Mine, there would be no new changes to watershed boundaries, stream flow alterations, sediment or TSS loading; no new potential for hydrocarbon or other chemical spills; and no implications for water rights or existing water uses. At least initially, the surface waters that currently have elevated selenium concentrations due to the Smoky Canyon Mine would continue to have elevated levels. Total selenium concentrations would continue to be above the 0.005 mg/L chronic aquatic life standard, and often at or over the 0.02 mg/L acute standard, based upon the baseline study results. Selenium exceedances reported during the baseline study (Stantec 2017a) were shown in **Table 3.5-4**, and are further detailed as follows. Eight samples collected at Hoopes Spring (HS) had total selenium concentrations that ranged from 0.108 to 0.134 mg/L and the single sample collected at Hoopes Spring Creek (HS-3) had a total selenium concentration of 0.094 mg/L. The eight samples from Lower Sage Creek below Hoopes Spring (LSV-2) had total selenium concentrations between 0.028 and 0.074 mg/L; the eight from LSV-3 ranged between 0.024 and 0.051 mg/L; and the eight from LSV-4 ranged from 0.023 and 0.051 mg/L. Eight samples were also collected from Lower South Fork Sage Creek (LSS), with total selenium ranging from 0.013 to 0.021 mg/L. Total selenium concentration in Crow Creek below Sage Creek (CC-1A) ranged from 0.011 to 0.023 mg/L in eight samples; eight samples collected downstream at the Wyoming State line (CC-WY-01), had total selenium concentrations ranging from 0.01 to 0.022 mg/L. While there is no known available selenium data downstream of the State line, it can be assumed that selenium remains elevated for some unknown distance in Crow Creek downstream into Wyoming.

According to the Smoky Canyon Mine RI/FS (Formation Environmental 2014), selenium concentrations in these surface waters are predicted to peak between 2015 and 2018 and are projected to decrease markedly from 2018 until approximately 2030, when they are expected to decline more gradually. Concentrations at modeled locations HS-3, LSS, LSV-3, LSV-4, CC-1A, and CC-WY-01 are predicted to level off and stabilize by 2050 at much lower than current levels, but still generally higher than the current chronic aquatic life standard, particularly under low-flow conditions. Specifically, the 2050 predicted HS-3 and LSS year-round selenium concentrations are 0.025 and 0.005 mg/L, respectively. The 2050 predicted low-flow selenium concentrations at the modeled downstream sites are: 0.015 mg/L (LSV-3); 0.014 mg/L (LSV-4); 0.006 mg/L (CC-1A); and 0.005 (CC-WY-01). These declines are predicted based upon the anticipated effectiveness of various Pole Canyon remedial actions (e.g., bypass pipeline, infiltration basin, run-on diversions, ODA capping) and decreasing source contributions (e.g., Panel A, Pole Canyon ODA, Panel D, and Panel E). Pole Canyon Creek selenium concentrations have already been greatly reduced due to the 2006 remedial actions (Formation Environmental 2014). In addition, while Hoopes Spring and South Fork Sage Creek Springs are considered the largest contributors of selenium to local surface waters, including Crow Creek via Sage Creek, additional potential minor sources are Pole Canyon alluvium and accumulated selenium residing in North Sage Valley (Formation Environmental 2014).

In addition to the remedial actions described above, Simplot proposed in 2014 to perform a pilot treatability study at the Smoky Canyon Mine to reduce the selenium concentration of the water discharged at Hoopes Spring and South Fork Sage Creek Springs to improve the water quality of the receiving streams. The proposal included collecting water from the two spring complexes and piping it to a central water treatment pilot plant (WTPP) where selenium would be removed from the influent water prior to it being discharged to Sage Creek. The water quality of the WTPP effluent would need to meet the water quality criteria established by the regulatory agencies for Sage Creek.

Several water treatment technologies were preliminarily considered and some of them were tested between 2009 and 2013 at the site including: active anaerobic biological reduction, zero-valent iron, reverse osmosis, and semi-passive biological treatment. Based on this evaluation, Simplot proposed in 2014 to pilot test an active anaerobic fluidized bed reactor (FBR) to complete a biological reduction process with additional polishing of water quality to control ammonia, biological oxygen demand (BOD), chemical oxygen demand (COD), phosphorus, and total organic carbon in the WTPP effluent. The FBR system removes selenium from the water via biological activity in a chemically reducing environment and the precipitated non-hazardous elemental selenium and biosolids are periodically backwashed to a settling tank. The sludge from the settling tank is periodically transferred to a sludge storage tank before being transported offsite for disposal.

The Phase 1 proposed pilot test was for 250 gpm in 2014 with plans to increase flow to 1,000 to 2,000 gpm (Phase 2) if the FBR technology was proven to be effective at the site. The proposed Phase 1 pilot plant incorporated a number of treatment technologies that have proven track records in other applications including: filtering, pH control, anaerobic FBR, sulfide oxidation, phosphorus precipitation, settling, and sludge handling.

The Phase 1 pilot treatment plant started up in late 2014 and treated 200 to 250 gpm on and off during start-up and troubleshooting and has been effectively operating since March 2015. Between March 2015 and March 2017 plant effluent selenium concentrations ranged from 0.005 to 0.010 mg/L with a mean of 0.0083 mg/L (all concentrations expressed as total selenium). The influent selenium concentration ranged from 0.113 to 0.138 mg/L with a mean of 0.126 mg/L, resulting in an average decrease in selenium concentrations of 93 percent.

Based on the Phase 1 results, Simplot proposed in early 2015 to add ultra-filtration (UF) and Reverse Osmosis (RO) systems and finalize designs to construct and operate the Phase 2 pilot treatment plant intended to treat 2,000 gpm. To increase treatment flows and efficiencies in the FBR step, the treatment plant was augmented with an additional FBR unit identical to the Phase 1 FBR unit (2 units total) and the influent water was proposed to be pretreated through UF membranes followed by RO membrane treatment (3 units each). The UF step removes fine particulates that could foul the RO membranes while the RO step separates the remaining 2,000 gpm of filtered influent into about 1,500 gpm of very low selenium RO permeate (<0.0006 mg/l) and 500 gpm of high selenium RO concentrate. The RO concentrate feeds the two FBR units for selenium removal while the RO permeate is mixed with the treated effluent from the FBR and polishing systems.

Treated water from the two FBR units is pumped to a post-treatment polishing system that first aerates the sulfides and COD in the FBR discharge water and then removes the resulting solids with a gravity clarifier and sand filters. Phosphorus and any carryover biological solids are also removed with alum or ferric chloride addition. The thickened solids from the clarifier are pumped to the sludge storage tank until it is transported for offsite disposal. Effluent from the post-treatment polishing system is combined with the RO permeate in an effluent blending tank and aerated again before discharge to the plant outfall on Sage Creek.

All the treatment steps proposed for the Phase 2 pilot treatment plan are standard technology with a proven track record in other applications. Based on the experience at the site with the FBR and post-treatment polishing steps it is reasonably foreseeable that the Phase 2 treatment train will also be effective in removing selenium and other contaminants from the treated water. The Phase 2 treatment system was planned to be operational in summer 2017. However, construction delays did not allow the start of commissioning services until August. The fully commissioned WTPP came on line in November 2017.

The effect of the WTPP operation on the selenium concentrations in the Sage Creek drainage downstream will be evaluated during the future monitoring of the WTPP and downstream locations. However, based on the monitoring of the Phase 1 WTPP operations, it is reasonably foreseeable that the operation of the Phase 2 WTPP will significantly reduce selenium concentrations in the receiving streams.

### 4.5.3 Mitigation Measures

Springs currently in use that are disrupted by mining under the Proposed Action or Alternative 1 would be replaced with alternate, permanent, and generally equivalent water sources by Simplot, in accordance with the RFP requirements and as described below. Springs that were predicted to potentially be lost were described under the Baseflow Reductions heading above, and include URS, ESS-1, ESS-2, and LinS. These feed Roberts Creek, Roberts Creek Diversion, and/or Upper Tygee Creek, which could experience reduced flows.

This replacement would be done for springs that are affected either during (short-term) or after (long-term) mining operations. The specific type of water source replacement would be determined on a case-by-case basis in concert with the appropriate resource specialists (hydrology, range, wildlife), and if necessary, grazing permittees, as applicable if on NFS land. Depending upon the location and the existing use of a water source, its replacement plans may need to consider wildlife other than just the large mammals (i.e., insects, amphibians, birds). The projects would be designed by Simplot, reviewed and approved by the USFS (as applicable for projects on NFS land), constructed (and operated) by Simplot, and monitored for effectiveness by Simplot. Monitoring results would be submitted to the CNF on a regular basis (as applicable for projects on NFS land). In some cases, supplemental NEPA analysis may also be required. Water rights may need to be acquired or modified following Idaho State rules, laws, and regulations. These spring mitigation measures would not necessarily restore the original functions and values of any wetlands at the native springs that are being replaced; these measures and their duration would be determined by USFS on a case-by-case basis.

Replacement options that would be considered include, but are not limited to:

1. Supplying new water tanks with water hauled and/or piped by Simplot;
2. Improving water flow or retention (ponding) at springs near the disturbed area to compensate for springs disrupted within the disturbed area, and/or fencing them (while considering the ramifications of fencing on specific species such as bats);
3. Building new livestock/wildlife watering ponds;
4. Building guzzlers, some of which could accommodate various species by using alternate guzzler designs such as ramps, etc. (i.e., gallinaceous guzzlers);
5. Designing some mine runoff and sediment retention ponds to be available to livestock and wildlife, while monitoring water quality to ensure it is suitable for their consumption;
6. Drilling small water wells into local aquifers with windmills to supply water tanks; and,
7. Enhancing nearby existing stock ponds that typically dry up early in the summer with bentonite sealing of the bottom, thereby extending their season of usefulness.

Water resources monitoring sites pertaining to this Project would be added to the current water monitoring program at Smoky Canyon Mine.

Roads would be designed, constructed, and operated to prevent a fuel or oil spill from entering a nearby stream by implementing suitable BMPs to contain such an event.

Middle waste and cherty shale material would not be used as construction materials for building haul roads, ditches, or any other miscellaneous mining features associated with the Project.

Last, an AMP has been prepared for this Project. It focuses on water management facilities and the means by which the quality of surface water downstream and down gradient of the Hoopes Spring would be adequately protected. The AMP (**Appendix 4B**) documents objectives, agency relationships, water management practices, a Simplot commitment to treat water as needed, and the Hoopes Spring condition and related response if the condition is not met.

### 4.5.4 Unavoidable (Residual) Adverse Impacts

#### 4.5.4.1 Groundwater

Unavoidable adverse effects to groundwater conditions at the site after mining ceases, and after any mitigation and/or final reclamation has occurred, would be mainly from water quality impacts. Since it has been determined that infiltration of precipitation through seleniferous overburden has the potential to affect groundwater quality by releasing selenium, manganese and other COPCs into the groundwater regime, residual effects would still be likely to remain and be ongoing after proposed reclamation actions have been completed. Over hundreds of years, the concentration of contaminants in the infiltrating water are expected to increase, then decrease, as demonstrated by the model results.

#### 4.5.4.2 Surface Water

Unavoidable adverse effects to surface water quantity would include reduction or elimination of water supplying the alluvial or Salt Lake Formation springs east of the Project Area beyond the mining timeframe. Even if Simplot provided another source of water to supply upper Tygee Creek, it would not likely be at the same locations or provide the same values as these small surface water sources.

Unavoidable adverse effects to surface water quality would be incremental increases in COPCs in Hoopes Spring, Sage Creek, and Crow Creek beyond the mining timeframe.

### 4.5.5 Relationship of Short-term Uses and Long-term Productivity

Some short-term use of surface and groundwater resources would occur from mining operations. Seepage of infiltration through seleniferous overburden and contribution of COPCs to groundwater downgradient of the areas containing seleniferous overburden would result in long-term water quality impacts of this groundwater. No exceedances of groundwater quality protection standards are expected due to the Proposed Action or Action Alternative 1, except potentially manganese, which has a secondary standard reflective of aesthetics. Where the contaminated groundwater discharges to the surface environment, the contaminants would be transferred from the subsurface to the surface environment for long periods of time. No exceedances of surface water quality standards from the Proposed Action or Action Alternative 1 are expected. Over the long term (centuries), these concentrations are expected to decrease.

### 4.5.6 Irreversible and Irretrievable Commitment of Resources

#### 4.5.6.1 Groundwater

The loss of groundwater quantity that is used for mining at the industrial well during the proposed mining operations would practically all be recovered through natural precipitation and infiltration. Based on the aquifer characteristics of the formations in the area, impacts to groundwater quantity would not be irreversible or irretrievable.

Irretrievable changes in groundwater quality under and downgradient of the backfilled areas would occur. This would occur because of the long-term infiltration of water through the seleniferous overburden material placed as backfill in the pits. An area of the Wells Formation aquifer extending to downgradient discharge locations (e.g., springs) has been predicted to be impacted by COPCs. Over the modeled period, concentrations of most COPCs decrease to levels below groundwater standards, except for manganese which is regulated by secondary, non-health based standards. Therefore, these impacts to groundwater quality are considered to be irreversible and irretrievable over the 300-year time period used for the model predictions.

#### 4.5.6.2 Surface Water

For practical purposes, streams that are negatively impacted by COPCs in groundwater discharges would be irreversible commitments of these resources. The same is true for springs that may lose water (i.e., those small springs east of the Project Area).

## 4.6 SOILS

### 4.6.1 Issues and Indicators

*Issue: Soil quantity or quality may be insufficient for reclamation plans.*

*Indicators:*

- Estimated volumes of stockpiled and direct-placed soil.

### 4.6.2 Direct and Indirect Impacts

The Proposed Action would impact soil resources within the Project Area by removing them from areas prior to disturbance due to mining and related activities. These direct and indirect impacts to soil resources include loss of soil during salvage, loss due to erosion of stockpiles or reclaimed areas, exposure and potential mobilization of selenium, and reduced productivity.

#### 4.6.2.1 Proposed Action

Soil would be disturbed as part of mining preparations, as it is removed, stockpiled, and eventually replaced during reclamation activities. This process would directly result in physical and chemical changes to the soil due to mixing of horizons and soil types during initial salvage operations and when the soil is placed in stockpiles for future reclamation use. Direct physical impacts to soil resources would also include compaction and crushing. Related effects include reduced permeability, porosity, and available water holding capacity, as well as increased bulk density. Microorganisms such as bacteria and fungi, which are important in the decomposition of biological materials and the formation and improvement of soil itself, can be diminished in soils that are handled and then stored long term in large stockpiles. Combined, these can affect soil productivity and/or fertility, which could in turn affect reclamation success. Additionally, erosion potential from water and wind would also increase when soil is stockpiled.

As described in **Section 3.6.3**, eight soil map units and two miscellaneous landform units were described in the Study Area during the Order 2 Soil Survey. The two landform units are water bodies and previously disturbed mine areas, and thus do not currently contain soil resources. Over the smaller Project Area (approximately 850 acres), portions of each of the eight soil map units would be disturbed and undergo the effects mentioned previously as soil is removed, stockpiled, and stored. **Table 4.6-1** shows the acres proposed for disturbance by soil type. Considering the depths that could be salvaged within the various mapping units (**Tables 3.6-6** and **4.6-1**), this would result in approximately 1.5 million BCY of affected topsoil and 2.0 million BCY of affected subsoils.

Soil stored in stockpiles could be subject to erosion with some resultant loss that would not be available for later use in reclamation.

Reclamation would entail placing a topsoil cover and revegetating all disturbed areas except for a small section of highwall along the southeast edge of the pit on Simplot-owned land and certain stormwater features (12 acres total left unreclaimed). This would return topsoil to a productive resource use, and along with the accompanying grading and reestablishment of drainage patterns would conserve soil by reducing erosion potential.

Table 4.6-1 Topsoil and Subsoils Affected by the Proposed Action

| SOIL MAP UNIT | SOIL MAP UNIT NAME | TOTAL DISTURBANCE (ACRES) | AVERAGE ESTIMATED TOPSOIL SALVAGE DEPTH (INCHES) | TOPSOIL VOLUME (CY) | AVERAGE ESTIMATED SUBSOIL SALVAGE DEPTH (INCHES) | SUBSOIL VOLUME (CY) | COMBINED TOPSOIL & SUBSOIL VOLUME (CY) |
|---|---|---|---|---|---|---|---|
| Bf | Buffork silt loam, 18-40% | 86 | 16 | 184,487 | 40 | 461,217 | 645,704 |
| BTS | Beaverdam-Tahquats-Swede complex, 2-18% | 169 | 15 | 340,540 | 35 | 0* | 340,540 |
| Ck | Skelter silty loam, 3-12% | 105 | 15 | 210,754 | 28 | 393,408 | 604,162 |
| M | Mine areas | 114 | 0 | 0 | 0 | 0 | 0 |
| OA | ZZZ family loam, 1-3% | 6 | 14 | 11,714 | 20 | 16,734 | 28,448 |
| STB | Swede-Tahquats-Buffork complex, 4-25% | 275 | 16 | 590,685 | 27 | 996,782 | 1,587,467 |
| TS | Targhee-Swede complex, 15-60% | 54 | 15 | 108,850 | 20 | 145,134 | 253,984 |
| ZS | Zimmer loam, 8-35% | 27 | 10 | 36,907 | 8 | 29,526 | 66,433 |
| Zz | Zimmer gravelly loam, 35-60% | 13 | 9 | 15,801 | 4 | 7,023 | 22,824 |
| TOTAL | | 848 | | 1,499,739 | | 2,049,824 | 3,549,562 |

*Unsuitable and should not be salvaged for use as topsoil due to the high percent clay, as described in **Section 3.6.5.1**.

The soils baseline study included a determination of reclamation suitability (**Section 3.6.5**). Some mapping unit components had subsoils that are too clayey. Some soil samples had *limiting* pH values and some localized pockets were too sandy. While selenium concentrations varied (**Section 3.6.5.16**) they were not considered limiting overall. In all these cases (clay, pH, sand, selenium), blending of different soils during the salvage and stockpiling process would render them suitable. The most limiting feature of Project Area soils is depth to bedrock. This would affect reclamation by controlling the reduced amount of topsoil and subsoil that can be salvaged and then replaced. The estimated volume of salvaged topsoil and the planned replacement depth of six inches minimum account for this limitation and based upon the average topsoil depth, plus the estimated subsoil depth, there would be well over the six-inch minimum of topsoil available for reclamation.

It is impossible to determine the exact amount of soil that can be salvaged, so thickness may be adjusted upward or downward as required.

Last, as described in **Section 2.4.11.2**, topsoil would be sampled prior to placement to determine agronomic characteristics, which would then dictate fertilizer types and application rates, if any are needed.

Combined, impacts to soil resources would be minor, but long term.

#### 4.6.2.2 Alternative 1 Reduced Pit Shell with Soil-only Cover

While there would be 78 fewer acres of soils disturbed under Alternative 1 than under the Proposed Action, the types of impacts on the particular soils that would be disturbed would be similar. There would be slightly fewer acres (9 compared to 12) left unreclaimed under this alternative.

#### 4.6.2.3 No Action Alternative

Under the No Action Alternative, Simplot's proposed detailed mining and reclamation/mitigation plans for the development of the East Smoky Panel would not be approved. Simplot would not be able to proceed with mining of the ore in this panel until such time as a mining and reclamation plan is found to be acceptable by the BLM and USFS. Local effects to soil resources in the Project Area would be eliminated since mining would not be implemented. The portion of the existing Panel B area would still be reclaimed under No Action, but it would not be subject to additional backfilling since overburden generated from the Proposed Action would not be available for backfill material. Mining and reclamation would continue on the existing, approved mine panels at the Smoky Canyon Mine.

### 4.6.3 Mitigation Measures

No measures beyond those stated in **Chapter 2** and those in use currently for Simplot's ongoing erosion control, seedbed preparation, and monitoring programs would be needed.

### 4.6.4 Unavoidable (Residual) Adverse Impacts

Native soil conditions would be lost on the disturbed areas due to the breakdown of soil structure, adverse effects to microorganisms, and discontinuation of natural soil development as a result of salvage operations. Soils salvaged and utilized in reclamation would initially demonstrate a decrease in infiltration and percolation rates, decrease in available water holding capacity, and loss of organic matter. These effects would be reversed by natural soil development over time. Successful reclamation of disturbed areas would expedite these natural processes and create an environment suitable for long-term vegetation establishment.

Approximately 12 acres of disturbance under the Proposed Action and 9 acres under Alternative 1 would consist of unreclaimed highwall areas and functioning stormwater features. Soil recovered from these areas during mining would not be replaced, but used for reclamation in other areas of the Project.

### 4.6.5 Relationship of Short-term Uses and Long-term Productivity

Soils would be disturbed in the short-term during mining operations and reclamation of disturbed areas would return the disturbed soil to long-term productivity by being utilized as growth medium in reseeded areas, while the unreclaimed highwall area and stormwater features under the Proposed

Action would permanently eliminate 12 acres from potential production (9 acres for Alternative 1).

### 4.6.6 Irreversible and Irretrievable Commitment of Resources

For both the Proposed Action and Alternative 1, unreclaimed areas of soil disturbance for highwall and stormwater features would produce an irreversible and irretrievable commitment of soil resources disturbed by these features.

## 4.7 VEGETATION

### 4.7.1 Issues and Indicators

*Issue: The mining operations and related transportation activities would affect vegetation patterns and productivity in the Project Area.*

*Indicators:*

- Acres of vegetation communities that would be disturbed by the Project and also potentially subjected to an increase in weed invasion.
- Acres of disturbed areas that are planned for reclamation and the types of vegetation that would be restored.
- Acres of permanent vegetation conversion from forest to non-forest cover and predicted re-growth rate back to forest conditions.
- DSAYs lost through the Proposed Action and Action Alternative.

*Issue: What is the potential for the introduction or spread of invasive, non-native, or noxious plant species?*

*Indicators:*

- Acres of disturbed land potentially subjected to invasive plant species.

### 4.7.2 Direct and Indirect Impacts

#### 4.7.2.1 Proposed Action

**Vegetation**

Over the life of the proposed mining activities, the Proposed Action would remove up to 728 acres of upland (non-wetland) vegetation and zero acres of wetland vegetation (composed of riparian shrub). The vegetation types and associated acreages impacted by the Proposed Action are summarized in **Table 4.7-1**.

**Table 4.7-1 Vegetation Types and Estimated Affected Acreages under the Proposed Action**

| VEGETATION TYPE | ACRES |
|---|---|
| Forested | |
| Aspen | 90.0 |
| Aspen/Conifer | 320.2 |
| Aspen Dry | 23.9 |
| Douglas-fir | 14.5 |
| Dry Aspen/Conifer | 87.3 |
| Dry Conifer Mix | 8.7 |
| Lodgepole Pine | 0.6 |
| Mixed Conifer | 37.8 |
| **Forested Sub-total** | **583.0** |
| Non-Forested | |
| Grass/Forb | 27.4 |
| Mountain Brush | 62.9 |
| Riparian Shrub | 0.0 |
| Sagebrush | 54.9 |
| **Non-Forest Subtotal** | **145.2** |
| **Total** | **728.2**[1] |

[1]The remaining 121.2 acres of disturbance occurs in areas already disturbed by current mining.

Following mining activities, reclamation would revegetate these areas using the seed mix shown in **Table 2.4-2**. While vegetation would re-grow in these areas, the resulting species composition and community structure would be different than before the disturbance. Therefore, direct impacts to vegetation would be long-term.

Approximately 98 percent (719 acres) of the disturbed vegetation would be reclaimed and re-vegetated. The remaining 2 percent (12 acres) would comprise bare pit walls remaining where pits are not backfilled crest-to-crest and stormwater features. For the purposes of the Habitat Equivalency Analysis (HEA) and quantifying residual wildlife habitat service losses (habitat service lost after accounting for habitat service gained from reclamation), these areas were assumed to remain unvegetated into perpetuity. Although the purpose of the HEA was to quantify wildlife habitat services lost and gained, because upland vegetation parameters were used to formulate the metric, the HEA is also useful for quantifying impacts and subsequent recovery of upland vegetation.

To determine the residual wildlife habitat service losses under the Proposed Action, the HEA required quantification of wildlife habitat services gained through reclamation. Published literature, data from other mines in the region, and the best professional judgment of Stantec and USFS botanists were used to develop recovery trajectories for reclaimed areas. A series of four measurements were used for the metrics for the HEA process. These included herbaceous vegetation production, hiding cover, thermal, cover, and vegetation structure diversity. The methodology and results for the development of recovery trajectories for reclaimed areas are presented in the East Smoky Loss Calculations (Stantec 2017h, 2015c), and the results are summarized here. Herbaceous vegetation production, also called herbage or understory production, is a key element of general wildlife habitat and generally includes browse, grasses, and forbs. The production of herbaceous vegetation generally increases in quantity and quality as overstory canopy cover decreases because the ground vegetation receives more sunlight and does not need to compete with trees for minerals and water (Jameson 1967). The production potential for herbaceous vegetation is influenced not only by canopy cover, but also by soil depth, soil moisture, geology, vegetation type, distance from vegetation patch edge, temperature regime, and fire history (Jameson 1967; Hedrick et al. 1968; Ffolliott and Clary 1975; Miller and Krueger 1976; Woods et al. 1982; Tapia et al. 1990). Hiding cover is described as vegetation capable of hiding 90 percent of a standing deer or elk at 200 feet or less and providing a visual screen where animals can spend more time foraging or resting and less energy fleeing from human disturbance or predators (USFS 1985). Thermal cover allows wildlife to conserve energy by protecting them from the stresses induced by weather (Leckenby et al. 1982). Generally, as canopy cover increases, the effectiveness of a forest stand to provide thermal cover improves (Dealy 1985). Diversity in vegetation structure, the distribution of vegetation biomass horizontally and vertically, influences the habitat services provided to wildlife. Several researchers have hypothesized that forest structure plays a role in wildlife habitat diversity (Urban and Smith 1989; Hansen et al. 1995).

According to the HEA, the Proposed Action would result in a total debit of 62,043 DSAYs during mining and before reclamation. Reclamation would result in the long-term return of 28,491 DSAYs at the mine site, which equates to 46 percent of the wildlife habitat services total debit under the Proposed Action. Therefore, under the Proposed Action, there would be a net debit of 33,551 residual DSAYs of wildlife habitat services (Stantec 2017h). DSAYs are used to quantify the value of all ecosystem services provided by one acre of land over the course of one year. Without additional mitigation, this residual debit in wildlife habitat services would represent a long-term adverse impact of the Proposed Action on wildlife, and also on vegetation as measured by plant species metrics.

Some plant species would be unlikely to re-establish in reclaimed areas because these areas would exhibit different soil characteristics and would likely be drier than existing conditions. Aspen is a clonal species that primarily regenerates by sprouting from parent roots. These roots would be removed or destroyed in the mining process; therefore, without an existing root source, it would be unlikely to recover in areas where the soil had been removed (Schier et al. 1984). Therefore, the Proposed Action would result in the permanent loss of 521.4 acres of aspen or aspen mix. An additional 61.6 acres of conifer habitat would be lost.

This would also represent a permanent loss of 583 acres of snag-producing forest habitat, which, through reclamation and succession, would be replaced with grassland and shrubland. The loss of these forested stands would not adversely affect landscape-scale age class evenness of aspen forest because the stands that would be lost are all in old-mature age classes, which are over-represented on the landscape.

The management of topsoil would be critical to the success of revegetation. All topsoil deemed suitable for use would be placed directly on areas that are ready for reclamation or would be salvaged and stockpiled for later use in reclamation (**Section 2.4.11.2**).

Invasive and noxious species would have the potential to encroach in disturbed areas.

Some reclamation revegetation on historical southeastern Idaho phosphate mines has been found to accumulate selenium to levels detrimental to livestock foraging on the vegetation. Certain species, such as trees, legumes, and plants with deep roots and tap roots, are more susceptible to selenium accumulation (Mackowiak and Amacher 2003; Mackowiak et al. 2004; Zlatnik 1999; Ohlendorf 2003 as cited in BLM and USFS [2016]).

Under the Proposed Action, Simplot is proposing a store and release cover system over all locations in the Project Area receiving seleniferous overburden, which would include the Panel B additional backfill area and almost the entire East Smoky Panel (minus the unreclaimed high wall in the extreme southeastern portion of the pit), for a total of approximately 364 acres. The store and release cover system would consist of approximately two feet of chert, overlain by three feet of Dinwoody and/or Salt Lake Formation and, finally, a topsoil layer estimated at a minimum of six inches, contingent upon the topsoil availability which appears to be well above the six-inch minimum. This cover system would aid in preventing selenium uptake by vegetation.

The Proposed Action seed mix has also been developed to avoid selenium accumulator or deep-rooted species. The seed mix does not contain any trees, legumes, or plants that would extend substantial root mass to depths below the cover. The areas to be revegetated would be properly prepared to receive seeds by ripping or scarifying the surface and drilling or broadcasting seed onto the area. All revegetation efforts would be conducted either in the spring or the fall to take advantage of high ground moisture conditions. Permanent revegetation would be conducted during the first planting season following the preparation of an area to reduce the period of time a disturbed area would be exposed to erosional forces.

**Appendix 4A** summarizes compliance with applicable standards and guidelines from the CNF RFP (USFS 2003a) with regard to vegetation resources under the Proposed Action.

Overall effects of the Proposed Action to upland vegetation would be long-term and minor. Reclamation would eventually re-establish vegetation cover, but the species composition and community structure would be different.

**<u>Wetlands and Riparian Areas</u>**

Executive Order (EO) 11990, Protection of Wetlands, requires that federal agencies "…avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative." As stated in **Section 3.7.3**, no wetlands occur within the Study Area; therefore, there would be no impacts to wetlands.

Sediments could also be carried into surface water by large storm events via stormwater runoff. BMPs would be designed and implemented to control stormwater runoff and the resulting sediment load at the mine. During mining, precipitation falling on disturbed areas associated with the pit, stockpiles, and haul roads would infiltrate or be retained in sediment catchment and runoff sediment basins. Runoff sediment basins for runoff water and silt would be constructed at strategic locations before mining activities occur in that area to collect and contain water exposed to mining disturbances or overburden. Collection ditches constructed along the outer perimeters of the overburden pile and stockpile sites would transfer surface water runoff from these sites and carry it to runoff sediment basins. Sediment basins are designed at a minimum to capture runoff water from a 100-year, 24-hour storm depth. The capture of runoff during active mining would minimize erosion and sedimentation from the Proposed Action to protect surface waters (and thus wetlands connecting to surface waters) adjacent to the Project Area. Additional erosion control measures would be used where needed to further reduce the potential for introduction of sediments into the watershed, including straw wattles and silt fencing, to control water and soil movement from mining disturbances and the use of erosion matting on haul road fill slopes where appropriate to control soil movement into drainages. Barriers and establishment of short-term vegetation cover would be used to control runoff from overburden piles and topsoil stockpiles.

The capture of surface runoff during active mining would decrease the quantity of water in streams and wetlands downstream of the Study Area over the short-term. As explained in **Section 4.5.2**, the reduced quantity of water may result in the localized drying of some wetlands downstream of the Study Area over the short term. Following reclamation, runoff to nearby streams and wetlands is predicted to be the same or greater compared to baseline conditions.

The Proposed Action could also indirectly impact wetlands adjacent to the Project Area. As a result of Project design, use of BMPs, the wetland and riparian indirect impacts would be local, long-term, and minor.

**Noxious Weeds**

EO 13112, Invasive Species, requires that a federal agency "…not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the U.S. or elsewhere unless, pursuant to guidelines it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm would be taken in conjunction with actions." The primary purpose of this EO is to reduce ecological and economic effects of invasive plant and animal species to agriculture, industry, recreation, and the environment.

The removal of native vegetation would increase the potential for expansion of non-native plants including noxious weeds or other invasives. Non-native plants carry a potential to colonize disturbed areas and, once established, may reduce the diversity in native plant communities. However, because of the existing low occurrence of noxious weeds in the Project Area and incorporation of BMPs into the Project, the potential for the uncontrollable infestations of noxious weeds would be minimized, and effects from noxious weeds would be long-term and minor. Weed control would extend for the life of the Project and reclamation. Project BMPs that would minimize noxious weed impacts include keeping active mining disturbances to a minimum for as short a timeframe as possible, with overburden areas and pit backfill advancing in concert with the active pit; monitoring and controlling noxious weed infestations; using certified weed-free seed, mulch, and straw; cleaning all off-road vehicles prior to entering and re-entering the Project Area; and implementing an annual noxious weed treatment plan.

**Appendix 4A** summarizes compliance with applicable standards and guidelines from the CNF RFP (USFS 2003a) with regard to noxious and/or invasive weeds for the Project.

**Threatened, Endangered, and Sensitive Plants**

As discussed in **Section 3.7.6**, there are no identified plant species listed as threatened, endangered, or proposed under the ESA in Caribou County (USFWS 2015). No CTNF sensitive plant species or CTNF Watch rare plant species are anticipated to occur or have been observed during baseline studies. Therefore, impacts to sensitive plants are not anticipated to occur and are not analyzed further.

### 4.7.2.2 Alternative 1 Reduced Pit Shell with Soil-only Cover

Under Alternative 1, most components of the mine would remain the same. The only difference is that the pit shell footprint would be reduced by approximately 78 acres, reducing the overall disturbance to 771 acres. Additionally, under this alternative, there would be a total of nine acres that would not be reclaimed, as compared with 12 acres under the Proposed Action. According to the HEA, Alternative 1 would result in a total debit of 53,527 DSAYs during mining and before reclamation. Reclamation would result in the long-term return of 25,464 DSAYs at the mine site, which equates to 48 percent of the wildlife habitat services total debit under the Alternative 1. Therefore, under Alternative 1, there would be a net debit of 28,063 residual DSAYs of wildlife habitat services (Stantec 2017h). The vegetation types and associated acreages affected by Alternative 1 are summarized in **Table 4.7-2**.

**Table 4.7-2 Vegetation Types and Estimated Affected Acreages under Alternative 1**

| VEGETATION TYPE | ACRES | CHANGE IN ACRES FROM PROPOSED ACTION |
|---|---|---|
| Forested | | |
| Aspen | 75.3 | -14.7 |
| Aspen/Conifer | 282.7 | -37.5 |
| Aspen Dry | 19.2 | -4.7 |
| Douglas-fir | 5.9 | -8.6 |
| Dry Aspen/Conifer | 64.5 | -22.8 |
| Dry Conifer Mix | 8.4 | -0.3 |
| Lodgepole Pine | 0.6 | 0.0 |
| Mixed Conifer | 32.0 | -5.8 |
| **Forested Sub-total** | **488.6** | |
| Non-Forested | | |
| Grass/Forb | 24.8 | -2.6 |
| Mountain Brush | 59.1 | -3.8 |
| Riparian Shrub | 0.0 | 0.0 |
| Sagebrush | 54.8 | -0.1 |
| **Non-Forest Subtotal** | **138.7** | |
| **Total** | **627.3**[1] | |

[1]The remaining 143.5 acres of disturbance occurs in areas already disturbed by current mining.

All other impacts to the various components of vegetation (i.e. wetlands and riparian, noxious weeds, and sensitive plant species) would be the same as those described under the Proposed Action.

### 4.7.2.3 No Action Alternative

Under the No Action Alternative, the federal phosphate leases would not be developed. The No Action Alternative would result in no new impacts to vegetation resources in the Study Area. The No Action Alternative would maintain the current status of vegetation resources in and around the

Study Area. However, this does not preclude future development of the federal phosphate leases under a different mine plan.

### 4.7.3 Mitigation Measures

Simplot's M&RP intends to keep mining disturbances to a minimum and for as short a timeframe as possible with overburden areas and pit backfill advancing in sequence with the active pit. Additionally, the cover would be constructed incrementally as mining advances, which would also help minimize impacts. The reclamation activities for the Proposed Action are described in **Section 2.4.11**.

No mitigation measures for vegetation, above and beyond what Simplot has proposed in the M&RP and described in **Section 2.5**, have been recommended.

### 4.7.4 Unavoidable (Residual) Adverse Impacts

For the Proposed Action and Alternative 1, disturbed areas would constitute an unavoidable residual adverse impact to vegetation resources because existing vegetation will not be eventually replaced through reclamation and subsequent natural succession. Simplot would be required to stabilize and revegetate disturbed areas in accordance with their approved M&RP. Performance bonds would be held by regulatory agencies to ensure that the site is reclaimed to land use plan standards and other established requirements. Despite reclamation efforts, the Proposed Action and Alternative 1 would have a long-term residual adverse effect on vegetation communities, as some vegetation types (such as forested areas) may never recover to baseline conditions. When vegetation encroaches naturally into disturbed or newly reclaimed areas, it is likely that some colonizing species would be noxious weeds. These areas would remain susceptible until reclamation vegetation becomes established. The longer a site is disturbed, the longer the window of opportunity and space for noxious weed seeds to invade and establish relative to sites that are reclaimed. These residual impacts on vegetation are reflected in the HEA results, which are based on vegetation metrics.

Based on the HEA, the Proposed Action would result in a net debit of 33,551 residual DSAYs of wildlife habitat services (Stantec 2017h). This means that either action alternative would have a long-term net negative impact on wildlife habitat, as measured by the vegetation metric. This debit in wildlife habitat services would constitute an unavoidable residual adverse effect from either action alternative.

### 4.7.5 Relationship of Short-term Uses and Long-term Productivity

The Proposed Action and Alternative 1 would implement ground-disturbing activities that would produce short- and long-term effects to vegetation while providing the short-term benefits of phosphate resources and productive employment.

### 4.7.6 Irreversible and Irretrievable Commitment of Resources

Under the Proposed Action and Alternative 1, the loss of forest vegetation is considered an irreversible commitment of resources. Although the M&RP would re-establish upland grassland and shrub vegetation in disturbed areas after mining operations end, it is not anticipated that forests would re-establish in the foreseeable future.

Long-term loss of vegetation would occur in areas where pit walls are not reclaimed. Over a very long time, exposed pit walls would ultimately weather to a reduced slope configuration conducive to supporting vegetative communities. Therefore, the pit walls would be considered an irreversible or irretrievable commitment of resources.

# 4.8 WILDLIFE RESOURCES

## 4.8.1 Issues and Indicators

The following are the issues and indicators for general wildlife species.

*Issue: The mining operations and related transportation facilities may physically affect terrestrial wildlife (and amphibians), including MIS and significant wildlife corridors, through direct disturbance and fragmentation of their habitat, as well as reduction in amounts and quality of available water.*

*Indicators:*

- Acres of different wildlife habitats physically disturbed over the life of the Project.
- Acres of disturbance to and the proximity of Project operations to high value habitats such as: crucial and or high value big game ranges, significant migration corridors, wetlands, and seep and spring areas.
- An analysis of the DSAYs as calculated in the HEA for both the Proposed Action and Alternative 1.

*Issues: Exposure of wildlife to selenium or other harmful contaminants.*

*Indicators:*

- BMPs or mitigation measures to prevent exposure and bioaccumulation.

The issues and indicator for Special Status species are as follows:

*Issue: What is the potential for impact to threatened, endangered, or sensitive species through mortality and displacement?*

*Indicators:*

- Disruption and displacement of threatened, endangered, or sensitive species at lek, nest, or roost sites.
- Disturbance to threatened, endangered, or sensitive species from noise and mining activity.

*Issue: What is the potential to impact threatened, endangered, or sensitive species through habitat removal and alteration?*

*Indicators:*

- Acres of habitats for threatened, endangered, or threatened species physically disturbed and reclaimed.
- Changes in predator/prey interactions for threatened, endangered, or sensitive species.

The CTNF manages forest wildlife resources and their uses according to the CNF RFP (USFS 2003a). The DFCs and objectives for wildlife resources are achieved through the implementation of the forest-wide standards and guidelines as well as the standards and guidelines for biological elements specified in the management prescriptions of the CNF RFP. Forest plans provide for the persistence of healthy wildlife communities while balancing multiple uses on Forest lands. CNF uses the planning process and ongoing monitoring, evaluation, and adjustment of fish, wildlife, and rare plant standards to prevent listing of species under the ESA and to avoid the extirpation of species (USFS 2003a).

### 4.8.2 Direct and Indirect Impacts

#### 4.8.2.1 Proposed Action

Impacts of the Proposed Action on terrestrial wildlife would include: 1) immediate, direct effects in terms of wildlife mortality, disturbance, and displacement; and 2) changes in wildlife behavior and composition associated with long-term changes in land cover and reclamation.

Under the Proposed Action, one potential direct impact on terrestrial wildlife would be mortality, particularly when species are not mobile enough to avoid mining equipment or vehicles. Mortalities are likely to occur on an individual, short-term, and localized scale. The impact of these mortalities at the population or community level is, therefore, expected to be negligible. Direct impacts on large and mobile terrestrial wildlife may include disturbance and displacement. These impacts are expected to have a greater effect on intermediate- and large-sized mammals (e.g., coyote and big game) and birds. These wildlife groups may be disturbed by human presence and noise, which could lead to short-term stress and behavior modifications. As mining proceeds, terrestrial wildlife may also displace into adjacent areas to establish temporary or long-term (potentially permanent) territories and home ranges. Displacement to already occupied habitats would likely result in increased competition for available resources. Depending on the season and species, overall disturbance and displacement impacts would be short-term to long-term and negligible to moderate.

Wildlife may also be indirectly affected by exposure to COPCs in vegetation. An effective cover design over backfill and overburden, and the use of a seed mix with species that are relatively shallow-rooted and not selenium accumulators, would address issues associated with adverse COPC concentrations in reclamation vegetation. The seed mix developed for the Proposed Action includes species that are relatively shallow-rooted and are not selenium accumulators. Therefore, vegetation growing on the reclaimed areas would not create a selenium exposure pathway for any wildlife species.

The potential also exists for wildlife to have access to water that has increased COPC concentrations as a result of the Proposed Action. However, as described in **Section 4.5**, this potential is not anticipated based upon groundwater modeling results from the Proposed Action. Existing surface waters adjacent to the Project Area used by wildlife that currently have elevated COPCs would have negligible COPC concentration increases from the Proposed Action as described in **Section 4.5**.

In terms of water quantity, some available water sources that are likely currently used by wildlife within and adjacent to the Project Area would be impacted and could either be dried up or reduced, resulting in an indirect impact as described in **Section 4.5**.

Indirect effects to terrestrial wildlife populations from habitat alteration and reclamation would generally be localized and long-term. As described in **Section 4.7**, the Proposed Action would result in the loss of 728 acres of primarily forested and shrubland wildlife habitat. This includes 583 acres of disturbance to forested habitats and 145 acres of disturbance to shrubland and grassland habitats. There would be no loss of wetland or riparian areas, which are particularly high-value wildlife habitats.

The majority of disturbed habitat (98 percent) would be reclaimed with grasses and shrubs. Over the long term, reclaimed areas would likely regain the level of wildlife habitat services provided by the baseline on big sagebrush and high-elevation rangeland habitat types. However, even after reclamation, the Proposed Action would result in the net debit of 33,551 DSAYs (units that represent wildlife habitat services in the HEA; Stantec 2017h). This means that the Proposed Action would have a long-term net negative impact on wildlife habitat. Forest habitats are unlikely to re-establish in reclaimed areas because of different soil characteristics and drier conditions, as well as removal of root systems from the soil. As such, reclamation would result in a shift in some areas from forest to perennial grasses and shrubs and, therefore, would contribute to long-term fragmentation of formerly forested areas. Also, the shift in vegetation community from forest to grasses and shrubs in some reclaimed areas could change the species composition of the wildlife community as forest-dependent species locally decline in abundance while grassland, shrub, and generalist species may locally increase.

**Birds**

*Upland Game Birds*

The Proposed Action would result in the permanent loss of 583 acres of forested habitat for dusky and ruffed grouse. Indirect impacts from loss of habitat would be long-term because final reclamation would emphasize establishment of communities dominated by perennial grasses and shrubs. Although grouse would probably migrate to other suitable habitats outside the disturbed area, they may in the short term be subject to increased predation by raptors and other predators as a result of the presence of people and machinery. Existing power lines in the Project Area have been there for many years and would only be slightly relocated, so no new opportunities of providing perching platform for raptors to make it easier for them to prey on grouse would occur from the Proposed Action. Noxious weed and invasive plant introductions could indirectly impact upland game birds over the long term through a reduction in habitat quality or changes in trophic structure. The potential for noxious weeds and invasive species to spread would be highest in newly disturbed areas. However, impacts from noxious weeds and invasive species are anticipated to be minimal because of the use of BMPs to control them. Because of the localized scale of land disturbance, overall impacts on upland game birds are expected to be minor. Impacts to greater sage-grouse and Columbian sharp-tailed grouse are discussed later in this section.

*Migratory Birds*

The Proposed Action would result in the short-term loss of 728 acres of migratory bird habitats. Of this, there would be no impacts to riparian areas or wetlands, 54.9 acres of disturbance to sagebrush, and 90 acres of disturbance to aspen woodlands (does not include aspen/conifer sites). As discussed in **Section 3.8.3.2,** these have been identified as high priority habitats for migratory birds in Idaho. Most of these areas would be reclaimed, but the post-reclamation habitat structure and composition would change toward a grassland-dominated community (initially), which would develop into upland shrubland over the long term. Birds that use shrubland and forest communities would likely decrease in abundance in the Study Area after mining, whereas those that are generalist species or that use grasslands may remain at levels similar to baseline or increase. Bird species associated with forest, sagebrush, high-elevation rangeland, habitats would be the most affected.

Potential direct effects could include direct mortality (trampling, vehicle collision, and powerline collision), forced movement, and stress related to increased noise and human activity. Removal of trees and other ground-clearing activities would not be allowed to take place during migratory bird nesting season, unless surveys described in **Section 2.5.6** were conducted and no active nests are found. Simplot would plan ground-clearing activities during the non-nesting season as much as possible to minimize potential impacts to nesting birds. Indirect effects could include increased competition among displaced individuals and resident birds.

Many species of migratory birds are susceptible to collision with power lines, especially during inclement weather, when the lines may be harder to see (Loss et al. 2014; Manville 2005). A recent study estimated that there is an average of 29.6 collision-caused avian mortalities per km of power line per year in the U.S. (though this collision rate varies widely depending on a number of factors such as habitat and the species involved; Loss et al. 2014). However, because the two power lines in the Project Area have been there for many years and would only be slightly relocated from their current location, an increase in the current level of impacts from collisions is not anticipated. To help minimize collisions, Simplot would implement BLM's guidelines for powerlines (**Section 2.5.6**).

The Proposed Action would also result in habitat fragmentation: the division of blocks of contiguous habitat into smaller, isolated patches. The effects of habitat fragmentation on bird communities may depend on the scale of analysis (Fahrig 2003). On a landscape scale, fragmentation of shrub steppe habitats in the Intermountain West has been linked to range-wide declines in several bird species, including Brewer's sparrows, western meadowlarks, and horned larks (Knick and Rotenberry 2002). However, on a more localized scale (such as the Study Area), vegetation characteristics within habitats seem to have a larger influence on productivity and survival of individual birds than the juxtaposition of those habitats on the landscape (Knick and Rotenberry 2002). Also, evidence suggests that birds breeding in naturally patchy landscapes may be relatively tolerant of habitat fragmentation (Berry and Bock 1998). The habitats in the Study Area are naturally patchy; therefore, the effects from additional fragmentation caused by the Proposed Action are anticipated to be minor. Additionally, no impacts are anticipated at the landscape scale as the impacts from the Proposed Action comprise a small portion of the overall habitat available.

Studies have shown that bird populations, particularly breeding birds, may be negatively impacted by elevated noise levels (Reijnen and Foppen 2006; Bayne et al. 2008; Ortega 2012). Noise from traffic and other mining activities could affect bird populations in a number of ways.

Acoustic interference from noise could hamper the detection of mating songs, making it more difficult for birds to establish and maintain territories, attract mates, or maintain pair bonds (Reijnen and Foppen 1994, Habib et al. 2007, Swaddle and Page 2007 as cited in Reijnen and Foppen 2006; Ortega 2012). Thus, noisy habitats may reduce breeding success.

Because birds may avoid areas close to noise sources, noise may effectively extend habitat disturbance beyond the actual facility footprint. The effects of traffic noise on nesting birds may extend more than 300 meters on both sides of roadways (Ortega 2012). McClure et al. (2013) found a negative relationship between recorded traffic noise and the abundance of 13 species of migratory birds at a site in Idaho. In a study of songbirds near energy facilities in Alberta, Canada, songbird density was 1.5 times higher near noiseless facilities than near noise-producing facilities (Bayne et al. 2008), indicating that birds avoided the noisy areas.

Migratory birds using the Study Area could be subject to indirect impacts of selenium, which include impaired reproduction and survivorship, although based upon reclamation practices and groundwater modeling results (**Section 4.5**) these sorts of potential impacts are not anticipated. Further, significant population-level effects of COPCs on migratory birds have not been observed for birds in the Idaho phosphate patch, even at historical mines that were constructed without a cover. In 1999 and 2000, Ratti et al. (2006, as cited in BLM and USFS 2016) tested selenium levels in 544 bird eggs from mine and reference sites in southeastern Idaho, and in 2001, the authors monitored the nest success of 623 American robin and red-winged blackbird nests at these sites. The authors concluded, "On a population level, American robin and red-winged blackbird reproductive success in southeastern Idaho was not impaired by existing levels of selenium in avian eggs. Based on our multi-species data ... and more-specific data on American robins and red-winged blackbirds, we conclude that there are no negative effects on reproductive success of the general avian community at this time." The authors go on to acknowledge that negative effects may be occurring in some bird species immediately adjacent to some historical mine sites, where high selenium concentrations (>10 micrograms per gram [µg/g]) were observed in eggs (Ratti et al. 2006, as cited in BLM and USFS 2016).

Overall, impacts of the Proposed Action on migratory birds would be long-term and minor.

*Raptors*

Raptors that occur in the Study Area could be directly and indirectly affected by the Proposed Action. Raptors could be subject to mortality and could be directly disturbed by noise and activity associated with the mining activities. Raptors are sensitive to noise and human presence near their nests and may become agitated and ultimately abandon nests located near disturbance. The distance at which raptors are sensitive to disturbance varies by species, habitat, topography, and even the habituation of individual birds to humans (Richardson and Miller 1997). Simplot would plan ground-clearing activities during the non-nesting season to the extent possible to minimize potential impacts to nesting birds. In the event that ground-disturbing activities must take place during the nesting season, biological surveys would be conducted to identify any active nests and avoidance plans would be developed as necessary. To minimize impacts to nesting raptors, Simplot would implement appropriate mitigation measures, such as buffer zones around occupied nests, during the nesting season.

Raptors often perch and nest on power line poles and could be at risk of electrocution. To address this issue, Simplot would implement BLM's powerline guidelines (**Section 2.5.6**). Raptors may also collide with the power line, but because the two power lines in the Project Area have been there for many years and would only be slightly relocated from their current location, an increase in the current level of impacts from collisions is not anticipated.

Indirect disturbances would include loss of foraging habitat, reduction or alteration of prey base, and loss of nesting habitat. Over the short term, the Proposed Action would reduce habitat for a number of prey species, including mice, voles, ground squirrels, and rabbits. However, abundant foraging habitat exists adjacent to the Study Area, which would limit the potential effects of the Proposed Action. In addition, reduced plant cover on disturbed areas following reclamation may make prey species that colonize those areas more visible to raptors.

With implementation of avoidance plans as necessary (**Section 2.5.6**) around active raptor nests if discovered during pre-ground clearing (logging) surveys and use of BLM measures on the re-located power lines, overall impacts on raptors under the Proposed Action are expected to be short-term and minor.

*Special Status Species*

<u>Bald Eagle</u>

As shown in **Table 3.8-1**, baseline surveys observed one bald eagle at the tailings pond in 2013, but did not find any nests in the Project Area (JBR 2013), nor are any expected within the Study Area or immediately adjacent areas. Known nest sites near the Project Area include along the Snake River and Palisades Reservoir (north of the Study Area), along the Blackfoot River (West of the Study Area; Sallabanks 2006), near Thayne, Wyoming (east of the Study Area; USFS 2003b). Additionally, there are four known winter roost sites within the CTNF, with the nearest along Crow Creek, approximately five miles south of the Project Area.

Noise and activity from the Proposed Action may influence bald eagles to temporarily avoid some areas of the mine footprint during active mining. Bald eagles could be directly impacted as a result of mortality from collision with aboveground structures (such as the overhead power lines) and moving vehicles., but this has not occurred during the more than 20 years of the mine's existence. Numerous studies have been conducted and published on the interactions between raptors (including bald eagles) and transmission lines, and raptor electrocution continues to be a concern of state and federal agencies (USGS 1999b; Lehman 2001; Erickson et al. 2005; Manville 2005; Mojica et al. 2009). To minimize these potential impacts, Simplot would implement BLM's power line guidelines (**Section 2.5.6**).

No direct impacts to bald eagle habitat from the Proposed Action are anticipated. The Proposed Action may have a minor impact on the prey base for bald eagles as there may be a decrease in their potential prey. However, this impact would be short-term as after mining has ended, the prey base is anticipated to return to pre-disturbance levels. Overall, the Proposed Action, with the implementation of design features and measures to minimize impacts on raptors, would have negligible impacts on individuals or habitat over the long term.

<u>Boreal Owl</u>

If boreal owls are nesting in the vicinity of the mine, noise and human activity may disturb or disrupt nesting pairs. However, boreal owls are relatively tolerant of noise and human presence near their nest sites and are unlikely to abandon nests as a result of these factors (Hayward 1994). Activities could also result in the direct removal of boreal owl nests. No boreal owl nests have been found within the Study Area or vicinity. Even so, ground-disturbing activities would be planned outside of the avian nesting season (~March 1 to August 31) as much as possible. If ground-disturbing activities must extend into the nesting season, a nest clearance survey using agency-approved methods would be conducted within a 0.5-mile buffer of disturbance areas and any active nests discovered would be allowed to fledge out before being disturbed.

Noise and activity from the Proposed Action may influence boreal owls to temporarily avoid areas near the Proposed Action during active mining. Boreal owls could also be directly impacted as a result of mortality through mechanisms, such as collision with above ground structures (such as the overhead power lines) and moving vehicles, particularly at night. Simplot would implement BLM's power line guidelines (**Section 2.5.6**).

Approximately 583 acres of potentially suitable boreal owl habitat (forested habitat) would be removed under the Proposed Action, or 38 percent of the forest habitat in the Study Area. In addition to direct habitat loss, habitat removal could indirectly impact boreal owls by altering prey base and potentially increasing abundance of predators that are more tolerant of human activity, such as great horned owls. Most of the disturbed area would be reclaimed as soon as the area was no longer needed; however, reclaimed areas would not function as suitable habitat for boreal owls and would likely support a different prey community (favoring rodent species that are habitat generalists or grassland/shrubland species as opposed to mature forest species).

As a result of the relatively small area of mature forest that would be impacted, and lack of indication from baseline studies for a robust boreal owl population in the Study Area, direct and indirect impacts under the Proposed Action are unlikely to have population-level effects on this species. Overall, the Proposed Action, with the implementation of design features and measures to minimize impacts on raptors, may result in negligible to minor impacts on individuals or habitat over the long term.

<u>*Brewer's Sparrow*</u>

Primary impacts to Brewer's sparrows under the Proposed Action may include direct removal of active nests and nesting habitat and disruption of nesting activity from noise and human activity.

If mine construction were to occur during the nesting season, active Brewer's sparrow nests could be inadvertently destroyed (and eggs, chicks, and brooding adults could be killed) by construction equipment. To comply with the Migratory Bird Treaty Act (MBTA), Simplot would minimize the potential for direct mortality of migratory birds by clearing vegetation from potential nesting habitat outside of the nesting season or conducting nest clearance surveys during the nesting season. If Brewer's sparrows are nesting in the vicinity of the mine, noise and human activity may disturb or disrupt nesting pairs. As discussed in **Section 4.8.2.1**, noise can negatively impact small birds by interfering with acoustic communication and eliciting an avoidance response.

Approximately 55 acres of potentially suitable Brewer's sparrow habitat (big sagebrush shrubland) would be removed under the Proposed Action, or 13 percent of the habitat in the Study Area. The majority (98 percent) of this habitat loss would be temporary because most areas would be reclaimed once mining had ceased and would eventually recover to big sagebrush shrubland and again provide potential habitat for Brewer's sparrows over the long-term.

Under the Proposed Action, the power lines may provide a hunting perch for predators such as raptors and ravens. The power lines would be constructed in compliance with BLM's guidelines for power lines (**Section 2.5.6**).

Because of the relatively small area of big sagebrush habitat that would be impacted, as well as reclamation practices that would return much of the disturbed habitat back to big sagebrush habitat after cessation of mining, direct and indirect impacts under the Proposed Action are not expected to have population-level effects on Brewer's sparrows. Overall, the Proposed Action, with the implementation of design features and measures to minimize impacts on migratory birds, may result in long-term but negligible to minor impacts on individuals or habitat.

<u>*Columbian sharp-tailed grouse*</u>

As described in **Section 3.8.3.3**, no Columbian sharp-tailed grouse leks or nesting grounds were confirmed in the Study Area during baseline surveys. Additionally, no records of Columbian sharp-tailed grouse exist within 10 miles of the Study Area (IDFG 2014a). A study found that sharp-tailed grouse hens can move up to 1 mile from the lek to nest, and that mean winter movements from lek to winter habitat is 2 miles (USFS 2003 b). Given that no leks have been confirmed within 2 miles of the Study Area, nesting and wintering grouse may be limited in the area. Therefore, the following impacts are expected to be limited to foraging and transient grouse.

Noise and activity from the Proposed Action would likely cause Columbian sharp-tailed grouse to temporarily avoid some areas of the Proposed Action during active mining. Columbian sharp-tailed grouse would be at risk of collision with moving vehicles along the haul road.

Approximately 145 acres of potentially suitable Columbian sharp-tailed grouse foraging and wintering habitat (grassland, sagebrush, and mountain brush) would be directly removed under the Proposed Action, or 17 percent of the available habitat in the Study Area. The majority (98 percent) of this habitat loss would be short-term because most areas would be reclaimed once mining had ceased. Reclaimed areas would eventually recover to shrubland and again provide potential habitat for Columbian sharp-tailed grouse over the long term. Noxious weeds and invasive plant introductions could indirectly impact Columbian sharp-tailed grouse over the long term through a reduction in habitat quality or changes in trophic structure. The potential for invasive species to spread would be highest in newly disturbed areas. However, impacts from noxious weeds are anticipated to be minimal because of the use of BMPs to control them.

Under the Proposed Action, the existing power lines may already provide hunting perches for raptors and ravens, which may indirectly result in predation on Columbian sharp-tailed grouse in the Study Area. The re-located power lines would be constructed in compliance with BLM standards (**Section 2.5.6**) to minimize raptor perching and thereby reduce predation on Columbian sharp-tailed grouse.

Because Columbian sharp-tailed grouse use the Study Area sporadically, primarily during the non-breeding season, the Proposed Action is unlikely to have population-level effects on this species. Overall, the Proposed Action may result in negligible to minor impacts on individuals or habitat over the long term.

*Flammulated Owl*

If flammulated owls are nesting in the vicinity of the mine, noise and human activity may disturb or disrupt nesting pairs. However, flammulated owls are relatively tolerant of noise and human presence near their nest sites and are unlikely to abandon nests as a result of these factors (Hayward 1994). Activities could also result in the direct removal of flammulated owl nests. Even so, ground-disturbing activities would be planned outside of the avian nesting season (~March 1 to August 31) to the extent possible. If ground-disturbing activities must extend into the nesting season, a nest clearance survey using agency-approved methods would be conducted within a 0.5-mile buffer of disturbance areas and any active nests discovered would be allowed to fledge out before being disturbed.

Noise and activity from the Proposed Action may influence flammulated owls to temporarily avoid areas near the Proposed Action during active mining. Flammulated owls could also be directly impacted as a result of mortality through mechanisms, such as collisions with aboveground structures (such as the overhead power lines) and moving vehicles, particularly at night. Simplot would minimize collision risk on the relocated power lines by using BLM's power line guidelines (**Section 2.5.6**).

Approximately 583 acres of potentially suitable flammulated owl habitat (forests) would be removed under the Proposed Action, or 38 percent of the forest habitat in the Study Area. In addition to direct habitat loss, habitat removal could indirectly impact flammulated owls by altering prey base and potentially increasing abundance of predators that are more tolerant of human activity, such as great horned owls. Most of the disturbed area would be reclaimed as soon as the area was no longer needed; however, reclaimed areas would not function as suitable habitat for flammulated owls and would likely support a different prey community (favoring rodent species that are habitat generalists or grassland/shrubland species as opposed to mature forest species).

As a result of the relatively small area of mature forest that would be impacted and lack of indication from baseline studies that flammulated owls are present in the Study Area, direct and indirect impacts under the Proposed Action are unlikely to have population-level effects on this species. Overall, the Proposed Action, with the implementation of design features and measures to minimize impacts on raptors, may result in negligible to minor impacts on individuals or habitat over the long term.

*Great Gray Owl*

For great gray owls nesting in the vicinity of the mine, noise and human activity may disturb or disrupt nesting pairs. Ground-disturbing activities could also result in the direct removal of great gray owl nests. As discussed in **Section 3.8.3.3**, great gray owl individuals and two nesting territories were detected in the Study Area during baseline surveys. Therefore, ground-disturbing activities would be planned outside of the avian nesting season (~March 1 to August 31) to avoid possible impacts to nesting owls. If ground-disturbing activities must extend into the nesting season, a nest clearance survey using agency-approved methods would be conducted within a 0.5-mile buffer of disturbance areas and any active nests discovered would be allowed to fledge out before being disturbed.

Noise and activity from the Proposed Action may influence great gray owls to temporarily avoid some areas of the Proposed Action during active mining. Great gray owls could also be directly impacted as a result of mortality through mechanisms, such as collisions with aboveground structures (such as the overhead power lines) and moving vehicles, particularly at night. Simplot would minimize collision risk on the relocated power lines by using BLM's power line guidelines (**Section 2.5.6**).

Approximately 583 acres of potentially suitable great gray owl habitat (forested areas) would be removed under the Proposed Action, or 38 percent of the forest habitat in the Study Area. In addition to direct habitat loss, habitat removal could indirectly impact great gray owls by altering prey base and potentially increasing abundance of predators that are more tolerant of human activity, such as great horned owls. Most of the disturbed area would be reclaimed as soon as the area was no longer needed; however, reclaimed areas would not function as suitable habitat for great gray owls and would likely support a different prey community (favoring rodent species that are habitat generalists or grassland/shrubland species as opposed to mature forest species).

As a result of the relatively small area of mature forest that would be impacted and implementing avoidance plans for any active nests (**Section 2.5**), direct and indirect impacts under the Proposed Action are unlikely to have population-level effects on this species. Overall, the Proposed Action, with the implementation of design features and measures to minimize impacts on raptors, would result in minor impacts on individuals or habitat over the long term.

*Greater Sage-grouse*

Under the Proposed Action, there would be 55 acres of direct removal of big sagebrush habitat. As described in **Section 3.8.3.3**, no greater sage grouse have been identified in the Study Area, but have been observed nearby. No greater sage-grouse habitat management areas (Priority Habitat Management Areas [PHMAs], Important Habitat Management Areas [IHMAs], and General Habitat Management Areas [GHMAs]) occur in the Study Area or vicinity (**Figure 3.8-3**; BLM and USFS 2015). As noted in **Section 3.8.3.3**, no indication of breeding or nesting activity has been confirmed in the Study Area, and although a group of greater sage-grouse were observed within 10 miles (two miles northeast), no lekking was confirmed. For these reasons, the Study Area is not expected to be used by nesting or brood-rearing grouse but rather by individual or small, transient groups of foraging grouse (which coincides with baseline survey observations). This is further supported by the ROD for the ARMPA (BLM and USFS 2015), which indicates that 90 percent of greater sage-grouse nesting occurs within 6.2 miles of active leks in Idaho; no active leks are known to occur within 6.2 miles of the Study Area. Therefore, the impacts discussed below are specific to individuals or small groups of transient, foraging grouse. Additionally, the Idaho Land Board (IDL) has developed the Idaho State Board of Land Commissioners Greater Sage-Grouse Conservation Plan to develop conservation measures for state endowment trust land and IDL regulatory programs as part of Idaho's commitment to conserving greater sage-grouse. As part of this plan, IDL is to encourage mining operators located within Core or Important habitat zones to adopt mining BMPs specific to greater sage-grouse conservation. After consultation with the IDL, it was determined that the Project does not fall within either of these zones.

The Proposed Action may impact greater sage-grouse through short-term displacement of individuals, long-term habitat loss and alteration, direct mortality from vehicle collisions, avoidance responses to the relocated power lines, and increased predation. Mining activities could potentially cause individual greater sage-grouse to temporarily or permanently avoid marginally suitable habitat in the vicinity of these activities. As a result, displaced greater sage-grouse may relocate to unaffected but already occupied habitats where population and competition would increase. Consequences of such displacement and competition could result in lower survival and potentially lower reproductive success of individual greater sage-grouse (NTT 2011).

Habitat modifications associated with development of the Proposed Action may fragment marginally suitable sagebrush habitat and could directly and indirectly impact individual sage-grouse. Over the long term, the areas reclaimed would be expected to recover to a plant community similar to that present in the on-site baseline high-elevation rangeland habitat, which includes a big sagebrush component. Noxious weeds and invasive plant introductions could indirectly impact greater sage-grouse over the long term through a reduction in habitat quality or changes in trophic structure. The potential for invasive species to spread would be highest in newly disturbed areas. However, impacts from noxious weeds are anticipated to be minimal because of the use of BMPs to control them.

Individual greater sage-grouse could collide with moving vehicles along the proposed haul road, although under the Proposed Action, vehicles would travel the gravel haul road at low speeds, which would limit the potential for collisions.

The relocated and existing power lines could continue to have direct and indirect effects on individual greater sage-grouse using the Study Area, but as noted previously, the area is outside of mapped habitat management areas. Several studies suggest that greater sage-grouse and related species instinctively avoid areas where power lines or other vertical structures are visible to avoid predation (Schroeder 2010). One study found that greater sage-grouse tend to avoid habitat located within 600 meters (1,968 feet) of power lines (Gillan et al. 2013; Braun 1998). By avoiding use of the habitat, the birds lose the benefits of that habitat. Thus, the effective habitat loss and fragmentation created by power lines may extend to an area much larger than the actual power line corridor. These impacts are expected to be minor, as the power line would not fragment any PHMA, IHMA, GHMA, or other important habitats for greater sage-grouse.

Powerlines also provide hunting perches for raptors and ravens, which may result in increased predation on greater sage-grouse in the Study Area (Schroeder 2010; NGSGCT 2010), although this impact may be reduced as greater sage-grouse may avoid areas around the power lines. The relocated power lines would be constructed in compliance with BLM guidelines to minimize raptor perching and thereby reduce predation on greater sage-grouse.

Overall, field observations indicate that sagebrush habitat is marginal and there are no greater sage-grouse habitat management areas (PHMAs, IHMAs, or GHMAs). For these reasons, greater sage-grouse use of the Study Area is expected to be limited to small foraging or migrating groups. Therefore, potential direct and indirect impacts from the Proposed Action on these foraging grouse are not expected to affect greater sage-grouse at the population level. As such, a determination was made that the Proposed Action may have long-term but negligible to minor impacts on individuals or habitat.

*Harlequin Duck*

As there is no suitable habitat, and this species is not expected to occur in the Study Area, the Proposed Action would have no impact on harlequin ducks.

*Northern Goshawk*

If northern goshawks are nesting in the vicinity of the mine, noise and human activity may disturb or disrupt nesting pairs. No northern goshawk nests have been confirmed within the Study Area; however, pairs could establish nesting territories in the forests in the Study Area in the future based upon observations and callbacks from the baseline survey results. Nesting northern goshawks can be sensitive to disturbance at a nest site from nest construction through 20 days post-hatch (Squires and Kennedy 2006). Any activity near active nest sites may cause goshawks to abandon the nest. Simplot would plan ground-disturbing activities outside of the goshawk nesting season (April 1 to August 15). However, if ground-disturbing activities must occur during the nesting season, a nest clearance survey using agency-approved methods would be conducted within 0.5 mile of disturbance areas and any active nests discovered would be allowed to fledge out before being disturbed. Noise and activity from the Proposed Action may influence northern goshawks to temporarily avoid areas near the Proposed Action during active mining. Northern goshawks could also be directly impacted as a result of mortality from collision with aboveground structures (such as the overhead power lines) and moving vehicles. Simplot would minimize collision risk on the relocated power lines by using BLM guidelines for power lines.

Approximately 583 acres of potentially suitable northern goshawk habitat (forests) would be removed under the Proposed Action, or 38 percent of the forested habitat in the Study Area. In addition to direct habitat loss, habitat removal could indirectly impact northern goshawks by altering prey base and potentially increasing abundance of predators that are more tolerant of human activity, such as great horned owls. An increase of predators may reduce nesting success for goshawks remaining in the vicinity. Most of the disturbed area would be reclaimed as soon as the area was no longer needed; however, reclaimed areas would not function as suitable nesting habitat for northern goshawks and would likely support a different prey community (favoring rodent species that are habitat generalists or grassland/shrubland species as opposed to mature forest species).

Because of the relatively small area of mature forest that would be impacted, and lack of evidence from baseline studies that there are any active or historical northern goshawk territories within the Study Area, direct and indirect impacts under the Proposed Action are unlikely to have population-level effects on this species. Overall, the Proposed Action, with the implementation of design features and measures to minimize impacts on raptors, may result in minor impacts on individuals or habitat over the long term.

_Olive Sided Flycatcher_

Primary impacts to the olive-sided flycatcher under the Proposed Action may include direct removal of active nests and nesting habitat, plus indirect effects from disruption of nesting activity from noise and human activity.

If mine construction were to occur during the nesting season, active olive-sided flycatcher nests could be inadvertently destroyed (and eggs, chicks, and brooding adults could be killed) by construction equipment. To comply with the MBTA, Simplot would minimize the potential for direct mortality of migratory birds by clearing vegetation from potential nesting habitat outside of the nesting season. If olive-sided flycatchers are nesting in the vicinity of the mine, noise and human activity may disturb or disrupt nesting pairs. As discussed in **Section 4.8.2.1**, noise can negatively impact small birds by interfering with acoustic communication and eliciting an avoidance response.

Thirty-eight acres of potentially suitable olive-sided flycatcher habitat (Subalpine coniferous forests and mixed forests) would be removed under the Proposed Action, or 15 percent of the habitat in the Study Area. Most of the disturbed area would be reclaimed as soon as the area was no longer needed; however, reclaimed areas would not function as suitable habitat for olive-sided flycatchers.

Under the Proposed Action, the existing power lines may continue to provide a hunting perch for predators such as raptors and ravens. The relocated power lines would be constructed in compliance with BLM guidelines to minimize raptor perching and thereby reduce predation on olive-sided flycatchers and other migratory birds.

Because of the relatively small area of forested habitat that would be impacted and the uncertainty of their presence in the Study Area, direct and indirect impacts under the Proposed Action are unlikely to have population-level effects olive-sided flycatchers. Overall, the Proposed Action, with the implementation of design features and measures to minimize impacts on migratory birds, may result in long-term but negligible to minor impacts on individuals or habitat.

_Peregrine Falcon_

The Proposed Action is not expected to impact nesting peregrine falcons because of a lack of known nests or suitable nesting habitat in the Study Area. Therefore, the impacts described below would most likely affect small numbers of individual peregrine falcons that forage in the area or move through the Study Area during the non-breeding season.

Noise and activity from the Proposed Action may influence peregrine falcons to temporarily avoid areas near the Proposed Action during active mining. Peregrine falcons could be directly impacted as a result of mortality from collision with aboveground structures (such as the existing and relocated overhead power lines) and moving vehicles. Simplot would minimize collision risk on the relocated power lines by using BLM guidelines.

Approximately 701 acres of potentially suitable peregrine falcon foraging habitat (forest, mountain brush, shrubland, grass/forb areas) would be removed under the Proposed Action.

Because the Study Area lacks nesting habitat for peregrine falcons, and peregrine falcons may only use the Study Area sporadically, direct and indirect impacts under the Proposed Action are unlikely to have population-level effects on this species. Overall, the Proposed Action, with the implementation of design features and measures to minimize impacts on raptors, may result in negligible impacts on individuals or habitat over the long term.

*Prairie Falcon*

The Proposed Action is not expected to impact nesting prairie falcons because of a lack of known nests or suitable nesting habitat in the Study Area. Therefore, the impacts described below would most likely affect small numbers of individual prairie falcons that forage in the area or move through the Study Area during the non-breeding season.

Noise and activity from the Proposed Action may influence prairie falcons to temporarily avoid some areas of the Proposed Action during active mining. Prairie falcons could be directly impacted as a result of mortality from collision with aboveground structures (such as the existing and relocated overhead power lines) and moving vehicles. Simplot would minimize collision risk on the relocated power lines by using BLM guidelines, as given in **Section 2.5.6**.

Approximately 118 acres of potentially suitable prairie falcon foraging habitat (high-elevation mountain brush and sagebrush) would be removed under the Proposed Action, or 27 percent of the available habitat in the Study Area. The majority (99 percent) of this habitat loss would be short-term because most areas would be reclaimed once mining had ceased. Reclaimed areas would again provide potential foraging habitat for prairie falcons, initially supporting a grassland community, which would recover to shrubland over the long term.

Because the Study Area lacks nesting habitat for prairie falcons, which may only use the Study Area sporadically, direct and indirect impacts under the Proposed Action are unlikely to have population-level effects on this species. Overall, the Proposed Action, with the implementation of design features and measures to minimize impacts on raptors, may result in negligible impacts on individuals or habitat over the long term.

*Sagebrush sparrow*

Primary impacts to sagebrush sparrows under the Proposed Action may include direct removal of active nests and nesting habitat, plus indirect effects from disruption of nesting activity from noise and human activity.

If mine construction were to occur during the nesting season, active sagebrush sparrow nests could be inadvertently destroyed (and eggs, chicks, and brooding adults could be killed) by construction equipment. To comply with the MBTA, Simplot would minimize the potential for direct mortality of migratory birds by clearing vegetation from potential nesting habitat outside of the nesting season. If sagebrush sparrows are nesting in the vicinity of the mine, noise and human activity may disturb or disrupt nesting pairs. As discussed in **Section 4.8.2.1**, noise can negatively impact small birds by interfering with acoustic communication and eliciting an avoidance response.

Approximately 55 acres of potentially suitable sagebrush sparrow habitat (big sagebrush shrubland) would be removed under the Proposed Action, or 13 percent of the habitat in the Study

Area. The majority (98 percent) of this habitat loss would be temporary because most areas would be reclaimed once mining had ceased. Areas reclaimed would eventually recover to big sagebrush shrubland through natural succession and again provide potential habitat for sagebrush sparrows over the long-term.

Under the Proposed Action, the existing power lines would continue to provide a hunting perch for predators such as raptors and ravens. The relocated power lines would be constructed in compliance with BLM guidelines to minimize raptor perching and thereby reduce predation on sagebrush sparrows and other migratory birds.

Because of the relatively small area of big sagebrush habitat that would be impacted, as well as reclamation practices that would return much of the site to big sagebrush habitat after cessation of mining, direct and indirect impacts under the Proposed Action are unlikely to have population-level effects on sagebrush sparrows. Overall, the Proposed Action, with the implementation of design features and measures to minimize impacts on migratory birds, may result in long-term but negligible to minor impacts on individuals or habitat.

*American three-toed woodpecker*
Primary impacts to the American three-toed woodpecker under the Proposed Action may include direct removal of active nests and nesting habitat, plus indirect effects from disruption of nesting activity from noise and human activity.

If mine construction were to occur during the nesting season, American three-toed woodpecker nests could be inadvertently destroyed (and eggs, chicks, and brooding adults could be killed) by construction equipment. To comply with the MBTA, Simplot would minimize the potential for direct mortality of American three-toed woodpecker and other migratory birds by clearing vegetation from potential nesting habitat outside of the breeding season. If American three-toed woodpeckers are nesting in the vicinity of the mine, noise and human activity may disturb or disrupt nesting pairs. As discussed in **Section 4.8.2.1**, noise can negatively impact small birds by interfering with acoustic communication and eliciting an avoidance response. These impacts would be short-term, as they would occur primarily during construction and active mining.

Approximately 38 acres of potentially usable American three-toed woodpecker habitat (spruce-fir forests) would be removed under the Proposed Action, or 15 percent of the suitable habitat in the Study Area. This loss of habitat would be permanent because reclaimed areas would be seeded with upland vegetation rather than being restored to their baseline forested habitat type.

Because of the relatively small area of suitable habitat that would be impacted, direct and indirect impacts under the Proposed Action are unlikely to have population-level effects on this species. Overall, the Proposed Action, with the implementation of design features and measures to minimize impacts on migratory birds, may result in minor impacts on individuals or habitat over the long term.

*Trumpeter swan*
As described in **Section 3.8.3.3**, no suitable habitat for trumpeter swans exist within the Study Area so impacts would be limited to transient individuals.

Trumpeter swans could be directly impacted as a result of mortality from collision with aboveground structures (such as the existing overhead power lines) and moving vehicles. Simplot would minimize collision risk on the relocated power lines by using BLM guidelines.

Because of the lack of suitable habitat that would be impacted and lack of evidence from baseline studies that the Study Area supports nesting trumpeter swans, direct and indirect impacts under the Proposed Action are unlikely to have population-level effects on this species. Overall, the Proposed Action, with the implementation of design features and measures to minimize impacts on migratory birds, may result in long-term but negligible to minor impacts on individuals or habitat.

*Willow flycatcher*

Primary impacts to the willow flycatcher under the Proposed Action may include direct removal of active nests and nesting habitat, plus indirect effects from disruption of nesting activity from noise and human activity.

If mine construction were to occur during the nesting season, active willow flycatcher nests could be inadvertently destroyed (and eggs, chicks, and brooding adults could be killed) by construction equipment. To comply with the MBTA, Simplot would minimize the potential for direct mortality of willow flycatchers and other migratory birds by clearing vegetation from potential nesting habitat outside of the breeding season. If willow flycatchers are nesting in the vicinity of the mine, noise and human activity may disturb or disrupt nesting pairs. As discussed in **Section 4.8.2.1**, noise can negatively impact small birds by interfering with acoustic communication and eliciting an avoidance response.

No potentially usable willow flycatcher habitat (shrub/scrub wetland) would be removed or impacted under the Proposed Action, thus direct and indirect impacts under the Proposed Action are unlikely to have population-level effects on this species. Overall, the Proposed Action, with the implementation of design features and measures to minimize impacts on migratory birds, may result in negligible to minor impacts on individuals or habitat over the long term.

**Mammals**

Direct impacts on mammals would be similar to those described for terrestrial wildlife in general. Small mammals may be crushed or trampled by mine equipment or vehicles. Large- and intermediate-sized mammals may be killed by moving vehicles along haul roads. Mortalities are expected to occur on a short-term, individual, and localized scale; therefore, population- or community-level impacts on wildlife from mortalities would likely be negligible.

In terms of indirect impacts, habitat alteration, disturbance, and displacement from mine activities would affect mammals. Habitat structure and composition determine the current diversity of species in the analysis area. The landscape alteration would cause some large mammals to displace to surrounding habitats, potentially increasing competition for resources with other wildlife already occupying those habitats. However, some species (such as coyote) may acclimate to human presence and disturbances and may continue using resources in the Project Area.

Over the long term, reclaimed areas are anticipated to recover to big sagebrush and high-elevation rangeland habitat types. Aspen forest habitats are unlikely to re-establish in reclaimed areas because of different soil characteristics and drier conditions, as well as removal of aspen root systems from the soil. As such, reclamation would result in a shift in some areas from forest to perennial grasses and shrubs. This shift in the plant community could change the species composition of the mammalian community as forest-dependent species locally decline in abundance while grassland, shrub, and generalist species locally increase in the Study Area.

Because of the localized scale of landscape alteration, overall indirect impacts on mammals are expected to be long-term and negligible to minor.

Noxious weeds and invasive plant introductions could indirectly impact mammals (including special status mammals as described below) over the long term through a reduction in habitat quality or changes in trophic structure. The potential for invasive species to spread would be highest in newly disturbed areas. However, impacts from noxious weeds are anticipated to be minimal because of the use of BMPs to control them.

Direct and indirect impacts on individual groups of mammals are analyzed below. Note that the impacts generally described for mammals apply to all groups discussed in the following paragraphs. Therefore, only those impacts unique to each individual mammal group are discussed.

*Big Game*

Elk summer habitat exists throughout the Study Area and elk winter range exists on the far western side of the Study Area. Based on where winter range is expected to occur in comparison to the facilities layout for the Proposed Action, approximately 130 acres of IDFG-mapped elk winter range would be directly impacted. This represents 17 percent of the Study Area. Additional winter habitat is available immediately east of the Study Area. This area would be stripped of vegetation and would therefore be unusable as winter range by big game during active mining. Winter range is especially important for big game, as it provides valuable food and thermal cover that allows these species to conserve energy during severe weather conditions (USFS 2003b). Therefore, the temporary loss of winter range would have a long-term and moderate effect on big game survivorship, at least until it was reclaimed and again supported vegetation of sufficient density and cover to provide food and shelter.

Although winter range habitat impacted by the Proposed Action would be reclaimed, the successional stages of grassland habitat to shrubland would take a number of years. Until it had fully recovered, the habitat would not provide the same structure and complexity as it did before disturbance. Increased human presence associated with the mine and reduction in cover may also intensify the potential for wildlife-human interactions.

Mule deer summer range overlaps the entire Study Area and broadly surrounds it. Mule deer are dependent on shrublands for browse and cover (Cox et al. 2009), so the initial loss of shrubs from the impacted areas is likely to adversely affect mule deer in the Study Area over the short term. Over the long term, as reclaimed areas return to shrubland through succession, these areas would once again become suitable mule deer foraging habitat. The Idaho Mule Deer Initiative assigns a high value to fawning habitat and forage production associated with aspen forests (aspen forests are also important to elk annual recruitment). Given that there would be some permanent loss of aspen forest (as a result of changes to soil characteristics and removal of root systems), there would also be some permanent loss of deer fawning habitat and annual elk recruitment production.

Noise and human presence associated with the mine would interrupt big game movement corridors and displace some big game into adjacent undisturbed habitat. Mule deer have been found to avoid heavily disturbed areas at mines during migration (Merrill et al. 1994 and Blum et al. 2015, both as cited in BLM and USFS 2016). In addition to affecting movement corridors, there would likely be at least some displacement of big game from parturition and winter ranges over the short term. Noise and disturbance during the calving/fawning season may cause pregnant elk and mule deer and those with young calves/fawns to vacate the area, which could negatively impact calf and fawn survivorship. Human-related disturbances on winter ranges can cause big game to burn necessary fat reserves that help them survive the winter. Any extra activity or unnecessary movements, such as running from the sound of a vehicle, could affect survivorship, as could the need to travel farther to alternate areas of crucial range (Canfield et al. 1999; Lutz et al. 2011).

A study of elk calf response to human activity and simulated mine noises in southeastern Idaho found that calves exposed to disturbance moved farther, used larger areas, and used less favorable habitat than calves not exposed to disturbance (Kuck et al. 1985 as cited in BLM 2011). However, if a resource in the disturbance area is of high quality, or there is no suitable alternative habitat, then big game may not flee (Frid and Dill 2002). In addition, there currently is and has been an active mine immediately adjacent to the Project Area and it is likely that some individual big game may have become habituated to noise, disturbance, and human presence associated with mining activities in the area.

As described in **Section 3.5**, baseline surface water quality data indicate that streams and tributaries mainly south of the Study Area exhibit concentration levels, particularly for selenium, that exceed Idaho Cold-Water Aquatic Life Standards CCCs. Therefore, big game could continue to be exposed to levels of COPCs (via drinking contaminated water exposed to COPCs) whether the Proposed Action is built or not. As summarized in **Section 4.5**, the Proposed Action has the potential for a minor (0.001 mg/L) increase in water quality impacts to Hoopes Spring. Therefore, big game that drink water in this area could be at an added risk of COPCs exposure under the Proposed Action. However, this risk is expected to be negligible given the potential increase of 0.001 mg/L, plus big game's wide-ranging nature, and irregular use of the site.

Overall, impacts to big game would be long-term and minor to moderate under the Proposed Action. The effects of noise and disturbance would be short-term but would occur over a relatively wide area, whereas the effects of habitat removal would be localized to the Project Area, but would be long-term.

*Bats*

Mining activities could disturb bat roosts and result in the long-term loss of bat foraging habitat. Undocumented bat roosts and habitat could be directly impacted under the Proposed Action through removal of trees (primarily aspen trees). Bats may also collide with vehicles and mine equipment, particularly when they are most active at night during the summer. Because no mine shafts or caves have been identified within the Study Area, the Proposed Action is most likely to affect small numbers of individual bats that may be roosting in trees or rock crevices and is unlikely to have population-level impacts because of the lack of significant roosts or hibernacula identified in the Study Area. Overall, impacts to bats are expected to be minor, as they would occur on an individual and localized scale.

*Special Status Species*

*<u>Gray wolf</u>*

As discussed in **Section 3.8.4.4**, there are no established packs or breeding pairs within the Study Area although sightings and evidence of use occur. Disruption of movement (anything that could influence wolves, if present, to travel around the periphery of the Study Area) could result from habitat removal, noise, human activity, or impacts to distribution of prey (e.g., the potential for prey such as big game to avoid the mine site could influence wolves to hunt outside the mine site). Generally, disruption to wolf movement from these impacts is expected to be negligible given the gray wolf's wide-ranging nature and irregular use of the site. If wolves do pass through the area during construction, mining, or reclamation, they could be at risk of vehicle collisions. Again, because of the irregular use of the site, collision with vehicles is expected to be rare. Further, it is more likely that wolves would travel around the edges of the mine rather than along any existing roads during periods of increased human activity.

As described in **Section 3.5**, baseline surface water quality data indicate that streams and tributaries mainly south of the Study Area exhibit concentration levels, particularly for selenium, that exceed Idaho Cold-Water Aquatic Life Standards CCCs. Therefore, gray wolves could continue to be exposed to levels of COPCs (via drinking contaminated water or eating prey exposed to COPCs) whether the Proposed Action is built or not. As summarized in **Section 4.5**, the Proposed Action has the potential for a minor (0.001 mg/L) increase in water quality impacts to Hoopes Spring. Therefore, wolves could be at an added risk of COPCs exposure under the Proposed Action. However, this risk is expected to be negligible given the potential increase of 0.001 mg/L, plus the gray wolf's wide-ranging nature, and irregular use of the site.

Overall, because of the lack of known packs or otherwise robust wolf population in the Study Area, impacts are expected to be limited to individual or small groups of wolves passing through the area. Because of the infrequent and wide-ranging nature of the gray wolf in the Study Area, disruption to movement associated with previously described impacts and exposure to COPCs are expected to be negligible. As such, a determination was made that the Proposed Action may impact individuals or habitat but is not expected to affect the species at a population level.

*Canada lynx*
The primary impact of the Proposed Action on Canada lynx would be the disruption of their movement through linkage habitat. This impact may result from noise, human activity, and small-scale habitat removal (as discussed below), but is expected to be negligible, as any lynx occurrence is likely to be limited to transient use of linkage habitat (as explained in **Section 3.8.4.4**). For this reason, the potential for lynx exposure to COPCs is also expected to be negligible.

The year-round noise and human activity associated with the construction and active mining phase of the Proposed Action would likely influence lynx, if present, to travel around the periphery of the Study Area rather than directly through it. Therefore, the potential for direct impacts to lynx from Proposed Action mining activities (e.g., vehicle collision) would be negligible.

The Proposed Action area of disturbance would be 2.8 miles tall (measured north to south). Assuming that the entire Proposed Action footprint is potential linkage habitat (USFS 2007), there could be a 2.8-mile-wide impact of disturbance. However, after active mining, the majority of disturbance would be reclaimed with grasses and shrubs, and human presence in the area would be minimal. Over the long term (110 years), reclaimed areas would be expected to recover to habitat composition similar to baseline conditions. Therefore, there would be little impact on lynx movement through the region over the long term. Thus, a determination was made that the Proposed Action may affect, but is not likely to adversely affect, the Canada lynx.

*Pygmy rabbit*
Given the lack of habitat for pygmy rabbits within the Study Area as described in **Section 3.8.4.4,** pygmy rabbits are not anticipated to occur and therefore, there would be no impacts to this species.

*Spotted bat*

As described in **Table 3.8-1**, no spotted bats were detected during baseline acoustic monitoring. Spotted bats are not anticipated to occur give the overall lack of suitable habitat for this species (i.e. cracks and crevices of rocky outcrops and cliffs). Due to this lack of habitat, there would be no impact to this species.

*Townsend's big-eared bat*

As described in **Table 3.8-1**, no Townsend's big-eared bats were detected during baseline acoustic monitoring. If present, it is expected that use of the Study Area by Townsend's big-eared bats would be infrequent and transitory (because of the lack of roost sites in the vicinity for this species), and impacts would be expected to occur at the individual versus population level. Potential impacts of the Proposed Action on the Townsend's big-eared bat include the loss of foraging and commuting habitat, loss and degradation of water sources, potential mortality from vehicle collisions, and changes in predator communities.

The Proposed Action would result in the loss or alteration of approximately 701 acres of potential foraging habitat. Habitat impacts would be long-term. The majority (96 percent) of disturbed habitat would be reclaimed and would eventually recover to high-elevation rangeland habitat types. However, losses of aspen and forest habitat would be long-term. Water sources used by the spotted and Townsend's big-eared bat could be dried up or reduced in water quantity, although plenty of existing and adjacent water sources would not be impacted.

Townsend's big-eared bats could collide with moving vehicles along the haul road, when vehicles are traveling the road between dusk and dawn. The bats could also be subject to increased mortality from predators, such as the great horned owl, raccoon, and weasel, which are relatively more tolerant of human disturbance. However, predators tend to prey on bats while asleep or when emerging from their roosts (Gruver and Keinath 2003), and because there no known roosts in the area, any predator impacts are expected to be opportunistic in nature. Mortalities are expected to be rare and limited to individual bats because use of the site is expected to be low and sporadic.

Overall, roosting sites (e.g., caves and underground mines) are not known in the Study Area or vicinity; therefore, impacts to Townsend's big-eared bats, if present, would be limited to individuals foraging in or moving through the area. Impacts on habitat would be long-term until the site is successfully reclaimed. Bats may collide with moving vehicles or infrastructure, especially between dusk and dawn. However, collision impacts, if any, are expected to be rare. Added exposure of bats to COPCs given existing selenium levels in the watershed is anticipated to be negligible due to the infrequent use of the site and the very small potential increase in COPCs in surface waters outside of the Study Area.

*Uinta chipmunk*

Under the Proposed Action, the primary potential impacts on the Uinta chipmunk include the loss of habitat, loss and degradation of water sources, mortality from vehicle collisions, and changes in predator communities.

Approximately 457 acres of potential Uinta chipmunk habitat (i.e., aspen, aspen/mixed conifer, and mixed conifer forests) would be removed under the Proposed Action. In addition to direct habitat loss, habitat removal could indirectly impact Uinta chipmunks by the potential increase in the abundance of predators that are more tolerant of human activity. Most of the areas disturbed by the Proposed Action would be reclaimed as soon as the areas were no longer utilized for Project activities; however, reclaimed landscapes would not function as suitable habitat for Uinta chipmunk, as the forested habitats impacted by the Proposed Action would be reclaimed to grassland and shrubland communities over the short term and shrubland communities over the long term.

Uinta chipmunks could collide with moving vehicles along the proposed access and haul roads. Under the Proposed Action, the impact of vehicle collisions on the Uinta chipmunk would be short-term, as human presence in the area would be minimal upon the conclusion of Project activities.

Uinta chipmunks could also be subjected to increased mortality from predators that are relatively more tolerant of human disturbance and which may benefit from perching on the existing and relocated overhead power lines. The relocated power lines would be constructed in compliance with BLM guidelines to minimize raptor perching and, thereby, reduce the predation of Uinta chipmunks.

The overall impacts to Uinta chipmunk under the Proposed Action would be long-term and negligible to minor.

*North American wolverine*

As discussed in **Section 3.8.4.4**, wolverine use of the Study Area is likely limited to occasional transitory movements of individual wolverines. Therefore, the primary impact of the Proposed Action on the wolverine would be the disruption of wolverine movement through the general area. Disruption of movement (anything that could influence wolverines, if present, to travel around the periphery of the Study Area) could result from habitat removal, noise, human activity, or impacts to distribution of prey (e.g., the potential for prey such as big game to avoid the mine site could influence wolverines to hunt outside the mine site). Generally, disruption to wolverine movement from these impacts is expected to be negligible given the species' wide-ranging nature and irregular use of the site. If wolverines do pass through the area during construction, mining, or reclamation, they could be at risk of vehicle collision along the haul road. Again, because of irregular use of the site, collision with vehicles is expected to be rare. Further, it is more likely that wolverines would travel around the edges of the mine rather than along the haul roads during periods of increased human activity.

As described in **Section 3.5**, baseline surface water quality data indicate that streams and tributaries mainly south of the Study Area exhibit concentration levels, particularly for selenium, that exceed Idaho Cold-Water Aquatic Life Standards CCCs. Therefore, wolverines could continue to be exposed to levels of COPCs (via drinking contaminated water or eating prey exposed to COPCs) whether the Proposed Action is built or not. As summarized in **Section 4.5**, the Proposed Action has the potential for a minor (0.001 mg/L) increase in water quality impacts to Hoopes Spring. Therefore, wolverines could be at an added risk of COPCs exposure under the Proposed Action. However, this risk is expected to be negligible given the potential increase of 0.001 mg/L, plus the wolverines wide-ranging nature, and irregular use of the site.

Overall, there is no potential for wolverine denning in the Study Area. Impacts are therefore expected to be limited to transient individuals, if present, during construction, mining, and reclamation. Because of the likely infrequent and wide-ranging nature of the wolverine in the Study Area, disruption to movement associated with aforementioned impacts and exposure to COPCs are expected to be negligible. For these reasons, a determination was made that the Proposed Action may impact individuals or habitat, but is not expected to jeopardize this species.

**Reptiles and Amphibians**

The Proposed Action would not result in permanent loss of any wetland and riparian habitat within the Study Area. Direct mortalities to amphibians and reptiles may occur on the haul road as individuals travel between various habitats. The placement of culverts and mine runoff could introduce sediments into habitats used by amphibians and reptiles. Simplot would implement surface water control structures with several types of designs to reduce or eliminate risk of surface water contamination or fill. For this reason, indirect impacts from runoff on sensitive amphibians and reptiles are expected to be negligible. Indirect effects could also adversely affect amphibian populations including localized drying or reduction in the quantity of existing surface water sources as a result of the capture of surface runoff during active mining.

*Special Status Species*

*Columbia Spotted Frog*
As the Study Area is outside the known range of the Columbia spotted frog, there would be no impact to this species from the Proposed Action.

*Northern Leopard Frog, Common Garter Snake, and Boreal Toad*
Impacts to these three species would be similar to those already described for amphibians and reptiles generally. Impacts may be long-term and negligible to minor on individuals or habitat.

The Proposed Action would not result in any loss of breeding habitat for the northern leopard frog and boreal toad as no riparian or wetland areas would be impacted. As stated in **Section 3.8.5**, while the common garter snake may occur in a variety of habitat, in Idaho they are associated with marshes and wet areas. As such, there would be no direct impact to habitat for this species as well.

### 4.8.2.2 Alternative 1 Reduced Pit Shell with Soil-only Cover

The types of potential impacts on terrestrial wildlife resulting from Alternative 1 would be essentially identical to those described under the Proposed Action (**Section 4.8.2.1**). However, the total acres of wildlife habitat loss and disturbance from mining activities would be reduced by approximately 78 acres as a result of reconfiguring the pit shell footprint and various habitat types used by specific species would be slightly reduced, primarily to forested habitats (**Section 4.7**).

Under this alternative, no cherty shale would be encountered which would result in less seleniferous material being encountered. This reduction would likely reduce the potential for COPCs to affect wildlife populations.

Overall, impacts to wildlife under Alternative 1 would be reduced compared with the Proposed Action by reducing the footprint of disturbance and the amount of seleniferous material. Depending on the season and species, overall disturbance and displacement impacts would be long-term and would range from negligible to minor.

### 4.8.2.3 No Action Alternative

Under the No Action Alternative, the phosphate leases would not be developed. The No Action Alternative would result in no new impacts to wildlife in the Study Area. The No Action Alternative would maintain the current status of terrestrial wildlife and terrestrial wildlife populations in and around the Study Area. However, this does not preclude future development of the federal phosphate leases under a different mine plan.

### 4.8.3 Mitigation Measures

EPMs described in **Section 2.5** would be implemented to avoid and/or minimize potential impacts to wildlife. No mitigation measures for wildlife, above and beyond what Simplot has proposed in the M&RP and described in **Section 2.5**, have been recommended.

### 4.8.4 Unavoidable (Residual) Adverse Impacts

Based on the HEA, reclamation would offset 52 percent of the wildlife habitat services lost under the Proposed Action, with a net debit of 33,551 residual DSAYs of lost wildlife habitat services (Stantec 2017h). This loss of wildlife habitat services would be an unavoidable residual adverse effect of the Proposed Action. The net residual DSAY debit under Alternative 1 would be 5,488 DSAYs less than that of the Proposed Action, at 28,063 DSAYs remaining, with reclamation offsetting 48 percent of the wildlife habitat services lost.

The potential destruction of undiscovered active bird nests under the Proposed Action or Alternative 1 would be unavoidable; however, the potential for this unavoidable impact would be greatly reduced by EPMs that include migratory bird nest surveys prior to any ground disturbing activities.

### 4.8.5 Relationship of Short-term Uses and Long-term Productivity

The Proposed Action and Alternative 1 would implement ground-disturbing activities that would produce short- and long-term effects to wildlife and Special Status Species and the habitat they use in the Project Area. Species that depend on mid- and late-seral forested vegetation that occurs within the Project Area would be displaced and the long-term productivity of this habitat would be impacted.

### 4.8.6 Irreversible and Irretrievable Commitment of Resources

Under the Proposed Action, the loss of aspen and forested areas is considered an irreversible commitment of resources and would have long-term impacts on wildlife species that use those habitats. This irreversible commitment would be slightly reduced under Alternative 1. Although reclamation would re-establish upland grassland and shrub vegetation in disturbed areas after mining operations end, it is not anticipated that aspens and conifers would re-establish in the foreseeable future, if ever, because the existing rootstock or seed source would be removed. As a result of the loss of habitat, wildlife species that use forested habitats may locally decline in abundance, while other species that use grassland habitats may locally increase following reclamation. This small-scale shift in wildlife community composition in the Project Area would also be considered an irreversible commitment of resources.

It is possible that some wildlife would be adversely impacted by elevated COPC concentrations from the Proposed Action. These potential negligible impacts are assumed to be limited in magnitude and areal extent and therefore, represent a minor irretrievable commitment of resources. This would be reduced under Alternative 1.

## 4.9 FISHERIES AND AQUATICS

This section describes the impacts to fisheries and aquatic resources, with the exception of amphibians, which are discussed in **Section 4.8**.

### 4.9.1 Issues and Indicators

The following are the issues and indicators for fisheries and aquatic resources.

*Issue: The Project may affect cutthroat trout, other native fish, fisheries resources, or aquatic resources in the Project Area.*

*Indicators:*

- The length of intermittent and perennial stream channels directly affected by the Project, and comparison with the undisturbed lengths of these stream channels in the Project Area.
- Acres of AIZ to be affected and comparison with undisturbed acreage of this habitat in the Project Area.
- Quantities of suspended sediment, selenium, other heavy metals, and other contaminants of concern, with emphasis on compliance with applicable aquatic life water quality standards and toxicity thresholds, and whether the number of sites where thresholds are exceeded changes as a result of the Project.

### 4.9.2 Direct and Indirect Impacts

#### 4.9.2.1 Proposed Action

Direct and indirect effects to fisheries and aquatic resources would primarily be driven by two mechanisms: (1) streamflow alterations due to watershed disturbance and mine water management; and (2) potential increases in selenium and other COPCs in streamflow from the weathering of waste rock and subsequent transport of these COPCs to surface water via groundwater. Other mechanisms that have the potential for effects, but for which the potential is slight due to engineering controls include: sediment transport to streams from disturbed areas, and accidental releases of contaminants to the aquatic environment. These mechanisms and the direct and indirect effects that could occur from them are described in separate subsections for AIZs, aquatic habitat, macroinvertebrates, and fish populations. Because any effects to fisheries and aquatic resources are largely connected to changes in surface water, this section tiers to **Section 4.5** and is referenced for further details, as applicable.

**Aquatic Influence Zones**

The Proposed Action would include direct disturbance of approximately 20.9 acres within AIZs. This is approximately 8.7 percent of the AIZ acreage in the Study Area (239 acres). There would be no direct or indirect effects to the remaining 218.1 acres within AIZs. The areas that would be disturbed include:

- Approximately 0.42 acres within the AIZ on upper Smoky Creek where the rerouted power line terminates (see **Figures 3.9-2a** and **2.4.1**). This area of Smoky Creek is within the active mining area of the existing Smoky Canyon Mine and is an engineered stream channel with little in the way of riparian vegetation or stream habitat.
- Approximately 20.5 acres within AIZs associated with several small intermittent drainages between Roberts Creek and Pole Canyon Creek (see **Figure 3.9-2b**). These areas would be disturbed due to construction of the open pit (8.4 acres), haul road (4.3 acres), and associated facilities (7.8 acres). These areas lack defined channels and do not have surface connections to channel systems or permanent bodies of water. They appear to flow only

during snowmelt, but may have subsurface connections to springs that flow into Roberts Creek, the Roberts Creek Diversion, or North Sage Valley.

Disturbance within AIZs can result in a variety of effects to aquatic habitats, such as increases in water temperature due to a loss of shading from riparian vegetation, increases in sediment due to the removal of riparian vegetation, changes to stream channel morphology, etc. The changes can then lead to adverse effects on biota such as macroinvertebrates and fish. Under the Proposed Action, the areas to be disturbed are either in previously disturbed areas that lack the structure or function typical of AIZs, or are in drainages that lack sufficient perennial flow and/or habitat for aquatic organisms. As a result, disturbance of these AIZs would not result in changes to stream temperature, sediment, channel morphology, etc., and the effects would overall be minor. They would be long-term, as these areas are unlikely to be restored to a similar function during reclamation (i.e., the areas would be reclaimed, but may not support intermittent drainages). However, it should be noted that AIZ disturbance in the Roberts Creek drainage would be part of a larger area of disturbance that would have indirect impacts to aquatic habitat in Roberts Creek (discussed in the aquatic habitat section).

**Appendix 4A** summarizes compliance with the CNF RFP with regard to AIZs under the Proposed Action.

**<u>Aquatic Habitat</u>**

There would be no direct or indirect impacts to Spring Creek, Webster Creek, Draney Creek, or South Fork Sage Creek as these streams are located outside the area of disturbance and no changes to surface water quantity or quality are predicted for these streams. Regarding water quality, the groundwater model does not predict migration of COPCs as far south as South Fork Sage Creek (**Figure 4.5-2**). The model does predict some migration of COPCs northward, reaching as far north as Draney Creek (**Figure 4.5-2**). However, COPCs would be transported in the Wells Formation groundwater, which is found at increasingly greater depths north of the Project Area (HGG 2018). The top of the Wells Formation is estimated to be more than 1,000 feet beneath Draney Creek in the location where the plume is shown (HGG 2018), and springs that support Draney Creek issue from formations younger and higher than the Wells Formation. As a result, Wells Formation groundwater conveying COPCs would not be intercepted by Draney Creek.

Potential direct and indirect effects to other streams in the Study Area are described in separate subsections below.

*Smoky Creek*

There would be no direct disturbance to Smoky Creek under the Proposed Action and direct effects would be limited to the potential for increases in sediment due to runoff from mine disturbance and the USFS road used for mine access, and/or accidental releases of other pollutants such as chemicals or hydrocarbons. Levels of fine sediment in Smoky Creek are high, possibly due in part to proximity to the access road. Sediment runoff would continue to be managed under Simplot's SWPPP and these effects would continue. Because the long-term substrate embeddedness monitoring in Smoky Creek does not show sediment increasing over time (**Table 3.9-3**), it appears that any road related sediment inputs are stable. The Proposed Action would not result in a change to these inputs and the effects would be negligible (i.e., no measurable change relative to current conditions). Effects would be short term, limited to the active mining and post-mining reclamation period. Regarding an accidental release of contaminants, the most likely sources would be mobile equipment and/or vehicles delivering chemicals and other materials to the mine along Smoky Canyon Road that occurs adjacent to Smoky Creek, although there have not been any known accidental releases in the recent past. The magnitude of the effects of an accidental release would vary depending upon the amount released and the proximity to live water, but would generally be short term. Given that the potential for an accidental release is slight due to the BMPs, SPCC, and other precautionary measures in place, the effects are also expected to be negligible.

Indirect effects to aquatic habitat due to changes in water quality are not expected because the Wells Formation groundwater that would be impacted (**Figure 4.5-2**) is estimated to be more than 600 feet beneath Smoky Creek (HGG 2018). The springs that support Smoky Creek issue from formations younger and higher than the Wells Formation groundwater, as described for Draney Creek. Rather, any indirect effects would be due to streamflow reductions as a result of stormwater runoff rerouting and/or being captured in open pits and sedimentation ponds. Currently, runoff has been withheld from approximately 880 acres (approximately 22 percent of the 4,200-acre Smoky Creek drainage). The Proposed Action would reduce Smoky Creek's contributing area by another 125 acres (3 percent). Because the entire perennial base flow in Smoky Creek comes from LSmS (reaches upstream of LSmS have very low flow in late summer and fall and typically go dry), a 3 percent reduction in runoff would not result in a measurable change to overall habitat conditions. So, although any decrease in streamflow can be considered an adverse effect to aquatic habitat, the effect would be negligible on Smoky Creek. Further, the effect would be short term as disturbed and reclaimed areas would function as part of the watershed following mining.

*Tygee Creek*

There would be no direct disturbance to Tygee Creek, and the potential for direct effects due to sediment and accidental releases of contaminants would negligible as described for Smoky Creek. Likewise, impacts to water quality are not expected because Tygee Creek does not intercept the Wells Formation groundwater that would be impacted. This is due both to the depth of the Wells Formation groundwater and to the West Sage Valley Branch fault shown in **Figure 4.5-2** that intercepts any eastward movement of contaminated groundwater. The Proposed Action could, however, reduce streamflow in Tygee Creek due to potential indirect effects to streamflow in the Roberts Creek drainage (see Roberts Creek section below and **Section 4.5**). The potential reduction in base flow is estimated to be approximately 0.44 cfs, which would reduce baseflow in upper Tygee Creek by approximately 79 percent (0.56 cfs – 0.44 cfs). Downstream near the mouth of Tygee Creek at LT-6, input from tributaries would attenuate the response and the decrease would be approximately three percent of baseflow (13.23 cfs – 0.44 cfs).

Reductions in streamflow reduce the quantity and quality of habitat available for aquatic organisms. Among other factors, the quantity and quality of habitat is reduced due to decreased wetted stream widths, shallower pool depths, less instream cover, and increased temperatures (Harvey et al. 2006). Reduced flow can also lead to increased amounts of fine sediment in the substrate, as there is less flow for downstream transport. This leads to reduced habitat for macroinvertebrates (due to a filling of interstitial spaces in the substrate) and reduced food availability for fish (Harvey et al. 2006). The magnitude of these effects would vary longitudinally in Tygee Creek due to the differences in flow from upstream to downstream. While the overall effect to the stream is likely moderate, it would approach major in the most upstream areas where the watershed area is small and flows are lower and yet be negligible in downstream areas where the watershed area is larger and flows are higher. The effects would contribute to Tygee Creek's inability to meet its beneficial uses of cold water aquatic life and salmonid spawning. The indirect effects would be long term as disturbed and reclaimed areas would begin to function as part of the watershed following reclamation, but flow patterns may take longer to re- establish.

*Roberts Creek*

Although the open pit and ancillary facilities would be in close proximity to Roberts Creek, there would be no direct disturbance to perennial portions of the stream. Further, the potential for direct effects due to sediment and accidental releases of contaminants would be negligible to minor due to stormwater controls and other BMPs. In addition, water quality impacts are not predicted due to the depth of the Wells Formation groundwater and the West Sage Valley Branch fault, as described for Tygee Creek. The Proposed Action is predicted to have indirect effects to Roberts Creek due to streamflow alterations.

Runoff has already been withheld from approximately 180 acres of the 1,600-acre Robert's Creek drainage (i.e., about 11 percent). The Proposed Action would reduce Robert's Creek's contributing area by another 530 acres (33 percent), including the loss of areas mapped as intermittent tributaries. This may result in similar losses in runoff volume (i.e., 33 percent). Further, as described in **Section 4.5**, the reduction in watershed area and groundwater recharge would dry up the springs that feed Roberts Creek and Roberts Creek itself. Roberts Creek has limited aquatic habitat due to low flow, impoundments, and it being diverted around the tailings pond in a canal. As a result, although the impact would be moderate (i.e., loss of all flow would be an easily measurable change in current conditions), the quality of habitat lost relative to fisheries and aquatic resources would be minor. The effects would be long term as disturbed and reclaimed areas would begin to function as part of the watershed following reclamation, but flow patterns may take longer to re-establish.

*North Fork Sage Creek*

There would be no direct disturbance to North Fork Sage Creek. Impacts to water quality are not expected due to depth of the Wells Formation groundwater and the West Sage Valley Branch fault, as described previously for Tygee Creek. Although there is the potential for releases of sediment from stormwater ponds, as well as the accidental release of contaminants, given the protections in place and the large low gradient valley between mine disturbance and the North Fork Sage Creek, direct effects from either of these two mechanisms would be negligible. Despite the direct impacts to intermittent drainages that feed into North Fork Sage Creek, indirect effects due to streamflow alterations would be beneficial to North Fork Sage Creek due to an overall increase in drainage area under the Proposed Action (primarily due to run-on ditches diverting water toward North Sage Valley). The magnitude would be negligible due to the small increase (six percent), and short term, as water would not be diverted to the drainage after reclamation.

*Pole Canyon Creek*

Direct impacts to Pole Canyon Creek would be as described for North Fork Sage Creek (negligible). Indirect effects would also be similar (negligible) as there would be a small overall increase in drainage area due to runoff from about 260 acres being directed into Pole Canyon Creek via a run-on ditch. Water quality impacts are not expected because the contaminated Wells Formation groundwater is approximately 200 feet below the stream.

*Hoopes Spring, Sage Creek, and Crow Creek*

There would be no direct disturbance to Hoopes Spring, Sage Creek, or Crow Creek. Further, as all components of the Proposed Action are located north of these streams, there is also no potential for other types of effects (i.e., streamflow alterations, sediment related effects, or effects related to the accidental release of contaminants from a spill). Rather, any effects to aquatic habitat in these streams would be limited to increases in selenium and other COPCs as an indirect effect of mining.

As described in **Section 4.5**, groundwater modeling indicates that the Proposed Action would increase selenium, manganese, sulfate, and TDS concentrations at Hoopes Spring. The number chosen for the analysis is the upper limit of the 95 percent confidence interval for the mean concentration predicted by the stochastic modeling approach. The upper confidence level is the value that when calculated for a random data set equals or exceeds the true mean 95 percent of the time, and is considered conservative as explained in **Section 4.5**. The predicted upper limit for selenium is 0.001 mg/L beginning about 80 years after mining and continuing until at least 300 years after mining. The predicted upper limit for manganese, sulfate, and TDS increases would be 0.047 mg/L, 3 mg/L, and 13 mg/L, respectively. These concentrations are assumed to represent the concentration in Hoopes Spring's downstream channel with an assumed average flow of 9 cfs, based upon two measurements made at HS-3 during the water resources baseline study (Stantec 2017a).

For sulfate and TDS, predicted increases would be approximately 4-5 percent greater than the current mean concentrations of approximately 60 mg/L and 300 mg/L for sulfate and TDS, respectively). There are no aquatic life criteria for sulfate or TDS in the Idaho Water Quality Standards or in EPA's National Recommended Water Quality Criteria. Because the predicted increases are small relative to current concentrations, the predicted effects to aquatic habitat would be negligible, but long term.

The predicted increases in manganese are greater than the increases for sulfate or TDS, but are also expected to remain below water quality standards. There is no aquatic life criterion in Idaho for manganese, but predicted concentrations would remain below the secondary drinking water standard of 0.05 mg/L as explained in **Section 4.5**. Wyoming does have aquatic life criteria for manganese, including an acute criterion of 3.11 mg/L and a chronic criterion of 1.462 mg/L (WDEQ 2013). The predicted concentrations would remain well below these criteria and effects to aquatic habitat would be negligible, but long term.

Regarding selenium, there are aquatic life criteria, including proposed changes as described in **Section 3.9.5.1**. To be able to calculate potential bioaccumulation of selenium in the food chain and assess the impacts on aquatic life in subsequent sections, the following estimations were made to determine the magnitude of selenium increases in streams downstream of Hoopes Spring (**Table 4.9-1**):

- The assumed flow rate (cfs) and predicted selenium concentration increase (0.001 mg/L) were converted to a selenium load (e.g., pounds per day) by multiplication and unit conversions.
- The load was then applied to Sage Creek and Crow Creek with assumed flow rates and a new (diluted) concentration determined. To be consistent with the water resources impact assessment (**Section 4.5**), the average low-flow season flow rates for Sage Creek and Crow Creek, obtained from the RI/FS (Formation Environmental 2014), were used for the analysis.

It is important to emphasize that these concentrations are not the predicted total selenium concentrations at these sites, as selenium is already elevated at these sites as a result of previous mining activities as described in **Section 4.5**. Rather, these concentrations merely represent the increase that is predicted from the Proposed Action. Also, it should be noted that the groundwater modeling predicts selenium increases at Hoopes Spring only. As described in previous subsections, streams not connected to Hoopes Spring (i.e., streams in the Tygee Creek drainage, North Sage Valley, Pole Canyon Creek, and South Fork Sage Creek) are not predicted to see selenium increases as a result of the Proposed Action due the depth of the Wells Formation groundwater and the West Sage Valley Branch Fault.

**Table 4.9-1 Estimated Increases in Selenium Concentrations – Water**

| STREAM[2] | SITE | SELENIUM CONCENTRATION (mg/L)[1] |
|---|---|---|
| Hoopes Spring | HS-3 | 0.001 |
| Sage Creek | LSV-3 | 0.0005 |
| | LSV-4 | 0.0005 |
| Crow Creek | CC-1A | 0.0002 |

[1] Predicted increase due to Proposed Action only – not a predicted total concentration for all sources combined.

[2] Average low-flow season flow rates for Sage Creek and Crow Creek were used for dilution.

As described in **Section 4.5.2.1**, and discussed below for macroinvertebrates and fisheries, these selenium increases are small relative to current and projected future concentrations. As a result, the indirect effects to aquatic habitat from the projected increases would be minor, but long term, as they would persist long after mining has ceased.

## Macroinvertebrates

There would be no direct or indirect effects to macroinvertebrates in Spring Creek, Webster Creek, Draney Creek, or South Fork Sage Creek as these streams are located outside the area of disturbance and no changes to surface water quantity or quality are predicted for these streams. Potential direct and indirect effects of the Proposed Action on macroinvertebrates in others stream are described below.

*Smoky Creek*

Macroinvertebrates can be affected by a variety of factors such as water quality changes, sedimentation, etc. Current data for Smoky Creek indicates that macroinvertebrate communities are affected by low water flow and sedimentation. The Proposed Action would not directly disturb Smoky Creek. Any increases in sediment or other contaminants would negatively affect macroinvertebrates through alteration of substrates and water quality. Because macroinvertebrate taxa vary in their responses to sediment and water quality changes, the most likely effects of any perturbations would be a shift in the composition of local macroinvertebrate communities. Because sediment would be controlled through the SWPPP and is not likely to differ from current conditions (i.e., there would be no change to the SWPPP under the Proposed Action and mine activity adjacent to Smoky Creek would be similar), and because the chance for an accidental release is slight, changes in macroinvertebrate community compositions are unlikely. Thus, direct effects would be negligible. Changes in streamflow can also affect community composition; however, the changes in streamflow are minimal and indirect effects are also expected to be negligible.

*Tygee Creek*

The potential for direct effects to macroinvertebrate communities in Tygee Creek would be negligible as described for Smoky Creek. However, in Tygee Creek, indirect effects to macroinvertebrate communities are likely due to streamflow reductions. Streamflow reductions can affect macroinvertebrates by reducing the amount of habitat available (i.e., a reduced amount of wetted substrate), as well by reducing the suitability of that habitat (i.e., increased fine sediment in the substrate due to a lack of flow available to transport the sediment, and increased temperatures). Because the impact on instream flow would be more drastic in upper Tygee Creek than in lower Tygee Creek, indirect effects to macroinvertebrates would be most pronounced in upper Tygee Creek, and would likely include decreases in density and changes in community composition towards taxa tolerant of low flow conditions, higher amounts of fine sediment, etc. However, because conditions for macroinvertebrates are already poor at both the upstream and downstream locations, the measurable effect may only be small. A small measurable effect, would by definition be a minor effect, even if that minor effect may include the loss of most macroinvertebrates at the most upstream locations. Effects would be short term as described for habitat related effects.

*Roberts Creek*

The potential for direct effects to macroinvertebrate communities in Roberts Creek would be negligible; however, there is the potential for macroinvertebrate communities in Roberts Creek to be lost if the stream dries up as assumed (see **Section 4.5**). This would be a moderate effect, as the change would be easily measurable, but not greater as the macroinvertebrate communities present are currently limited by the small amount of habitat available. The effect would be long term as macroinvertebrate communities would be slow to reestablish even if stream flow is restored following reclamation.

*North Fork Sage Creek and Pole Canyon Creek*

Direct and indirect effects to macroinvertebrates in North Fork Sage Creek and Pole Canyon Creek would be negligible due to the negligible potential for direct effects related to sediment and spills, as well as the negligible changes to streamflow and water quality.

*Hoopes Spring, Sage Creek, and Crow Creek*

The Proposed Action is predicted to increase selenium, manganese, sulfate, and TDS concentrations by a small amount in these streams, as described for aquatic habitat. Macroinvertebrates can be exposed to pollution, including metals pollution, through direct uptake from the water, through ingestion of contaminated food (periphyton, detritus, other invertebrates), or though incidental ingestion of sediment (Merritt and Cummins 1984). In the case of selenium, evidence suggests that the primary pathway is through ingestion of contaminated food (Chapman et al. 2010, Lemly 1985). Although some work has been done to determine selenium toxicity levels for many macroinvertebrate taxa (EPA 2016b), taxa vary widely in their tolerance to pollution. For this reason, the most common effect of pollution, including metals pollution, is a change in the benthic community composition. For example, in systems with metals pollution, community composition changes toward fewer metal intolerant taxa such as EPT taxa. Poor SMI scores (which includes several EPT related metrics) on reaches of Sage Creek downstream of Hoopes Spring (relative to upstream reaches) are likely due in part to selenium impacts, although high levels of fine sediment may be a stronger determining factor in the differences observed (Formation Environmental 2012).

The question for this analysis is whether or not the predicted increases in these contaminants are likely to result in additional changes to community composition. The predicted increases in manganese, sulfate, and TDS concentrations are small, and it is expected that there would be only negligible changes to community composition (i.e., it would be difficult to discern a change in community composition). The predicted increases in selenium concentrations at Hoopes Spring, Sage Creek, and Crow Creek of 0.001 mg/L, 0.0005 mg/L, and 0.0002 mg/L, respectively, are also small relative to the current concentrations described for these sites in **Section 3.5**. However, since selenium bioaccumulates in macroinvertebrate tissue, the potential increases in water concentration were converted to tissue concentrations using the following equation, which was derived from EPA (2016b):

$$C_{tissue} = TTF \text{ x } EF \text{ x } C_{water}$$

Where:

$C_{tissue}$ = selenium concentration in benthic macroinvertebrate tissue in mg/kg dw

TTF = Trophic Transfer Factor for benthic macroinvertebrate tissue

EF = Enrichment function (liters per gram [L/g])

$C_{water}$ = Concentration of selenium dissolved in water (µg/L)

Values for TTF and EF were taken from the median values derived for benthic macroinvertebrates at HS-3, LSV-2C, LSV-4, CC-1A, and CC-3A as part of the proposed SSSC for Hoopes Spring, Sage Creek, and Crow Creek (Formation Environmental 2017). The predicted increases in macroinvertebrate tissue concentrations are shown in **Table 4.9-2**. Increases in concentrations range from 0.42 – 0.56 mg/kg dw. Increases in this range would be small relative to existing tissue concentrations in these streams (**Table 3.9-18**). The increase is also small relative to the reference concentration for unaffected macroinvertebrate tissue of 3.75 mg/kg dw (**Section 3.9.5.1**). Because the predicted increases in tissue concentrations would be small, effects relative to existing conditions would be negligible. Research indicates that fish are typically more sensitive to selenium than invertebrates (EPA 2016b). As a result, fish, which are discussed in the following section, are a more sensitive resource for determining the effects of the predicted selenium increases.

It should also be noted that existing selenium concentrations in water are projected to decrease prior to the increases discussed here (which wouldn't begin until 80 years after mining; see **Section 4.5**). Assuming macroinvertebrate tissue concentrations decrease in the future as well, the minor increases under the Proposed Action would not be of a magnitude sufficient to increase concentrations beyond their present values. This is discussed further for cumulative effects in **Section 5.5**.

**Table 4.9-2 Estimated Increases in Selenium Concentrations – Macroinvertebrate Tissue**

| STREAM | SITE | $C_{TISSUE}$ (mg/kg dw)[1] | TTF | EF | $C_{WATER}$ (mg/L)[2] |
|---|---|---|---|---|---|
| Hoopes Spring | HS-3 | 0.56 | 1.10 | 0.51 | 0.001 |
| Sage Creek | LSV-2C | 0.51 | 2.41 | 0.42 | 0.0005 |
| | LSV-4 | 0.40 | 1.27 | 0.63 | 0.0005 |
| Crow Creek | CC-1A | 0.42 | 2.38 | 0.88 | 0.0002 |
| | CC-3A | 0.54 | 2.85 | 0.94 | 0.0002 |

[1] Predicted increase due to Proposed Action only – not a predicted total concentration for all sources combined.
[2] Calculations were made with water concentrations in µg/L; displayed in mg/L for consistency with other sections.
$C_{tissue}$ = selenium concentration in macroinvertebrate tissue
TTF = Trophic Transfer Factor for benthic macroinvertebrates – Formation Environmental (2017)
EF = Enrichment Factor – Formation Environmental (2017)
$C_{water}$ = selenium concentration in water from model predictions and dilution (**Table 4.9-1**)

**Fish**

There would be no direct or indirect effects to fish in Spring Creek, Webster Creek, Draney Creek, or South Fork Sage Creek as these streams are located outside the area of disturbance and no changes to surface water quantity or quality are predicted for these streams. Also, no direct or indirect effects are expected to fish in North Fork Sage Creek or Pole Canyon Creek due to the lack of fish in these streams. Potential direct and indirect effects of the Proposed Action on fish in others stream are described below.

*Smoky Creek*

Fish populations in Smoky Creek are unlikely to be affected by the Proposed Action. There is the potential for sediment, contaminants, and streamflow changes to occur, all of which limit habitat potential for fish. These changes can also affect macroinvertebrate populations, which can lead to a reduced food source for fish. However, as discussed for habitat and macroinvertebrates, all these potential impacts are expected to be negligible. As a result, effects to fish populations are expected to be negligible as well. Further, any negligible effects would be short term, as they would cease following reclamation.

*Tygee Creek*

The predicted streamflow decreases in Tygee Creek would have adverse indirect effects to fish, particularly in upper portions of Tygee Creek, due to the loss of habitat. The streamflow decreases would also reduce macroinvertebrate density due to loss of habitat and increased sedimentation, as described in that section. This would lead to reduced food available for fish. YCT populations in upper Tygee Creek (i.e., at LT-3 where they have been monitored) may not be self-sustaining due to the poor habitat available; rather, fish may be moving up from lower reaches (**Section 3.9.4.6**). Assuming this is the case, the effects of decreased flow (and associated effects to macroinvertebrates) on YCT would be minor, as these fish would likely just move out of the most affected reaches. For other fish species that are more resident, such as dace, sculpin, redside shiner, Utah chub, and northern leatherside chub, the magnitude of impacts would be greater. For example, northern leatherside chub have been detected in upper reaches of Tygee Creek (upstream from Draney Creek), but not in lower reaches. Decreased flow and its associated effects in the upper reaches would likely reduce populations of northern leatherside chub, as well as other species found primarily in the upper reaches. The predicted flow decreases are unlikely to eliminate these species entirely from upper Tygee Creek, as inflow from Smoky Creek and Draney Creek would be unaffected. Reduced population sizes or a reduced distribution of these populations would be a moderate effect (i.e., easily discernable). Although flows and associated ecological function (e.g., cleaner substrates, macroinvertebrate populations) would return to normal at some point following reclamation, some fish populations may take longer to recover, thus the effects may range from short term to long term. No direct effects are expected due to the negligible effects to habitat.

*Roberts Creek*

Predicted streamflow alterations in Roberts Creek would adversely affect fish, but the effects would be limited because Roberts Creek appears to only support sparse fish populations. Only one fish has been sampled in Roberts Creek above the impoundment. That was in 2005, and no fish have been collected in subsequent efforts, although redside shiner have been found below the impoundment in the Roberts Creek diversion. Loss of flow would adversely affect any fish present by eliminating habitat. Assuming all flow is lost as discussed in **Section 4.5**, this would remove all habitat and fish in Roberts Creek. Because few fish are present, the effect would be minor. Although flows would return to normal at some point following reclamation, some fish populations may take longer to recover, thus the effects may range from short term to long term. No direct effects are expected due to negligible to minor effects to habitat coupled with the sparse fish populations present.

*Hoopes Spring, Sage Creek, and Crow Creek*

There is the potential for indirect effects to fish populations in Hoopes Spring, Sage Creek, and Crow Creek from predicted increases in selenium, manganese, sulfate, and TDS concentrations. The predicted increases for manganese, sulfate, and TDS are expected to be small. Manganese concentrations would remain below Wyoming criteria (no manganese criteria in Idaho). High TDS can disrupt an organism's normal ion exchange process and cause stress or death. However, research on TDS toxicity indicates toxicity is predominantly due to either chloride (which is not predicted to increase) or sulfate, and that fish were found to be tolerant of sulfate (Iowa Department of Natural Resources 2009). Furthermore, sulfate has been demonstrated to ameliorate selenium bioaccumulation and toxicity, similar to hardness for other metals (DeForest et al. 2017). As a result, no or negligible effects to fish are expected in these streams from these three contaminants (i.e., there would be no effect or an effect that is too small to be measured). Predicted increases in selenium would also be small. However, selenium levels are currently elevated in these streams and will continue to be for the long term (see **Section 4.5**). Because of this, and because selenium accumulates in fish tissue, additional analysis is presented in following paragraphs to better determine what effects could occur from the predicted selenium increases.

Organisms in aquatic environments exposed to selenium accumulate it primarily through their diets and not directly through water (Chapman et al. 2010, Lemly 1985). Research also indicates that selenium toxicity occurs primarily through maternal transfer to eggs, where developing fish are affected by the level of selenium bioaccumulated by the maternal parent (EPA 2016b, Formation Environmental 2012). Deformities (which most often lead to mortality) result in developing fish when the level of selenium transferred via eggs exceeds a certain level (EPA 2016b). As a result, selenium concentrations measured in egg or ovary tissue of exposed adult females have the best correlation to effects (deformity and reduced survival of offspring). The toxicity levels; however, are often not much higher than the levels considered to be biologically essential (i.e., there is a narrow concentration range where selenium goes from essential to toxic; EPA 2016b).

The EPA Aquatic Life Ambient Water Quality Criterion for Selenium is described in **Section 3.9.5.1**. The national criteria for all freshwater life (i.e., all freshwater organisms, cold water or warm water) is a concentration of 15.1 mg/kg dw in egg or ovary tissue. Because egg and/or ovary tissue concentrations can be difficult to monitor, this concentration is converted to a whole-body tissue concentration of 8.5 mg/kg dw using various conversion factors. **Section 3.9.5.1** also describes the adoption of site- or species-specific criteria and derivation of a whole-body threshold for brown trout of 13.2 mg/kg dw. This threshold is considered by EPA (2016b) to be conservative and more sensitive than thresholds for YCT. This threshold is used here to determine potential effects. Also, it should be noted that Simplot has submitted a revised SSSC to EPA (Formation Environmental 2017). Data from this revised SSSC is used in various calculations, as explained below, to determine potential increases to fish tissue concentrations from the predicted selenium increase at Hoopes Spring.

The predicted increases in water concentration were converted to brown trout tissue concentrations using two methods. First, tissue concentrations were calculated using the tissue to water concentration translation equation developed by EPA and the USGS (EPA 2016b). The translation equation quantifies bioaccumulation in fish tissue as the product of the concentration of dissolved selenium in water, an enrichment function representing the proportional bioconcentration of dissolved selenium at the base of the food web (i.e., the uptake of dissolved selenium by plants), and a parameter representing the trophic transfer of selenium through all subsequent dietary pathways (e.g., macroinvertebrates and fish):

$$(C_{egg\text{-}ovary}=TTF_{composite} * EF * C_{water})$$

Where:

| | |
|---|---|
| $C_{egg\text{-}ovary}$ | = selenium concentration in brown trout egg and ovary tissue in mg/kg dw |
| $TTF_{composite}$ | = Trophic Transfer Factor for macroinvertebrates, sculpin, and trout |
| EF | = Enrichment function (L/g) |
| $C_{water}$ | = Concentration of selenium dissolved in water (µg/L) |

Values for $TTF_{composite}$ and EF were taken from the median values derived at HS-3, LSV-2C, LSV-4, CC-1A, and CC-3A as part of the proposed SSSC (Formation Environmental 2017). The concentration in egg and ovary tissue was then converted to a whole-body concentration ($C_{whole\text{-}body}$) using a conversion factor (CF) of 1.46 (Formation Environmental 2017). The predicted increases in brown trout tissue concentrations are shown in **Table 4.9-3**.

To provide a range of predictions, the estimated increases in tissue concentrations were also calculated using a bioaccumulation factor (BAF) described as part of the proposed SSSC (Formation Environmental 2017). A BAF is the ratio of the concentration of a chemical in the tissue of an aquatic organism to the concentration of the chemical dissolved in ambient water at the sampling site. In this case, the BAF was calculated by dividing the median selenium concentrations in brown trout tissue at HS-3, LSV-2C, LSV-4, CC-1A, and CC-3A by the median water concentrations at the same sites. The BAFs and predicted concentrations using this approach are shown in **Table 4.9-4**.

The predicted increases in whole body selenium concentrations using both the translation equation and BAFs are small, ranging from 0.26 to 1.04 mg/kg dw. Predicted concentrations are similar between the two approaches, with the largest differences at LSV-2C and CC-3A. The greatest increase (1.04 mg/kg dw) is at the lower Crow Creek location (CC-3A) using the BAF.

**Table 4.9-3 Estimated Increases in Selenium Concentrations – Brown Trout Tissue – using the EPA Translation Equation**

| STREAM | SITE | $C_{WHOLE\text{-}BODY}$ (mg/kg dw)[1] | CF | $TTF_{COMPOSITE}$ | EF | $C_{WATER}$ (mg/L)[2] |
|---|---|---|---|---|---|---|
| Hoopes Spring | HS-3 | 0.71 | 1.46 | 2.04 | 0.51 | 0.001 |
| Sage Creek | LSV-2C | 0.26 | 1.46 | 1.85 | 0.42 | 0.0005 |
| | LSV-4 | 0.42 | 1.46 | 1.95 | 0.63 | 0.0005 |
| Crow Creek | CC-1A | 0.32 | 1.46 | 2.66 | 0.88 | 0.0002 |
| | CC-3A | 0.71 | 1.46 | 5.51 | 0.94 | 0.0002 |

[1] Predicted increase due to Proposed Action only – not a predicted total concentration for all sources combined.
[2] Calculations were made with water concentrations in µg/L; displayed in mg/L for consistency with other sections.
$C_{whole\text{-}body}$ = selenium concentration in whole-body brown trout tissue
$TTF_{composite}$ = Trophic Transfer Factor for macroinvertebrates, sculpin, and trout – Formation Environmental (2017)
EF = Enrichment Factor – Formation Environmental (2017)
CF = Conversion Factor – Formation Environmental (2017)
$C_{water}$ = selenium concentration in water from model predictions and dilution (**Table 4.9-1**)

**Table 4.9-4 Estimated Increases in Selenium Concentrations – Brown Trout Tissue – using the BAFs**

| STREAM | SITE | $C_{WHOLE\text{-}BODY}$ (mg/kg dw)[1] | $BAF_{MEDIAN\ WHOLE\text{-}BODY}$ | $C_{WATER}$ (mg/L)[2] |
|---|---|---|---|---|
| Hoopes Spring | HS-3 | 0.71 | 0.71 | 0.001 |
| Sage Creek | LSV-2C | 0.44 | 0.87 | 0.0005 |
| | LSV-4 | 0.43 | 0.86 | 0.0005 |
| Crow Creek | CC-1A | 0.39 | 1.96 | 0.0002 |
| | CC-3A | 1.04 | 5.21 | 0.0002 |

[1] Predicted increase due to Proposed Action only – not a predicted total concentration for all sources combined.
[2] Calculations were made with water concentrations in µg/L; displayed in mg/L for consistency with other sections.
$C_{whole\text{-}body}$ = selenium concentration in whole-body brown trout tissue
$BAF_{median\ whole\text{-}body}$ = BAF calculated as median of brown trout tissue concentrations/dissolved selenium concentrations - Formation Environmental (2017)
$C_{water}$ = selenium concentration in water from model predictions and dilution (**Table 4.9-1**)

Determining the significance and potential effects of these predicted increases is complicated by current conditions, uncertainty regarding effects that may be occurring under the current conditions, and uncertainly about future concentrations associated with existing mining activities. An increase of 0.26 to 1.04 mg/kg dw is a fraction of the brown trout threshold of 13.2 mg/kg dw (2–8 percent). Were increases of this magnitude to occur at uncontaminated locations, such as the South Fork of Tincup (used as a reference location in **Section 3.9.5.1**) where tissue concentrations ranged from 1.8–9.16 mg/kg dw, the predicted increases would not push concentrations above the brown trout threshold of 13.2 mg/kg dw, which is considered to be the most sensitive threshold for these streams and protective of all aquatic organisms (EPA 2016b).

However, the increases would not occur in uncontaminated locations. Selenium concentrations in fish tissue from Hoopes Spring, Sage Creek, and Crow Creek are many times higher than the predicted concentration increases (**Table 3.9-15**) and in most cases higher than the brown trout threshold. Fish populations at these sites have declined in recent years, which may be due in part to selenium contamination, but may also be due to other factors such as drought (fish populations in nearby streams show similar trends), and other habitat changes (habitat alterations at monitoring locations). Further, trout populations in western streams are known to show large fluctuations in population year to year (Platts et al. 1988). Without knowing if impacts are occurring at current selenium levels (that are already higher than thresholds), it's difficult to determine if the small increases under the Proposed Action would have effects. However, because the predicted increases would be such a small fraction of current concentrations (for example, the upper end prediction for Sage Creek of 0.44 mg/kg dw is a 2.5 percent increase relative to mean concentration on Sage Creek; **Table 3.9-15**) the contribution of the Proposed Action alone would be minor, and selenium concentration in fish tissue would remain above thresholds with or without the Proposed Action. Because any impacts would be added to past and present concentrations, additional discussion is contained in cumulative effects (**Section 5.5**). Any effects would be long term.

Regarding future selenium levels, predictions are that current selenium levels are expected to decrease prior to any increases associated with the Proposed Action (**Section 4.5**). This would likely mean that any increases from the Proposed Action would not increase selenium concentrations beyond current levels. Because this is a reasonable foreseeable action, it is also discussed further in cumulative effects (**Section 5.5**).

This analysis also acknowledges that there is no way to remove all uncertainty associated with modeling water quality changes, and the actual changes to selenium concentrations at Hoopes Spring could be higher or lower than the value analyzed here. It also acknowledges water quality modeling associated with past and present mining in the area has not always accurately predicted impacts. However, the number used for the Proposed Action was determined to be conservative (the upper limit of the 95 percent confidence interval for the mean concentration predicted by the stochastic modeling approach). Therefore, the possibility of any actual changes being higher than predicted is reduced.

#### 4.9.2.2 Alternative 1 Reduced Pit Shell with Soil-only Cover

Water quality predictions for Alternative 1 would be the same for selenium loading at Hoopes Spring and lower for manganese, sulfate, and TDS. Impacts to surface water resources in regard to watershed disturbances, flow alterations, sediment and TSS loading, and accidental release of pollutants such as hydrocarbons would be similar in magnitude and locations as predicted for the Proposed Action. As a result, direct and indirect effects to fisheries and aquatic resources would be the same under Alternative 1 as described for the Proposed Action.

#### 4.9.2.3 No Action Alternative

Under the No Action Alternative, mining the East Smoky Panel would not be approved. Thus, there would be no impacts to AIZs, changes to the amount of watershed disturbance, streamflow, sediment, or the potential for an accidental release of contaminants to streams as a result of mining activities related to the Project. Predicted increases in selenium, manganese, sulfate, and TDS concentrations from mining the East Smoky Panel would also not occur. Existing conditions already addressed, predicted, or occurring as related to fisheries and aquatic resources due to other already permitted activities at the Smoky Canyon Mine would continue.

### 4.9.3 Mitigation Measures

No mitigation measures for fisheries and aquatics have been identified. However, all EPMs described in **Section 2.5** would be implemented to avoid and/or minimize potential impacts to fisheries and aquatic resources. In addition, mitigation measures identified for water resources in **Section 4.5.3** would also be implemented that could reduce potential impacts to fisheries and aquatic resources.

### 4.9.4 Unavoidable (Residual) Adverse Impacts

The direct loss of AIZs and intermittent drainages under the Proposed Action and Alternative 1 would be an unavoidable adverse impact as these drainages would be difficult to restore to achieve the original structure and function, following reclamation.

### 4.9.5 Relationship of Short-term Uses and Long-term Productivity

The Proposed Action and Alternative 1 would implement ground-disturbing activities that would produce short- and long-term effects to fisheries and aquatic resources. However, short-term uses associated with the Project are not anticipated to produce more than negligible to minor long-term productivity issues related to fisheries and aquatic resources. Portions of AIZs in the Project Area would be impacted by mining components in order to facilitate short-term uses associated with Project-related activities.

### 4.9.6 Irreversible and Irretrievable Commitment of Resources

Over the long term, impacts under the Proposed Action/Alternative 1 would be irretrievable in that predicted increases in selenium, manganese, sulfate, and TDS concentrations in affected water resources that impact fisheries and aquatic resources may occur for a long period of time.

## 4.10 LAND USE (GRAZING AND RECREATION) AND TRANSPORTATION

### 4.10.1 Issues and Indicators

The following issues and indicators were developed related to land use (grazing and recreation) and transportation:

*Issue: There are potential adverse impacts to private property owners in the region and the Project may cause changes to the USFS road network in and around the Project Area, from OHV/ATV use and mining activities.*

*Indicators:*

- Changes in access to private property. Increase/decrease in traffic.
- Relative increase in traffic on public roads in the Project Area as a result of proposed mining activities, change in traffic types, and road design features to deal with this.

*Issue: The Project may result in impacts to grazing in the Study Area.*

*Indicators:*

- Acres of suitable livestock foraging areas to be disturbed and the length of time livestock would be excluded from the mining areas, and comparison with undisturbed acres of grazing allotments in the Project Area.
- Changes in vegetation or forage value as a result of the reclamation mix.

*Issue: Recreational use and public access to the Project Area may be limited or prevented by mining activities.*

*Indicators:*

- Acres of and number of recreational access points temporarily closed and/or blocked to public use.
- Locations of primary access roads blocked or closed by the Project.
- Changes in the quality of recreational use of the area including fishing, hiking, riding, wildlife viewing, and hunting.

### 4.10.2 Direct and Indirect Impacts of the Proposed Action

#### 4.10.2.1 Land Use and Jurisdiction

The Proposed Action would convert primarily undeveloped forest land to an active mining area, immediately adjacent to the existing Smoky Canyon Mine. There would not be any change in land ownership and jurisdiction. The Proposed Action would result in additional USFS SUAs (**Section 4.10.2.2**) and the need for an RFP amendment (**Section 4.10.2.3**).

The only two private landowners in the Study Area are Simplot and Alan Linford/Crow Creek Ranches. The Linford parcel is a large piece of land (610 acres) that would not be directly impacted by the Proposed Action, but adjoin a small portion of the Project Area that would be developed with a borrow pit, stormwater pond, stormwater features, haul road, and a potential dewatering pipeline (**Figure 2.4-1**). This portion of the Linford parcel does not contain any year-round residences and the Proposed Action would only change the character of the Simplot parcel, immediately adjacent from forest to an industrial use. No change in access to the Alan Linford/Crow Creek Ranches private parcel would occur as a result of the Proposed Action. Public access to the Simplot parcel that surrounds the Alan Linford/Crow Creek Ranches parcel is currently restricted and would continue under current conditions, thus any indirect impacts would be negligible to minor for the Alan Linford/Crow Creek Ranches private land use.

#### 4.10.2.2 USFS Special Use Authorizations

The Proposed Action would result in 30 acres of CTNF land encumbered by SUAs (**Table 2.4-1**) for a variety of mining-related disturbances situated off-lease, adjacent to mining disturbance that would occur on existing leases in the Project Area (**Figure 2.4-4**). These new SUAs would represent a negligible amount of NFS lands available for public use in the general area and the CTNF on a whole.

### 4.10.2.3 Consistency with Revised Forest Plan

The Proposed Action would require an amendment to the CNF RFP (USFS 2003a) to change the management prescription of NFS land associated with the reroute of the Lower Valley Energy 115 kV transmission line around the south end of the East Smoky Panel pit. The relocation of the Lower Valley Energy 115 kV transmission line into a location with no CNF RFP designated utility corridor would require an RFP amendment to be consistent with the RFP. The RFP amendment would change the land use to a designated utility corridor on 1.8 acres (< 1 percent) of CTNF along the reroute which would be a negligible effect on land use.

The Proposed Action compliance with CNF RFP standards and guidelines and with the BLM ARMP is presented in **Appendix 4A**.

### 4.10.2.4 Grazing and Range Resources

Mining and infrastructure development under the Proposed Action would remove 594 acres from the Pole Draney Allotment in the short term, which based upon the numerical ratios would be a loss of 23 percent of the allotment acres and AUMs in the Study Area (moderate effect) and a loss of 5 percent of the acres and AUMs in the allotment as a whole (minor effect).

However, as described in **Section 3.10.1.3**, under current usage the permittee spends 13 and 19 days in the area as the sheep make their way between the Pole Canyon Dump south of the Project Area and the ground north of the Smoky Canyon Road and the Project Area. Therefore, over the life span of active mining and reclamation, the permittee would gradually lose up to approximately 19 days per season of grazing time on NFS lands. Due to active mining in the Project Area, the ability to move a band of sheep throughout the allotment while remaining on NFS lands would become extremely difficult if not impossible, especially along the southeastern portion of the allotment. Based upon the impacts from the Proposed Action combined with the effects and days lost from mining previous panels over the years, it is anticipated that the remaining permitted allotment area would not likely be sufficient to sustain the permitted number and duration of the existing permit unless mitigated (see potential mitigation listed below), resulting in direct impacts to the permittee.

Reclamation would occur as described in **Section 2.4.11**. Reclaimed areas containing established native bunch grasses and forbs and meeting rangeland capability criteria (e.g., over 60 percent ground cover, over 200 pounds of forage per acre; Maxim 2004c) would be suitable for grazing. The exact composition of vegetation communities after reclamation would not resemble their original state as they follow a unique succession process. Grasses would be over-represented initially, and as a result, relatively more fodder may be available for livestock grazing after reclamation than before mining. Because of specific reclamation treatments and cover requirements for overburden, elevated selenium levels in forage on reclaimed sites are not anticipated.

Impacts would occur until the disturbed areas have been reclaimed and their rangeland capacity restored (as determined by the CTNF via restoration criteria). Then these areas would again be suitable for livestock grazing. The long-term objective of the reclamation revegetation would be a vegetative community suitable to support the post-mining land uses of grazing and wildlife habitat. Therefore, there would be a negligible impact on long-term forage value under the Proposed Action.

Under the Proposed Action, there would be no effect on grazing access to portions of the Pole Draney Allotment that have historically been accessed through the mine, and are outside of the Project Area. Access to these portions of the Pole Draney Allotment would be coordinated with the Smoky Canyon Mine to avoid conflicts due to mining activities. The permittee would be allowed to cross the mine area to get sheep to the allotment. Animals would not be allowed to rest, water, or graze in the active mine area associated with the Proposed Action.

#### 4.10.2.5 Recreation

Approximately 409 acres of public land managed by the CTNF would be newly disturbed by mining or mining infrastructure and would become unavailable to recreation in the short term until reclamation restored the land to its post-mining condition. In addition, approximately 570 acres of CTNF land between the existing mine and the Project Area would also become essentially unavailable to public recreation due to safety concerns related to crossing active mining operations. This approximately 980 acres would be 37 percent of the available CTNF land in the Study Area that would become unavailable for recreation in the short term and all of the area occurs within the RM ROS class (**Section 3.10.1.4**). However, given that recreation use and opportunities in the Study Area are currently limited and are not as popular as in other parts of the CTNF due to the presence of the mine and lack of access, and the approximately 3,000,000 acres of greater CTNF available for recreation, this effect would be negligible and last until reclamation has been deemed successful and recreation activities are allowed to occur in the area.

The long-term objective of the reclamation revegetation would be a vegetative community suitable to support the post-mining land uses of grazing and wildlife habitat. While the reclaimed Project Area may not be as suitable for some types of recreation due to altered topography, the revegetated areas may be more desirable for various hunting activities due to better forage for game species.

#### 4.10.2.6 Transportation

There would be approximately 4.5 miles of new haul roads constructed in the Study Area over the life of the Project. The public would not be allowed access on these roads and following mining activities, the haul roads would be recontoured and reclaimed. There would not be any changes to public access on CTNF roads. Traffic would not increase on public roads in the Study Area; there would not be any additional employees traveling to the mine and the current number of haul trucks and other vehicles would continue as in the existing operations. No impacts to transportation are anticipated from the Proposed Action.

### 4.10.3 Alternative 1 Reduced Pit Shell with Soil-only Cover

Alternative 1 would have the same effects as the Proposed Action would in regard to proposed SUAs and the need for an RFP amendment. Similarly, Alternative 1 would also comply with CNF RFP standards and guidelines for grazing management and recreation. It would also have the essentially the same effects to land use (grazing and recreation) and transportation as described for the Proposed Action, although the area of direct disturbance would be less by 78 acres.

### 4.10.4 No Action Alternative

Under the No Action Alternative, there would not be any change to land use (grazing and recreation) and transportation and the current status would remain in and around the Study Area. There would not be any new SUAs or an RFP amendment would not be necessary for a new utility corridor. However, this does not preclude future development of the federal phosphate leases under a different mine plan.

### 4.10.5 Mitigation Measures

Simplot has indicated a willingness to provide adjacent, off-NFS land forage to mitigate this lost grazing time on NFS lands. Any reductions in numbers or days of permitted use would be determined through monitoring of forage use and impacts to water sources, if and when they occurred.

Simplot would be required to prevent livestock grazing on active and reclaimed mine disturbances until these areas are accepted for grazing management by the CTNF. This would be done by periodic coordination between Simplot and the permittee to identify exclusion areas and discuss additional measures that may be needed, such as fencing or bilingual signs. Simplot would also collaborate annually with the permittee to share mining progress plans and to discuss and resolve any potential access issues.

### 4.10.6 Unavoidable (Residual) Adverse Impacts

The 12 acres of unreclaimed highwall under the Proposed Action and a slightly lesser amount under Alternative 1 would present areas that would not be available for grazing and recreation activities. Disturbed areas would be susceptible for colonization by noxious weeds. Noxious weed invasions would adversely impact the quality of reclaimed sites for grazing, although EPMs for noxious weed control would minimize these residual impacts.

### 4.10.7 Relationship of Short-term Uses and Long-term Productivity

The Project would implement ground-disturbing activities that would reduce short-term uses of grazing resources and recreation activities. After establishment of vegetation communities on the disturbed areas, long-term productivity impacts to grazing resources would be eliminated and potentially enhanced under the Proposed Action and Alternative 1 and recreation activities that currently take place would once again be available.

### 4.10.8 Irreversible and Irretrievable Commitment of Resources

All areas disturbed under the Project would be reclaimed as described in **Section 2.4.11**. Grazing losses during the period of time that Project disturbances and reclamation prevent grazing in portions of the grazing allotments would be irretrievable. Once reclamation is complete and vegetation communities are reestablished, there would be no irreversible or irretrievable commitment of grazing resources except for the small areas that would be left permanently unreclaimed.

The conversion of NFS lands to uses associated with mining would represent an irretrievable loss of the current limited recreational uses of the disturbed areas.

# 4.11 VISUAL RESOURCES

## 4.11.1 Issues and Indicators

*Issue: Visual impacts of the Project should be disclosed.*

*Indicators:*

- Estimated compliance with the VQO in the USFS VMS.
- Change in scenery, from baseline to projected, from various public and occupied points within the Study Area.

## 4.11.2 Direct and Indirect Impacts

The landscape in the Project Area would be permanently altered by disturbance associated with the Project. The Project-related disturbance would cause direct and indirect impacts and changes to the local landscape; however, a large portion of the Project Area is generally not within view of the casual observer (**Figure 3.11-1**). Further, it is important to note that the past mining operations have become part of the overall viewscape and viewer experience since mining began in the 1980s. The visual impacts from the Project would be more substantial if mining had not occurred in the Project Area in the past and there had been no previous alteration of the landforms and vegetative patterns.

### 4.11.2.1 Proposed Action

Under the Proposed Action, construction of stormwater ponds, borrow pits, and haul roads, and mining operations would require disturbance that removes vegetation cover, exposes soil, and alters landforms, which would affect the form, line, texture, and color elements of the existing visual environment creating a contrast in the visual landscape. Over the life of the mine, there would be permanent facilities (topsoil stockpiles, borrow pits, haul roads, stormwater ponds, and the two power lines that would be relocated), personnel, vehicles and heavy equipment moving around the site that may be visible from outside the Project Area. There would also be mine-related vehicles and equipment moving to and from the mine, which would be visible offsite. The types of observers potentially affected by visual impacts include local residents, commuters, travelers, mine employees, and recreational users.

The existing mine sits high behind a ridge and is shielded from most views unless a viewer is in a specific location such as on the Smoky Canyon Road or is far enough away to see the mine in the distance as it is seen mainly in the background. Under the Proposed Action, the mine would be extended to the east. As mining progresses, it would open views of the mine from the lower elevation areas to the east because vegetation would be removed and the mine would extend over the eastern side of the ridge above Sage Valley (see **Figure 3.11-1**). This would cause the mine to become more visually dominant from the east side in both the middle ground and background and would have a minor to moderate effect on visual quality depending on the viewpoint. Even though the site would be mined with a deep V-cut pit hiding some of the mining activities from view, the upper elevations of the mine would be visible from the east. Similarly, the expanded mining area would be more visible from the higher elevations to the north and west, but these views would be affected closer in the middle ground view from ½ to 1 mile away.

Views from the foreground (¼ to ½ mile) of the Proposed Action would be highly dependent on where the viewer was in proximately to the mine, the amount of timber remaining, and the angle of view. For example, the phasing would mine the site from north to south. Viewers in the foreground to the southeast would not see the site until the later years of mining (10-12 years), if at all, because of a lower viewing angle and the raised height of the mine. Similarly, as the mine progresses south and is reclaimed, views from the foreground to the northeast would not include the mining activity towards the southern end again due to a lower viewing angle. (If some timber is left to the eastern side of the pit, this would help to screen the mine from the eastern foreground views which would mainly occur from private lands.) Thus, over time the view from the foreground would change and be highly dependent on the location and angle of the viewer.

Overall views of the mine under the Proposed Action would be most pronounced from the higher elevations such as from existing roads and hiking trails outside the Project Area. Viewer sensitivity in these areas for recreational users may be high. However, visual effects are likely to be minor due to fewer people using these roads and trails, the transitory nature of people moving through these areas (there aren't any campgrounds or other similar facilities that would create longer period views of the site), and the locations of these areas which are typically at greater distances from the mine.

During mining, the landscape character would be unavoidably altered by harvesting trees, removing vegetation, and exposing soil. In particular, soil becomes more noticeable when it is newly exposed as the reddish-brown Project soils would contrast sharply with the greens of the aspens, firs, and pines on the ridgelines above the mine and the lighter browns of the mountain brush in Sage Valley. When newly disturbed, there would be moderate effect on visual quality due to the high contrast. As the soil weathers, the color would slowly become more muted and lighter in shade, which wouldn't stand out as much as when newly disturbed. At this point the intensity of the visual effect would be negligible to minor in intensity.

In addition to soil colors, textures change depending on how the soil has been disturbed. For example, in some places the mining would result in high wall slopes with benches that would create straight horizontal lines. These straight lines would contrast with the irregular forms of trees and ridgelines near the site from the foreground and middle ground views. Over time these slopes would erode and weather and the horizontal lines would become less discernable.

Relocation of the existing transmission lines would alter views. The level of visual impact would vary based on the final location of the transmission lines, the topography of the right-of-way, materials used for the structures, and potential viewers and viewer locations. The relocated portion of the northern line would mostly traverse through areas already mined and is less likely to affect views in that area. The exception is the eastern segment of that line that would be located at the edge or slightly over the ridge line. This portion of the line would have a negligible to minor adverse effect on views because it would likely be seen by mine employees and residents in the vicinity of KOP 1 and the Smoky Canyon Road who would be less sensitive to these changes.

The line to the south would create more of a contrast with the landscape because the new transmission line right-of-way would be constructed through a relatively untouched area where mining would not occur until the final phases (10-12 years). The straight line of the transmission right-of-way in this area would contrast sharply with the surrounding vegetation causing a minor to moderate effect on visual quality.

Due to the 24-hour mining schedule, lighting would be used at the site. Lighting would consist of fixed lighting on working portions of the mine face and on heavy equipment and vehicles, as well as haul roads where necessary. Lighting would affect the night sky in the Project vicinity and would be highly noticeable due to the lack of lighting in the general area (existing sources of light outside the mine are from a few residences and the occasional vehicles passing through the area). The mine-related lighting would create an artificial glare in front of celestial objects making them harder to observe. The deep V-cut pit would help to shield some light from the surrounding area, but depending on climate conditions, the lighting could affect the night sky in an area from 5 to 10 miles around the mine site.

Similar to mine construction and operations, reclamation activities would produce visual effects that contrast with surrounding areas. One beneficial impact of the Proposed Action would be backfilling the existing Panel B area with overburden from the Project to bring the topography closer to pre-mining conditions and thus, minimizing the visual contrast of the reclaimed portions to some degree. Impacts caused by reclamation activities would mostly be temporary, but could produce strong contrasting elements in the viewscape. For example, replacing soil cover from the topsoil piles would create a strong reddish-brown color over the reclamation area contrasting with the green of the mixed coniferous/deciduous forest. The color and texture of new vegetation would also contrast with surrounding mature vegetation. These temporary effects could be negligible to minor in intensity depending on the viewer and location.

**Visual Quality Objectives Compliance**

The CNF RFP identifies VQO for the Project Area: PR and M, which basically allow for human activities to remain subordinate (PR) or dominate the landscape (M), as long as views of the activities generally conform to the characteristics of the landscape and appear more or less as natural occurrences (see **Table 3.11-1**).

**Appendix 4A** describes the CNF RFP standard for scenic resources.

**Key Observation Points**

Viewers from KOP 1 would experience a negligible to minor effect on the visual landscape in the far middle to background view depending on the type of viewer and how long views were visible. Foreground views would not change and retain their strong visual elements as described in **Section 3.11**. In the early phases, the mine would expand towards KOP 1 and open up the far middle ground and background views of the mining activity. Removal of vegetation and earth moving would produce views typified by blocky and irregular landforms that rise up above the gently rolling hills in the middle ground indicating where mining was occurring. The side slopes of the new mined area would display horizontal lines where the slope stability benches were cut contrasting with the curvilinear skyline and more rounded mountains in the background. The cleared mine areas would be devoid of vegetation and produce a brown color that stands out above and against the green vegetation of the mixed conifers and deciduous trees in the middle ground view. The mined areas would also produce a rougher texture compared with the softer views of the surrounding vegetation and terrain.

Observers would see the site from KOP 1 while traveling westbound on Smoky Canyon Road and because most would be traveling along the roadway at 30 to 40 miles per hour, the view would pass by quickly and only produce a negligible effect on visual quality. Observers such as mine employees and residents would not likely be highly sensitive to the change in view. Recreational observers may experience a minor effect on visual quality as the expanded area would create a discernable change, particularly if the observer were to stop by the side of the road. This type of viewer may be more sensitive to the changed visual conditions as more of the mine would be visible from this location. However, as mining moves to the south and the area closer to KOP 1 (Phases 1 and 2) are reclaimed, the visual impacts would lessen over time. Visual impacts at KOP 1 would be relatively short-term (less than 10 years).

Views from KOP 2 are in the far background and the mining operations are less discernable than from KOP 1. The brown color of the existing mine stands out against the intervening terrain of gently rolling green hills, which marks the location of the mine in the landscape view. Under the Proposed Action the mined area would expand, further extending the mined area making it slightly more visible. The Proposed Action would not intrude on the pastoral quality of the foreground and middle ground views. Because of the distance from the mine, the change in the extent of the cleared mining area would only have a negligible to minor effect on visual quality depending on the observer. Travelers on U.S. 89 and Highway 238 would have a brief passing view of the mine when traveling southbound and are not likely to register that there were any changed conditions at the mine. Visual impacts on these travelers would be negligible in intensity. There are several residences in this area (near the intersection of U.S. 89 and Highway 238) and these observers may be likely to notice a change in the extent of the mined area. However, they may be less sensitive since the mine has been a visible feature in the landscape for many years. Visual impacts on these observers would be negligible to minor in intensity but would be longer-term (greater than 10 years).

#### 4.11.2.2 Alternative 1 Reduced Pit Shell with Soil-only Cover

Although there would be somewhat fewer acres disturbed under Alternative 1 than under the Proposed Action, as well as somewhat few acres left unreclaimed, visual impacts would be similar due to the views from varying vantage points.

#### 4.11.2.3 No Action Alternative

Under the No Action Alternative, the expansion of the mine into the East Smoky Panel would not occur and there would be no adverse Project-related impacts to visual resources or views from the Project. However, this does not preclude future development of the federal phosphate leases under a different mine plan. Panel B would not be backfilled with overburden from the East Smoky Panel and not bring the topography in that area closer to pre-mining conditions to lessen any visual impacts. Mining operations in other areas of the existing mine continue.

### 4.11.3 Mitigation Measures

Simplot's M&RP proposes temporary and permanent mitigation measures that would help to minimize impacts to visual resources. Temporary measures include: hydroseeding the large cut slopes on the haul roads; revegetation on cuts and fills that would remain disturbed for the life of the mine; minimizing un-reclaimed pit disturbance as much as practical; and minimizing dust by watering or using magnesium chloride on haul and access roads. Permanent measures in the M&RP revolve around reclamation and include: demolishing facilities; restoring natural drainage patterns; contouring final grades so the topography more closely matches the surrounding area; replacing the topsoil cover; and revegetating disturbed areas with a permanent mixture of grass and forbs using USFS approved seed mixes. In addition, vegetation would be monitored and amended as necessary to ensure this effort is successful.

### 4.11.4 Unavoidable (Residual) Adverse Impacts

The scenic landscape would unavoidably be altered by mining and would likely always be noticeable to a certain degree. While reclamation efforts would result in cover replacement and revegetation, there are some aspects of the landscape, notably the landforms and vegetative patterns, that would be changed and never be fully restored.

### 4.11.5 Relationship of Short-term Uses and Long-term Productivity

The Project Area would be actively mined of its phosphate resource, producing a number of socioeconomic benefits in the short term. As previously mentioned, the disturbed area would never be fully returned to its natural topography and the visual resources of the area would be permanently altered. As vegetation becomes established visual effects would gradually lessen.

### 4.11.6 Irreversible and Irretrievable Commitment of Resources

The original characteristics of the landscape would be irreversibly affected as mining would alter the existing landform by changing the topography and the subsequent views of the area and they would always be noticeable to a certain degree. Reclamation of the disturbed areas would mimic the natural conditions, but it may take many years to replace the forested habitat and there would be some areas (e.g., the unreclaimed highwalls) where it may be impractical or impossible to replace in-kind the vegetation that was removed. This would cause an irreversible effect on visual quality because it would change the color and texture of that area. If the re-establishment of vegetation is unsuccessful then this would be an irretrievable commitment of scenic resources.

## 4.12 CULTURAL RESOURCES

### 4.12.1 Issues and Indicators

*Issue: Cultural resources may be impacted by the Project.*

*Indicator:*

- Number of historic properties (cultural sites eligible for the NRHP) impacted by the Proposed Action

The goals of the DFCs for cultural resources in the CNF RFP are general goals for the identification, evaluation, and protection of the resources for educational, scientific, and public benefit. There are no standards or guidelines specific to cultural resources for any of the prescription areas in the Study Area.

### 4.12.2 Direct and Indirect Impacts

The entire APE has been inventoried for the presence of cultural resources. As discussed in **Section 3.12**, two cultural resources have been identified within the APE. These two sites have been recommended as not eligible for the NRHP. The CTNF and the Idaho SHPO have concurred with these recommendations. Therefore, no historic properties (cultural sites eligible for the NRHP) have been identified in the cultural resources survey area. The general goals of the DFCs for heritage (i.e., cultural) resources in the CNF RFP are that the resources be identified, evaluated, and protected for educational, scientific, and public benefit. There are no standards and guidelines for the management of cultural resources in the CNF RFP specific to the prescription areas in the Study Area. Regulations implementing Section 106 of the NHPA (36 CFR 800) require that impacts to historic properties be considered for federal undertakings.

#### 4.12.2.1 Proposed Action

Under the Proposed Action, no historic properties are within the areas of proposed disturbance. The Proposed Action would have no effect to known historic properties.

#### 4.12.2.2 Alternative 1 Reduced Pit Shell with Soil-only Cover

As with the Proposed Action, no historic properties are within the areas of proposed Alternative 1 disturbances. Thus, the alternative would have no effect to known historic properties.

#### 4.12.2.3 No Action Alternative

Under the No Action Alternative, the East Smoky Panel would not be developed, and there would be no effect to known historic properties similar to the Proposed Action and Alternative 1. However, this does not preclude future development of the federal phosphate leases under a different mine plan.

### 4.12.3 Mitigation Measures

No mitigation measures have been identified as there are no historic properties within the APE.

If unanticipated cultural materials or historic sites are encountered during mining, the CTNF Forest Archaeologist would be notified, and operations would be halted in the vicinity of the discovery until evaluated by the Forest Archaeologist or a professionally trained archaeologist in consultation with the CTNF Forest Archaeologist and a mitigation plan developed, if necessary.

### 4.12.4 Unavoidable (Residual) Adverse Impacts

The Proposed Action and Alternative 1 would not result in unavoidable residual adverse impacts to historic properties.

There would be no unavoidable adverse impacts to NRHP-eligible cultural resources or heritage resources/values.

### 4.12.5 Relationship of Short-term Uses and Long-term Productivity

As there would be no impacts to NRHP-eligible cultural resources, there would be no short-term uses or long-term productivity.

### 4.12.6 Irreversible and Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of NRHP-eligible cultural resource sites.

# 4.13 NATIVE AMERICAN CONCERNS AND TREATY RIGHTS RESOURCES

## 4.13.1 Issues and Indicators

*Issue*: The analysis should consider whether or not the Project would affect tribal natural and/or cultural resources and address any concerns of the Tribes in accordance with federal tribal trust responsibilities.

Indicators:

- Change in land status and Treaty Rights access;
- Acres of access and recreation areas that would be unavailable for the duration of mining activities to exercise Treaty Rights;
- Known prehistoric cultural resource and traditional use sites impacted by the Project and visibility of disturbances to these areas;
- Changes in water quality and quantity of both surface water and groundwater;
- Acres of wetlands disturbed;
- Acres and types of vegetation disturbed, including DSAYs, versus acres and types of vegetation replanted;
- Increased COPC uptake by wildlife and vegetation in mining-disturbed areas and reclaimed areas;
- Changes in types of aquatic resources and comparison with undisturbed habitats in the Project Area; and
- Changes in air quality.

A goal of the DFCs for tribal coordination in the CNF RFP is that "Culturally significant items and sites are identified, protected and treated within the context of the culture that identifies and values them." Awareness of the context of tribal culture that may identify and value important items, sites, and resources entails sustained communication and coordination with the Tribes.

## 4.13.2 Direct and Indirect Impacts

The trust responsibility of the federal government includes an obligation to protect and preserve Treaty Rights resources. The BLM and the CTNF have a responsibility and obligation to consider and consult on potential effects to natural resources related to the Tribes' rights, uses, and interests under the federal laws, EOs, and the 1868 Fort Bridger Treaty between the U.S. and the Shoshone and Bannock Tribes (U.S. Congress 1868). In addition, the NHPA and its implementing regulations (36 CFR 800), AIRFA, EO 13175: Consultation and Coordination with Indian Tribal Governments, and EO No. 13007: Indian Sacred Sites contain requirements for consulting with Tribes on the potential effects of federal actions on Tribal interests. The Native American Graves Protection and Repatriation Act (NAGPRA) requires that concerned tribes be consulted if human remains that may be Native American or objects of cultural patrimony are discovered. Consultation with the Tribes has yielded important issues regarding treaty resources that would potentially be affected by the Project. As stated in Article 4 of the Fort Bridger Treaty of 1868, the Shoshone-Bannock Tribes "…shall have the right to hunt on the unoccupied land of the United States…"

Actions that change the land status, restrict, or alter the ability of the Shoshone-Bannock Tribes to exercise their Treaty Rights, or affect the physical integrity of a sacred site, traditional cultural property, and/or location of traditional importance, are considered impacts.

Resources or issues of interest to the Tribes that could involve their traditional use or treaty rights include tribal historic and archaeological sites, sacred sites and TCPs, traditional use sites, fisheries, traditional use plants (including culturally significant plant species) and animal species, vegetation (including noxious and invasive, non-native species), air and water quality, wildlife, access to lands and continued availability of traditional resources, land status, and the visual quality of the environment. As reflected in the indicators listed previously, tribal concerns include potential changes in the quality and quantity of groundwater and surface water, traditionally valued vegetation (culturally significant plants), grazing resources, and wildlife. Changes in quality of these resources may include increased uptake of COPCs by vegetation and wildlife, changes in the natural setting of traditional resources that would diminish their value to traditional practices; diminished value of traditional hunting, fishing, and gathering areas; rendering of culturally important natural resources unfit for harvest or consumption; and impairment of access to resource areas. Many of these resources or issues overlap with other resource concerns discussed in this EIS, but also must be considered in consultation with the Tribes. Tribal consultation to date has not identified culturally unique resources in this Study Area, including any sacred sites.

#### 4.13.2.1 Proposed Action

The Proposed Action would result in adverse impacts to some of the natural resources that the Tribes may desire in the exercise of their Treaty Rights. The following analysis describes Project effects to Native American concerns and Treaty Rights.

**Land Status and Access**

There would be no change in land ownership status. The federal portion of the affected land would remain under federal ownership with the rights to mine phosphate granted to Simplot. The use of lands for mining operations and associated facilities would be short-term; lands would be reclaimed and structures removed after mining was completed.

Phosphate mining, directed under the Mineral Leasing Act of 1920, would be considered a temporary surface use and occupancy of the federal land under lease. There would be a short-term, temporary loss of access to land for exercising Treaty Rights under the Proposed Action while the lands are occupied for mining. The Project would disturb approximately 530 acres or 0.1 percent of the CTNF, a negligible temporary impact. There are no known resources located exclusively within the Project Area that are not available on the remaining portions of the CTNF.

**Treaty Rights Access**

Access, or the continued availability of the traditional natural resources, would be affected by the Proposed Action. There would be a temporary loss of approximately 530 acres of federal land to disturbance associated with land occupancy from mining activities under the Proposed Action, which represents less than 0.1 percent of the CTNF. After reclamation, hunting and gathering areas would be restored through revegetation of disturbed areas (except for approximately 12 acres of unreclaimed areas) and wildlife would return. Tribal members would regain access to the federal lands. There are no known types of natural resources available for exercising Treaty Rights in the Project Area that are not available on the surrounding NFS lands. This EIS assigns a quantification (context, duration, and intensity), as required by CEQ, to the impacts to resources such as wildlife or water quality; however, it is difficult to quantify or otherwise determine the impact of a temporary loss of a right. In consultations with the Shoshone-Bannock Tribes, they noted that any loss of Treaty Rights is significant to them and could potentially affect all tribal members.

The overall impact to Treaty Rights access from the Proposed Action would be local, short-term, and negligible (less than 0.1 percent of the CTNF).

**Land Access/Transportation**

There would be no effects to existing transportation routes under the Proposed Action (**Section 4.10**). Existing public access roads would remain open under the Proposed Action. Public motorized access to active mine areas, including haul/access roads, would be restricted during the life of the Project. Public non-motorized access (i.e., walking, hiking, horse) would be unrestricted during mining, except to protect personal safety in the specific areas where active mining operations are occurring. The impact to land access for exercising Treaty Rights under the Proposed Action would be local, short-term, and negligible.

**Recreation**

There would be impacts to solitude, and the temporary loss of dispersed recreation opportunities in the area disturbed by the Project, although as described previously, current recreation opportunities in the Project Area are very limited due to the existing mine and private property that occur within or immediately adjacent to the Project Area. The limited opportunity for recreation uses would be re-established on these areas following reclamation. Recreation impacts to the Tribes would be local, short-term, and negligible.

**Cultural Resources and Traditional Use Sites (including Tribal Historical/ Archaeological Sites, Rock Art, and Sacred Sites)**

There would be no impacts to tribal historic/archaeological sites as no tribal historical or prehistoric archaeological sites have been identified within the Project Area. See **Sections 3.12** and **4.12** (Cultural Resources). No occurrences of rock art, sacred sites (EO 13007), or TCPs (NHPA) have been identified in the Project Area.

In addition to the permanent alterations of the Project Area, the Proposed Action would cause changes to the local landscape. Although there are now known sites, changes to the landscape would have negligible to minor impacts on nearby ceremonial or traditional use sites that may exist, depending on whether they could be seen from those sites.

**Water Resources**

Impacts to water resources are discussed in detail in **Section 4.5**. Runoff associated with the Proposed Action would be contained, which would minimize contribution of sediment to local streams. Implementation of the geologic store and release cover system under the Proposed Action would limit the percolation of water into the seleniferous overburden beneath, by increasing runoff and retaining moisture within some of the cover layers thereby reducing the amount of selenium that could be transported by groundwater. Surface water available for tribal use in the area would not be impacted above human drinking water standards by the Proposed Action.

**Vegetation**

Impacts to vegetation, including DSAYs with a long-term net debit residual of 33,551, are discussed in detail in **Section 4.7**. Vegetation would be cleared from approximately 850 acres under the Proposed Action, 530 acres would occur on NFS lands. Clearing would likely include plants of traditional importance to the Tribes as discussed in **Section 3.7.7**.

Reclamation would include revegetation with short-lived grass species intended to help stabilize the reclaimed surfaces from erosion as well as long-lived native bunch grasses and forbs. The goal of the selected revegetation mix is to establish healthy native bunch grass communities that are structurally diverse and allow succession of native species over time. Other native forbs, shrubs, and trees could be seeded or planted in clusters where they are most likely to establish. Some species (i.e., yarrow and basin wildrye) of traditionally important plants indicated in **Section 3.7.7** would be included, to make up approximately 11 percent of the proposed seed mix. In addition, a number of grasses and other forbs are important for inclusion in the seed mix to provide a stabilizing cover that does not have deep penetrating roots. This would constitute a short-term and minor impact to Tribal access to vegetation in the Project Area.

**Wildlife**

*Big Game*

Impacts to big game would involve displacement and alterations of normal movement routes. The implementation of the geologic store and release cover system under the Proposed Action would limit the levels of selenium and other contaminants in forage sources in reclamation vegetation and water sources, and would be expected to reduce the possibility of any contaminant effects on big game. HEA DSAY calculations were described and presented in **Section 4.7.2.1**.

*Wolves*

Wolves may alter their normal movement patterns to avoid the Project Area, but no direct impacts to individuals or populations are expected.

*Bald Eagles*

There are no known bald eagle nests or winter roost areas within 5 miles of the Project Area. Project-related noise and activities have the potential to displace bald eagles that happen to be flying over or foraging near the Project Area into adjacent suitable habitat. Impacts to bald eagles are expected to be site-specific, short-term, and negligible.

*Small Mammals and Birds*

Any greater sage-grouse individuals in the Project Area would be displaced, and noise or increased human presence may cause moderate effects to birds in the vicinity for the duration of active mining and reclamation activities. No direct mortality is expected. Some individual small mammals such as rabbits, rockchucks, and squirrels, in the disturbance areas under the Proposed Action would be displaced or killed. Displaced individuals may cause increased competition in adjacent populations that may lead to increased mortality or decreased reproductive rates.

Similar to big game, selenium and other contaminants in water sources and the reclaimed mine site would be controlled by using BMPs, including a store and release cover that would be built using a native soil cover. This would ensure healthy environments for small game under the Proposed Action. Impacts to these wildlife for exercising Treaty Rights in the Project Area under the Proposed Action would be minor in the short- and long-term as disturbance represents less than 0.1 percent of the CTNF.

**Fisheries**

Impacts to fisheries are discussed in detail in **Section 4.9**. No direct impacts to intermittent or perennial stream channels or potentially suitable habitat for fisheries, amphibians, or aquatic resources would occur, with the exception of potential indirect impacts of either drying up or reducing the quantity of water at specific surface water sources described in **Section 4.5**. No impacts to YCT are expected from the Proposed Action. There would be site-specific, long-term, and negligible to minor impacts to AIZs from the Proposed Action.

**Air Quality**

The Proposed Action would meet NAAQS and IDEQ air quality standards. There would be no air quality impacts to Treaty Rights.

#### 4.13.2.2 Alternative 1 Reduced Pit Shell with Soil-only Cover

Alternative 1 would have similar impacts to Treaty Rights as those described for the Proposed Action, although there would be approximately 78 acres less disturbance and impacts to water resources would be less, as described in **Section 4.5**. DSAYs were provided in **Section 4.7.2.2**, showing that there would be long term net debit residual of 28,063.

#### 4.13.2.3 No Action Alternative

Under the No Action Alternative, the Proposed Action or Alternative 1 would not be authorized, and there would be no Project-related adverse impact to known Tribal Treaty Rights and interests. However, this does not preclude future development of the federal phosphate leases under a different mine plan.

### 4.13.3 Mitigation Measures

No detailed mitigation measures for Native American concerns or Treaty Rights resources specific to this Project have been identified. Potential impacts to traditional use or Treaty Rights that have been identified include short-term interruption of access to the lands to exercise Treaty Rights and traditional uses. No specific impacts to traditional resources or uses that are not available in other areas have been identified. If adverse impacts to traditional resources or uses were identified, mitigation measures specific to those resources would be developed through consultation among the Tribes and the Agencies. Resource-specific mitigation measures are addressed in the applicable sections of this EIS. For wildlife habitat, off-site mitigation could reduce or eliminate any residual impacts prior to full reclamation. In general, however, vegetation and wildlife habitat impacts would occur for a period of time, but reclamation would occur after mining is complete. Eventually (over several decades) vegetation transitions to a more natural state. See **Section 4.7** for residual HEA analysis describing the long-term condition, which reduces mitigation needs.

### 4.13.4 Unavoidable (Residual) Adverse Impacts

The temporary use of unoccupied federal lands for the Project would affect the exercise of Treaty Rights during the life of the Project and subsequent reclamation. The potential for the indirect impact of selenium uptake due to bioaccumulation in plants and animals utilized by the Tribes would be minimized by the Project design and EPMs. The change in topography as a result of mining and reclamation represents an unavoidable adverse impact to lands of cultural importance to the Tribes.

### 4.13.5 Relationship of Short-term Uses and Long-term Productivity

The general area of southeastern Idaho is of cultural importance to the Tribes. Although no specific areas of traditional cultural significance have been identified within the Project Area, the short-term use of natural resources and the temporary unavailability of unoccupied federal land during the mining activities would adversely impact the long-term productivity of these lands in terms of providing Treaty Resources.

### 4.13.6 Irreversible and Irretrievable Commitment of Resources

The Project represents an irretrievable commitment of Treaty Rights resources for the duration of mining, mining reclamation, and rehabilitation of the area. The loss of timber would be an irreversible commitment of resources. Conifer forests in particular may not recover to current stature and complexity for at least 200 years (**Section 4.7**). The change in topography because of mining and reclamation represents an irretrievable commitment of lands of cultural importance to the Tribes.

Mining would result in the short-term partial or complete loss of access to traditional resources on the impacted public lands during mining and initial reclamation. Over time, access to unoccupied public lands and resources would be restored. Valued and traditional resources, including vegetative resources and wildlife habitat, would be reclaimed or replaced.

## 4.14 SOCIAL AND ECONOMIC RESOURCES

### 4.14.1 Issues and Indicators

The following issues were identified through scoping and indicators were developed to address the issues.

*Issue: Potential for closure of the mine and effects on the local economy of affected communities should be evaluated.*

*Indicators:*

- Numbers of employees, contractors, and their dependents that could be affected by potential mine and fertilizer plant closure and loss of personal/public income.
- Estimated economic and social impacts of the Proposed Action, Action Alternatives, and No Action Alternative.

*Issue: Efficient recovery of the phosphate resource should be discussed.*

*Indicator:*

- Phosphate resource (tons) that would not be recovered under the No Action Alternative.

### 4.14.2 Direct and Indirect Impacts

Social and economic impacts were evaluated for the four-county area of Bannock, Caribou, and Power counties, Idaho, and Lincoln County, Wyoming. The great majority of employees at the Smoky Canyon Mine and the Don Plant reside in those four counties. Consequently, the direct, indirect, and induced employment and wages resulting from operation of the Smoky Canyon Mine and the Don Plant are most strongly felt in this area. The four-county area is influenced by both the Smoky Canyon Mine and the Don Plant in Pocatello.

Direct social and economic impacts are those that are caused by the action and occur at the same time and in the local area of the action, including such things as the Smoky Canyon Mine and Don Plant employment, royalties, expenditures, and taxes. Indirect social and economic impacts are those that are caused by the action, but may occur later in time or are farther removed from the location of the action including such things as indirect or induced employment and the purchase of goods and services outside the local area.

#### 4.14.2.1 Proposed Action

From a socioeconomic perspective, the primary impact of the Proposed Action would be to extend the Smoky Canyon Mine's operations for an additional approximately three years past what is currently anticipated. In each of the following areas the Proposed Action would have essentially no impact other than to extend current conditions:

- Land ownership would not change, although some new SUAs would be required on NFS lands.
- Population and demographics would not be affected as there would be no increase or decrease of consequence in the workforce at the mine or the Don Plant.
- Housing would not be affected as there would be no change in the workforce at the mine or the Don Plant which might trigger an increase or decrease in the area population. Therefore, the availability and pricing of housing should remain unchanged.
- Local government finances and services would not be affected for the same reason, including county and municipal governments, school districts or special districts. The extent of the fiscal inputs to local governments from the mine and the Don Plant is provided in **Section 3.14.2**.
- Community services, such as schools, fire protection, law enforcement, health care, and utilities should not be affected as there would be no change in population or government funding.
- Employment in the four-county area should not be affected, including direct employment at the mine and the Don Plant, as well as indirect and induced employment that would be generated in the community due to the presence of the mine and the Don Plant and their direct employees.
- Wages and income should remain approximately the same as currently occurring, adjusted for inflation and other economic factors. In addition to wages paid to employees at the Smoky Canyon Mine, the mine made purchases totaling $12,991,222 to Idaho vendors in 2015, and the Don Plant made purchases of $14,657,530 during that same year (Simplot 2016a) (**Section 3.14.6.1**).
- Agricultural fertilizer production and supply would tend to remain at current levels.

The Proposed Action would reduce the available grazing area and AUMs during operations and reclamation, but, given the comparative small area relative to the overall acreage that is available and potential mitigation measures, this impact would be short-term and minor (**Section 4.10**).

**Table 4.14-1** shows direct, indirect, and induced employment and earnings (wages) in the four-county Study Area as determined using the RIMS II multipliers provided by the BEA. Direct social and economic impacts are those that are caused by the action and occur at the same time and in the local area of the action (i.e., the Smoky Canyon Mine and Don Plant). Indirect impacts include those that affect regional businesses that provide goods and services directly to the mine, and induced impacts are those created as a result of employee spending in the region for goods and services. Overall, the impacts of the Proposed Action would be beneficial, short-term, and major.

**Table 4.14-1 Direct, Indirect and Induced Employment and Earnings, Smoky Canyon Mine and Don Plant, 2015**

| | DIRECT EMPLOYMENT | EARNINGS FROM DIRECT EMPLOYMENT | INDIRECT EMPLOYMENT | EARNINGS FROM INDIRECT EMPLOYMENT | INDUCED EMPLOYMENT | EARNINGS FROM INDUCED EMPLOYMENT |
|---|---|---|---|---|---|---|
| **Smoky Canyon Mine** | 254 | $25,077,772 | 465 | $39,234,174 | 218 | $8,059,996 |
| **Don Plant** | 372 | $35,674,038 | 533 | $52,480,077 | 164 | $10,780,694 |
| **Total** | 626 | $60,751,810 | 998 | $91,714,252 | 382 | $18,840,690 |
| **Grand Totals** | 2,006 Employed | | | $171,306,752 Earnings | | |

Source: Simplot 2016a; BEA 2017

The Proposed Action would allow Simplot to continue to contribute to the Western U.S. integrated phosphate nutrient/fertilizer network.

#### 4.14.2.2 Alternative 1 Reduced Pit Shell with Soil-only Cover

Impacts to socioeconomics would be the same under Alternative 1 as were described for the Proposed Action.

#### 4.14.2.3 No Action Alternative

Under the No Action Alternative, the East Smoky Panel would not be mined and the Smoky Canyon Mine period of operation, relative to the Proposed Action, would be shortened by approximately three years. However, this does not preclude future development of the federal phosphate leases under a different mine plan. Consequently, the socioeconomic benefits of the mine and the Don Plant would end approximately three years earlier than for the Proposed Action, but no sooner than what is currently authorized for the mine and the Don Plant.

Some of the anticipated impacts from this earlier closure would be as follows:

- Employment in the four-county area would decline, including direct employees of the mine and the Don Plant, as well as indirect and induced employment that is currently generated in the community due to the presence of the mine and the Don Plant.

- Population would likely decline as most, if not all, of the current employees would seek employment elsewhere. Although some current employees may find new positions in the four-county area, the majority would likely need to find work elsewhere due to the limited opportunities locally.
- Housing would likely be affected as workers leaving the area sell their houses or cancel their leases. The increased vacancy rate would likely cause housing prices to decline.
- Local government finances and services would be affected by the population decline as well. Tax and other receipts would decline, including those that fund county and municipal governments, school districts or special districts.
- Community services, such as schools, fire protection, law enforcement, health care, and utilities would lose funding, but they would also be serving fewer people.
- Wages and income from direct, indirect, and induced employment would decline, as would ongoing purchases from local vendors.
- Temporary loss of grazing acreage would not occur.

The No Action Alternative could cause the regional price of fertilizer and cost of agricultural production to increase for a period of time if Simplot had to curtail production pending final acquisition of an alternative area to mine.

Consequently, impacts from the No Action Alternative, compared to those of the Proposed Action, would be adverse, short-term, and major.

### 4.14.3 Mitigation Measures

No mitigation measures for socioeconomic impacts would be required.

### 4.14.4 Unavoidable (Residual) Adverse Impacts

There would be no residual adverse impacts to social or economic resources as a result of the Proposed Action or Alternative 1.

### 4.14.5 Relationship of Short-term Uses and Long-term Productivity

The short-term use of mining of the phosphate ore would result in beneficial long-term effects from increased public funds available for social programs and/or infrastructure improvements due to increased federal lease royalties. There would also be an increase in wealth and economic stimuli from the manufacture of goods and services related to mining phosphate ore from the leases. Mining and use of the phosphate resource would make good use of the mineral in the short-term, but would reduce its availability for the future.

### 4.14.6 Irreversible and Irretrievable Commitment of Resources

There would be no irreversible and irretrievable commitment of socioeconomic resources associated with the Proposed Action or Alternative 1.

This page intentionally left blank.

# CHAPTER 5

# CUMULATIVE EFFECTS

# TABLE OF CONTENTS

## LIST OF TABLES



## LIST OF FIGURES

# CHAPTER 5 CUMULATIVE EFFECTS

Cumulative effects are those impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions on the Cumulative Effects Area (CEAs). They can result from individually minor, but collectively significant actions taken over a period of time. Major past and present land uses in the area, which are also projected to continue into the future include: mining, roads/trails, timber harvesting, wildfires, Tribal Treaty Rights, livestock grazing, and agriculture. Dispersed recreation (including hunting and fishing) and residential development also occur in parts of the CEAs.

Guidance from CEQ, "Considering Cumulative Effects – January 1997," was used in identifying geographic boundaries and ultimately the CEA for each resource. The CEA for each environmental resource – and the rationale for its boundaries – is described below in the specific resource subsection. However, for simplicity, ease of cumulative impact analysis, and in an attempt to avoid having only slightly different CEAs for some resources, CEA boundaries were left identical for the resources where it seemed reasonable and conservative to do so. Maps for the various CEAs are also included.

## 5.1 GEOLOGY, MINERALS, TOPOGRAPHY, AND PALEONTOLOGY

### 5.1.1 CEA Boundary

The CEA boundary for geology, minerals, topography, and paleontology (**Figure 5.1-1**) includes the southeastern Idaho phosphate mining district, including KPLAs in Bear Lake and Caribou Counties, Idaho. The boundary was developed with the IDT experts and professional judgement. This is an area 509,540 acres in size within which there are current leases for 38,874 acres or 7.6 percent of the total CEA area. **Figure 5.1-1** shows locations of KPLAs, phosphate mine leases, and past, present, and reasonably foreseeable future phosphate mines in Bear Lake and Caribou Counties, Idaho; and identifies the general location of proposed future phosphate mines.

With the exception of the Gay Mine, located on the Fort Hall Indian Reservation, impacts to geology, minerals, topography, and paleontology from past, present, and future phosphate mining operations are confined to specific phosphate mining properties (KPLAs and leases) within these two counties.

### 5.1.2 Introduction

Potential effects to the geology, mineral, topographic, and paleontological resources consist of mineral resource depletion, paleontological resource disturbance, topographic changes, exposure of rock bearing COPCs, and geotechnical instability. Past and present phosphate mining activities, and proposed future phosphate mining are analyzed in terms of cumulative effects to these resources.

Phosphate rock production generates a variety of waste streams including: maintenance wastes such as used petroleum products or hazardous wastes, trash and debris, mill tailings, and mine overburden. The existing Smoky Canyon Mine operations produce all of these waste streams. The East Smoky Panel operations would be an extension of the existing Smoky Canyon Mine such that the annual quantities of small volume wastes (i.e., used petroleum products, hazardous wastes from maintenance activities, and general trash) would remain approximately the same as the existing conditions. Thus, there would be no incremental change in the cumulative effects of these waste management activities from the proposed operations within the CEA. The mill tailings waste stream would continue to be disposed of within the existing tailings disposal facility at the Smoky Canyon Mine within essentially the same disturbed area as described for the existing approved mine operations. Thus, there would be essentially no incremental increase in the waste management area for this waste stream within the CEA due to the East Smoky Panel operations. The mine overburden from the East Smoky Panel operations would be disposed of within the acreage of the mine expansion. The cumulative effects of this increased disposal area are included within the following discussion of mine disturbance areas within the CEA. All of the seleniferous overburden would be covered as described in **Section 2.4.3** to minimize the environmental effects of selenium contained within the overburden.

Other land uses within the CEA such as agriculture and forest management may disturb surface acreage but typically conform closely to the local topography and have negligible impacts on geology, mineral resources, topography, and paleontology compared with phosphate mining.

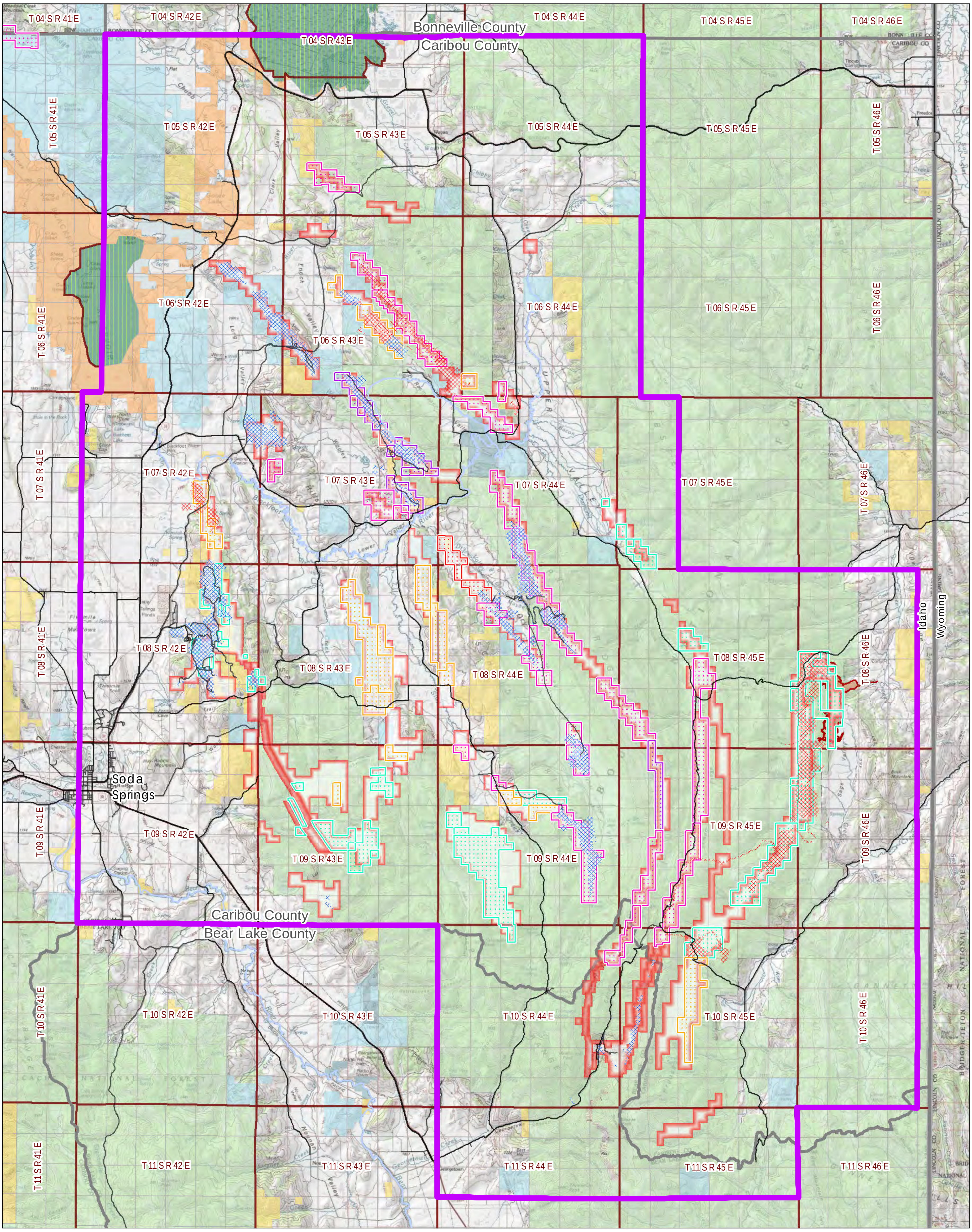
**Table 5.1-1** shows land ownership within the CEA for geology, mineral, topographic, and paleontological resources. The largest percentage is land managed by the USFS, approaching 50 percent. Privately owned lands make up almost 40 percent of the CEA area.

**Table 5.1-1 Geology Cumulative Effects Area**

| LAND OWNERSHIP | ACRES | PERCENTAGE OF THE CEA |
|---|---|---|
| USFS | 247,568 | 48.6 |
| USFWS (Historic Waterbody) | 6,911 | 1.4 |
| Indian Reservation | 9,949 | 1.9 |
| BLM | 15,289 | 3.0 |
| Private | 199,099 | 39.1 |
| State | 28,988 | 5.7 |
| State (IDFG) | 1,736 | 0.3 |
| TOTAL CEA | 509,540 | 100.0 |

### 5.1.3 Past and Present Disturbances

Since phosphate mining began in southeastern Idaho, there have been a total of 31 phosphate mines in the area (USGS 2001). Through consolidations of the original operations, there are 24 mines listed in **Table 5.1-2** that actually occur within the CEA, some of which were small underground mines that have been closed for years. Two former underground mines within the CEA, Conda and Maybe Canyon, were converted to surface mining operations, and the surface mine disturbance for these mines is still noticeable. The open pit phosphate mines in the CEA with significant production include: Conda, Ballard, Maybe Canyon, Georgetown Canyon, Mountain Fuel, Henry, Wooley Valley, Lanes Creek, Champ, Enoch Valley, Smoky Canyon, Blackfoot Bridge, Rasmussen Ridge, South Rasmussen, and Dry Valley.




Legend

Proposed East Smoky Panel Disturbance

Cumulative Effects Area for Geology, Minerals, Topography, & Paleontological Resources

Known Phosphate Lease Areas (KPLAs)

Phosphate Mine Status

- Active
- Inactive
- Non-Phosphate (Inactive)

Phosphate Mine Leases (by Lessee)

- Agrium
- Earth Sciences Inc.
- FMC
- FMC; Rhodia Inc.
- JR Simplot Co.
- Monida Resources Inc.
- Monsanto
- Rhodia Inc.

Land Status

- Indian Reservation
- Bureau of Land Managment
- Idaho Dept. of Fish and Game
- National Wildlife Refuge
- Private
- State
- US Forest Service

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4. Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 2 4 6
Miles
1:215,000 (at original document size of 11x17)
N

Figure 5.1-1
Cumulative Effects Area for Geology, Minerals, Topography, and Paleontological Resources
East Smoky Panel Mine EIS

**Table 5.1-2 Past Disturbance: Phosphate Mines of Southeastern Idaho within the CEA**

| MINE | YEARS OF OPERATION | DISTURBED AREA (ACRES) |
|---|---|---|
| Hot Springs | 1907 - 1911, 1954 - 1956 | <1 |
| Paris Canyon | 1917 – 1926 | <2 (estimate) |
| Bear Lake | 1920 – 1921 | <1 |
| Conda | 1920 - 1984 | 1,988 |
| Consolidated | 1920 - 1921, 1930 - 1938 | <1 (estimate) |
| Bennington Canyon | 1907 - 1912, 1939 - 1942 | 2 (estimate) |
| Wyodak | 1942 - 1943 | <1 (estimate) |
| Ballard | 1952 - 1969 | 638 |
| North and South Maybe Canyon | 1951 - 1995 | 1,119 |
| Georgetown Canyon | 1958 - 1964 | 251 |
| Wooley Valley | 1955 - 1989 | 1,052 |
| Diamond Gulch | 1960 | 32 |
| Fall Creek | 1955 - 1964 | <1 (estimate) |
| Mountain Fuel | 1966 - 1967, 1985 - 1993 | 717 |
| Henry | 1969 - 1989 | 1,093 |
| Bloomington Canyon | 1972 - 1975 | <1 |
| Pritchard Creek | 1975v1976 | 2 (estimate) |
| Lanes Creek* | 1978 – 1989, 2015 to present | 86 |
| Champ and Champ Extension | 1982 - 1985 | 404 |
| Smoky Canyon* | 1982 - present | 3,580 |
| Rasmussen Ridge/Enoch Valley Mines* | 1991- present | 1,400 |
| South Rasmussen | 2003 – 2015 | 275 |
| Dry Valley | 1992 – 2014 | 1,092 |
| Blackfoot Bridge* | 2013 - present | 466 |
| Total Disturbance | 1901-present | 14,205 |

Sources of information: USGS 2001, Open file Report 00-425; various reports citied in BLM and USFS 2007; BLM 2014; BLM 2017

* active mine

Although volumes of mined ore and overburden material may be better indicators of disturbances to geologic and paleontological resources, volumetric data may either be non-existent for older mines or proprietary in the cases of current or recently operating mines. Therefore, acres of known disturbance are presented in **Table 5.1-2**. Based solely upon the information presented previously, past and present disturbances strictly from phosphate mining activities within the CEA total approximately 14,200 acres.

There are currently five active phosphate mines in the Southeast Idaho Phosphate District: Smoky Canyon (Simplot), Rasmussen Ridge Mines (Agrium), Rasmussen Valley (Agrium), Lanes Creek

(Agrium), and Blackfoot Bridge (P4). Each of the currently operating mines simultaneously performs mining and reclamation activities in different parts of the mines. The portion of the mined-out areas at previously approved mines that has been reclaimed is unclear, as reclamation varies from mine to mine, and information for older mines is sparse. Mines in operation before 1970 were often released from lease liabilities without stipulations requiring backfilling, regrading, or reseeding disturbed areas (Causey and Moyle 2001). These modern mining operations work within the current environmental protection requirements by the State, BLM, and USFS. A major environmental mitigation measure employed by each of these mining operations is concurrent reclamation wherein previously disturbed areas are reclaimed during the course of ongoing mining.

U.S. phosphate production fell in 2014 to 25,300 thousand metric tons (down from 31,200 thousand metric tons in 2013) but began rising again in 2015 to 27,600 thousand metric tons (USGS 2016). According to USGS (2016), domestic phosphate rock production capacity remained at 32.7 million tons. Positive effects associated with recovery of this resource include making this commodity available now, economic growth and employment, and increased understanding of the geology of this and similar deposits.

Altogether, the past phosphate mining operations within the CEA have disturbed approximately 14,200 acres of surface or about three percent of the total CEA. The historic mining operations, which account for about two-thirds of the 24 mines, are typically not reclaimed to the same standards as today, thus there is more unreclaimed topographic disturbance associated with the historic mining operations and less with the more recently operated mines. The mines that were in operation within the last 20 to 30 years have undergone various degrees of reclamation to restore the land to a stable and usable condition. This reclamation has typically included: removal of structures and equipment, backfilling open pits during mining where feasible, regrading overburden piles to slopes of approximately 3h:1v, stabilizing surface runoff patterns, and revegetating regraded surfaces.

Past reclamation activities have not always resulted in complete remediation of environmental risk from selenium and other COPCs. CERCLA-related studies and related remediation projects are underway at many of the mine sites in the CEA, due to the potential presence of COPCs in vegetation and water from mining activities. For example, remediation-related work at Dry Valley and Wooley Valley has either just recently began and/or is scheduled to begin in the near future (BLM and USFS 2016).

Within the CEA, other major earth-moving activities such as construction of highways, railroad lines, dams, aggregate pits, and hard rock mines can also potentially affect geology, mineral, topography, and paleontological resources. These features primarily impact topographic resources, with lesser influences on geologic, mineral, and paleontological resources. The impact of aggregate pits on geologic resources is negligible in comparison to phosphate mining. Transportation features can disturb significant surface areas but are purposely designed to have minimal excavations in solid rock so they do not affect geology and mineralogy to a significant degree. They are also designed to have minimal cut and fill volumes so their effects on topography are not as severe as phosphate mining. There are small to moderately sized aggregate mining operations located within the CEA. They tend to only involve disturbance of unconsolidated earth materials and therefore only impact surficial deposits with minor effects on geology, mineral resources, and topography.

There is no known past oil or gas production in the CEA. Although exploration wells have been drilled in the recent past, no commercial production has been established. Hard-rock mineral and metals mines operate in Idaho, but not within the CEA, although some gold prospecting does occur (Gillerman and Bennett 2007). The inactive Kerr McGee Limestone Mine does occur within the CEA and has resulted in approximately 17 acres of previous disturbance.

Gold and copper mining was historically important on the CTNF and small-scale, gold placer mining is still practiced (USFS 2003b). A small amount of gold prospecting occurs in the CEA. There are few disturbances in the CEA for metals exploration or development.

### 5.1.4 Foreseeable Future Disturbances

Ongoing and future phosphate mining is expected to be the most prominent foreseeable cause of future disturbances within the CEA. In addition to the US phosphate production discussed above, the world phosphate fertilizer demand increased from 41.7 million ton in 2013 to 42.7 million tons in 2014, at a growth rate of 2.4 percent. It is expected to reach 46.6 million tons in 2018 at a growth rate of 2.2 percent per year (FAO 2015). Based on this information, phosphate production from the CEA will likely also be stable or increase slightly.

As reported in the Rasmussen Valley EIS (BLM and USFS 2016), Florida and North Carolina have produced approximately 85 percent of all phosphate rock in the U.S. in recent years, while Idaho and Utah produced the rest. Average annual production in the CEA is expected to be between 5 and 6 million tons per year.

Reasonably foreseeable mining disturbances (including the Proposed Action and Alternative 1) within the CEA include continued mining at the Blackfoot Bridge Mine (approximately 350 acres), development of the Dairy Syncline Mine (approximately 2,900 acres), the recently approved Rasmussen Valley Mine (approximately 520 acres), the proposed Caldwell Canyon Mine (approximately 1,530 acres) and the Husky/North Dry Ridge Mine (approximately 1,050 acres, currently on hold, although the application has not been withdrawn). The continued mining of Blackfoot Bridge and the proposed new mines would result in approximately 6,350 acres of additional disturbance, the majority of which would be reclaimed.

Stonegate Agricom Ltd. proposed to develop the Paris Hills phosphate project in Bear Lake County which would be a 2,495-acre underground phosphate rock mine where three previous mines operated intermittently during the 20th century. The proposed Paris Hills mine has total measured and indicated mineral reserves of 16.7 million tons of marketable rock and expected average annual rate of production of about 0.9 million tons (Stonegate Agricom Ltd. 2017). However, this proposal has been curtailed because of financial constraints and the proposed project is situated south of the CEA and thus, not included in the acreage for reasonably foreseeable disturbance.

Additional phosphate exploration drilling within the CEA has also been proposed outside of the new mine areas listed above and includes: Dry Ridge (approximately 69 acres), Trail Creek (approximately 60 acres), and Freeman Ridge/Husky 2 (approximately 168 acres), although only the Trail Creek exploration project is currently active.

The reasonably foreseeable disturbance expected from phosphate mining and potential exploration activities in the CEA is approximately 6,650 acres.

Future oil/gas exploration and possibly production could occur in the CEA, but would have minimal effect on geology and topographic resources. If there were any proposed future oil/gas disturbance it would be analyzed under a separate NEPA analysis process. Mineral resource development of oil/gas would not likely affect phosphate mining and future phosphate mining would have no effect on oil/gas resources in the area.

### 5.1.5 Cumulative Disturbances

The combined past and present disturbance (approximately 14,200 acres) and reasonably foreseeable future disturbance (6,650 acres) totals about 20,850 acres of mining related disturbance in the CEA. The disturbance of the Proposed Action (approximately 850 acres) would increase this total to about 21,700 acres, still approximately four percent. The cumulative effect of mining disturbance from past, present, and foreseeable future activities (19,320 acres) would be approximately four percent of the CEA. Alternative 1 would disturb approximately 78 fewer acres, also approximately four percent cumulative increase.

As summarized from the Blackfoot Bridge FEIS (BLM 2011), if all KPLAs within the CEA are developed to the extent that 90 percent of each federal phosphate lease is disturbed through excavation, construction, or other ancillary activities, approximately 39,300 acres (7.7 percent of the CEA) would be disturbed at some point. The volumetric equivalent of geological, mineral, topographic, and paleontological resources that would be disturbed is uncertain because each mine would design mine plans according to geologic and market constraints unique to each phosphate lease.

### 5.1.6 Cumulative Effects

The cumulative result of this action when combined with other past, present, and foreseeable future disturbances in the CEA would be a total of approximately 21,700 acres for which there is a residual change in topography following mineral development. This would be approximately four percent of the CEA. A large majority of this disturbance would be fully reclaimed.

Regarding selenium mobilization within the CEA, this is most affected by disturbance of selenium-containing bedrock or soil. Phosphate mining activities impact these resources and can result in release of selenium and trace metals to the environment. Most other ground-disturbing activities within the CEA such as road/highway construction and maintenance, building construction, ditch construction, and agricultural practices typically do not disturb bedrock. The effects of selenium mobilization on water resources are thoroughly discussed in **Section 4.5**.

The Proposed Action includes the construction of a geologic store and release cover over seleniferous overburden associated with the East Smoky Panel and the predicted load loading of selenium and potentially other COPCs to potentially affected springs and creeks in the area is anticipated to be low based upon the modeling results described in **Section 4.5.2**. Alternative 1 includes only a topsoil cover over the East Smoky Panel and the currently approved chert cover over the Panel B pit backfill. However, due to the change in the pit configuration and material handling, there would be less seleniferous overburden. Thus, the area of the Proposed Action or Alternative 1 is not expected to be additive to the existing mining disturbances in the CEA in a cumulative manner with regard to exposure of seleniferous overburden.

## 5.2 AIR AND CLIMATE CHANGE

### 5.2.1 CEA Boundary

The CEA boundary for Air and Climate Resources includes the Crow Creek Watershed (HUC 5) to its confluence with the Salt River, the Tygee Creek Watershed (HUC 5) to its confluence with Stump Creek, and the Diamond Creek Watershed (HUC 6) that extends to the confluence with Timber Creek. The boundary was developed with the IDT experts and professional judgement. The CEA encompasses 148,861 acres. This is the same boundary as was used for the Smoky Canyon Mine Panels F & G EIS (BLM and USFS 2007) and identical to the water resources CEA boundary. This area was selected due to geographic and topographic features that surround the Project Area (**Figure 5.2-1**).

Air pollutants are expected to comply with all federal and State air quality standards within the direct effects Study Area, so cumulative effects are not anticipated outside of this area.

### 5.2.2 Air Resources

#### 5.2.2.1 Introduction

Excellent air quality generally exists on National Forest System Lands (USFS 2003b). Air quality in the CTNF can occasionally be adversely affected by pollutants from sources outside the CTNF such as Pocatello or Soda Springs. These effects typically occur during winter inversions or when stable air masses occur under static, high-pressure weather systems. Other typical pollution sources outside the CTNF may include power plant, factory, agricultural burning, and auto emissions (USFS 2003b). Grazing and timber harvesting can produce fugitive dust, but the quantities are minimal and are expected to remain approximately equal to present conditions. Travel on unpaved roads in the CEA can adversely affect air quality from auto emissions, but this type of use has not adversely affected air quality measurably in the past and is not considered a concern (USFS 2003b).

#### 5.2.2.2 Past and Present Disturbances

Air quality conditions in the CTNF and the CEA are generally good to excellent (EPA 1998 as cited in USFS 2003b). Occasionally air quality in this area is affected from pollutants from upwind sources to the south and west (particularly during winter inversions). Activities within the forest including wildfires, prescribed burning, and road use produce fugitive dust, nitrogen oxides, VOCs, and CO that would be additive to the estimated emissions from the Proposed Action or Alternative 1. Prescribed fires on the CTNF are conducted only when favorable meteorological conditions and air quality conditions exist and when State and federal ambient air quality standards will not be exceeded. Particulate emission estimates from forest fires were provided in the CNF RFP FEIS and ranged from 62 lbs/acre for sagebrush to 822 lbs/acre for spruce/fir (USFS 2003b).

Mining is the major fugitive dust producing activity in the CTNF. Phosphate ore production in Idaho is expected to remain stable or slightly increase over the next 15 years. The fugitive dust emissions would likely remain stable or increase the same amount because the dust emission rate is roughly proportional to the mining rate. Current mining dust emissions at Smoky Canyon Mine would not increase because mining of the East Smoky Panel would replace the current mining operations. Cumulative effects of dust emissions from the mines operating in southeastern Idaho are not expected because all mining must be done in compliance with IDEQ regulations requiring application of dust control BMPs and adherence to permit conditions that ensure protection of air quality.

### 5.2.2.3 Foreseeable Future Disturbances

Timber harvesting, agriculture, travel on paved and unpaved roads, grazing, controlled burns, and wildfires are foreseeable future disturbances within the CEA that would continue to generate dust and exhaust emissions, along with continued mining and CERCLA related activities at the Smoky Canyon Mine.

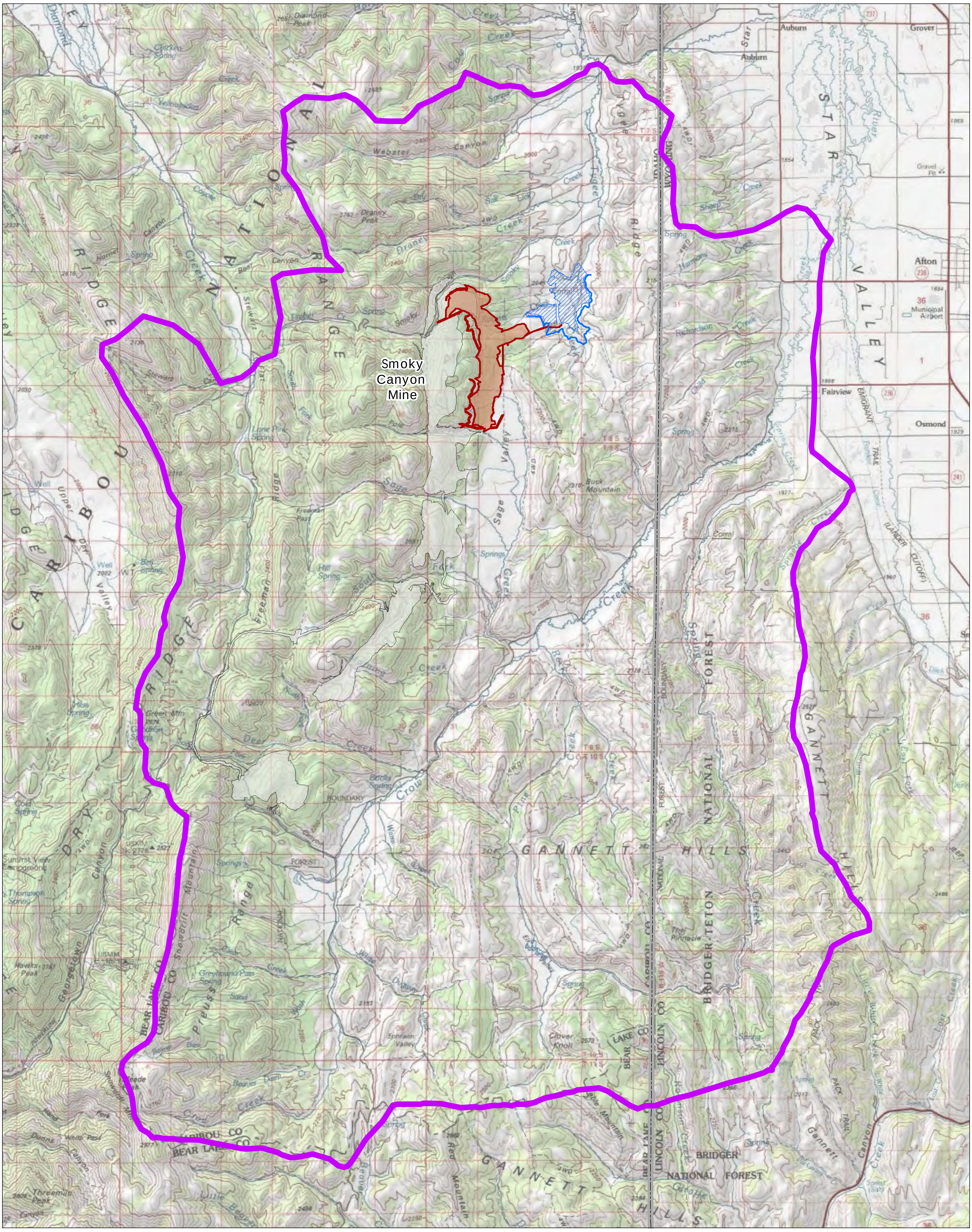
Wildfire and prescribed burns have the greatest potential to affect air quality in the CTNF and surrounding lands (USFS 2003b). Fire produces particulates, carbon monoxide, nitrogen oxides, and volatile organic compounds. Fuel loading in forested and non-forested vegetation in the CTNF has increased, along with the risk of wildfires that may contribute to air pollution in the future.

Other mining operations are proposed in the vicinity of the CTNF (see **Section 5.1.4** for details) and could contribute dust and exhaust emissions within the CEA. Also, the Lower Valley Energy Crow Creek Natural Gas Pipeline Project, if approved, would occur within portions of the CEA and during construction would contribute dust and exhaust emissions short term and of negligible amounts.

### 5.2.2.4 Cumulative Disturbances

Wildfire emissions, when added to existing concentrations of air pollutants, could produce cumulative effects that result in non-attainment of the particulate standards in specific areas. All prescribed fires are conducted in compliance with state regulations for protection of air quality and only when ambient air quality standards will not be exceeded. The RFP FEIS states, "Burning will be permitted only when management-caused smoke emissions combined with other residual pollutants does not create cumulative effects that could adversely affect air quality, human health, and visibility" (USFS 2003b). However, depending on the proximity of prescribed fires to the location of the Proposed Action and Alternative 1 and the prevailing wind direction, emissions from the fires could be additive to those from the ongoing mining operations at the Proposed Action or Alternative 1 location. Smoke disperses rapidly in most cases and impacts from smoke on air quality are short-lived. It is not possible to quantify these effects in this CEA due to the uncertainty of these conditions, so cumulative effects of adding the particulate emissions from the Proposed Action or Alternative 1 to potential smoke emissions from fires cannot be determined.

All the past, present, and reasonably foreseeable mining activities in the CEA are operated by Simplot, and the amount of air pollutants resulting from this activity is largely based on the mining rate and the truck haul distances. The present rate of mining is comparable to the proposed mining rate for the Proposed Action or Alternative 1 and reasonably foreseeable future mining activities. The location of the mining would be moved generally north from current operations, but the mining related amounts of air emissions would stay approximately constant so the air emissions from the mining over time are not cumulative. Rather they would primarily just be relocated. Depending on the truck haul distances for each phase of mining, the air emissions from this activity would change over time. The Proposed Action and Alternative 1 would comply with National Ambient Air Quality Standards and applicable State and federal regulations on protection of air quality.




Legend

- Cumulative Effects Area for Surface Water, Soils, Vegetation, Wetlands, Fisheries and Aquatics, Visual/Aesthetics, Air, and Noise
- Proposed East Smoky Panel Disturbance
- Existing Mine Disturbance Boundary
- Tailings Pond (TP)

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4. Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 2 4
Miles
1:125,000 (at original document size of 11x17)

N

Figure 5.2-1
Cumulative Effects Area for Surface Water, Soils, Vegetation, Wetlands, Fisheries and Aquatics, Visual/Aesthetics, Air, and Noise
East Smoky Panel Mine EIS

Present mining operations at the Smoky Canyon Mine would result in a cumulative effect from dust emissions due to ongoing mining operations. In addition to the dust emissions from mining and transportation, the mining and haulage equipment produce gaseous emissions of $NO_x$, $SO_2$, CO, $CO_2$, and VOCs. These would combine with other emissions from present and reasonably foreseeable emitting sources.

Current, future, or alternative operations at the Smoky Canyon Mine are not forecasted to impact any federally designated Class I Areas (i.e., Bridger Wilderness, Grand Teton National Park, and Yellowstone National Park) as most recent air quality monitoring data demonstrates compliance with all applicable NAAQS.

#### 5.2.2.5 Cumulative Effects

Considering past, present, and foreseeable future disturbances to air resources combined with disturbances from the Proposed Action or Alternative 1 to these resources, cumulative effects would be short term and negligible. The Proposed Action or Alternative 1 would be expected to maintain the status of compliance with state and federal standards. Emissions from the Smoky Canyon Mine would continue although move north. Wildfires could add additional pollutants but cannot be predicted.

### 5.2.3 Climate Change

#### 5.2.3.1 Introduction

As described in **Section 4.3.2** of this EIS, the combustion of diesel and gasoline contribute $CO_2$, GHGs, to the atmosphere. GHGs would be generated by the Proposed Action or Alternative 1.

#### 5.2.3.2 Past and Present Disturbances

In addition to ongoing phosphate mining, contributions to GHG emissions within the CEA include those from local rural and community traffic, traffic through the area to recreational locations, operation of agricultural equipment, residential and small industrial heating sources, and other commercial and industrial activities. Quantitative data on these varied sources is not readily available, but their contribution in the CEA is small compared to phosphate mining activities and they are expected to remain approximately equal to present conditions.

#### 5.2.3.3 Foreseeable Future Disturbances

Foreseeable future contributions to GHG emissions include ongoing and new phosphate mining activities at the Smoky Canyon Mine as previously described. They also include continuation of local rural and community traffic, traffic through the area and to recreational locations in the CEA, operation of agricultural equipment, residential and small industrial heating sources, and other commercial and industrial activities. Quantitative data on these varied sources not directly associated with phosphate mining is not readily available, but their contribution is small compared to phosphate mining and they are expected to remain approximately equal to present conditions.

#### 5.2.3.4 Cumulative Effects

Past, present, and reasonably foreseeable contributions to GHG emissions in the CEA have been and would continue to be predominantly associated with phosphate mining activities. GHG emissions from the mining operations are associated with direct fuel consumption for operating equipment and machinery including haul trucks and other mining equipment, and generation of electricity consumed at the facilities.

GHGs are considered to have caused a warming trend globally and could continue to do so if atmospheric levels are not reduced. The generation of GHGs would still occur under the Proposed Action, Alternative 1, or No Action. Because the scale of the global warming issue is so large and the release of $CO_2$ from fuel consumption for both the approved and proposed operations is relatively miniscule compared to the U.S. emission rate (U.S. GHG emissions totaled 6,870 million metric tons of carbon dioxide equivalents in 2014 [EPA 2016a]), an assessment of the effects of the Proposed Action or Alternative 1 on global climate change would be unreliable. Impacts from GHGs may be countered locally by $CO_2$ sequestration in the vegetation of the adjacent CTNF and added to by any future fires in the CTNF; however, the RFP FEIS (USFS 2003b) cautions that estimating these effects may not be reliable.

## 5.3 NOISE

### 5.3.1 CEA Boundary

The CEA boundary for noise is the same as air, surface water, and several other resources (**Figure 5.2-1**) and encompasses 148,861 acres. The boundary was developed with the IDT experts and professional judgement. Noise attenuates within the direct effects area, so cumulative effects are not anticipated outside of this CEA. Noise from mining is attenuated by vegetation and topography to levels that are not discernable for long distances to humans. Noise related to access traffic and haul roads is of importance to persons along nearby public roads and in nearby residences.

### 5.3.2 Introduction

Mines in the southeast Idaho phosphate mining district do not overlap within the CEA and noise impacts from these mines are not known to overlap either due to the distance and topography between the existing mines. Noise impacts from the Proposed Action or Alternative 1 do not impact sensitive receptors in the CEA beyond what is currently occurring. The effects of adding the Project to the past, present, and foreseeable future disturbances to noise resources would not result in adverse cumulative impacts.

### 5.3.3 Past and Present Disturbances

Within the CEA, mining and mining-related activities are ongoing at Smoky Canyon Mine. The continuation of approved mining at the Smoky Canyon Mine will result in ongoing noise. Other existing operating phosphate mines are located outside the CEA and would not impact the CEA for noise resources. Past and present disturbances contributing to noise include vehicular traffic on Smoky Canyon Road, the haul roads, and Crow Creek Road. Noise from vehicular traffic is short-term and intermittent. Past mine operations would no longer contribute to noise impacts.

### 5.3.4 Foreseeable Future Disturbances

Foreseeable future noise disturbances within the CEA include ongoing and new phosphate mining activities at the Smoky Canyon Mine as previously described, as well as local rural and community traffic, traffic through the area and to recreational locations in the CEA, operation of agricultural equipment, and other commercial and industrial activities. The Lower Valley Energy Crow Creek

Natural Gas Pipeline Project, if approved, would occur within portions of the CEA and during construction would contribute to noise disturbances.

### 5.3.5 Cumulative Disturbances

Past, present, and reasonably foreseeable disturbance impacts to the CEA have been and would continue to be predominately associated with noise localized to the mining areas associated with the Smoky Canyon Mine.

Cumulative activities for the Proposed Action or Alternative 1 would remain the same and would not impact differently for noise levels within the CEA.

### 5.3.6 Cumulative Effects

Mining-related noise within the CEA, if the Proposed Action or Alternative 1 were selected, would basically be equivalent to existing conditions. Noise impacts from mining operations would shift north of current operations at Panels F and G under the Proposed Action or Alternative 1. The noise from these operations would be cumulative as mining would continue in Panels F and G at the same time mining at the East Smoky Panel would occur, basically replacing the mining activities at Panel B. Noise from haul traffic between the mine panels and the mill at Smoky Canyon would be the same as present conditions. The public driving on the Smoky Canyon Road is currently exposed to the mining and haul traffic noise. Potential noise impacts from the Proposed Action or Alternative 1 are not expected to contribute to cumulative impacts to sensitive noise receptors within the CEA because the sensitive noise receptors along Crow Creek Road would be situated a sufficient distance away so that sound would attenuate.

Noise impacts from mining operations at Panels F and G would be ongoing for another 10-15 years and would likely be combined with potential mining related-noise from the Proposed Action or Alternative 1 (both situated approximately seven miles to the north). The public driving on the road to the main Smoky Canyon Mine entrance is currently exposed to the mining and haul traffic noise and residents along Crow Creek are exposed to some noise from mining currently occurring at Panels F and G which would last until 2027.

Noise impacts from the Proposed Action or Alternative 1 when added to the ongoing Smoky Canyon Mine operations would not impact sensitive receptors within the CEA above what is currently occurring.

Considering past, present, and foreseeable future disturbances to noise resources combined with disturbances from the Proposed Action or Alternative 1 to these resources, cumulative effects would be for the life of the mine and negligible.

## 5.4 WATER RESOURCES

### 5.4.1 CEA Boundary

The CEA for groundwater resources is a 37,156-acre area bound by natural geologic and hydrogeologic features as defined by current and previous groundwater modeling and conceptual site models (**Figure 5.4-1**). The boundary was developed with the IDT experts and professional judgement. This area incorporates the existing Smoky Canyon Mine and the Project, and the down-gradient underlying aquifers where groundwater quality impacts could potentially occur. The boundary is formed along Draney Creek between where it is crossed by the West Sage Valley

Branch Fault trace and the top of Webster Range, then south along the Webster Range to Wells Canyon, east along Wells Canyon stream to Crow Creek, northeast along Crow Creek to the trace of the West Sage Valley Branch Fault trace, and north along the West Sage Valley Branch Fault trace back to Draney Creek. The tailings pond facility is not included in the groundwater CEA because past studies have demonstrated that it is hydrogeologically isolated from the regional Wells Formation aquifer that is present west of the Meade Thrust Fault, and upward groundwater flows of naturally saline water under this facility eliminate its potential to negatively affect groundwater chemistry (BLM and USFS 2007).

The CEA boundary for surface water resources (**Figure 5.2-1**) includes the Crow Creek Watershed (HUC 5) to its confluence with the Salt River, the Tygee Creek Watershed (HUC 5) to its confluence with Stump Creek, and Diamond Creek Watershed (HUC 6) that extends to the confluence with Timber Creek. The boundary was developed with the IDT experts and professional judgement. The CEA encompasses 148,861 acres. This is the same boundary as was used for the Smoky Canyon Mine Panels F & G EIS (BLM and USFS 2007), also there has been a slight refinement in the acreage determination.

This boundary was selected because it incorporates natural watershed boundaries including all past, present, and reasonably foreseeable phosphate mining and transportation-related disturbances upstream of Stump Creek, the Salt River, and Timber Creek. As flows progress downstream, localized effects become more and more diluted and eventually reach a point where effects become non-measurable.

### 5.4.2 Introduction

#### 5.4.2.1 Groundwater

Cumulative effects to groundwater in the CEA could consist of groundwater withdrawals from wells or chemical effects caused by surface land uses that contribute contaminants to the groundwater under or down gradient of these land uses. Effects from timber harvesting, grazing, rights-of-way, and recreational uses on groundwater resources are negligible. Mining activities within the CEA have the greatest potential to impact the groundwater resources by withdrawal for consumptive use or from infiltration from open pits and seepage through overburden disposal fills, which have the potential to affect groundwater quality. The only active mining operations in the CEA are those at the Smoky Canyon Mine. Under the Proposed Action or Alternative 1, there would be no change in the mine's water supply wells or water consumption, thus, cumulative effects analyzed in this section are limited to those activities that have the potential to affect groundwater quality, not quantity.

Groundwater conditions in the CEA are described in various studies conducted for the Smoky Canyon Mine under CERCLA authorities to investigate the release of hazardous substances under (Formation Environmental 2014 and related reports). More recently, groundwater has been studied and modeled for this East Smoky Panel Mine EIS (HGG 2018). HGG (2018) in part reinterprets groundwater flow directions and recharge areas that were previously assumed in the CERCLA investigations.

#### 5.4.2.2 Surface Water

**Table 5.4-1** provides land ownership data within the CEA, showing that USFS lands dominate the area. Potential cumulative effects to surface water resources within the CEA can occur from road construction and maintenance, livestock grazing, timber harvesting, agricultural activities, and mining. Simplot's current mining activities span two watersheds, both of which ultimately are part of the Salt River system. The northernmost watershed is the Tygee Creek basin. Tygee Creek is a tributary of Stump Creek, which drains to the Salt River approximately five miles downstream (northeast) of Tygee Creek. The southern part of the mine is located in tributary basins that drain to Sage Creek. Sage Creek joins Crow Creek in the approximate center of the Water Resources CEA (**Figure 5.2-1**). Crow Creek flows northeastward into Wyoming, combining with flow from Spring Creek, and enters the Salt River about eight miles upstream from the confluence of Stump Creek with the Salt River.

**Table 5.4-1 Land Ownership in the Surface Water CEA**

| LAND OWNERSHIP | ACRES | PERCENTAGE OF CEA |
|---|---|---|
| USFS | 106,388 | 71% |
| BLM | 2,100 | 1% |
| Private | 39,080 | 26% |
| State | 1,293 | 1% |
| TOTAL CEA | 148,861 | 100% |

Forest management activities including timber harvests, livestock grazing, and public recreational uses occur within the CTNF located on the east and west slopes of the Crow Creek watershed upstream (south) of its confluence with Sage Creek. The CTNF comprises most of the west slopes of the Sage Creek and Tygee Creek watersheds and all of the Diamond Creek watershed in the CEA. In Wyoming, the Bridger-Teton National Forest holdings comprise most of the Spring Creek watershed which drains into Crow Creek about five miles upstream of the Salt River.

### 5.4.3 Past and Present Disturbances

#### 5.4.3.1 Groundwater

The Smoky Canyon Mine is the disturbance that has by far had the greatest effect on, and continues to affect, groundwater quality in the CEA. Past mining operations in the Panel A area of the Smoky Canyon Mine have apparently affected groundwater quality in the underlying Wells Formation aquifer (BLM and USFS 2007). As reported in the RI/FS (Formation Environmental 2014), samples collected from GW-IW in 2000 and 2001 had selenium concentrations that ranged from 0.007 to 0.022 mg/L; selenium then slowly increased (with some seasonal spikes) until it reached a high concentration of 0.126 mg/L in June 2011 in one of the aforementioned seasonal spikes. After that sampling event, selenium concentration dropped quickly to about 0.03 mg/L, then remained consistent at that concentration for most of the 2011 and 2012 RI/FS sampling period, with an overall range between 0.02 and 0.04 mg/L. As also reported in the RI/FS, selenium spiked again in late spring 2013 (0.07 mg/L), then dropped again to about the same range as in 2011-2012 (Formation Environmental 2014). East Smoky Panel Mine baseline data (Stantec 2017a) showed that groundwater sampled from GW-IW had selenium concentrations ranging from 0.026 to 0.046 mg/L. Other nearby Wells Formation wells in this part of the Smoky Canyon Mine have not been affected (or, at least not to the same degree) to date.

Panels B and C have had the potential to impact water quality of the Wells Formation aquifer in a local area under and downgradient of approved pit backfills and external overburden fill areas (BLM and USFS 2002). Mitigation measures introduced by Simplot and adopted by the Agencies were designed to reduce the groundwater quality impacts to acceptable levels within a relatively short distance from the margins of the Panels B and C operations area.

Further to the south, the Smoky Canyon Mine's Pole Canyon overburden disposal facility was built as a canyon fill from approximately the contact of the Phosphoria and Wells formations downstream to the mouth of the canyon. A gravity sorted rock drain was incorporated into the design along the drainage bottom where the coarse rock fill could continue to convey Pole Canyon Creek under the overburden. Run of mine overburden was placed into the drainage where gravity sorting allowed large rocks to collect at the bottom of the fill and form a drain to carry the creek water. The water chemistry exiting the rock drain has contained cadmium and selenium concentrations greater than the groundwater standards for these parameters, and impacts have extended to downgradient alluvial groundwater (BLM and USFS 2007). Some remediation projects have been implemented to address these conditions; in particular, actions taken to reduce groundwater impacts from the Pole Canyon Dump. For example, GW-15 is a well completed in the alluvium at the mouth of Pole Canyon. The RI/FS (Formation Environmental 2014) reported past selenium concentrations ranging from 0.0892 to 5.19 mg/L in samples collected from GW-15 over the period of record. Data collected more recently during the East Smoky Panel Mine baseline study shows GW-15 selenium concentrations ranging from 0.102 to 0.49 mg/L (Stantec 2017a). Groundwater from alluvial wells GW-22 and GW-26 continues to have elevated selenium (Formation Environmental 2014; Stantec 2017a).

Another fraction of contaminated alluvial groundwater in the Pole Canyon area is believed to enter the Wells Formation where it impacts the regional aquifer. Wells Formation groundwater selenium concentrations were elevated in GW-16 and GW-25 samples before and during the RI/FS. GW-25 is primarily influenced by Panel E. Specifically, Formation Environmental (2014) reports selenium concentrations at GW-16 ranging from 0.447 to 1.27 mg/L, and at GW-25, ranging from 0.00028 to 0.594 mg/L. Data from the East Smoky Panel baseline monitoring (Stantec 2017a) showed selenium concentrations ranging from 0.766 to 0.926 mg/L at GW-16.

Hoopes Spring is located along the trace of that fault and is a key discharge point (along with South Fork Sage Creek Springs) for groundwater from the Wells Formation in the vicinity of the Smoky Canyon Mine (Ralston 1979, NewFields 2005, Formation Environmental 2014). The elevated selenium concentrations at Hoopes Spring (see **Section 5.4.3.2** below) were initially thought to be solely due to infiltration of seleniferous leachate from the Pole Canyon overburden fill entering the upper part of the Wells Formation aquifer downgradient of the overburden and migrating south along the West Sage Valley Branch Fault (NewFields 2005). The Pole Canyon overburden fill hydrogeological setting is a unique feature at the Smoky Canyon Mine. This valley fill likely represents the worst known source of groundwater contamination at Smoky Canyon Mine and is not repeated anywhere else at the mine. A Removal Action (RA) construction was completed at Pole Canyon in 2008 and included a creek-bypass pipeline, upgradient infiltration basin, and run-on control channel (BLM and USFS 2007). An additional removal action, the Pole Canyon ODA cover, was completed at Pole Canyon over the period from 2013 to 2016. However, sources other than Pole Canyon also influence water quality at Hoopes Spring including sources in Panels D and E (Formation Environmental 2014). More recently, a WTPP (described in **Section 4.5.2.3**) has also been constructed as part of the continuing CERCLA effort and is treating contaminated water discharged from Hoopes Spring.

In sum, past mining at Smoky Canyon Mine has affected groundwater quality locally within the CEA, with those impacts continuing into the present, although they are in the process of being addressed through CERCLA actions. The Wells Formation is the primary aquifer affected, although there have also been local alluvial groundwater impacts.

#### 5.4.3.2 Surface Water

According to USFS GIS mapping and Idaho and Wyoming Gap Analysis Program (GAP) maps, mining and agriculture reflect two of the dominant land uses/major disturbances within the CEA, but each represent very small percentages (2 and 3 percent, respectively) of the total CEA (**Figure 5.2-1**). According to the same information, sagebrush/shrub and conifer are the dominant vegetative cover types within the Surface Water CEA, making up about 70 percent. Agriculture occurs on the majority of the private lands. For example, cultivated agriculture and livestock pasture land uses occur on private land located in the bottom of the Crow Creek Valley upstream of Sage Creek. Agricultural private lands also dominate the eastern portions of the Tygee and Sage Creek watersheds and along Crow Creek Valley from Sage Creek downstream to the confluence with the Salt River.

**Table 5.4-2 Dominant Land Use and Disturbance Types in the Surface Water CEA**

| LAND USE OR DISTURBANCE TYPE | AREA (ACRES) | PERCENT OF CEA |
|---|---|---|
| Mining, quarries, gravel pits | 4,390 | 3 |
| Timber Harvests | 730 | negligible |
| Burned Areas | 930 | 1 |
| Agricultural Areas (private) | 3,400 | 2 |
| Utility and Pipeline Corridors | 60 | negligible |
| Roads/Trails | 380 | negligible |

**Table 3.5-3** includes numerous stream segments within the CEA that are listed as impaired in the latest USEPA-approved 305(b) Integrated Report (IDEQ 2014a), which was prepared in 2012. In addition, several stream segments that are outside of the Water Resources Study Area, but within the Surface Water CEA are listed. Specifically, Manning Creek, North and South Forks of Deer Creek, Deer Creek, Rock Creek, Books Creek, Warm Creek, White Dugway Creek, Sand Wash, Beaver Dam Creek, Little Elk Creek, Spring Creek, and Diamond Creek, as well as unnamed tributaries, are listed as impaired in certain segments or throughout their length. Impairments are primarily due to *E. coli*, sedimentation/siltation, or combined biota/habitat bioassessments (i.e., habitat alterations), or a combination of those. Several stream segments down gradient of the Smoky Canyon Mine are listed for selenium impairment (**Table 3.5-3**).

The Salt River Subbasin Assessment and TMDL (IDEQ 2017b), which includes most of the Idaho portion of CEA, notes that sediment, bacteria, habitat modifications, and selenium all affect beneficial uses in the subbasin.

For segments impaired due to sediment, IDEQ (2017b) determined that the impairment was primarily due to bank erosion on public and private lands, with some additional component due to natural hydrological and geomorphic processes. There have been occasional discrete events wherein the Smoky Canyon Mine has released sediment (namely Smoky, Pole Canyon and Sage creeks), and IDEQ (2017b; 2017c) has developed a Smoky Creek TSS WLA specifically for Simplot's allowable TSS load. Simplot is also obligated to follow its SWPPP and to use an adaptive management processes to ensure BMP functioning to comply with Idaho's Water Quality Standards.

For segments impaired due *E. coli*, impairment was determined as due to nonpoint loading from livestock and wildlife feces, with no components attributed to the Smoky Canyon Mine (IDEQ 2017b). The mine was noted as associated with elevated selenium in the listed stream segments. However, the assessment and TMDL did not address selenium-impaired stream segments because they are currently under CERCLA responsibility (IDEQ 2017b).

As noted above, groundwater quality has locally been impacted at parts of the Smoky Canyon Mine, which in turn has impacted specific surface water, in large part, due to discharge at Hoopes Spring. The selenium concentration at Hoopes Spring began to increase in the fall of 1997. During the 13-year period from 1984 to 1997, the mean selenium concentration was 0.0024 mg/l, ranging from <0.001 to 0.005 mg/l (BLM and USFS 2002a). The selenium concentration then increased and ranged up to 0.013 mg/L prior to October 2002, with concentrations in 2003 and 2004 ranging from 0.0067 to 0.015 mg/L and averaging 0.011 mg/L (NewFields 2005). Hoopes Spring selenium concentrations ranged between about 0.006 and 0.019 mg/L through early 2007 (NewFields 2006 and 2007). Formation Environmental (2014) showed that Hoopes Spring selenium has continued to increase, with essentially all site HS samples collected during the RI/FS (between 2011 and 2013) reflecting concentrations greater than 0.05 mg/L. Further, as reported in **Table 3.5-4**, selenium concentrations ranged from 0.108 mg/L to 0.134 mg/L in the eight samples collected from this site during the baseline study for this EIS.

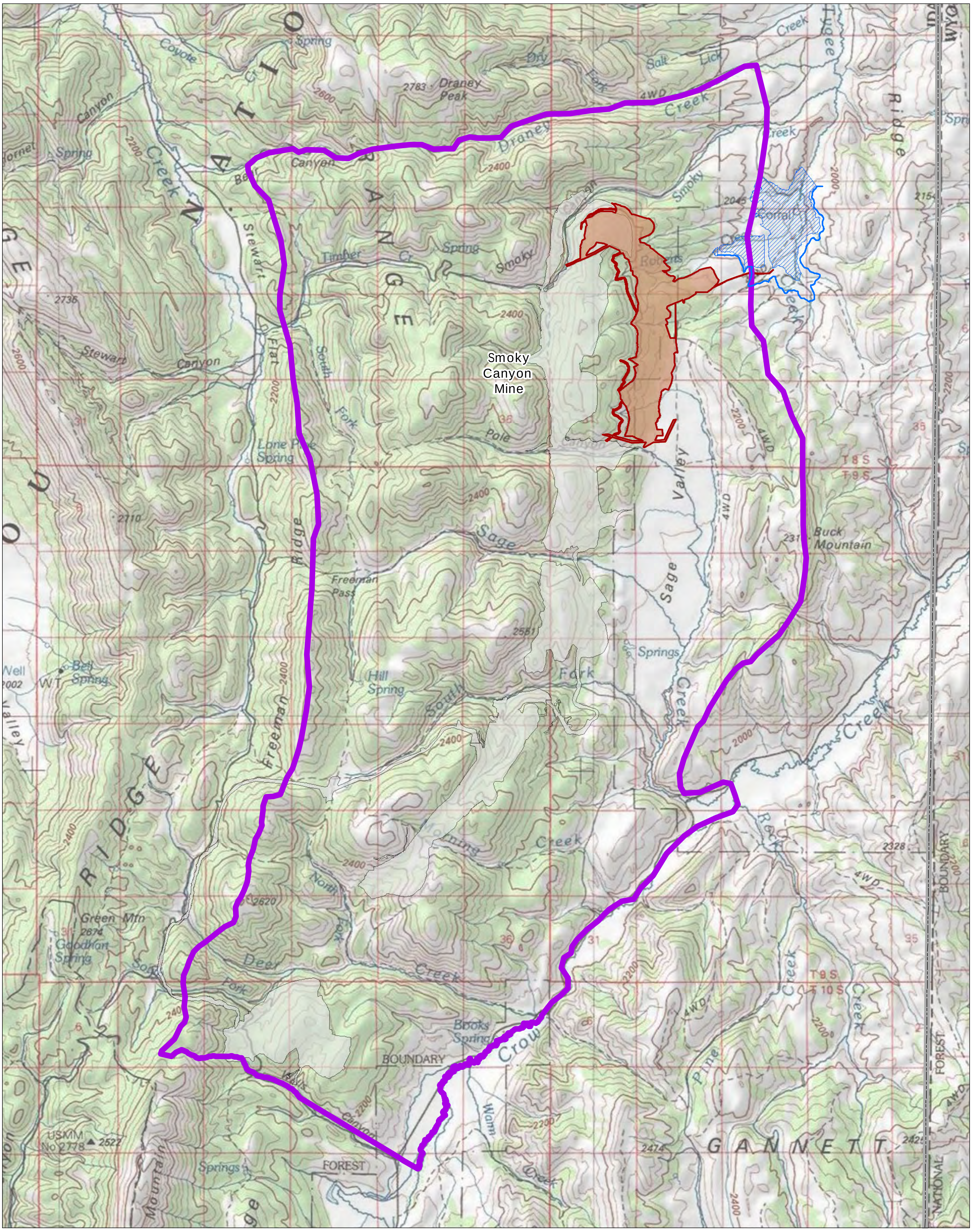
## 5.4.4 Foreseeable Future Disturbances

### 5.4.4.1 Groundwater

Other than the East Smoky Panel Project, and ongoing, already approved mining activities at the Smoky Canyon Mine, there are no reasonably foreseeable phosphate mining operations in the groundwater resources CEA (**Figure 5.4-1**) that are expected to begin operations. Potential exploration activities on existing phosphate leases (Agrium on the west edge of the water resources CEA and Monsanto in the south part of the groundwater CEA) may occur, although in both cases only a very small portion of these lease areas are within the CEA. These leases are shown on the geology CEA map (**Figure 5.1-1**). Exploration would not be likely to impact groundwater quality.

Impacts to groundwater from the existing Smoky Canyon Mine are not expected to continue in perpetuity because of the AOC to investigate and develop alternatives to address contaminant releases from the mine, with its subsequent SIs, RAs, and ongoing CERCLA considerations. These actions are expected to eventually reduce contaminant levels in Hoopes Spring, which are sourced from Pole Canyon, Panel D, and Panel E.

There are no other mining or non-mining projects known within the foreseeable future that would be expected to impact groundwater in the CEA.




Legend

- Cumulative Effects Area for Groundwater Resources
- Proposed East Smoky Panel Disturbance
- Existing Mine Disturbance Boundary
- Tailings Pond (TP)

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4. Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 1 2
Miles
1:75,000 (at original document size of 11x17)

N

Figure 5.4-1
Cumulative Effects Area for Groundwater Resources
East Smoky Panel Mine EIS

### 5.4.4.2 Surface Water

There are no reasonably foreseeable phosphate mining operations in the surface water resources CEA (**Figure 5.2-1**) that are expected to begin operations other than the East Smoky Panel Project and ongoing, already approved mining activities at the Smoky Canyon Mine. Potential exploration activities on existing phosphate leases (Agrium on west edge of the water resources CEA and Monsanto in the south part of the groundwater CEA) may occur. These leases are shown on the geology CEA map (**Figure 5.1-1**). Potential small changes to private agricultural lands are possible as portions of these lands are converted into low-density residential areas. Near-term development of private agricultural lands within the CEA is expected to be limited because Caribou County has identified infilling of existing city limits and impact areas, rather than expansion into rural areas, as a growth goal (Caribou County 2006). Future quantities, extents, and types of grazing activities within the CEA are not expected to vary from current activities.

In the foreseeable future, there would be impacts to surface water as a result of mining at Panels F and G and predicted in the EIS (BLM and USFS 2007). Neither the RI/FS predictions nor the existing conditions account for the predicted future selenium increases in surface waters from the Panels F and G mining. For one, the bounds of the southern groundwater flow sub-region considered in the RI/FS modeling had its northern boundary along a presumed groundwater divide between Smoky Canyon and Pole Canyon and its southern boundary just south of South Fork Sage Creek (Formation Environmental 2014). For another, the predicted Panels F and G impacts to surface water (from the selected Alternative D), combined with existing un-remediated Smoky Canyon Mine impacts, were assessed at South Fork Sage Creek downstream to Crow Creek and Deer Creek downstream to Crow Creek at a timeframe of several hundred years post-mining (BLM and USFS 2007). Thus, the timing of impacts to surface waters from Panels F and G is well beyond the 2050 end-date modeled in the RI/FS. However, the current selenium concentrations in South Fork Sage Creek, Sage Creek, and Crow Creek downstream of Sage Creek are already above the Alternative D predictions in the Panels F and G EIS (BLM and USFS 2007). As discussed in **Section 4.5.2.3**, a reasonably foreseeable action implemented by Simplot at the Smoky Canyon Mine, but not associated with the Proposed Action or Alternative 1, is the continued operation of the WTPP to treat and reduce selenium in spring waters that discharge to the Sage Creek drainage.

## 5.4.5 Cumulative Disturbances

### 5.4.5.1 Groundwater

Existing groundwater pumping at the Smoky Canyon Mine would not change as a result of the Proposed Action or Alternative 1, other than extending the Project life and thus the duration of pumping, so there should be no cumulative effects on groundwater quantity withdrawn that could potentially affect the flow of springs in the CEA. The development of the open pits and subsequent pit backfills in the existing Smoky Canyon Mine have the potential to increase local groundwater recharge to the Wells Formation aquifer because the Meade Peak aquitard covering the Wells Formation in these areas is largely removed by mining. The same situation would be produced in the Proposed Action or Alternative 1. The store and release cover would reduce this effect because of the designed reduction in percolation through the cover.

The Panels F and G Project would not be cumulative to the East Smoky Panel Project for groundwater because it is not anticipated to impact Hoopes Spring or groundwater north of South Fork Sage Creek. The groundwater regimes for these two areas are different. Groundwater flow in the Wells Formation in the vicinity of Hoopes Spring is apparently flowing from west to east toward the West Sage Valley Branch Fault then from north to south along the fault zone to the spring (NewFields 2005). In the vicinity of Panel G, groundwater flow in the Wells Formation is to the east, discharging in Lower Deer Creek, Books Spring, and Crow Creek. In the vicinity of Panel F, groundwater flow in the Wells Formation is east to the West Sage Valley Branch Fault and then north to South Fork Sage Creek Spring. Hydrogeologic models of groundwater flow in the Wells Formation south of South Fork Sage Creek Spring indicate that groundwater does not flow further north. Groundwater studies done by NewFields (2005) at the Smoky Canyon Mine have indicated that there is a low elevation area in the Wells Formation water table at the mouth of South Fork Sage Creek Canyon. The East Smoky Panel Mine would not impact groundwater any further south than Hoopes Spring, as discussed in **Section 4.5** and as shown in **Figures 4.5-2**, **4.5-3**, **4.5-4**, and **4.5-5**. The geographic area (footprint) of the Wells Formation regional aquifer potentially affected by the East Smoky Panel Project, with regard to water quality, is cumulative to that already, and potentially, impacted by the Smoky Canyon Mine.

Groundwater in the vicinity of the industrial well and the now-abandoned culinary well is influenced by sources in Panel A. The groundwater gradient in the vicinity of the industrial well is heavily influenced by pumping. Leachate from the Pole Canyon ODA affects groundwater quality downgradient (east) of the overburden fill. Contaminants released from Pole Canyon flow south along the West Branch Sage Valley Fault to Hoopes Spring, and possibly South Fork Sage Creek Spring, where the groundwater discharges to the surface environment. The East Smoky Panel Project would not impact groundwater quality at the culinary or industrial wells, and would not impact water quality at South Fork Sage Creek Spring. Groundwater beneath and to the south of the East Smoky Panel would be impacted, as described.

#### 5.4.5.2 Surface Water

As described in **Section 3.5.2.1**, the NFS lands portion of the Tygee Creek HUC 6 watershed has approximately 8.6 percent of its area hydrologically disturbed, and the NFS lands portion of the Sage Creek HUC 6 has approximately 19.2 percent. As described in **Section 4.5.2.1**, the Proposed Action would add 3.2 and 1.1 percent, respectively. Cumulatively, the totals for each of these two areas would remain at less than the 30 percent hydrologically disturbed area recommended by the RFP (USFS 2003a). Further, once reclamation has been successfully completed, the amount of hydrologically disturbed mining areas would be greatly reduced over time.

The selenium concentrations in lower Sage Creek are due to contributions of selenium from Hoopes Spring and South Fork Sage Creek Spring, which have been impacted by previously described mine features. The 2007 RA implemented at the Smoky Canyon Mine to reduce the selenium discharges from the Pole Canyon cross valley fill was intended to have reductions in contaminant concentrations in Hoopes Spring and thus in lower Sage Creek (BLM and USFS 2007). Modeled estimates calculated that the RA was expected to result in a 75-percent reduction in load from Pole Canyon as the single source of selenium discharged from Hoopes Spring. The estimated time that it would take to see measurable effects at Hoopes Spring was roughly 10 years (or sooner) from the time the RA was implemented (Appendix 2A in BLM and USFS 2007). A second RA was completed at the Pole Canyon ODA in 2015. It involved construction of the cover and stormwater controls, with minor follow-up construction performed in 2016. Additional sources of selenium at Hoopes Spring include Panels D and E (Formation Environmental 2014).

**Figure 5.4-2** shows total selenium concentrations at Hoopes Springs over time. Data prior to fall 2014 came from the RI/FS (Formation Environmental 2014), with subsequent data collected as part of the baseline study for this EIS. Selenium concentrations at Hoopes Springs were still increasing at the end of the baseline study as shown by the figure. However, Simplot's consultants note that subsequent sampling shows that Hoopes Spring selenium concentration has peaked and is beginning to decrease (Townsend 2017).

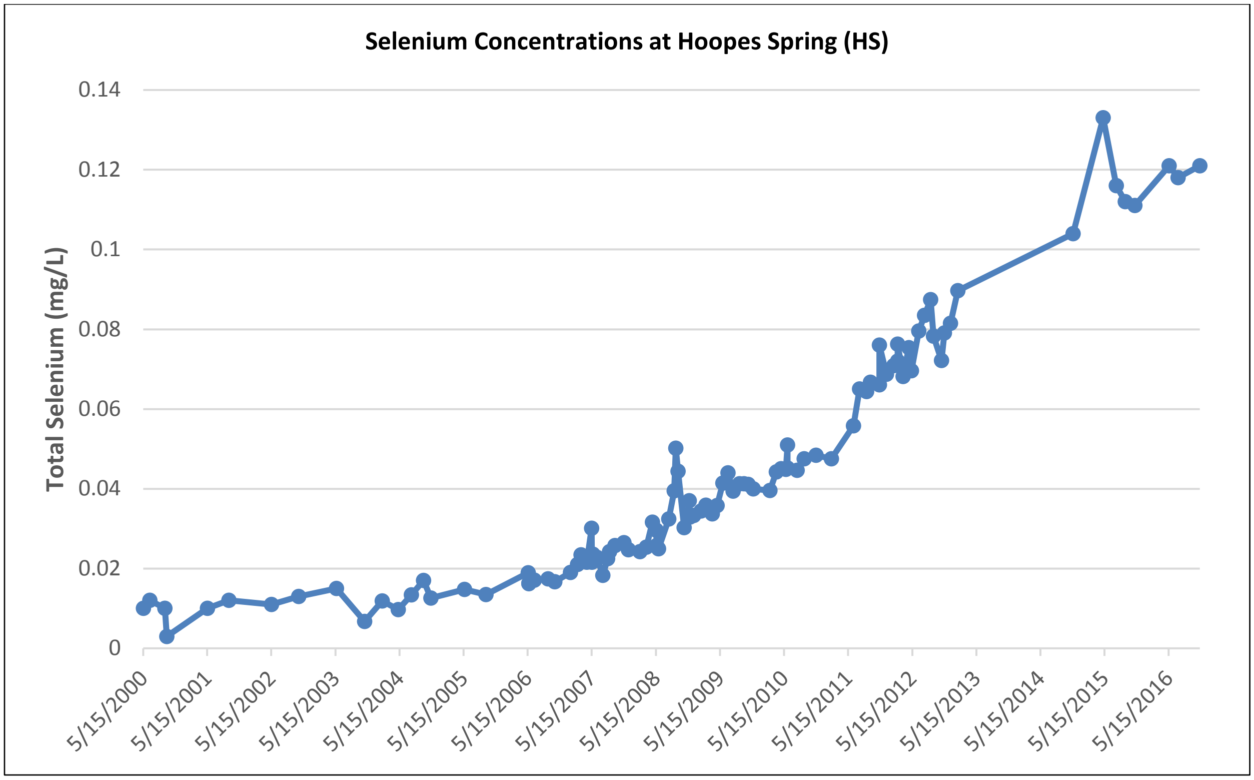



**Figure 5.4-2 Selenium Concentrations at Hoopes Spring (HS)**

Selenium impacts to surface waters were predicted to occur from Panels F and G development (BLM and USFS 2007), additive to impacts that were already occurring. The selenium concentrations from Panels F and G were expected to peak within a 50 to 100-year timeframe and then steadily decrease. The EIS considered that assumption to be conservative because the regulatory agencies and Simplot would be implementing programs over a much lesser period of time to remediate the current selenium loading to South Fork Sage Creek and lower Sage Creek. However, data collected for the RI/FS and for the East Smoky Panel Mine indicate that these estimated peaks were not realized, at least for streams that are already known to be impacted. Specifically, the EIS (BLM and USFS 2007) predicted that selenium concentration at the mouth of South Fork Sage Creek would eventually reach a peak of 0.01 mg/L. Baseline data collected between 2014 and 2016 for the East Smoky Panel Mine at LSS in lower South Fork Sage Creek averaged 0.018 mg/L. The 2007 EIS predicted that selenium concentration at the mouth of Sage Creek would peak at 0.009 mg/L; baseline data collected for the East Smoky Panel Mine at that location (LSV-4) averaged 0.041 mg/L. Lastly, the 2007 EIS predicted that selenium concentration at Crow Creek downstream of Sage Creek (CC-1a) would peak at 0.006 to 0.007 mg/L; baseline data collected for the East Smoky Panel Mine in that location averaged 0.0173 mg/L.

The net effect on selenium concentrations in Sage Creek and its tributaries, including Hoopes Spring, would increase slightly due to the Proposed Action or Alternative 1. Within and downstream of Sage Creek within Crow Creek, selenium concentrations may continue to be greater than the standard at CC-1A, regardless of the East Smoky Panel activities. The selenium concentration was predicted where Crow Creek reaches the Wyoming border, based upon the draft RI/FS report (Formation Environmental 2014). That report predicts a peak selenium concentration (not including any loading from the East Smoky Panel) during the low flow season at CC-WY-01 of about 0.02 mg/L in about 2015 dropping to about 0.005 mg/L by 2050.

### 5.4.6 Cumulative Effects

There would be no cumulative impacts to groundwater quantities under the Proposed Action or Alternative 1. However, under the Proposed Action or Alternative 1, there would be cumulative impacts to groundwater quality as the East Smoky Panel Project would result in the addition of various COPC concentrations to the already impacted groundwater resources in the CEA. As described in **Section 4.5**, adding overburden from either the Proposed Action or Alternative 1 to the Panel B backfill would not increase the selenium or cadmium concentration of seepage through the Panel B backfill, so additional groundwater impact analysis of this change to the Panel B backfill is not required. In contrast, manganese concentration predictions for either of the East Smoky Panel action alternatives are greater than the Panels B&C predictions, so there would be a cumulative manganese impact in this immediate area of the CEA.

While the Proposed Action and Alternative 1 modeled groundwater impacts do not show selenium exceeding the regulatory groundwater standard (0.05 mg/L) at any time during the 300-year model simulation time frame, those analyses did not consider the current mining impacted groundwater at the four modeled groundwater points. There is no means to assess current selenium concentrations at the theoretical OBS-1 and OBS-2 locations, but baseline data (Stantec 2017a) at GW-27 (one sample) showed a selenium concentration of 0.0109 mg/L; adding that to the predicted 0.003 mg/L peak impact at 100 years (under the Proposed Action, less under Alternative 1) results in a concentration that is still lower than the standard. At GW-IW, the eight baseline samples showed selenium concentrations ranging from 0.026 to 0.047 mg/L, with a mean of 0.032 mg/L. With no addition predicted from the East Smoky Panel under either alternative, there would be no cumulative impact at this well.

However, for manganese, the Proposed Action predicted groundwater concentrations were greater than the regulatory standard (0. 05 mg/L) at the end of the 300-year simulation at both of the model observation points and at GW-27, with a concentration of 0.101 mg/L at the latter. The current manganese concentration at GW-27 (based on one sample collected during the baseline monitoring program), is 0.004 mg/L. The addition of two orders of magnitude higher concentration would be a major cumulative impact at this well under the Proposed Action. There would be a reduced cumulative manganese impact at GW-27 under Alternative 1: the peak concentration would be at 300 years, at 0.042 mg/L. No manganese increase was predicted at GW-IW under the Proposed Action or Alternative 1, and that site had a mean manganese concentration of 0.002 mg/L during the baseline study.

For sulfate and TDS, the combined concentrations under the Proposed Action (or Alternative 1) and the current baseline conditions would still be well below the 250 mg/L and 500 mg/L groundwater standards, respectively, although existing TDS concentrations are in the 300 mg/L range.

In addition, surface water quality impacts at Hoopes Spring and downstream into Sage Creek and Crow Creek would be negligible from the addition of selenium from the Project. The selenium concentrations would be affected by contributions of selenium from past and existing Smoky Canyon Mine activities that are currently subject to CERCLA remediation, regardless of whether the No Action Alternative is chosen, or whether the Proposed Action or Action Alternative 1 is chosen. The intent of the CERCLA remediation activities is to protect human health and the environment and to comply with applicable or relevant and appropriate requirements (ARARs). The intent of the WTPP described under the No Action Alternative is also to reduce selenium concentrations in these downstream waters. Further, as described in the AMP (**Appendix 4B**), Simplot has committed to operating the WTPP regardless of CERCLA as needed to mitigate water quality impacts at Hoopes Spring.

## 5.5 SOILS

### 5.5.1 CEA Boundary

The CEA boundary for soils (**Figure 5.2-1**) is the same as described for surface water resources (**Section 5.4**). The boundary was developed with the IDT experts and professional judgement. The CEA encompasses 148,861 acres and is the same as for surface water due to the indirect effect that soil disturbance has on surface water quality from erosion and sedimentation.

### 5.5.2 Introduction

The CEA for soil resources includes private lands, state land, BLM land, portions of the CTNF in southeastern Idaho, and portions of the Bridger-Teton National Forest in southwest Wyoming. The USFS administers the largest amount of land within the CEA (71 percent) followed by private land (26 percent), with the state and BLM administering a few percent each of the total area.

Direct impacts to soil resources typically occur as a result of ground-disturbing activity. Major land uses in the CEA are timber harvesting, livestock grazing, agriculture, and mining. The area is also used for hunting, fishing, and other outdoor recreation where OHV use can disturb soil resources, but the effects of these activities on soils are insignificant compared to the other four major land uses.

Potential impacts to soil resources include damage or removal of topsoil and subsoil profiles and structure, slope failure, and weathering processes and subsequent erosion. Although disturbed soil will develop new profiles over extended periods of time, cumulative impacts to soils can include the loss of productivity and increased risk due to slope failures.

### 5.5.3 Past and Present Disturbances

In addition to ongoing mining activities at the Smoky Canyon Mine, other past and present land uses (ground disturbances) in the CEA that affect soils include timber harvests, burned areas, agriculture (including private land development), livestock grazing, utility and pipeline corridors, and roads/trails.

According to CTNF data, approximately 27,000 acres of timber harvest has occurred on the CNF since 1964 (BLM and USFS 2007). Timber harvest activities expose the soil resources to erosional factors, as does equipment used to remove and haul timber, and the associated. logging roads. Increased erosion of in-situ soil is a loss of that resource. The USFS conducted a 30-year erosion study on the CTNF by monitoring 25 erosion plots with collection tanks between 1982 and 2012 (USFS 2017b). Land subject to timber sales was monitored at two sites (one in a clear-cut unit and the other in a thinning unit). Average annual erosion rate at both sites was less than 0.2 tons/acre/year (much less than the soils' loss tolerance factor). The 2002-2003 CTNF Monitoring and Evaluation Report (USFS 2003e) analyzed some of that same data, and indicated that audits of ten timber sale disturbances in the CTNF showed BMPs appeared to be effective in controlling soil erosion.

Controlled burning and unplanned seasonal wildfires increase the risk of soil erosion by removing the organic surface material from the soil and can permanently alter the physical characteristics of the top layers of the soil. Within the CEA, soil impacts from fire have varied by location, timing of the fire, soil and vegetation type, and post-fire environment (USFS 2003a), but are not expected to comprise more than a negligible percentage of the CEA lands.

Livestock grazing may affect soil by decreasing the vegetation cover, destroying the microbiotic crust, increasing compaction, and thereby increasing the surface erosion of soils. The long-term USFS CTNF erosion plots study (USFS 2017b) included 11 plots in active cattle allotments, 6 plots in active sheep allotments, and 2 plots on historic sheep driveways. When averaged over the two-decades, erosion rates were all below soil loss tolerances for the respective soil types. The past and present vegetation and soil loss condition due to grazing uses of the CTNF is applicable to the CEA and is expected to continue in the foreseeable future.

Of all the land uses in the CEA that can affect soils, the most significant one is mining because the soils within the disturbed areas are physically removed and then replaced during reclamation activities. The only mining in the CEA is at the Smoky Canyon Mine. Past, present, and/or permitted mining activity at the Smoky Canyon Mine has or eventually will disturb approximately 3,580 acres of soil resources in the CEA based upon past and current approvals. Current mining practice requires topsoil salvage and reapplication during reclamation. Reclamation, which stabilizes disturbed soils, is conducted concurrently with ongoing mining activities, such that when mining is completed in one area, reclamation begins while mining proceeds to another area.

<u>Selenium and Other Metals</u>

The concentration of selenium and other metals in surficial growth medium and vegetation at reclaimed mining sites can be influenced by the mining operations and the type of reclamation treatment methods. Previously, reclamation techniques at phosphate mines inadvertently resulted in elevated concentrations of selenium and other COPCs.

The RI/FS (Formation Environmental 2014) reported on soil and overburden sampling at several reclaimed ODAs at the Smoky Canyon Mine, which reflected various types of previous reclamation activities and materials, including ROM (including non-seleniferous chert and seleniferous center waste shale), topsoil, or other geologic materials used as cover growth media. COPCs were detected at concentrations exceeding both the human health and ecological screening-level benchmarks in one or more surface soil samples, to include antimony, arsenic, cadmium, cobalt, manganese, molybdenum, nickel, selenium; and vanadium. Concentrations of aluminum, iron, thallium, and uranium exceeded only human health screening-level benchmarks in one or more surface soil samples. Concentrations of barium, chromium, copper, lead, silver, and zinc exceeded only ecological screening-level benchmarks in one or more surface soil samples. Beryllium and boron were not detected at concentrations that exceeded either the human health or ecological screening-level benchmarks in surface soil samples. Selenium generally had the widest distribution of elevated concentrations, and at times greatly exceeding the screening-level benchmarks. Selenium concentrations at these ODA surfaces in part reflects particular reclamation practices, which have evolved in order to reduce the impact (Formation Environmental 2014). Reclamation cover improvements have focused on thicker covers and/or reduced infiltration of precipitation and have been designed using results from recent and ongoing lysimeter data that suggests covers with no bentonite enhancement or plastic are proving less effective than previously thought. Further, as described in the AMP (**Appendix 4B**), Simplot has committed to construct final reclamation covers in accordance with agency-approved mining and reclamation plans.

### 5.5.4 Foreseeable Future Disturbances

The reasonably foreseeable developments in the CEA include exploration drilling at Freeman Ridge/Husky 2 (168 acres proposed, although this is currently on hold), plus ongoing livestock grazing and limited recreational use. Additional mining-related disturbances could occur within the CEA depending upon the actual locations of disturbance from proposed mining activities at the future Husky/North Dry Ridge Mine and exploration activities at the Freeman Ridge/Husky 2 and Dry Ridge sites. Also, the Lower Valley Energy Crow Creek Natural Gas Pipeline Project, if approved, would occur within portions of the CEA and during construction would impact soil resources within the trench that would be excavated to bury the pipeline.

### 5.5.5 Cumulative Disturbances

Cumulative disturbances of soil resources within the CEA as a result of past, present, and reasonably foreseeable developments, including the Proposed Action or Alternative 1, would primarily be the result of phosphate mining activities and agricultural practices. Additional disturbances of soils as a result of timber sales and residential development would also occur but would be of smaller scale.

With implementation of the Proposed Action, an additional approximately 12 acres of highwall and stormwater features would not be reclaimed (or 9 acres for Alternative 1). In addition, under the Proposed Action, Panel B would be reclaimed using a store and release cover over all seleniferous overburden; under Alternative 1, the currently approved technique would still apply for the Panel B pit. In accordance with the RFP (USFS 2003a), less than 15 percent of soils in the activity area would be detrimentally disturbed. Compliance with the RFP suggests the effects of the 12 or 9 acres of unreclaimed disturbance would have little effect on soil loss due to erosion.

### 5.5.6 Cumulative Effects

The most extensive impacts to soils in the CEA would result from mining, agricultural, wildfires, and timber harvesting activities. Because the success of mine reclamation largely depends on reuse of stockpiled or live-handled topsoil, and because all mines are required to implement a SWPPP, impacts to soils beyond initial disturbance and relocation (e.g., soil loss through erosion) are minimized. The success of the agricultural industry is also inherently dependent on maintaining soil quantity and quality, and soil management practices are widely implemented during these activities. Forest management activities on the CTNF include timber sales, livestock grazing, and recreation. Extensive portions of the soil resource CEA are located on lands administered by the CTNF. Activities in these areas are subject to management goals and standards provided in the CNF RFP (USFS 2003b).

BMPs and EPMs would be designed and/or implemented to contain sediment derived from mining disturbance. Because soil loss would be controlled by installation of water retention ponds, runoff control ditches, and implementation of other BMPs and/or EPMs, soil erosion as a result of the Proposed Action or Alternative 1 is expected to be minimal.

Agricultural, recreation, forestry, and land development activities would continue to contribute to soil loss within the CEA. Similarly, increased regulatory control on soil erosion, verified by reclamation monitoring, is expected to minimize impacts to soil productivity and erosion within the CEA. The short- and long-term contributions of the Proposed Action or Alternative 1 to cumulative effects on soil resources are expected to be minor in the CEA.

## 5.6 VEGETATION

### 5.6.1 CEA Boundary

The CEA boundary for vegetation (**Figure 5.2-1**) is the same as described for surface water resources (**Section 5.4**) and soils resources (**Section 5.5**). The boundary was developed with the IDT experts and professional judgement. The CEA totals 148,861 acres. The CEA for vegetation was determined to be the same as that for soils because the disturbance of vegetation would result in the disturbance of the soil resources in the same area. Vegetation effects from the Proposed Action and Alternative 1 would not be noticeable beyond this area.

### 5.6.2 Introduction

**Table 5.4-1** provides land ownership breakdown within the CEA. Disturbance of vegetation in the CEA occurs primarily through activities related to mining, agriculture, timber harvests, grazing, wildfires, prescribed burns, and OHV use (BLM and USFS 2007). **Table 5.6-1** indicates the major vegetation types and the amount of acreage each vegetation type encompasses within the CEA according to USFS GIS mapping and both the Idaho and Wyoming GAP maps. The reasonably foreseeable developments in the CEA are the same as those described in **Section 5.4**.

**Table 5.6-1 Vegetation Cover Types Within the Vegetation CEA**

| MAJOR VEGETATION TYPES | AREA (ACRES) | PERCENT OF CEA |
|---|---|---|
| Aspen | 16,174 | 11 |
| Aspen Conifer | 7,663 | 5 |
| Conifer | 47,126 | 32 |
| Sagebrush/Shrub | 57,763 | 39 |
| Grassland | 13,235 | 9 |
| Riparian | 6,901 | 4 |
| Total | 148,861 | 100 |

### 5.6.3 Past and Present Disturbances

In addition to ongoing mining and exploration activities at the Smoky Canyon Mine and existing roads and trails, past timber sales have reduced stand densities, simplified stand structure, and have resulted in the partial treatment of created fuels (logging slash) through the use of fire and mechanical means. Forest product extraction (including fuel, posts, poles, plant gathering, and Christmas trees) has impacted minor amounts of forest resources throughout the CEA. Impacts associated with timber harvests can include changes in species composition, habitat loss, habitat fragmentation from road construction, and an increase in soil erosion. Many of the timber harvest areas are regeneration prescription which has led to an even-aged replacement stand. However, structural diversity at the landscape scale has been increased and representative of a natural mixed severity disturbance regime.

Grazing activities also occur throughout the majority of the CEA. Livestock grazing has and would continue to utilize the grass/forb species, reducing competition for natural regeneration of tree/shrub species. In addition, grazing activities can result in specific, localized damage in riparian areas from vegetation removal by cattle as well as increasing the introduction and spread of noxious and non-native vegetation species. Grazing management cumulative effects are discussed in **Section 5.9**.

Noxious weeds associated with past and present surface disturbances (i.e., roads, mining and exploration activities, and private land development) have introduced and increased the susceptibility for the establishment of noxious weeds over a small percentage of the CEA, based upon an analysis for the Panels F and G EIS (BLM and USFS 2007) and assuming small increases in disturbances since then.

### 5.6.4 Foreseeable Future Disturbances

The reasonably foreseeable developments within the CEA that could affect vegetation include ongoing development of the Smoky Canyon Mine. No foreseeable future timber sales or prescribed burns are proposed or planned within the vegetation CEA in the current CTNF planning cycle. Wildfire effects in the CEA cannot be reliably evaluated and are thus not considered for this analysis. Forest product extraction (including fuel, posts, poles, plant gathering, and Christmas trees) would continue to impact minor amounts of forest resources throughout the CEA. Changes to private agricultural lands within the CEA are likely as some of these lands are converted from traditional agricultural utilization (ranching) to more residential and recreational utilization. Impacts to vegetation resources would include changes in vegetative composition and possibly loss of vegetation in some areas; however, specific plans for such conversions are unknown and cannot be reliably evaluated.

Ongoing impacts related to vegetation containing selenium at the Smoky Canyon Mine would be expected to continue until remedial action measures are completed. Newer mining and reclamation facilities and operations have incorporated BMPs and cover designs that limit potential for selenium uptake by vegetation, unlike older mine features that were constructed without consideration for the potential of selenium release (IDEQ 2006).

Also, the Lower Valley Energy Crow Creek Natural Gas Pipeline Project, if approved, would occur within portions of the CEA and during construction would impact vegetation resources within the construction corridor. Within the CEA, the pipeline corridor disturbance, as proposed, would largely occur adjacent to existing roads and affect sagebrush vegetation types.

### 5.6.5 Cumulative Disturbances

The potential new surface disturbance from the Proposed Action (approximately 850 acres) or Alternative 1 (approximately 770 acres), added to past and present known disturbances, likely results in 10 percent or less of the CEA vegetation being disturbed. The majority of disturbances results in the replacement of the natural vegetation condition with mainly grasses and forbs for mining areas, and crops and/or managed pasture for agricultural areas. Roads and trails permanently replace native vegetation with either pavement, gravel, or an exposed earth surface. The rest of the cumulative disturbances are mainly temporary disturbance, except for areas left unreclaimed. An additional amount of unquantified disturbance to vegetation occurs in the CEA as a result of livestock grazing and other activities. Natural revegetation and reclamation relatively quickly reestablish vegetation to these disturbed areas, although the vegetation composition and community type is changed and modified from its pre-disturbance state.

The cumulative impact of timber harvesting related to past, present, and reasonably foreseeable future actions, including approximately 850/770 acres associated with the Project, would affect approximately 4,200 acres of the CEA based upon figures obtained for the Panels F and G EIS (BLM and USFS 2007). Revegetation and reclamation would stabilize this area with vegetation; however, vegetation composition, structure, and community type would likely be different.

There are no predicted impacts to TEPC or sensitive plant species from the Project and none were documented during baseline studies, so there should be no cumulative impacts to those categories of plant species.

Adding the proposed increase in additional new surface disturbance within the CEA from implementing the Project (850/770 acres) would increase the cumulative effect of disturbed acres susceptible to noxious weed invasion. However, improved prevention measures and control/treatment requirements would limit this overall cumulative effect within the CEA.

In terms of potential bioaccumulation of selenium in vegetation growing on future reclaimed areas associated with the Project, as stated in **Section 5.5**, the Proposed Action or Alternative 1 would not incorporate harmful amounts of selenium or trace metals due to the incorporation of BMPs into the M&RP. The RI/FS for the Smoky Canyon Mine (Formation Environmental 2014) assessed COPCs (as reflected by selenium) in numerous vegetation types sampled from various of the ODAs, ODA seep areas, riparian areas, Hoopes Spring vicinity, and the Sage Valley area. Samples were collected in 2004 and 2010. The assessment found that plant uptake of selenium occurs on ODAs where revegetation has been directly into the ODA or where less protective covers were placed, and where overburden seeps saturate nearby soils. Where a more protective cover system was used (e.g., Panel E’s Dinwoody cover) selenium concentrations in vegetation are typically lower. Thus, selenium content of growth medium and subsequently potential bioaccumulation by vegetation on new reclaimed areas in the CEA would not increase under the Proposed Action/Alternative 1 or future mining of phosphate and no cumulative impacts are expected to vegetation in the CEA from this potential impact.

### 5.6.6 Cumulative Effects

Disturbance from either the Proposed Action or Alternative 1 would include many temporary disturbances and would be short-term and minor. Over the long term, there would be only minor contributions to cumulative effects. Reclamation after mining would replace existing vegetation with grassland and forbs, which would then be subject to the process of succession. Unreclaimed areas (pit walls and stormwater features) and removal of aspen forest (which is not expected to regenerate in reclaimed areas), totaling approximately 520 acres for the Proposed Action and approximately 440 acres for Alternative 1, would be a long-term, negligible cumulative impact affecting approximately 44 percent of the aspen in the CEA for the Proposed Action and 38 percent of the aspen in the CEA for Alternative 1. The overall vegetation cumulative effects with the addition of the Proposed Action or Alternative 1 would be long-term and minor. Disturbed lands would be more susceptible to weed infestations but control measures would be implemented.

Although there are areas of historical reclamation with elevated selenium and other COPCs in the CEA, it is not expected that either the Proposed Action or the Alternative 1 would add to these areas or any impacts from vegetation with elevated COPCs. The thickness of the reclamation cover over ODAs for the Proposed Action would limit the amount of root mass that could or would be in contact with Meade Peak overburden, thus preventing the accumulation of selenium over the 5 mg/kg action level in vegetation, and low seleniferous materials would be generated under Alternative 1 where only a topsoil cover is proposed. The seed mixes used for reclamation were designed to avoid plants with tap roots that could contact the Meade Peak overburden. Thus, reclamation vegetation is not anticipated to accumulate COPCs; therefore, although there would be additional acreage of disturbed vegetation, it would not exacerbate any current issues with selenium in vegetation in the CEA. Future mines would likely incorporate closure practices and BMPs that would minimize selenium uptake as well. Additionally, as historical mine reclamation is remediated through the CERCLA process, the area of the overall acreage of reclamation vegetation with elevated COPCs may decrease.

There are no predicted wetland impacts from the East Smoky Panel Mine Project, thus there are no potential cumulative wetland impacts.

## 5.7 WILDLIFE

### 5.7.1 CEA Boundary

The CEA boundary for wildlife includes species habitat within a 15-mile buffer around the Project Area disturbance boundary (**Figure 5.7-1**). The boundary was developed with the IDT experts and professional judgement. It encompasses 452,993 acres.

Most impacts to wildlife would occur within or immediately adjacent to the Project Area. Impacts would mostly be limited to temporary (during the life of the Project) displacement. Some individuals may be killed or permanently displaced; however, there should be no significant impacts to wildlife populations on a whole. The Project Area does not provide unique habitats that are not widely available adjacent to the Project Area, thus minimizing potential impacts related to displacement. How far any wildlife individuals would displace, and the impacts of displacement on resident populations is unknown; however, given the scale of the Project and being immediately adjacent to existing mining activities, it is unlikely that any short- or long-term, adverse impacts to wildlife species would occur within or beyond the identified CEA.

### 5.7.2 Introduction

GAP landcover data were used to quantify habitat types in the CEA, as this data source focuses on habitat identification, it provides habitat categories similar to those delineated in site-specific baseline studies (Stantec 2016e), and covers the entire 15-mile radius CEA. According to GAP and CTNF data, coniferous forest and sagebrush/shrubland are the dominant vegetation types within the CEA (**Table 5.7-1**) and NFS lands make up about 2/3 of the area (**Table 5.7-2**). Riparian areas, aspen forest, grasslands, and other vegetation communities also occur throughout the CEA in lesser amounts. This diversity in habitat types allows for many wildlife species to utilize the area.

**Table 5.7-1 Habitat Types in the Wildlife CEA**

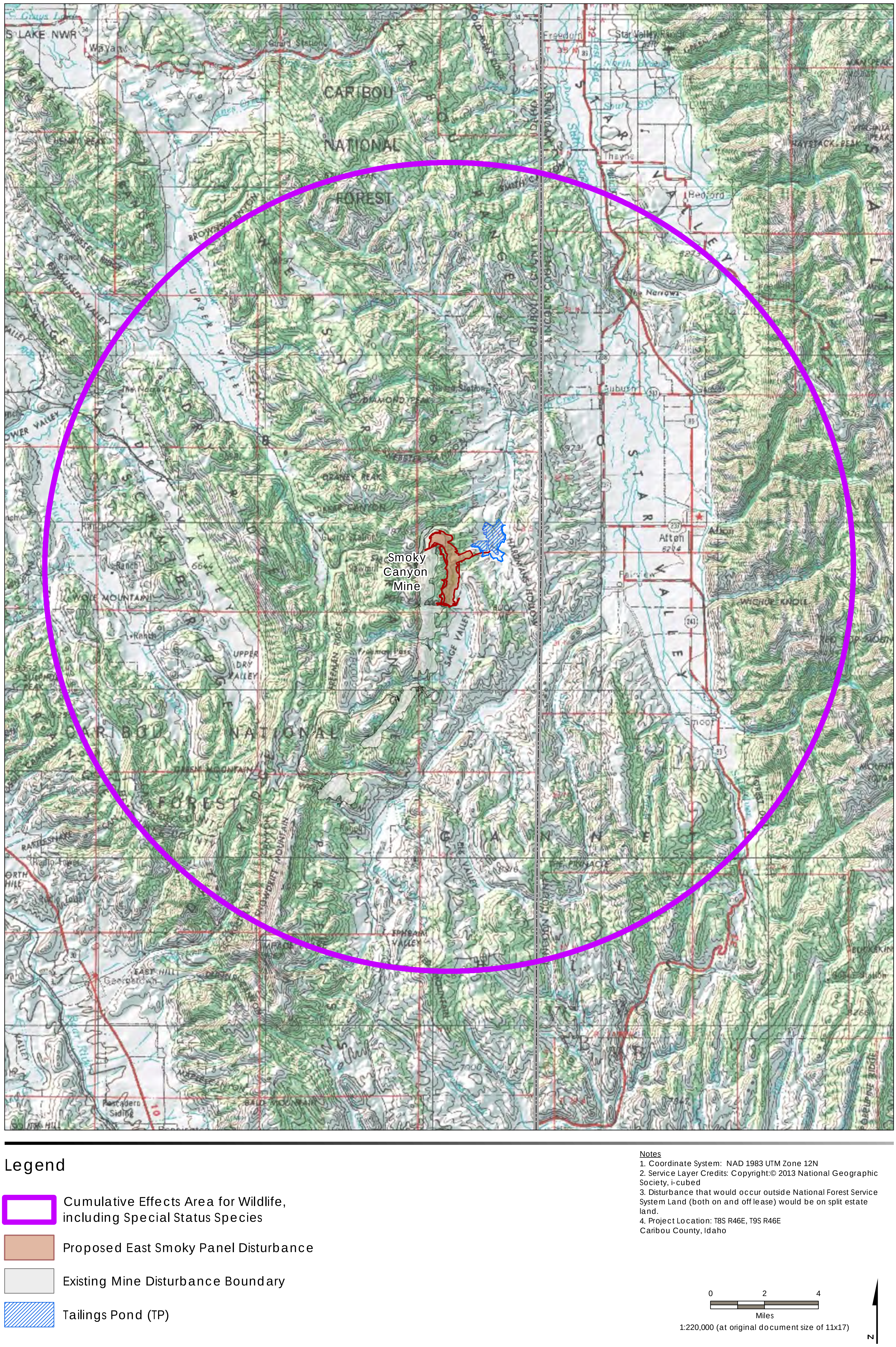
| COVER TYPE | ACRES | PERCENTAGE OF CEA |
|---|---|---|
| Sagebrush Shrubland | 138,525 | 30.6 |
| Coniferous Forest | 157,491 | 34.8 |
| Aspen Forest | 58,003 | 12.8 |
| Wetland/Riparian | 55,649 | 12.3 |
| Cropland | 1,688 | 0.4 |
| Grassland | 14,988 | 3.3 |
| Open Water | 497 | 0.1 |
| Other Shrubland | 4,294 | 0.9 |
| Developed | 3,452 | 0.8 |
| Harvested Forest | 1,873 | 0.4 |
| Pasture | 14,775 | 3.3 |
| Quarries, Mines, Gravel Pits | 1,540 | 0.3 |
| Introduced Grassland | 11 | <0.1 |
| Unclassified | 207 | <0.1 |
| Total | 452,993 | 100 |

**Table 5.7-2 Land Ownership in the Wildlife CEA**

| LAND OWNERSHIP | ACRES | PERCENTAGE OF CEA |
|---|---|---|
| USFS | 300,836 | 66 |
| BLM | 10,562 | 2 |
| Private | 134,429 | 30 |
| State* (includes 1,623 acres of ID Fish & Game) | 7,166 | 2 |
| TOTAL CEA | 452,993 | 100 |

### 5.7.3 Past and Present Disturbances

The foremost impact to wildlife within the area has been habitat changes associated with past and present mining activities, grazing, timber harvest, roads/trails, agriculture, and residential development, but these changes occur on a relatively small percentage of the CEA that provides wildlife habitat. Past and present actions in the wildlife CEA have likely resulted in both beneficial and negative impacts, at various levels, on wildlife.




Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4. Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

Figure 5.7-1
Cumulative Effects Area for Wildlife, including Special Status Species
East Smoky Panel Mine EIS

Beneficial impacts related to timber harvesting include increased foraging opportunities for species that utilize forest openings. Negative impacts would include loss of habitat, displacement, and fragmentation as a result of mining, timber harvesting, roads, private land development and agriculture, and recreation. Specific to small and less mobile wildlife species (i.e., small mammals, amphibians, and reptiles), past impacts from direct crushing and mortality by vehicles has likely also occurred within the CEA. In addition, grazing can contribute impacts by increasing competition for forage and changes in the structure or composition of native plant communities. Grazing in the CTNF is conducted in compliance with standards and guidelines contained in the CNF RFP (USFS 2003a). Other impacts that are not quantified have included noise disturbance/displacement from mining, roads, and recreational activities.

Past and present timber harvests in the CEA have resulted in habitat changes that affect wildlife. The majority of habitat conversion is in the form of forest removal followed by reforestation with a short period of early seral conditions. This habitat conversion would cause forest-dependent wildlife using the affected areas to disperse in search of new areas and wildlife that prefer more open areas to use these areas following the timber harvests.

The general effects of grazing in the CTNF portion of the CEA are discussed in the FEIS for the RFP (2003b). In general, wildlife are affected by livestock grazing due to competition for forage, direct mortality by trampling (i.e., amphibians and reptiles), and habitat removal/conversion. As described in the Canada Lynx Conservation Assessment Strategy (Ruediger et al. 2000), both domestic livestock and/or wild ungulate grazing may change the structure or composition of native plant communities. Proper rotation and stocking rates can minimize these negative effects.

Human presence tends to disturb many species of wildlife. Past and present recreational uses in the area include hunting, fishing, ATV and snowmobile use, camping, and picnicking. Human disturbance during periods of the year when wildlife are otherwise stressed, due to a lack of forage and/or harsh weather (as occurs during the winter season), can further stress wildlife and may increase mortality.

Past and present disturbances from existing roads and mining activities have resulted in fragmentation of certain, less mobile wildlife populations and their habitats. Fragmentation effects within the CEA have not been quantified by the land management agencies.

Past and present mining activities have likely resulted in temporary displacement of bald eagles within the CEA at various times as a result of noise and disturbances. Bald eagles are known to utilize the Crow Creek drainage during the winter months and one was observed in 2013 around the Smoky Canyon Mine tailings ponds (the only large body of open water in the CEA). Bald eagles are likely attracted to this area by waterfowl utilizing the ponds and the ponds do provide habitat suitable for bald eagles; however, the tailings ponds do not support suitable fish populations or open water habitat during the winter. Further, the tailings ponds are managed by Simplot as to not attract wildlife by reducing shoreline vegetation and habitat (Newfields 2005, revised 2014).

Within the CEA, quantified past and present disturbances based on the information from **Table 5.7-1** have resulted from agriculture (cropland and pasture; approximately 16,500 acres); roads, buildings, and other development (approximately 3,500 acres); timber harvests (approximately 1,900 acres); and quarries, mines, gravel pits, and oil wells (approximately 1,500 acres). According to BLM (2017), mining activity in the CEA indicates that even more acres have been disturbed by mining (primarily from historical phosphate mining activity) but, much of this area has been reclaimed and supports grassland and shrubland wildlife habitat.

Wildfires; grazed range allotments; residential and commercial development; vegetation management activities on private lands; roads; power lines; and recreational uses such as hunting, fishing, OHV and snowmobile use, camping, and picnicking are all past and present activities in the CEA that may affect wildlife and their habitat.

### 5.7.4 Foreseeable Future Disturbances

As previously described in **Sections 5.1** through **5.6** within the applicable CEAs, the largest disturbance from reasonably foreseeable actions within the CEA would likely result from future mining activities. Thirty-five percent (135,000 acres) of the wildlife CEA occurs on private lands. Past and present actions on private land within the CEA have mainly included agriculture and grazing activities. Housing development has also occurred on the large ranches and within residential areas within the CEA. Impacts on private lands in the CEA are difficult to quantify due to lack of specific data. Although disturbance of wildlife habitat on private land cannot be quantified with existing data, it would be an amount less than the private land ownership area as there are large parcels of private land within the CEA that are left undisturbed and continue to provide suitable wildlife habitat.

BLM phosphate mining regulations at 43 CFR § 3591.1 direct operators to take measures to “avoid, minimize or repair” damage to vegetation, fish, and wildlife habitat. The EPMs described in **Section 2.5** and mine reclamation would reduce or avoid impacts to wildlife and wildlife habitat from mining activities. Implementation of these mitigation measures would also tend to meet established requirements such as those contained in the federal land use plans, the Idaho Surface Mining Act, and contractual provisions in the individual federal phosphate leases.

The residual debits in wildlife habitat services as shown in **Table 5.7-3** would represent a long-term adverse cumulative impact of the Action Alternatives on wildlife, and also on vegetation as measured by plant species metrics.

**Table 5.7-3 DSAYs Table**

| ALTERNATIVE | CURRENT BASELINE | EFFECT OF MINING | EFFECT OF RECLAMATION | RESIDUAL IMPACT |
|---|---|---|---|---|
| Proposed Action | 62,043 | -62,043 | +28,491 | -33,551 |
| Alternative 1 | 53,527 | -53,527 | +25,464 | -28,068 |

### 5.7.5 Cumulative Disturbances

The reasonably foreseeable disturbances due to phosphate mining (approximately 6,350 acres), when added to the past and present disturbances, would increase the disturbance of USFS lands in the CEA to about five percent. When the potential new disturbance of either the Proposed Action/Alternative 1 is added to that total, there would be a negligible increase.

Cumulative impacts to wildlife, over essentially the same CEA, were evaluated in previous NEPA documents for the Smoky Canyon Mine, most recently including the Panels F and G EISs (BLM and USFS 2007; 2014). Those evaluations noted similar types of wildlife impacts as described **Section 4.8**.

The majority of the impacted habitat acreage has been reclaimed and revegetated using conventional practices of the time. Reclamation has stabilized most sites to prevent sediment loading to surface water. Much of the vegetation associated with the mine sites reclaimed prior to the year 2000 have been found to contain elevated levels of selenium that can pose a risk to wildlife in some cases. The majority of those reclaimed sites are under CERCLA investigation that may indicate a need for additional remedial work. The cumulative effects area for wildlife is also being assessed for possible natural resource damages to wildlife and their habitat. There are no formal conclusions regarding damages at this point in the process.

Implementing the Project could result in additional fragmentation to wildlife and habitat beyond that previously described (BLM and USFS 2007; 2014); although because the Project would occur essentially immediately adjacent to active and existing mining operations, the cumulative effects to wildlife from fragmentation impacts should be minimal.

Disturbance associated with activities in the CEA may limit the attractiveness of the CEA to Canada lynx, wolverine, and gray wolves, which generally prefer extensive tracts of undeveloped land. Impacts to mature forest and the disturbances associated with the Proposed Action or Alternative 1 would further decrease potential linkage habitat for Canada lynx, but this would result in a minor cumulative effect when added to the other past, present, and reasonable foreseeable actions in the CEA because the Project would occur immediately adjacent to active and existing mining operations that are already likely displacing lynx from the area. Further, since disturbance associated with the Proposed Action and Alternative 1, including the existing Smoky Canyon Mine, are oriented in a north-south direction and forested areas are available for reasonable movement around these areas, the overall impact to travel/linkage corridors should be minimal.

### 5.7.6 Cumulative Effects

The cumulative activities within the CEA may have a wide array of effects on wildlife. Some types of activities such as timber harvest, vegetation treatments, and fires, may be beneficial for wildlife species that utilize forest openings or early seral stages. The majority of habitat conversion from timber harvest is in the form of forest removal followed by reforestation with a short period of early seral (non-climax grass or shrub) conditions. This habitat conversion would cause forest-dependent wildlife using the affected areas to disperse in search of new areas. In contrast, most wildfires in the CEA have affected the scrub/shrub (largely sagebrush) vegetation type. The flush of new vegetation growth following a fire may provide a beneficial food source for wildlife such as big game. Once active mining had ceased under the Proposed Action or Alternative 1, the newly reclaimed area may likewise benefit some wildlife species through new growth of a variety of native forbs and grasses that could provide forage for a number of species, but at a detriment to other species because of lost forest habitat and further fragmentation.

It is anticipated that the reclamation activities to be performed under the Action Alternatives would not result in uptake of selenium in vegetation that would pose concern to wildlife. This would generally be true at other ongoing and future phosphate mining sites in the CEA. There would be a loss of habitat over the next thirty to fifty years while mining and reclamation at the Smoky Canyon Mine and other phosphate mines is undertaken. Over the long term, reclamation would occur at the mine sites. Wildlife habitat would be converted from areas having great diversity of wildlife habitat, to reclaimed sites with less diversity and productivity that consist primarily of grasses with some forbs. These residual impacts would occur over approximately 850 acres at the

Smoky Canyon Mine site and over approximately 5,500 acres within the CEA and would add to the existing approximately 14,000 acres of cumulative impacts.

Negative impacts to wildlife within the CEA include loss of habitat; displacement; and fragmentation as a result of fires, mining, timber harvesting, roads, private land development, agriculture, and recreation. Other impacts that are not quantified include the effects of noise on wildlife, habitat fragmentation, and displacement from mining, roads, and recreational activities. Additionally, small, less mobile wildlife (such as small mammals and reptiles that cannot relocate outside of disturbance areas) are subject to direct mortality and localized population reductions from ground-disturbing activities.

In general, displacement of larger, more mobile wildlife from habitat disturbance decreases survival rates of affected individuals to some degree and increases competition. Mine construction and operation could temporarily cause some wildlife, such as big game, carnivores, and raptors (which generally prefer areas free from anthropogenic noise and activity), to avoid the portion of the CEA close to mining. Implementing the Proposed Action or Alternative 1 would result in the displacement of mobile wildlife from the Study Area and the surrounding habitat into adjacent undisturbed areas, where competition in already-occupied habitats may increase.

Past and present disturbances from roads and mining activities have resulted in fragmentation of certain wildlife populations and their habitats. While larger, more mobile species may be able to traverse or route around mines, small, relatively immobile animals (such as reptiles and small mammals) may be subject to isolation as formerly contiguous habitats are disturbed by features such as roads and mines. Implementing the Proposed Action or Alternative 1 would result in additional fragmentation to wildlife habitat and could isolate populations of small, immobile wildlife.

Wildlife may be subject to direct mortality from a variety of sources, but these effects are not quantifiable. The Proposed Action and Alternative 1 would continue to contribute to cumulative effects of power lines in the CEA because it includes relocation of two existing overhead power lines that would continue to pose a mortality risk to birds and provide a potential perching substrate for avian predators.

Many game species are hunted within the CEA. Human presence in the form of recreation may disturb many species of wildlife. Human disturbance during periods of the year when wildlife are otherwise stressed (such as during the winter) can further stress wildlife and affect their survivorship. Wintering big game may be subject to harassment by recreationists, particularly if available hiding and escape cover is reduced by other activities. The Project would cumulatively contribute to displacement and stress on wintering big game. Under the Proposed Action, there would be 130 acres of winter range impacted.

Wildlife are affected by livestock grazing as a result of competition for forage and alteration of plant communities. As described in the Canada Lynx Conservation Assessment Strategy (Ruediger et al. 2000), both domestic livestock and wildlife ungulate grazing may change the structure or composition of native plant communities. Proper rotation and stocking rates can minimize these effects. Livestock grazing on the CNF is conducted in compliance with standards and guidelines contained in the CNF RFP (USFS 2003b). Neither alternative would change native rangeland plant communities over the long term because more than 95 percent of the disturbance would be reclaimed within native grass, forb, and shrub species. Once reclaimed, each alternative would allow for grazing similar to baseline conditions.

Of the two alternatives, the Proposed Action would have greater overall cumulative effects on wildlife because it would result in a greater residual debit in wildlife habitat services, based on the HEA residual debit of 33,551 DSAYs under the Proposed Action versus 28,063 under Alternative 1).

Elsewhere in the CEA, Simplot has discussed a 440-acre voluntary land-donation to BLM as part of its Dairy Syncline Mine (approximately 2,800 acres in size) application. The parcel is in the Stump Creek area east of Star Valley, Wyoming and adjacent to a BLM Area of Critical Environmental Concern (primarily big game winter habitat and sage grouse habitat). The parcel is in an area where some residential homes may be constructed in the future with an associated impact to wildlife habitat if the land is ultimately developed. A donation of this land to BLM in conjunction with an approval of the Dairy Syncline Mine would reduce cumulative impacts to wildlife habitat an unknown amount in the CEA.

Similar types of residual impacts to wildlife habitat would occur from the 1,530-acre proposed Caldwell Canyon Mine located 13 miles west of the Project. BLM processing of the application is not complete.

## 5.8 FISHERIES AND AQUATICS

### 5.8.1 CEA Boundary

The CEA boundary for fisheries and aquatics (**Figure 5.2-1**) is the same as described for surface water and encompasses 148,856 acres. The boundary was developed with the IDT experts and professional judgement. The CEA includes the Crow Creek Watershed (HUC 5) to its confluence with the Salt River, the Tygee Creek Watershed (HUC 5) to its confluence with Stump Creek, and Diamond Creek Watershed (HUC 6) that extends to the confluence with Timber Creek. The CEA encompasses 148,861 acres. This is the same boundary as was used for the Smoky Canyon Mine Panels F & G EIS (BLM and USFS 2007), but with a slight refinement in the acreage determination. This boundary incorporates natural watershed boundaries including all past, present, and reasonably foreseeable phosphate mining and transportation-related disturbances upstream of Stump Creek, the Salt River, and Timber Creek. As flows progress downstream, localized effects become more and more diluted and eventually reach a point where effects become non-measurable.

### 5.8.2 Introduction

Potential effects to aquatic habitat from mining in the CEA include temporary reductions of runoff contribution to local streams, increased sedimentation from surface disturbing activities, and the introduction of higher levels of selenium into streams by surface and subsurface flow of water. These potential water quantity and quality impacts to the surface waters in the CEA have been previously described in **Section 5.4**.

### 5.8.3 Past and Present Disturbances

The livestock industry has been an integral part of the CEA since human settlement of the area. Following years of grazing, livestock stocking levels have been recently decreased in order to bring numbers in line with forage production. Livestock grazing would continue to be a major land use activity within the CEA but is not expected to increase above current rates. The effect of grazing near aquatic habitats is well documented (USFS 2003b) and is typically detrimental towards fisheries. Within the Study Area, recent USFS monitoring data, reporting a two-decade erosion plot study as described in **Section 5.5.3**, indicate that erosion rates are below soil loss tolerances for the respective soil types.

Whirling disease and non-native fish issues are other past and present impacts to the fisheries and aquatic resources that have occurred or are occurring in the CEA. Regarding whirling disease, it was discovered in the Salt River drainage in the mid-1990s and was reported in Crow Creek in 2004 (BLM and USFS 2007). According to the Idaho Fish Health Center, most cases of whirling disease in the wild are classified as "light infections" and are not considered life threatening to adult fish. In terms of non-native fish, brook trout, rainbow trout, and brown trout are considered a threat to the YCT. These three non-native trout species either compete for habitat with the YCT, interbreed with native YCT, or prey on them directly (USFS 2003b).

As previously reported in Section **5.4.3.2**, approximately 730 acres of timber harvest (unrelated to mining) has occurred in the CEA (**Table 5.4-1**). Removal of trees and vegetation and associated timber harvest activities increase the potential for sedimentation into nearby aquatic environments through runoff and decreasing infiltration. Logging roads can alter water flow on the soil surface, creating impervious surfaces that concentrate runoff and increase erosion. The primary effect of these activities on the aquatic systems is increased erosion with the secondary effect of increased sediment loading in downstream surface waters. However, as reported in **Section 5.5.3**, a 30-year erosion study on the CTNF included land subject to timber sales at two sites. The average annual erosion rate at both sites was less than 0.2 tons/acre/year. While no pre-harvest data was collected at either site, the USFS determined that the 20- and 26-year data collection periods document a return to baseline at both sites. The 2002-2003 CTNF Monitoring and Evaluation Report (USFS 2003e) indicated that audits of ten timber sale disturbances in the CNF showed BMPs appeared to be effective in controlling soil erosion and stream sedimentation. The monitoring report also discussed the 13 miles of new roads constructed in the CNF in the previous five years and described that timber sale roads were typically being built on land types capable of this use, and no road failures or unmitigated problems were reported. The report concluded that, when planned and administered properly, timber harvesting and associated roading has had little observable effects to stream water quality due to soil erosion and sedimentation.

As noted in **Section 5.4.3.2**, numerous stream segments within the CEA are listed as impaired. Some of those impairments (i.e., sedimentation/siltation, combined biota/habitat bioassessments, selenium) are related to aquatic habitat or could otherwise affect aquatic life. Some of these impairments are caused or exacerbated by water diversions associated with agriculture and mining. Streams that have been impacted by selenium associated with past and current mining in the vicinity of the existing Smoky Canyon Mine include Pole Canyon, Hoopes Spring, South Fork Sage Creek, Sage Creek, and Crow Creek, as described in **Section 3.9.5** and **Section 4.9**. The selenium levels in these streams are described for water in **Section 3.5.2.3** and for periphyton, macroinvertebrate tissue, and fish tissue in **Section 3.9.5**, and the data is not repeated here.

### 5.8.4 Foreseeable Future Disturbances

In general, many activities that are occurring in the CEA are expected to continue in the foreseeable future. These activities may collectively increase sediment delivery to streams, which can adversely impact native fishes by filling gravels and interstitial spaces used for reproduction and cover. Activities that may introduce sediment include road construction, agriculture, private residences, wildfires, and prescribed burns. There are no known timber sales proposed within the fisheries CEA within the reasonable foreseeable future. Agricultural water diversions would continue at existing levels in the foreseeable future.

Selenium contamination from the Smoky Canyon Mine is being addressed through the CERCLA process between Simplot and the USFS, EPA, and IDEQ. Selenium inputs in the foreseeable future are expected to reflect: continued recent improvements due to the Pole Canyon remedial action, dissipating loading from existing mine features, future loads from Panels F & G mining; improvements due to the Hoopes Spring WTPP, and slight increases at Hoopes Spring due to the Proposed Action or Alternative 1. These future activities are discussed in **Sections 4.5.2.1** and **5.4.1.2** (Pole Canyon remedial action, dissipating loading from existing mine features, and Hoopes Spring WTPP), **Section 5.4.1.2** (future loads from Panels F & G mining), and **Section 4.9** (Proposed Action).

### 5.8.5 Cumulative Disturbances

The past, present, and reasonably foreseeable actions described have the potential for cumulative effects due primarily to the introduction of sediment to aquatic habitat, streamflow alterations, and selenium related water quality changes. The Proposed Action or Alternative 1 is not expected to result in noticeable surface water discharges of sediment to the surface streams due to the application of BMPs that contain all runoff and sediment on the mine site. Other actions in the CEA such as grazing, roads, wildfires, etc. are expected to continue at levels similar to, or slightly below (e.g. grazing and timber harvest) present levels. As a result, sediment levels within the CEA are expected to remain similar to or slightly better than those described in **Section 3.9.2**. Water diversions associated with agriculture would remain the same as past and present levels; however, mining related water diversions would increase due to the Proposed Action, which would decrease streamflow in the Tygee Creek and Roberts Creek drainages. These would be as described for the Proposed Action in **Section 3.9.2**.

The primary effects of the Proposed Action or Alternative 1 on surface water and, subsequently, the fisheries and aquatic resources in the CEA with regard to selenium would be eventual contributions to the surface water system at Hoopes Springs due to the mining and backfilling associated with the Project. The store and release cover used in the Proposed Action would reduce percolation of recharge water through the seleniferous overburden fills, but would still introduce COPCs into the Wells Formation aquifer beneath these areas. Under Alternative 1, which includes a smaller pit with improved geochemical characteristics, a more permeable cover would be used. As a result, selenium contributions to Hoopes Spring, Sage Creek, and Crow Creek would be similar between alternatives. Future selenium contributions from the existing Smoky Canyon Mine are unknown, but are likely to be lower than present concentrations as loading from existing mining is expected to be near peak and decreasing by 2050 (**Section 4.5.2.1**). In addition, the WTPP at Hoopes Spring is expected to decrease selenium levels by an unknown amount. However, some of these decreases could be offset by increases from Panels F & G mining (**Section 5.4.1.2**).

It should be noted, that due to the dynamics of selenium bioaccumulation, selenium levels in detritus and sediment can remain at high levels after inputs of dissolved selenium have stopped (Lemly 1997). A variety of habitats are present within the CEA, including seepage or floodplain wetlands, and other impoundments or off-channel backwater areas, where selenium can accumulate in the top layer of sediment and detritus through deposition of biologically incorporated selenium and settling of particulate matter (see Appendix 3C of the Panels F & G EIS [BLM and USFS 2007]). This top layer is a temporary repository for selenium until the selenium is cycled back into the biota. These areas within the CEA are the most vulnerable to long-term accumulation and retention of selenium resulting from cumulative low-level inputs into surface water and may be a continued source of low levels of selenium.

### 5.8.6 Cumulative Effects

The cumulative effects from sediment related effects and streamflow alterations would be the same as described for the Proposed Action and Alternative 1. Past and present actions in the CEA are adequately accounted for by the current conditions described in **Section 3.9**, and future levels of other actions are not expected to result in measurable changes to the baseline conditions.

Cumulative effects from all mining related selenium contaminations are difficult to determine for the same reasons as those listed in **Section 4.9.2**; uncertainty regarding effects that may be occurring under the current conditions, and uncertainly about future concentrations associated with existing mining activities. It is also uncertain what fish tissue concentrations will be in the future due to the complexities of bioaccumulation, as explained in **Section 5.8.5**. Acknowledging these uncertainties, a couple cumulative impact scenarios could occur. If selenium levels do not decrease as predicted (i.e., existing inputs from mining do not decrease as predicted or increases from Panels F and G are more than predicted), then the Proposed Action and Alternative 1 would contribute to the existing major impact. If selenium levels do decrease as predicted (due to the reasonably foreseeable actions described above), then the predicted increases from the Proposed Action and Alternative 1 would be added to smaller than existing concentrations, and cumulative effects would not be greater than the effects described in **Section 4.9.2.**

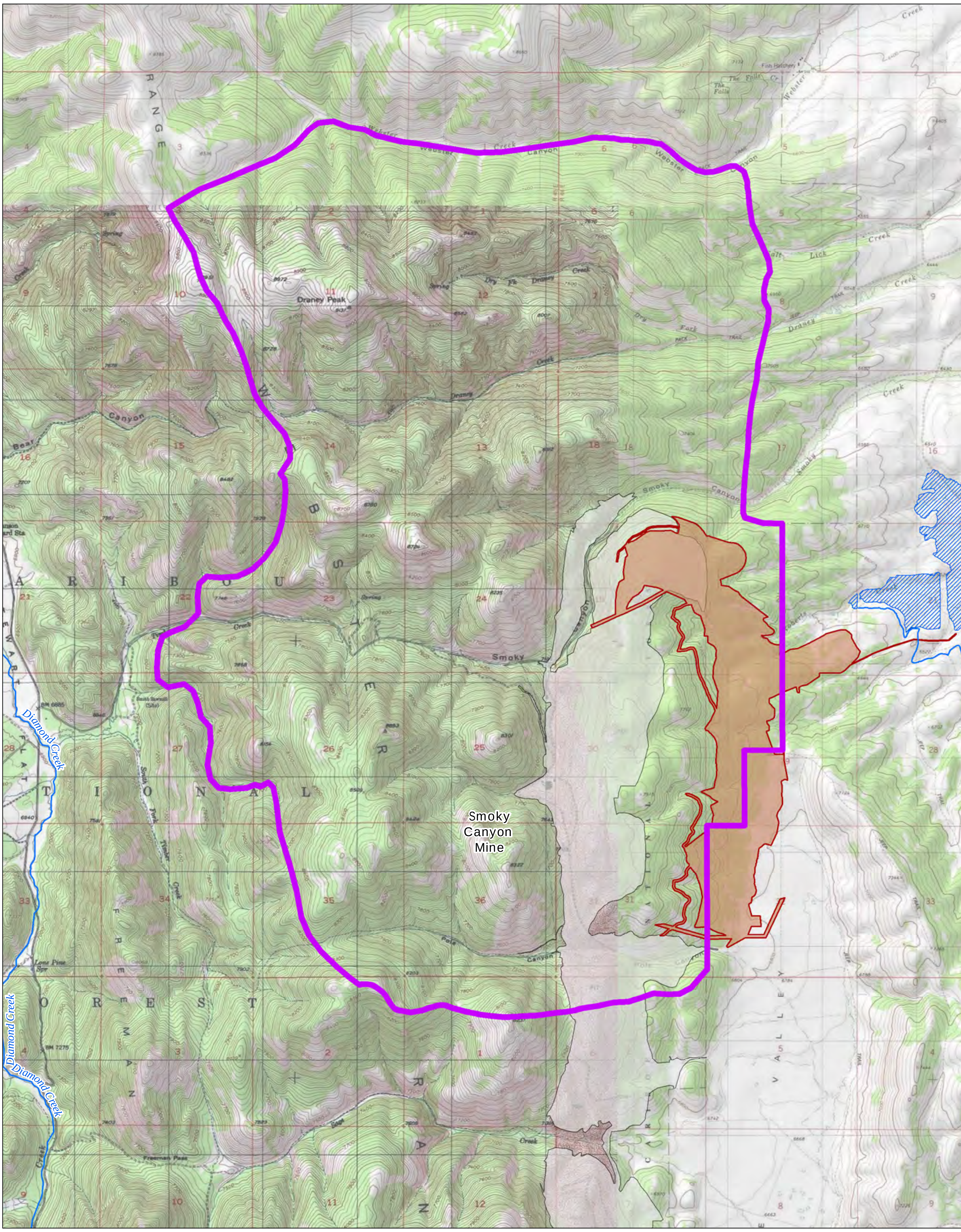
## 5.9 LAND USE INCLUDING GRAZING, TRANSPORTATION, AND RECREATION

### 5.9.1 CEA Boundary

The CEA boundary for grazing management and range resources is the Pole Draney Allotment because all Project disturbances would be confined to this 12,071-acre allotment (**Figure 5.9-1**). The boundary was developed with the IDT experts and professional judgement. Although small portions of the Sage Valley and Salt Lick Creek allotments occur within the half- mile-buffer Study Area (**Section 3.10.1.3**), they would not be impacted by the Proposed Action (**Section 4.10.2.5)** and are therefore not included in the CEA.

The CEA boundary for recreation and other non-grazing land uses is shown in **Figure 5.9-2**) and includes 135,470 acres.

The CEA boundary for transportation includes existing transportation routes into the Smoky Canyon Mine via Highway 89 and 237 in Wyoming (including Crow Creek Road and Wells Canyon Road) and Highway 30 in Idaho (including Georgetown Canyon Road, Diamond Creek Road, then Smoky Canyon Mine Road). Transportation should not be significantly affected beyond this area; travel and transportation outside of the identified CEA would not likely be impacted by the Proposed Action or Alternatives.




Legend

Cumulative Effects Area for Grazing Resources

Proposed East Smoky Panel Disturbance

Tailings Pond (TP)

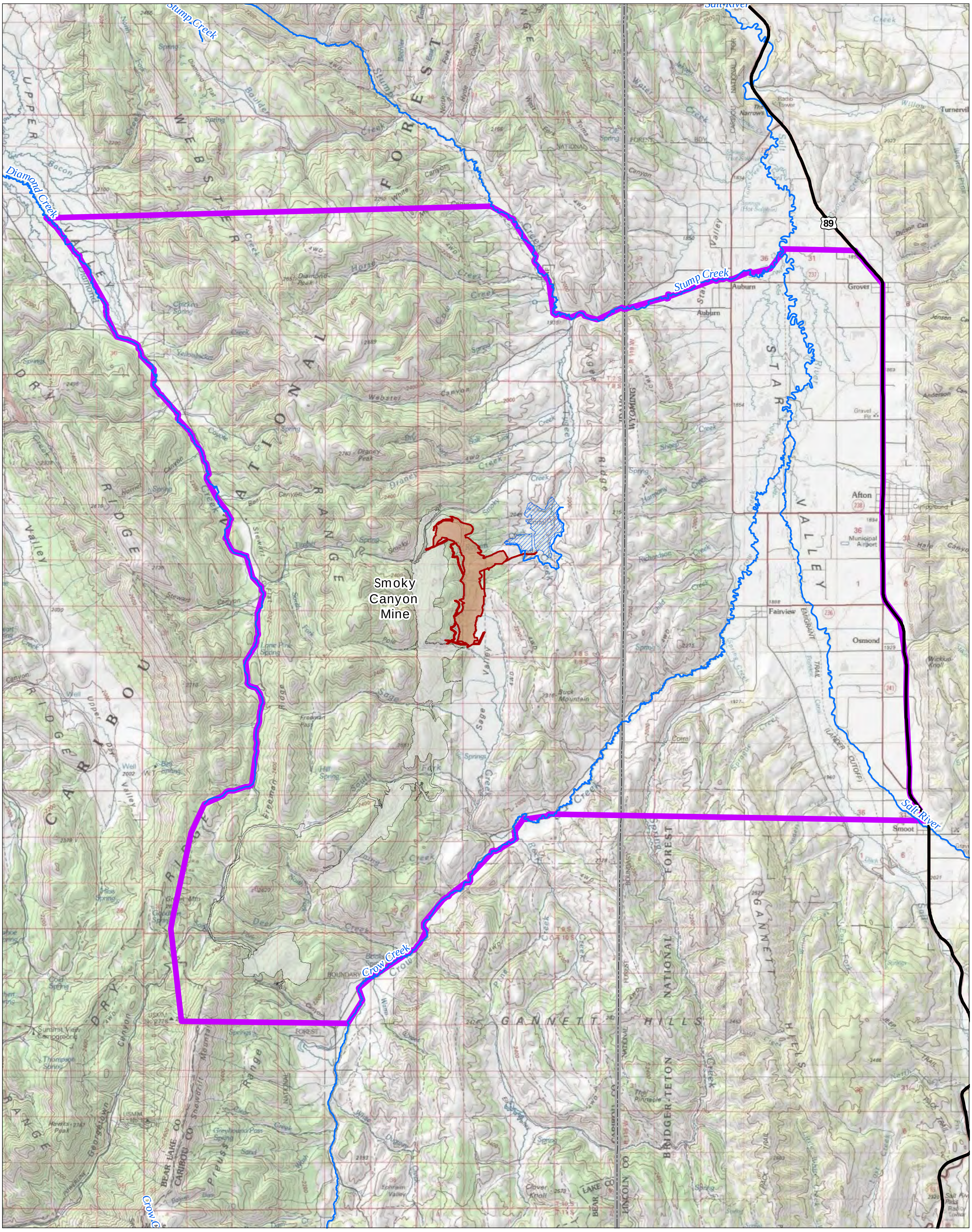
Existing Mine Disturbance Boundary

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4. Project Location: T8S R46E, T9S R46E
Caribou County, Idaho

0 0.5 1
Miles
1:42,500 (at original document size of 11x17)

N

Figure 5.9-1
Cumulative Effects Area for Grazing Resources
East Smoky Panel Mine EIS




Legend

- Cumulative Effects Area for Land Use & Recreation Resources
- Proposed East Smoky Panel Disturbance
- Existing Mine Disturbance Boundary
- Tailings Pond (TP)

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Copyright:© 2013 National Geographic Society, i-cubed
3. Disturbance that would occur outside National Forest Service System Land (both on and off lease) would be on split estate land.
4. Project Location: T8S R46E, T9S R46E Caribou County, Idaho

0 2 4
Miles
1:140,000 (at original document size of 11x17)

N

Figure 5.9-2
Cumulative Effects Area for Land Use and Recreation Resources
East Smoky Panel Mine EIS

## 5.9.2 Introduction

### 5.9.2.1 Grazing

Cumulative effects to grazing in the CEA occur primarily from mining. Recreation can also affect grazing but to a negligible extent compared to mining activities. Restrictions have been placed in the past on grazing permit holders in the CTNF as a result of mining on the affected allotments. In general, grazing is not allowed on active mine areas, livestock trailing is limited, and no watering is allowed in water control ponds or water flowing from mine overburden seeps. Depending on the reclamation methods, renewed grazing may not be allowed on a reclaimed mine site for several years after closure. The grazing permit holder is required to use only certified weed-free hay or straw on USFS lands.

### 5.9.2.2 Recreation and Other Non-Grazing Land Uses

The CEA for recreation and other non-grazing land use includes approximately 135,470 acres in Idaho and Wyoming. Almost 50 percent of that CEA is lands administered by federal agencies, the vast majority by USFS (**Table 5.9-1**).

**Table 5.9-1 Land Ownership in the Land Use and Recreation CEA**

| OWNERSHIP TYPE | AREA (ACRES) | PERCENT OF CEA |
|---|---|---|
| USFS | 65,297 | 48.2 |
| BLM | 2,234 | 1.6 |
| State – Idaho and Wyoming | 1,170 | 0.9 |
| Private | 66,769 | 49.3 |
| Total | 135,470 | 100 |

Public recreation is generally available on public lands in the CEA, which is mostly public land administered by the CTNF. The recreation opportunity spectrum for the CTNF land in the CEA is shown in **Table 5.9-2**.

**Table 5.9-2 CTNF Recreation Opportunity Spectrum for the Recreation Land Use CEA**

| RECREATION OPPORTUNITY SPECTRUM | AREA (ACRES) | PERCENT OF CEA |
|---|---|---|
| Roaded Modified | 14,788.9 | 11 |
| Roaded Natural | 0 | 0 |
| Semi-Primitive Motorized | 43,299.3 | 32 |
| Semi-Primitive Non-Motorized | 5,015.5 | 4 |
| Total CEA with ROS classification | 63,103.7 | 47 |

Source: Caribou National Forest, email communication from Judy Warrick (6/16/16)

Enjoyment of the recreation opportunities within the CEA depends upon a reasonable degree of public access, either motorized or non-motorized as the case may be, to the various Recreation Opportunity Spectrum areas along existing roads or trails. Once the forest visitor is within the public lands, their enjoyment of the recreation depends, in part, on the relative level of introduced disturbance from other land uses, particularly in the semi-primitive areas. There are four developed recreation sites in the CEA (**Table 5.9-3**).

**Table 5.9-3 Developed Recreation Sites in the CEA**

| NAME | TYPE | OPERATOR/OWNER |
|---|---|---|
| Diamond Creek | Campground | USFS/USFS |
| Diamond Creek Cabin | Rental Cabin (summer) & warming shelter (winter) | Private/USFS |
| Johnson GS | Rental Cabin | USFS/USFS |
| Stump Creek Guard Station | Rental Cabin | USFS/USFS |

A dominant recreational use within the CEA as well as within the CTNF is big game hunting. Within the CEA, cumulative effects to hunting occur from alteration of habitat by mining, reduced access, and reduced available acres.

#### 5.9.2.3 Transportation

The transportation CEA contains established transportation routes, including state highways and designated forest roads. Cumulative effects to transportation would be influenced by the roads built and maintained for mining and those that are left in place after closure and reclamation. During mining and reclamation, mining roads would be closed to public access, but some may be opened by surface owners or government agencies over time.

### 5.9.3 Past and Present Disturbances

#### 5.9.3.1 Grazing

Past and present activities include the approval and management of grazing within the CEA. Grazing permit have 10-year terms. Disturbances in the CEA are dominated by the Smoky Canyon Mine, with some smaller areas of road and forest regeneration disturbances. Grazing is currently not approved by the USFS on the Smoky Canyon Mine, although some grazing of reclaimed areas has been reported and Simplot accommodates short-term trailing across certain mine disturbances. The timber harvest areas within the CEA date as far back to the 1990s. Grazing is allowed in historic timber harvest areas because unless the area is closed in the Term Grazing Permit, the area is open.

Some vegetation growing in selenium-bearing mine waste rock at phosphate mines in southeastern Idaho is known to bioaccumulate selenium. Consumption of selenium-enriched plants by livestock can result in selenium poisoning as the element is further concentrated in the organs of the animal. Since 2003, Simplot has been working with the agencies (i.e., EPA, IDEQ, USFS) to remediate selenium issues (**Section 2.2.3**). The Pole Canyon ODA Removal Action was accomplished in 2008.

Past studies at Smoky Canyon Mine indicate that reclamation vegetation rooted in salvaged topsoil over a chert cover has selenium concentrations at or below background and well below the IDEQ removal action level. Presently, livestock are not permitted to graze on the reclaimed areas of the Smoky Canyon Mine until these areas are accepted by the BLM and USFS for bond release. The areas of the Smoky Canyon Mine where current reclamation vegetation has elevated selenium concentrations would need to be remediated to bring these concentrations below acceptable levels before grazing would be allowed. There is continued work to understand release mechanisms and to develop best management practices to prevent releases through ongoing studies, sampling, and remedial actions, such as the RI/FS (Formation Environmental 2014).

#### 5.9.3.2 Recreation and Other Non-Grazing Land Use

Past and present disturbance in the CEA is from previous mining and exploration operations, timber harvest, roads, agriculture, and limited development. A land use within the CEA that has effects on recreation activities is mining at the existing Smoky Canyon Mine. Active mining areas are off limits to public motorized access and recreation for the duration of mining and reclamation activities. Non-motorized access and recreation is allowed across mining areas except for active mine operation areas that might present a safety hazard to visitors. The currently approved Smoky Canyon Mine disturbance area includes about 550 acres of private land (tailings pond) and 3,450 acres on CTNF land (totaling 4,000 acres). Visitors to the CTNF adjacent to the active mining areas would be likely to notice the sight or sound of mining activities, which could detract from the recreational activity. Six FS trails in the CEA have been affected by previous mining.

#### 5.9.3.3 Transportation

The transportation CEA contains numerous miles of existing transportation routes that include paved, graveled, and dirt roads that provide access to the existing Smoky Canyon Mine, private lands, and areas of the CTNF. The routes situated on NFS lands have been assigned designated uses as part of the CNF Travel Plan Revision.

### 5.9.4 Foreseeable Future Disturbances

#### 5.9.4.1 Grazing

Grazing within the allotments would continue. Natural foreseeable future disturbances affecting grazing resources would include wildfire and noxious weed invasions. Noxious weed abatement efforts by the CTNF would continue as projects on NFS lands require protection measures and/or treatment to minimize the spread and establishment of noxious weeds on disturbed areas.

#### 5.9.4.2 Recreation and Other Non-Grazing Land Use

The Project Area does not offer unique recreational opportunities that are not also found elsewhere in the immediate vicinity. When added to the currently approved disturbance of CTNF land by the existing Smoky Canyon Mine, approximately 3 percent of the CEA would be temporarily restricted from recreational use by phosphate mining.

During the Proposed Action, all disturbed areas would be open to non-motorized access except those areas where active mining operations may present a safety concern to visitors. Non-motorized access along existing trails would be allowed across all the haul/access transportation routes and most of the other mining disturbed areas. In addition, motorized access along existing public roads would not be prohibited.

The majority of foreseeable future activities, namely the Proposed Action/Alternative 1, would be continuations of activities that are currently taking place in the CEA, but would be in a new location. It is presumed that usable public and private land in the CEA would continue to be grazed. This also represents a continuation of current activities in the CEA.

#### 5.9.4.3 Transportation

The majority of foreseeable future activities as discussed above would be continuations of activities that are currently taking place in the transportation CEA. Any future roads built in association with other projects on the CTNF would mostly likely be required to be reclaimed; therefore, there would be no net changes to the transportation system within the CEA in the foreseeable future.

### 5.9.5 Cumulative Disturbances

#### 5.9.5.1 Grazing

Mining disturbance can affect a grazing allotment by directly removing forage within the mining area. Within this footprint area, all forage vegetation is removed until reclamation and successful revegetation of the disturbed area restores the forage resource. Grazing on the reclaimed areas is restricted until the agencies accept the reclamation as being ready for grazing. In addition to this temporary restriction on grazing within the mine footprint, mining disturbances and mine roads can also restrict movement of livestock within an allotment. In many cases, the change from a pre-mine forested environment to reclamation grasslands can be a beneficial change for grazing animals. Over the long term, the replacement of forest by grasses could increase the amount of suitable forage for cattle and sheep, although the formal evaluation of AUMs available for grazing would not typically change.

The CTNF (USFS 2003a) requires that grazing, recreation, OHV travel, timber harvest, and mining activities minimize introduction of noxious weeds, but continued grazing and mining related use of the CEA does have the potential for further encroachment by noxious weeds on grazing lands.

The Proposed Action/Alternative 1 would disturb approximately 850/770 acres, 527 acres of which are in the Grazing CEA, representing approximately four percent of the CEA area. When combined with the past, present and other foreseeable disturbances in the CEA (approximately 1,700 acres), the total disturbance within the CEA would be about 18 percent of its area. Livestock grazing in this area would be temporarily displaced to adjacent parts of the affected allotments. The removal of the currently suitable grazing acres in the mine footprint may also result in the CTNF decreasing the permitted stocking rates in the affected allotments.

The Proposed Action within the CEA would conform to BMPs proposed to prevent bioaccumulation of selenium in reclamation vegetation by covering all seleniferous overburden with a cover and salvaged topsoil (**Section 2.4.11.2**). Alternative 1 would have a topsoil-only cover, but there would be less seleniferous overburden exposed. Any future phosphate mining in the CEA would also incorporate measures to prevent the uptake of selenium by reclamation vegetation. Thus, the reclaimed mine areas of the Project would not add to the current area within the CEA that has elevated selenium.

#### 5.9.5.2 Recreation and Other Non-Grazing Land Use

Cumulative disturbance in the CEA that affects recreation use is mainly the active and unreclaimed disturbance from mining and related roads and structures. The implementation of the Project could temporarily impact recreation and other land use as described above on a maximum of 850 acres of CTNF that are currently used for Roaded Modified and Semi-Primitive Motorized recreation, as well as a small amount of Semi-Primitive Non-motorized recreation.

#### 5.9.5.3 Transportation

Access to the Smoky Canyon Mine in the future would be the same as past and present conditions with no change to existing transportation routes or volume of traffic. The proposed haul roads would not provide public access and would be reclaimed after mining, therefore would not contribute to the transportation system in the CEA.

### 5.9.6 Cumulative Effects

#### 5.9.6.1 Grazing

The Project would directly impact available forage and movement within the allotment. There are no other past, present, or reasonably foreseeable activities in the CEA that result in restricting livestock grazing, therefore there is no cumulative effect to grazing.

#### 5.9.6.2 Recreation and Other Non-Grazing Land Use

During mining activities, big game would likely move to other areas with less disturbance or activity. The effect of this on recreation would be a temporary re-distribution of hunter use in the general area. Previous effects to trails in the CEA include disturbance to six trails in the currently permitted Smoky Canyon Mine area. Following reclamation at Proposed Panels F and G, impacts to trail use would be minimal. Following completion of reclamation activities, all mine areas on CTNF land would be open to recreation and should not present an ongoing distraction for recreationists. Upon successful reclamation of the mining disturbed areas, all disturbed areas would be available for recreation, although actual use may differ from past use based upon factors such as habitat composition and user preference. Upon the successful completion of reclamation and revegetation efforts, deer and elk are likely to return to previously mined areas, mostly on the forest edge (forest to grass land) to forage. Long-term cumulative impacts to hunters are anticipated to be minimal. Overall, minor long-term cumulative effects are anticipated to recreation on the public lands as a result of implementation of the Proposed Action and Alternatives combined with the lingering effects of the rest of the Smoky Canyon Mine.

Cumulative effects on the pattern of land use within the CEA (including grazing, recreation, and means of access) have occurred and would occur from past, present, and reasonably foreseeable future development activities. The cumulative effects would be the result of activities that are currently taking place in the CEA, but would be in new locations. As a result of the sequential nature of phosphate mining in the region, each new mine panel represents a continuation of existing mining activities and a continuation of existing effects.

Similarly, cumulative effects to the amount of land available for recreation could occur within the CEA, as small areas of land affected by the Proposed Action or Alternative 1 may not be reclaimed and made available again for recreation. These effects would be long-term and negligible given the small footprint of the reasonably foreseeable projects located on public land in the CEA and the ongoing reclamation of past projects in the CEA.

In summary, the Proposed Action or Alternative 1, in addition to other existing and reasonably foreseeable projects in the CEA, would contribute to cumulative effects to existing land use and recreation. These effects would be long-term and minor.

#### 5.9.6.3 Transportation

There would be no cumulative effects to transportation in the transportation CEA as there would be no net increase or decrease in transportation corridors or volume of traffic as a result of the Proposed Action or Alternative 1.

## 5.10 VISUAL AND AESTHETIC RESOURCES

### 5.10.1 CEA Boundary

The CEA boundary for visual and aesthetic resources is the same as described in Air Resources (**Section 5.2**; **Figure 5.2-1**) and CEA encompasses 148,861 acres. The boundary was developed with the IDT experts and professional judgement. Due to the limited visibility of the Project, visual and aesthetic resources should not be significantly affected beyond this area; viewers outside of the identified CEA would not likely be impacted by the Project.

### 5.10.2 Introduction

The CEA is within a region of generally north to northwest-trending mountain ranges and valleys. The most common of landforms in the area are foothills, which are cut at fairly regular intervals by small creeks and drainages. Although scenic variety exists in the topography and densities, arrangements, and colors of vegetation, no visually unique landscapes are found in the CEA. The visual quality objectives of all CTNF lands within the CEA are Modification or Partial Retention, with no areas of Retention and only a small area of Preservation. The VQO categories that exist within the CEA are shown in **Table 5.10-1**.

**Table 5.10-1 CTNF Visual Quality Objectives in the CEA**

| VISUAL QUALITY OBJECTIVE | AREA (ACRES) | PERCENT OF CTNF IN THE CEA |
|---|---|---|
| Modification | 55,205.9 | 37 |
| Partial Retention | 33,815.6 | 23 |
| Retention | 0 | 0 |
| Preservation | 264.2 | 0.2 |
| Total CEA with VQOs | 89,285.7 | 60 |

Source of information: USFS email from Judy Warrick 6/16/16

The CEA is largely undeveloped other than for mining activities, associated USFS and private roads, and a few private residences/ranches. Man-made features that have resulted in visual modifications to the landscape include the past and current mining and exploration activities, roads, power lines, pipelines, range improvements, and rural residences.

Cumulative effects to visual resources from other activities in the CEA would result from historical, existing, and future phosphate mining. Often, phosphate mining does not result in major impacts to visual resources because the disturbance areas are not readily visible to the general public. Most of the past, present, and foreseeable future phosphate mining activities in the CEA are located within relatively remote areas, and are not readily visible from sensitive viewing areas, such as roads, recreation sites, or rural residences.

### 5.10.3 Past and Present Disturbances

The CEA is generally not disturbed visually other than for timber cuts, roads, mining operations, range improvements, power lines, and pipeline corridors. **Table 5.4-2** lists past and present disturbances to areas within the CEA; the largest type of disturbance is phosphate mining related to the existing Simplot Smoky Canyon Mine. Based on those numbers, past and present disturbances have altered approximately seven percent of the area visually. Reclamation of the mine areas would mitigate much of the visual impact. Disturbances due to mining and exploration coincide with disturbances attributed to timber harvest in many cases, since timber sales are often conducted as the initial phase in a mining project. Burned areas and agricultural areas are more or less visually acceptable; burned areas if occurring as a natural wildland event are noticeable, but typically aren't perceived as man-caused or intrusive development. Agriculture is a common private land use in the area, and visually is part of the present landscape.

Exploration has occurred in the Wells Canyon Lease, but no mine plan has been proposed for that lease. Mining activities are ongoing in Panels B, F, and G of the Smoky Canyon Mine; Panels A, C, D, and E are mined out and have been fully reclaimed. The total currently approved, permitted mine disturbance for the Smoky Canyon Mine and tailings pond is approximately 4,000 acres (**Section 2.3.2**). The surface area of the tailings ponds (ultimate permitted area of 553 acres on private lands) has added to the permanent landscape change. The surface water-pond element was not present in the area prior to the creation of the tailings ponds. Views of the current mining activity in the CEA are blocked from the west by the Webster Range, although visitors to the higher elevation trails of the Webster Range have views of the mining activity east of the ridge and views to the west where past mining disturbances may be noticeable.

### 5.10.4 Foreseeable Future Disturbances

The only additional mining activity that has been proposed to date in the CEA is the Proposed Action and Alternative 1. The Proposed Action could potentially add up to approximately 850 acres of disturbance to the CEA, of which all but 12 acres would be reclaimed. The Alternative 1 disturbances would be somewhat less (78 fewer acres total disturbance and 3 fewer acres left unreclaimed). Portions of the East Smoky Panel disturbance would be visible from locations along the Smoky Canyon Road. The general mine area from Smoky Creek on the north to Wells Canyon on the south is a distant (about 10 miles) view for travelers on Highway 89 in Star Valley and the intervening Gannett Hills obscure most of the mine area.

### 5.10.5 Cumulative Disturbances

The total disturbed area for the Proposed Action/Alternative (approximately 850/770 acres) combined with the currently permitted Smoky Canyon Mine disturbance (approximately 4,000 acres) would represent about three percent of the total visual CEA, and the unreclaimed area for the entire mine would represent less than 0.01 percent of the total CEA.

### 5.10.6 Cumulative Effects

Reclamation of mined areas in the CEA would reduce the visual contrast of bare earth in the disturbed areas with adjacent forest vegetation. The reclaimed areas would be revegetated primarily with grass and forbs and patches of shrubs and trees. The reclaimed areas would still be visible but would not be as obvious a visual impact as the mining activities themselves. As activity shifts from currently active mining areas to others, and the disturbances are sequentially reclaimed, the landform and color contrast as well as the obvious presence of mining would be lessened for those traveling the secondary roads or recreating in the area. Over time, the landscape views inclusive of reclaimed mining areas, would become a more acceptable part of the landscape. As natural succession occurs throughout the reclaimed areas, a setting more similar to the original landscape over time would be restored.

## 5.11 CULTURAL RESOURCES

### 5.11.1 CEA Boundary

The CEA boundary for cultural resources encompasses the Project Area and a surrounding one-mile buffer. The boundary was developed with the IDT experts and professional judgement. Cultural resources should not be affected beyond this area; cultural resources outside of the identified CEA would not likely be impacted by the Proposed Action or Alternative 1.

### 5.11.2 Introduction

Over thirty cultural resource inventories have been conducted within the CEA. These projects were conducted in association with phosphate mine expansion and exploration, timber sales, utilities, land exchange, grazing activities, and stock pond development (Pagano 2015). These projects were completed between 1978 and 2015. The previous inventory information for the CEA was compiled from data collected for the Smoky Canyon Mine expansions and is likely not all-inclusive; even so, this information indicates the general site types and site density found in the CEA.

The previous projects indicate that at least 20 known cultural resource sites are located within the CEA, including prehistoric campsites and lithic scatters, and historic sites such as a salt works facility, cabins, a sawmill, and arborglyphs (tree carvings). A total of 10 sites have been recorded in studies conducted within one mile of the Project Area (**Section 3.12.2**). Site density in the area is low (Pagano 2014a, 2014b, 2014c, and 2015). The prehistoric sites are generally eligible for the NRHP due to the paucity of sites of this type in this high elevation area.

A review of historic (pre-1950) GLO maps reveals numerous features that were historically present within the CEA including several named roads, homesteads, houses/structures, ranching facilities, ditch systems, and utility lines.

### 5.11.3 Past and Present Disturbances

Past and present ground disturbances in the CEA that potentially affected cultural resources include timber sales, mine expansion and exploration, utilities, land exchange, road construction, and other developments**.** It is not possible to quantify potential impacts to unknown cultural resource sites in areas that have not been inventoried within the CEA. Recorded sites that are ineligible for the NRHP do not have to be avoided and therefore have likely been impacted by activities requiring the inventory (i.e., timber sales, mine expansion, utilities, etc.).

### 5.11.4 Foreseeable Future Disturbances

There are no reasonably foreseeable disturbances in the CEA with the potential to impact cultural resources other than the Smoky Canyon Mine disturbances. No USFS timber sales are proposed for the cultural resources CEA in the current planning cycle. No changes to transportation and recreational uses of the CEA have been proposed.

Changes to private agricultural lands near the CEA are likely as some of these lands are converted in the future from traditional agricultural utilization (ranching) to more residential and recreational utilization. However, no specific plans are known and these cannot be evaluated for this cumulative effects analysis.

### 5.11.5 Cumulative Disturbances

Past, present, and reasonably foreseeable disturbance to cultural resources in the CEA have been and would be the result of mining activities, timber harvesting, road development, archaeological excavation, livestock grazing, private development, and likely vandalism and artifact collection. Private development and vandalism/artifact collection are not quantifiable.

Past and present disturbance has impacted cultural resources. However, in the case of ineligible sites, the sites are not considered important resources and avoidance is not required. NRHP eligible sites within disturbance areas were subject to data recovery (excavation); therefore, the loss of the resource was mitigated.

The current on-the-ground status of the majority of the General Land Office features has not been confirmed, but some may still exist intact and could possibly be indirectly impacted by the Proposed Action.

### 5.11.6 Cumulative Effects

Section 106 of the NHPA requires consideration of the effects of federal actions to historic properties. No historic properties would be disturbed by the Proposed Action or Alternative 1. Neither the Proposed Action nor Alternative 1 would have adverse effects to historic properties. Therefore, neither the Proposed Action nor Alternative 1 would contribute to cumulative impacts to historic properties in combination with past, present, and reasonably foreseeable future activities in the CEA.

## 5.12 NATIVE AMERICAN CONCERNS AND TREATY RIGHTS RESOURCES

### 5.12.1 CEA Boundary

The CEA for Tribal Treaty Rights resources includes that portion of the Southeast Idaho Phosphate District on public lands in Caribou and Bear Lake Counties (no figure). The boundary was developed with the IDT experts and professional judgement. The CEA encompasses approximately 270,000 acres of public (BLM and USFWS) and CTNF lands. These areas are almost entirely within the upper Blackfoot River and upper Bear River drainage basins. The area extends into a small portion of the Salt River drainage near the Wyoming state line. The Tribes retain and exercise Treaty Rights on unoccupied federal lands.

This CEA does not include all areas of Tribal Treaty Rights resources in southeast Idaho, but only those areas that have been or may be affected by past, present, or reasonably foreseeable future phosphate mining and associated activities. To the extent that data are available on effects to Tribal Treaty Rights resources, the past, present, and reasonably foreseeable future actions would include those identified by the Agencies from the expansion of phosphate mining in the 1970s to currently planned and validated future activities.

### 5.12.2 Introduction

The ability of Native Americans to practice their traditional culture in the CEA as assured in the Fort Bridger Treaty and related statutes has been reduced through loss of "unoccupied lands" and degradation of the resources over time.

Federal land managers have a responsibility to consider effects on resources essential for the Tribes to exercise their Treaty Rights on public lands and a responsibility to manage and maintain the habitat of traditionally utilized natural resources in a viable and sustainable condition. Over the years, the ability of the Tribes to practice their traditional culture on these lands has been reduced by homesteading, Idaho statehood, and other statutes that allowed federal land to be converted to non-federal ownership. Aside from this, the loss or conversion of vegetation and wildlife habitat from phosphate mining and degradation of the resources valued by the Tribes has tended to reduce land and resource productivity in some cases.

### 5.12.3 Past and Present Disturbances

Fire suppression, mining, grazing, and timber harvest have altered or restricted access to areas of unoccupied public lands, have changed the vegetation, and in some areas, have affected water quality. In KPLAs in Bear Lake and Caribou Counties, Idaho, past mining alone has disturbed approximately 14,200 acres or approximately five percent of the federal lands within the CEA (**Table 5.1-2**). A large portion of these lands has been revegetated by reclamation activities. However, much of the vegetation reclaimed prior to 2000 has tested high in selenium, and some water bodies have been affected by contamination. However, upon investigation, the IDEQ concluded that regional human health and population-level ecological risks are unlikely to occur in the area. The assessment noted that ecological subpopulation risks are evident in localized areas, particularly aquatic and riparian environments, impacted by historic mining operations and ongoing releases (IDEQ 2004). Besides the contamination issue, wildlife habitats have been altered or otherwise changed by large scale open pit phosphate mining and reclamation activities, affecting Tribal hunting and gathering activities. The full impact to natural resources utilized by Indian Tribes is not known at this time.

### 5.12.4 Foreseeable Future Disturbances

Reasonably foreseeable future disturbances in the CEA would result from the Proposed Action or the Alternative 1 and associated activities. Mining plans currently being processed could result in at least 6,350 acres (approximately two percent of the federal lands within the CEA) of additional disturbance in Caribou and Bear Lake counties (**Section 5.1.4**). During mining, many natural resources traditionally utilized and accommodated by the Treaty would be destroyed, and access to others would be impeded for a time by the mine. Mining would continue until the approved ore reserves are depleted, and although reclamation of the mined areas is undertaken concurrently with mining operations, final reclamation of all affected acreage in the CEA would take over 30 years.

Unique or non-renewable traditional resources have not been identified in the East Smoky Panel area. Areas proposed to be mined in the future would be reclaimed, and thus there would not be a permanent loss of access to resources and the ability to exercise Treaty Rights, except for relatively small areas to be left unreclaimed or in the cases where land exchanges or sales of public land would occur, such as the proposed Dairy Syncline Project, which is currently undergoing NEPA analysis.

### 5.12.5 Cumulative Disturbances

As outlined in **Section 3.13**, the federal government has a unique trust relationship with federally recognized American Indian tribes including the Shoshone and Bannock Tribes. The BLM and the CTNF have a responsibility and obligation to consider and consult on potential effects to natural resources related to the Tribes' Treaty Rights, uses, and interests under the federal laws, EOs, and the 1868 Fort Bridger Treaty between the U.S. and the Shoshone and Bannock Tribes (U.S. Congress 1868). In addition, the NHPA and its implementing regulations (36 CFR 800), the American Indian Religious Freedom Act (AIRFA), EO 13175: Consultation and Coordination with Indian Tribal Governments, and EO No. 13007: "Indian Sacred Sites" contain requirements for consulting with tribes on the potential effects of federal actions on tribal interests.

Since the discovery of selenium and other contamination associated with phosphate mining in the late 1990's, new operational and reclamation practices have been developed to reduce contamination potential. Federal and state agencies are enhancing native fish and wildlife habitat, and these collective efforts to improve the condition of natural resources contribute to the protection and restoration of Tribal Treaty Rights. Appropriate mitigation measures and EPMs (such as reclamation, stormwater and sediment control, groundwater and surface water sampling/monitoring), which are protective of natural resources, are required and implemented for ongoing and future mining projects. These would continue.

### 5.12.6 Cumulative Effects

Consultation is ongoing among the Tribes and federal land managing agencies to address the most effective ways to protect and restore traditional resources and assure the continued exercise of Tribal Treaty Rights. Reclamation practices, BMPs, and EPMs are being implemented for new phosphate mining projects that help to address the cumulative effects to restore vegetation resources and wildlife habitat sooner to allow productive activities under their Treaty rights. Due to the number of undisturbed acres that occur adjacent to the phosphate mines, direct and indirect impacts to wildlife populations are likely fairly minimal as wildlife displace into these adjacent areas (**Section 4.8**). Cumulative effects to vegetation resources occur through short-term vegetation loss and long-term vegetation community changes (**Section 4.7**). Access to these areas also result in short-term impacts as well.

Approximately seven percent of the federal lands within the CEA would be impacted by past, present, and reasonably foreseeable future actions through conversion of wildlife and vegetation habitats for hunting and gathering and could tend to reduce opportunities from current levels, although as successful reclamation and natural succession occurs, the impacts would decrease over time.

The EIS can generally assign a quantification (context, duration, and intensity), as required by CEQ, to the impacts to resources such as wildlife or water quality. However, it is difficult to quantify the impact of a temporary loss of a right. Consultation that has occurred to date with the

Shoshone and Bannock Tribes is described in **Sections 1.7** and **6.2.3**. During past consultations for similar projects in the area, the Shoshone and Bannock Tribes stated that any loss of Tribal Treaty Rights is significant to them and could potentially affect all Tribal members.

## 5.13 SOCIAL AND ECONOMIC CONDITIONS

### 5.13.1 CEA Boundary

The CEA boundary for socioeconomics (no figure) includes the six-county area of Bannock, Bear Lake, Bingham, Caribou, and Power counties, Idaho; and Lincoln County, Wyoming. The boundary was developed with the IDT experts and professional judgement. The social and economic structures and relationships in support of mining and other activities are contained within these counties. Caribou and Bear Lake Counties contain most of the southeastern Idaho phosphate mines and processing facilities. Smoky Canyon Mine employees live in Lincoln County. The Don Plant and/or its employees are located in Bannock, Bingham, and Power counties. Simplot competes with other phosphate rock and fertilizer producers in the United States.

### 5.13.2 Introduction

The types of cumulative effects that could occur to social and economic conditions in the CEA would primarily be from a loss of economic activity under the No Action Alternative. Because the Proposed Action or Alternative 1 constitutes continuation of activities that are currently taking place in the CEA, but would be in a new location, it is not anticipated that there would be any increases in the populations of the CEA counties as a result of the Proposed Action or Alternative 1; therefore, there would be no additive, cumulative effect to housing, community services, and infrastructure from the Proposed Action or Alternative 1.

Local economic activity has increased and diversified in recent years, and such diversification may continue into the future. However, phosphate mining and ore processing will likely continue to anchor the economies in the CEA.

### 5.13.3 Past and Present Disturbances

The contribution of past and present phosphate mining and related processing plants to local economies within the CEA has been major in terms of employment and revenues earned from tax collections, purchasing, and value-added phosphorus products. The active phosphate mines, as well as previously approved mines, are part of the economic base of the CEA that stimulates the growth of other economic sectors through a multiplier effect as described in **Section 4.14**. Contributions to local economies from increased employment and addition of workforce payroll to local economies have benefitted Bannock, Bingham, Power, and Lincoln counties; however, no phosphate mines are located in these counties. Therefore, revenues earned from tax collections and equipment purchases have occurred primarily in Caribou and Bear Lake counties.

### 5.13.4 Foreseeable Future Disturbances

No major changes to population, housing, employment, or private and public income would occur as a result of the Proposed Action or Alternative 1. Continued phosphate mining would result in future private and public income at levels approximately the same as past and present conditions. Other incoming industry or developments proposed in the CEA or large scale economic issues would be more likely to affect socioeconomics; the Proposed Action or Alternative 1 is a continuation of the current industry.

Several new phosphate mines have been approved or proposed within the CEA (see **Section 5.1.4**). These include Simplot's Dairy Syncline Mine (proposed), Caldwell Canyon (proposed), the Rasmussen Valley Mine (approved), the Husky/North Dry Ridge Mine (proposed), and possibly Stonegate Agricom Ltd.'s Paris Hills phosphate project (currently curtailed). Phosphate exploration drilling has also been proposed outside of those mines including Dry Ridge, Trail Creek, and Freeman Ridge/Husky 2. These proposed exploration projects could lead to future additional mine development.

Minor gold prospecting activities are expected to continue but the development of hard-rock mineral or metals mines in the CEA is unlikely.

The majority of foreseeable future activities as discussed above, such as the Proposed Action or the Alternative 1, would be continuations of activities that are currently taking place in the CEA, but would be in new locations.

### 5.13.5 Cumulative Disturbances

The additional present and future phosphate mining and exploration projects described in the previous section would add to the continued relative economic stability within the CEA.

### 5.13.6 Cumulative Effects

Development of the new mines would be expected to at least maintain current economic drivers, should new mines replace completed mining projects. Because the Proposed Action or Alternative 1 would be a continuation of existing mining at the Smoky Canyon Mine, their implementation would not contribute effects on socioeconomics beyond existing levels.

Cumulative effects on the social and economic structure within the CEA have occurred and would occur from past, present, and reasonably foreseeable development activities. These effects have occurred primarily in Caribou County in terms of tax revenues and purchases of equipment and other services; however, all CEA counties have and may continue to benefit from employment. The cumulative effects (both negative and positive) have been substantial and have the potential to continue.

The Proposed Action or Alternative 1, in addition to other existing and reasonably foreseeable phosphate mining projects, would prolong the economic benefits associated with phosphate mining and ore processing as described in **Chapter 4**. BLM estimates that these annual economic benefits when added to all other current eastern Idaho phosphate mining and processing operations would total \$130 million in annual salaries, \$335 million in total annual purchasing, \$6.5 million in property taxes, \$11 million in state and federal mineral lease royalties (most of which is returned to the Idaho state governments, primarily for funding schools), around 2,000 direct employees and contract employees (with a total induced employment of around 4,500 in the cumulative effects area).

There is a trend to the development of low-density residential areas, sometimes on privately owned agricultural lands. This has a cumulative effect on the lands outside population centers. However, this land use change is not related to the Proposed Action or Alternative 1. It is not anticipated that there would be any increases in the populations of the CEA counties as a result of the Proposed

Action or Alternative 1; therefore, there would be no additive, cumulative effect to housing, community services, and infrastructure from the Proposed Action or Alternative 1. The cumulative effects on social and economic conditions would be positive, short-term and major.

Under the No Action Alternative, the East Smoky Panel would not be approved, and there would be no economic benefit from extending mining operation from the Smoky Canyon Mine. The No Action Alternative could cause the regional price of fertilizer and cost of agricultural production to increase for a period of time if Simplot had to curtail production pending final acquisition of an alternative area to mine. Overall impacts of the No Action Alternative to social and economic conditions would be adverse, short term, and major.

# CHAPTER 6

# CONSULTATION AND COORDINATION

# TABLE OF CONTENTS



## LIST OF TABLES

This page intentionally left blank.

# CHAPTER 6 CONSULTATION AND COORDINATION

## 6.1 PUBLIC PARTICIPATION SUMMARY

Initial issues and indicators to be considered in the EIS are identified through public and agency scoping. This process, along with the results of scoping, was documented in a public scoping report (Stantec 2015a).

### 6.1.1 Public Scoping Period and Meetings

The NOI for the Smoky Canyon Mine East Smoky Panel Project EIS was published in the Federal Register on April 3, 2015. Additionally, a legal notice was published in two local newspapers: the Idaho State Journal in Pocatello, Idaho on April 3, 2015; and the Star Valley Independent in Afton, Wyoming on April 8, 2015. Also on April 3, 2015, a news release was submitted to approximately 40 different television stations, radio stations, and newspapers. These notices and releases are included in the scoping report (Stantec 2015a).

Three open house-style public meetings were held from 5 – 7 pm as scheduled:

- April 21, 2015 at Afton Civic Center in Afton, Wyoming
- April 22, 2015 at Shoshone Bannock Hotel and Events Center in Fort Hall, Idaho
- April 23, 2015 at BLM Offices in Pocatello, Idaho

The open house meetings provided a Project overview, maps of the Project area, and a forum for exchange of information and ideas or concerns related to the Project. Comment forms were available at the meetings. BLM, Simplot, and Stantec representatives were present. Lists of individuals who signed attendance sheets at the public meetings are included in the scoping report (Stantec 2015a).

Scoping information was also provided on the BLM Land Use Planning and NEPA Register at https://www.blm.gov/epl-frontoffice/eplanning/planAndProjectSite.do?methodName=renderDefaultPlanOrProjectSite&projectId=39795&dctmId=0b0003e88074e314. Information was included on the CTNF Current and Recent Projects website at http://www.fs.fed.us/nepa/nepa_project_exp.php?project=44748 and included in the FS Schedule of Proposed Actions for the CTNF.

Public comments regarding the Project were solicited and are compiled in the scoping report (Stantec 2015a) to help determine the concerns, issues, and any potential alternatives for evaluation in the environmental analysis. Hard copy comments were requested to be received on or before May 4, 2015. By the close of the scoping period on May 4, 2015, nine comment letters had been received. Copies of all written comment letters are included in the scoping report (Stantec 2015a).

### 6.1.2 EIS Mailing List

The initial public mailing list for scoping was compiled and scoping letters were sent to 96 interested individuals, agencies, and groups. The list included persons and agencies that BLM determined may have interest in the Project from past experience with them. The mailing list for the Project was then revised to add those persons who provided comments in response to scoping, requested to be on the mailing list, signed a scoping meeting list, or responded to the e-mail request for mailing addresses.

### 6.1.3 Distribution of Draft EIS

A 90-day Draft EIS review period was initiated by publication of the Notice of Availability (NOA) for the Draft EIS in the Federal Register.

The Draft EIS was distributed as follows:

- An NOA was published in the Federal Register specifying dates for the comment period and the date, time, and location of the public comment meetings.
- A news release was provided by the Agencies at the beginning of the 90-day comment period on the Draft EIS. Legal notices and news releases were submitted to the same news organizations as for the initial public scoping announcement.
- The Draft EIS was distributed to interested parties identified in the updated EIS mailing list, as previously described, and made available via the BLM and CTNF websites.

Public meetings will be held at the same Afton, Wyoming and Pocatello, Idaho locations as for the initial public scoping meetings to obtain comments on the Draft EIS and to answer questions that the public has regarding the Project or the EIS process.

### 6.1.4 Final EIS Distribution

The Final EIS distribution will be completed after consideration is given to comments received on the Draft EIS. A 60-day Final EIS availability period will be initiated by publication of the NOA for the Final EIS in the Federal Register. The Final EIS will be released as follows:

- The NOA will be published in the Federal Register.
- Copies of the Final EIS will be sent to addresses on the updated mailing list and made available via the BLM and CTNF websites.

Legal notices and news releases will be issued to the same media sources used for previous Project announcements.

### 6.1.5 Record of Decision

The USFS will release a draft ROD and begin an objection period for the SUAs and RFPA decisions concurrent with a 60-day availability period for the Final EIS. The USFS will make recommendations to the BLM for the overall Project during the availability period. The BLM will not issue a draft ROD, but will issue a final ROD after considering the Final EIS and public comments received during the availability period. Both the BLM's ROD and the USFS's Final ROD will be distributed to people and organizations identified in the updated EIS mailing list. BLM will post its ROD on its ePlanning web site. The USFS will post its Final ROD on the CTNF Current and Recent Projects website which publishes the Schedule of Proposed Actions.

## 6.2 CONSULTATION WITH OTHERS

The BLM Pocatello Field Office and the USFS CTNF Soda Springs District are the primary agencies involved with this EIS. BLM is the lead agency and USFS is the joint lead agency. Their respective roles were described in **Section 1.2**.

### 6.2.1 Consultation with Idaho Department of Environmental Quality

Based upon their jurisdiction and expertise, primarily with water quality concerns, IDEQ is a cooperating agency for the EIS. They were consulted through the NEPA process in regard to the Project's relationship to EPHA, the Idaho Water Quality Act, the Idaho Ground Water Quality Rule, and the Federal Water Pollution Control Act through the Idaho Water Quality Standards and Wastewater Treatment Requirements.

### 6.2.2 Consultation with Idaho Department of Lands

IDL is the State of Idaho's agency charged with regulating mine reclamation on all lands in the state, regardless of ownership. They are another cooperating agency for the EIS and were consulted on mine reclamation and other aspects of the Project. They were also consulted on issues related to the Idaho Surface Mining Act; Rules Governing Exploration, Surface Mining, and Closure of Cyanidation Facilities (IDL 2017a); and Title 47 Mines and Mining Chapter 15 Surface Mining (IDL 2017b).

### 6.2.3 Consultation with Shoshone-Bannock Tribes

Tribal consultation for this Project has been undertaken on a Government to Government basis between the United States and the Shoshone-Bannock Indian Nation. Prior to initiation of formal scoping, as a part of routine contacts, the BLM introduced the proposed project to the Shoshone-Bannock Tribes in a meeting on December 17, 2014. A formal scoping letter was sent certified mail to the Shoshone-Bannock Tribes on March 31, 2015. BLM has met with Tribal technical staff to: brief them on the mining proposal and matters of the EIS; discuss issues to allow BLM a better understanding of Shoshone-Bannock issues and concerns; and to answer questions that Tribal staff may have in order for them to brief the Tribal Council. This process precedes formal consultation with the Fort Hall Council of the Shoshone-Bannock Tribes regarding the Project's effect on land management activities and land allocations that could affect Treaty Rights. This process has been ongoing and will continue throughout the NEPA process.

## 6.3 LIST OF PREPARERS AND REVIEWERS

This Draft EIS was prepared jointly by the BLM, Pocatello Field Office, and the USFS CTNF. IDEQ, IDL, and OEMR are cooperating agencies.

**Table 6.3-1 Agency Interdisciplinary Team Members/Specialists**

| RESOURCE/TITLE | AGENCY | TEAM MEMBER/SPECIALIST |
|---|---|---|
| Project Manager/Lead, Geology | BLM | Kyle Free |
| Project Lead, Hydrogeology, Geochemistry | USFS | Matthew Wilson |
| Minerals Branch Chief | BLM | Jeff Cundick |
| Aquatics, Fisheries | USFS | Lee Mabey |
| Hydrology | USFS | Brad Higginson |
| Forestry, Old Growth, Timber | USFS | Wayne Beck |
| Archaeology | USFS | Ali Abusaidi |
| Botany | USFS | Rose Lehman |
| District Ranger, Montpelier | USFS | Dennis Duehren |
| District Ranger, Soda Springs | USFS | Bryan Fuell |
| Forest Planning | USFS | Doug Herzog |
| Range | USFS | Heidi Heyrend |
| NEPA Coordinator | USFS | Jessica Taylor |
| Recreation | USFS | Vacant |
| Inventoried Roadless Areas | USFS | Doug Herzog |
| Soils | USFS | David Marr |
| Wildlife | USFS | Devon Green |
| Groundwater, Surface Water | IDEQ | Brady Johnson |
| Reclamation/Senior Resource Specialist - Lands | IDL | Gary Billman |
| Wildlife, Special Status Species, HEA | IDFG | Jim Mende |
| Administrator | OEMR | John Chatburn |
| Deputy Administrator | OEMR | Scott Pugrud |
| Energy Specialist | OEMR | Tyler Mallard |

## Table 6.3-2 Third Party Contractor – Stantec Consulting Services Inc.

| ROLE/RESOURCE | STAFF | EXPERIENCE |
|---|---|---|
| Project Manager | Greg Brown | BS Natural Resource Management<br>25 Years' experience |
| Assistant Project Manager<br>Water Resources, Geology, Geochemistry | Brian Buck | MS Geological Engineering<br>BS Geology<br>39 Years' experience |
| Visual Resources, Land Use, Grazing/Recreation, Special Designations | Schelle Davis | BA Environmental Studies<br>12 Years' experience |
| Air Resources | Dan Heiser | BS Chemical Engineering<br>MBA Business<br>33 Years' experience |
| Air Resources | Eric Clark | MS Civil Engineering<br>BS Environmental Science<br>12 Years' experience |
| Air Resources | Dave Strohm | BS Meteorology<br>13 Years' experience |
| Cultural Resources, Native American Religious Concerns, Land Use | Jenni Prince-Mahoney | BA Anthropology<br>MC NEPA<br>22 Years' experience |
| Land Use, Recreation, Range | Stephanie Lauer | BS Geology<br>MS Forestry/Watershed Management<br>17 Years' experience |
| Wildlife, Vegetation | Greg Sharp | BS Fisheries and Wildlife Biology<br>23 Years' experience |
| Wildlife, Vegetation | Neil Lynn | BS Wildlife Biology<br>16 Years' experience |
| Fisheries, Aquatic Ecology, Vegetation, Wildlife | Dave Kikkert | BS Fisheries and Wildlife<br>MS Ecology<br>16 Years' experience |
| Environmental Justice and Socioeconomics | Jon Schulman | BA English<br>MA Journalism<br>MS Environmental Engineering<br>23 Years' experience |
| Surface Water Resources, Document Control | Karla Knoop | BS Watershed Science<br>29 Years' experience |
| Groundwater Resources | Rebekah Brooks | BS Geology<br>MS Geology<br>36 Years' experience |
| Geology | Jamey Sage | BS Geology for Liberal Arts<br>18 Years' experience |
| Visual Resources | Gary Maynard | BA Geography<br>20 Years' experience |

| ROLE/RESOURCE | STAFF | EXPERIENCE |
|---|---|---|
| GIS | Claudia Gallegos | AS General Studies<br>BS Environmental Studies<br>16 Years' experience |
| Administrative Support and Project Record | Sue Terry | AS<br>30 Years' experience |
| Soils | Robert Long, Long Resources (subcontractor) | Certified Professional Soil Scientist<br>MS Soils and Biometeorology<br>BS Soils and Biometeorology<br>31 Years' experience |
| Geochemistry | Scott Effner, Whetstone Associates (subcontractor) | |
| Hydrogeological Investigation | Jonathan Williams<br>Alpine (subcontractor) | BS Geology<br>30 Years' experience |
| Water Resources | Alan Mayo, Mayo and Associates (subcontractor) | BS Geology<br>MS Geology<br>37 Years' experience |
| Groundwater Modeling | Michelle Smilowitz, Hydrogeo Group (subcontractor) | |

## 6.4 MAILING LIST

**Table 6.4-1** shows the Project mailing list and is divided into federal agencies, state agencies, and others. This list was compiled through agency maintained lists and the scoping process and will be updated throughout the Project.

**Table 6.4-1 Project Mailing List**

| FEDERAL | |
|---|---|
| David Alderman<br>BLM Pocatello Field Office<br>4350 Cliffs Drive<br>Pocatello, ID 83204-2105 | Larry Mickelsen<br>USDA NRCS<br>390 East Hooper Avenue<br>Soda Springs, ID 83276 |
| Jeff Cundick<br>BLM Pocatello Field Office<br>4350 Cliffs Drive<br>Pocatello, ID 83204-2105 | Tenna Reichgott<br>US EPA Region 10, Att: Manager of Environmental Review<br>1200 6th Ave., Suite 900, ETPA-202-3<br>Seattle, WA 98101-3140 |
| Kyle Free<br>BLM Pocatello Field Office<br>4350 Cliffs Drive<br>Pocatello, ID 83204-2105 | Tina Robison<br>USFS<br>FOIA Request<br>Soda Springs, ID |

| FEDERAL | |
|---|---|
| Sandi Fisher<br>US Fish & Wildlife Service<br>Eastern Idaho Field Office<br>4425 Burley Drive, Suite A<br>Chubbuck, ID 83202 | Elaine Suriano, US EPA<br>Washington Office<br>7500 Venice Court<br>Falls Church, VA 22043 |
| Doug Herzog<br>USFS - SO1405<br>Hollipark Drive<br>Idaho Falls, ID 83401 | U.S. EPA Region 8<br>EPR-N1595 Wynkoop Street<br>Denver, CO 80202-1129 |
| Lynne Hood<br>US EPA Region 10<br>EPA-R10-Idaho Operations Office<br>950 West Bannock Street, Suite 900<br>Boise ID 83702 | Diane Wheeler, USFS<br>1405 Hollipark Drive<br>Idaho Falls, ID 83401 |
| James Joyner<br>Army Corps of Engineers<br>900 North Skyline Drive, Suite A<br>Idaho Falls, ID 83402 | |

| STATE | |
|---|---|
| Reagen Bebout<br>Senator Michael B. Enzi, Field Rep.<br>P.O. Box 12470<br>Jackson, WY 83002 | Tim Fuchs<br>Wyoming Game & Fish<br>P.O. Box 67<br>Jackson WY 83001 |
| Gary Billman<br>Idaho Department of Lands<br>3563 Ririe Highway<br>Idaho Falls, ID 83401 | Idaho Department of Lands<br>Eastern Idaho Supervisory Area<br>3563 Ririe Hwy<br>Idaho Falls, ID 83401 |
| Jeff Cook<br>Id. Dept. of Parks & Recreation<br>P.O. Box 83720<br>Boise, ID 83720-0065 | Brady Johnson<br>IDEQ<br>1410 N. Hilton<br>Boise, ID 83706 |
| Senator Mike Crapo<br>United States Senator<br>275 South 5th Avenue, Suite 225<br>Pocatello, ID 83201 | Ron Kay<br>Idaho State Department of Agriculture<br>2270 Old Penitentiary Rd.<br>PO Box 7249<br>Boise, ID 83707 |
| Dennis Dunn C/O IDWR<br>900 North Skyline Drive, Suite A<br>Idaho Falls, ID 83402 | Jim Mende<br>ESBS E Region Idaho Fish & Game<br>1345 Barton Road<br>Pocatello, ID 83204 |

| STATE | |
|---|---|
| Jeremy Field<br>Office of US Senator James E. Risch<br>275 South 5th Avenue, #290<br>Pocatello, ID 83201 | Mike Rowe<br>IDEQ<br>400 Hospital Way, Suite 333<br>Pocatello, ID 83201 |

| TRIBAL AGENCIES | |
|---|---|
| Casper Appenay<br>Land Use Policy Commissioner, Shoshone Bannock Tribes<br>P.O. Box 306<br>Fort Hall, ID 83203 | Carolyn B. Smith, Cultural Resources Coordinator<br>Shoshone Bannock Tribe<br>P.O. Box 306<br>Fort Hall, ID 83203 |
| Susan Hanson<br>Environmental Consultant for the Shoshone Bannock Tribes | Jason Walker<br>Northwest Band of the Shoshone Nation Pocatello Tribal Office<br>505 Pershing Ave Suite 200<br>Pocatello, ID 83201 |
| Mitzi Sabori<br>Shoshone Bannock Tribes<br>P.O. Box 306<br>Fort Hall, ID 83203 | Kelly C. Wright, EWMP Manager<br>Shoshone Bannock Tribes<br>P.O. Box 306<br>Fort Hall, ID 83203 |
| Nathan Small<br>Shoshone Bannock Tribes<br>P.O. Box 306<br>Fort Hall, ID 83203 | |
| **LOCAL** | |
| Caribou County Commissioners<br>159 South Main Street<br>Soda Springs, ID 83276 | Lincoln County Commissioners<br>925 Sage Avenue, Suite 302<br>Kemmerer, WY 83101 |
| Georgetown City Council Members<br>P.O. Box 99<br>Georgetown, ID 83239 | Power County Commissioners<br>543 Bannock<br>American Falls, ID 83211 |
| Jerry T. Harmon<br>Board of Lincoln County Commissioners<br>Kemmerer, WY 83101 | Rauhn Panting<br>Oneida County Commissioner<br>30 North 100 West<br>Malad, ID 83252 |
| Hillyard Loni<br>The Town of Afton<br>P.O. Box 310<br>Afton, WY 83110 | Jonathan Teichert<br>Lincoln County Wyoming Planning & Development<br>520 Topaz Street, Suite 109<br>Kemmerer, WY 83101 |

| MEDIA | |
|---|---|
| Rosa Moosman, The News-Examiner<br>P.O. Box 278<br>Montpelier, ID 83254 | Mark Steele<br>Caribou County Sun<br>P.O. Box 815<br>Soda Springs, ID 83276 |
| John O'Connell<br>Capital Press | Mark Mendiola<br>Green Market News |

| ORGANIZATIONS | |
|---|---|
| Ed Berry, Superintendent<br>Auburn Hatchery<br>P.O. Box 130<br>Auburn, WY 83111 | Alan Linford<br>Crow Creek Ranches<br>9590 HWY 238<br>Afton, WY 83110 |
| Jim Cagle<br>Agrium<br>3010 Conda Road<br>Soda Springs, ID 83276 | Dani Mazzotta<br>Idaho Conservation League<br>P. O. Box 2671<br>Ketchum, ID 83340 |
| Scott L. Carlisle<br>Star Valley Trout Ranch Resort<br>P.O. Box 1266<br>Afton, WY 83110 | Lori McNamara<br>North Wind, Inc.<br>1425 Higham<br>Idaho Falls, ID 83402 |
| John Carter<br>Yellowstone to Uintas Connection<br>Box 280<br>250 South Main<br>Mendon, UT 84325 | Peart Land & Development, LLC<br>P.O. Box 128<br>Randolph, UT 84064 |
| John Carter<br>Yellowstone to Uintas Connection<br>P.O. Box 62<br>Paris, ID 83261 | Alan Prouty<br>J.R. Simplot<br>999 Main Street, Suite 1300<br>Boise, ID 83707 |
| Lane Clezie<br>Alternative Vice President Sci<br>13542 West Trail Creek Road<br>Pocatello ID83204-7014 | Pete Riede<br>Crow Creek Conservation Alliance<br>P.O. Box 233<br>Afton, WY 83110 |
| Neal Curry<br>C2C Holdings Inc.<br>933 South 3rd West<br>Grace, ID 83241 | Kathy Rinaldi<br>Greater Yellowstone Coalition<br>215 South Wallace Avenue<br>Bozeman, MT 59715 |
| Alicia Dredge<br>Jouglard Sheep Company<br>P.O. Box 245<br>Rupert, ID 83350 | Kathy Rinaldi<br>Greater Yellowstone Coalition<br>PO Box 1072<br>Driggs, ID 83422 |

| ORGANIZATIONS | |
|---|---|
| Rob Erickson<br>Dry Creek Lumber<br>3497 Dry Creek Road<br>Afton, WY 83110 | John Robison, Public Land Director<br>Idaho Conservation League<br>P. O. Box 844<br>Boise, ID 83701 |
| Jennifer Fairbrother, FSEEE<br>P.O. Box 11615<br>Eugene OR 97440 | Rachel Roskelley<br>Simplot |
| William Fielder<br>FMC Technologies<br>400 Highpoint Drive<br>Chalfont, PA 18914 | RVG Trust<br>3319 N. University Ave., Suite 200<br>Provo, UT 84604 |
| Helen Folger<br>Osprey Ranch LLC<br>10512 Samaga Drive<br>Oakton VA 22124 | Brad Smith<br>Idaho Conservation League<br>P.O. Box 844<br>Boise, ID 83702 |
| Chad Gentry<br>Simplot<br>1890 Smoky Canyon Road<br>P.O. Box 1270<br>Afton, WY 83110 | Kevin Toner<br>Aristeria Capital LLC<br>136 Madison Avenue, 3rd Floor<br>New York, NY 10016 |
| Bonnie Gestring<br>Earthworks<br>140 South 4th Ave West Unit 1<br>Missoula, MT 59801 | Randy Vranes, Monsanto<br>P.O. 816<br>Soda Springs, ID 83276-0816 |
| Ron Hager<br>Simplot<br>1890 Smoky Canyon Road<br>P.O. Box 1270<br>Afton, WY 83110 | Western Watersheds Project - Idaho Office<br>Box 1770<br>Hailey, ID 83333 |
| Lori Hamann<br>Simplot<br>1150 W Hwy 30, P.O. Box 912<br>Pocatello, ID | Dickson L. Whitney Sr.<br>Osprey Ranch LLC<br>P.O. Box 1427<br>Afton, WY 83110 |
| Dale Harris, Co-Chair<br>RACNAC<br>1434 Jackson Street<br>Missoula, MT 59802 | Gary Wilcox<br>Wilcox Logging, Inc.<br>1741 W 8200 S<br>Rexburg, ID 83440 |
| Evan Hathaway<br>Simplot | Grant Williams<br>Simplot<br>1890 Smoky Canyon Road<br>P.O. Box 1270<br>Afton, WY 83110 |

| ORGANIZATIONS | |
|---|---|
| Justin Hayes<br>Idaho Conservation League<br>P.O. Box 844<br>Boise, ID, 83701 | Matt Woodard<br>Trout Unlimited<br>151 North Ridge Avenue, Suite 120<br>Idaho Falls, ID 83402 |
| Tate Jarry<br>Live Water Properties<br>P.O. Box 9240<br>Jackson, WY 83002 | Bob Zimmer<br>Greater Yellowstone Coalition<br>215 S. Wallace Avenue<br>Bozeman, MT 59715 |

| INDIVIDUALS | |
|---|---|
| Don Corwin Aullman<br>P.O. Box 296<br>Thayne, WY 83127 | Fred & Dianne Nate<br>537 Washington Street<br>Montpelier, ID 83254 |
| Pat Aullman | Bobby Neal<br>1002 Taney Lane<br>Pocatello, ID 83201 |
| Laurence Beller<br>P.O. Box 160<br>Swan Valley, ID 83449-0160 | Wally Noe<br>4016 Nora<br>Pocatello, ID 83204-2020 |
| Keith Bitton<br>397 Fish Hatchery Road<br>Grace, ID 83241 | Ron Owens<br>P.O. Box 114<br>Soda Springs, ID 83276 |
| Tucker Dahlke<br>P.O. Box 433<br>Inkom, ID 83245 | Tim Palmer<br>358 West 1135<br>Idaho Falls, ID 83404 |
| Dr. Warren J. Davis<br>1740 Lance Drive<br>Pocatello, ID 83204 | Mike Panting<br>271 So. 2nd West<br>Soda Springs, ID 83276 |
| Steve DeMott<br>160 Tabor Avenue<br>Idaho Falls, ID 83401 | Ken Paulson<br>6737 Lee Street<br>Arvada, CO 80004 |
| Gregg Drameu<br>P.O. Box 88<br>2303 Smoky Canyon Road<br>Auburn, WY 83111 | Jean Public |
| Evern Draney<br>1930 Buchanan Ave.<br>Ogden, UT 84401 | Pete Riede<br>95 Star West Drive<br>Afton, WY 83110 |
| Gleno & Sons Ltd Draney<br>178 Auburn Tygee Rd.<br>134 Auburn, WY 83111 | Craig Shuler<br>255 West 4th South<br>Soda Springs, ID 83276 |

| INDIVIDUALS | |
|---|---|
| W. Gregg Etux Draney<br>2303 Smoky Canyon Road<br>Auburn, WY 83111 | James R. Smith<br>Mayor of Soda Springs<br>9 West 2nd South<br>Soda Springs, ID 83276 |
| Jim Drost | Brent Stewart<br>P.O. Box 917<br>Afton, WY 83110 |
| Gordon Ealey | Katie Strong<br>1427 M ST<br>Anchorage, AK 99501-4958 |
| Robert Eliason<br>524 Stansbury<br>Pocatello, ID 83201 | John R. Stucki<br>325 Algonquin Drive<br>Ballwin, MO 63011 |
| Ron & Linda Facer<br>P.O. Box 281<br>Grace, ID 83241 | John R. Stucki<br>P.O. Box 278<br>Paris, ID 83261 |
| Kym Ferguson<br>15533 East Ririe Hwy<br>Ririe, ID 83443 | Jack Sturm<br>541 East 1st North<br>Soda Springs, ID 83276 |
| John Frome, The Estate of Ted Frome<br>Box 173<br>Afton, WY 83110 | Jeff Sweeney<br>3055 Ross Ave<br>Idaho Falls, ID 83406 |
| Dustin Hansen<br>35 Vista Court<br>Star Valley Ranch, WY 83127 | Shawn Sweeney<br>3642 East Ivory Circle<br>Idaho Falls, ID 83401 |
| Alan Haslam<br>10955 Paintbrush Lane<br>Pocatello, WY 83202 | Coby & Linda Tigert<br>2037 Sandy Lane<br>Pocatello, ID 83204-4720 |
| La Dell Heiner<br>718 Stateline Road<br>Freedom, WY 83120 | Tami Tralant<br>RR6, Box 36<br>Pocatello, ID 83202 |
| Dave Janiak<br>P.O. Box 944<br>Afton, WY 83110 | Christine Waite<br>444 Hospital Way, #300<br>Pocatello, ID 83201 |
| Tracy Jones<br>P.O. Box 217<br>Thayne, WY 83127 | Dickson L. Whitney Jr.<br>669 Chargin River Road<br>Gates Mills, OH 44040 |
| Adam G. Koch | Lin Whitworth<br>P.O. Box 183<br>Inkom, ID 83245 |
| Robert Linford<br>8849 Hwy 238<br>Afton, WY 83110 | Katie Wilkes<br>380 Crow Creek Road<br>Afton, WY 83110 |

| INDIVIDUALS | |
|---|---|
| Robert McKim<br>10964 Hwy 238<br>Afton, WY 83110 | Bill R. & Elizabeth A. Williams<br>2677 Comanche Circle<br>Salt Lake City, UT 84108 |
| Gary L. Miller<br>5621 Highway 34<br>Wayan, ID 83285-5105 | Deb Wolfly<br>P.O. Box 10<br>Fairview, WY |
| Edward J. Minhondo Trust<br>2263 South 750 East<br>Bountiful, UT 84010 | The Estate of Ray & Sylvia Peterson<br>P.O. Box 63<br>Auburn, WY 83111 |
| David C. & Aneta Smith<br>4732 Highway 34<br>Wayan, ID 83285 | |

This page left blank intentionally.

# CHAPTER 7

# REFERENCES, ACRONYMS, ABBREVIATIONS, GLOSSARY, AND INDEX

# TABLE OF CONTENTS

This page intentionally left blank.

# CHAPTER 7 REFERENCES, ACRONYMS, ABBREVIATIONS, GLOSSARY, AND INDEX

## 7.1 REFERENCES

American Community Survey. 2016. Accessed online from: https://www.census.gov/acs/www/data/data-tables-and-tools/index.php

Apps, C. D. 2000. Space-use Diet, Demographics, and Topographic Associations of Lynx in the Southern Canadian Rocky Mountains: a Study. Pages 351–371 *In* L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. McKelvey, and J. R. Squires, editors. Ecology and Conservation of Lynx in the United States. University Press of Colorado, Rocky Mountain Research Station, Fort Collins, Colorado.

Aubrey, K. B., G. J. Koehler, and J. R. Squires. 2000. Ecology of Canada lynx in Southern Boreal Forests. Pages 373-396 *In* Ruggiero, L.F. et al., Editors. Ecology and Conservation of Lynx in the United States. University Press of Colorado, Boulder, Colorado.

Avrami, E., R. Mason, and M. de la Torre. 2000. Report on Research *In* Values and Heritage Conservation. Research Report, The Getty Conservation Institute, Los Angeles.

Banci, V. 1994. Wolverine. Pages 99–127 *In* L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, Editors. The Scientific Basis for Conserving Forest Carnivores American Marten, Fisher, Lynx, and Wolverine in the Western United States. U.S. Department of Agriculture Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-254, Fort Collins, Colorado.

Bannock County, Idaho (Bannock County). 2011. Bannock County Emergency Operations Plan. October 2011.

Bayne, E.M., L. Habib, and S. Boutin. 2008. Impacts of chronic anthropogenic noise from energy-sector activity on abundance of songbirds in the boreal forest. Conservation Biology 22(5): 1186-1193.

Bedekar, V., Morway, E.D., Langevin, C.D., and Tonkin, M., 2016, MT3D-USGS version 1: A U.S. Geological Survey release of MT3DMS updated with new and expanded transport capabilities for use with MODFLOW: U.S. Geological Survey Techniques and Methods 6-A53, 69 p., http://dx.doi.org/10.3133/tm6A53

Berry, M.E. and C.E. Bock. 1998. Effects of habitat and landscape characteristics on avian breeding distributions in Colorado foothills shrub. The Southwestern Naturalist 43(4): 453-461.

Braun, C. E. 1998. Sage grouse declines in western North America: what are the problems? Proceedings of the Western Association of State Fish and Wildlife Agencies. 78: 139–156.

United States Department of Commerce Bureau of Economic Analysis (BEA). 2014. CA25N: Total Full-time and Part-time Employment by NAICS Industry. Accessed March 24, 2015. http://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=5#reqid=70&step=30&isuri=1&7022=11&7023=7&7024=naics&7033=-1&7025=4&7026=16005,16007,16011,16029,16041,16077,56023&7027=2013&7001=711&7028=-1&7031=16000,56000&7040=-1&7083=levels&7029=33&7090=70

BEA. 2015. CA05N: Personal Income by Major Source and Earnings by NAICS Industry. Accessed May 22, 2015. http://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=5

BEA. 2016a. CA05: Personal Income by Major Source and Earnings by SIC Industry. Accessed February 15, 2016. http://www.bea.gov/iTable/iTable.cfm?ReqID=70&step=1&isuri=1&acrdn=5

BEA. 2016b. CA05N: Personal Income by Major Source and Earnings by NAICS Industry. Accessed February 15, 2016. http://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=5

BEA. 2017. U.S. Department of Commerce, Bureau of Economic Analysis (BEA). 2017. Regional Input-Output Modeling System (RIMS II) Multipliers (2007/2015).

Beck, W. 2011. Draft Vegetation Types Key; Caribou Zone. Version 1b Revised December 14, 2011. Caribou-Targhee National Forest.

Beck, W. 2017. East Smoky Supplemental Vegetation Report. Prepared for the Soda Springs Ranger District, Caribou-Targhee National Forest. July.

Binford, L. R. 1980. Willow Smoke and Dogs' Tails: Hunter-Gatherer Settlement Systems and Archaeological Site Formation. American Antiquity 45: 4-20.

Blakney, J.R., J. L. Loxterman, and E.R. Keeley. 2014. Range-wide Comparisons of Northern Leatherside Chub Populations Reveal Historical and Contemporary Patterns of Genetic Variation. Conservation Genetics 15: 757-770.

Bureau of Land Management (BLM). 1981. Southeastern Idaho Cultural Resources Overview: Burley and Idaho Falls Districts. U.S. Department of the Interior, Bureau of Land Management, Idaho.

BLM. 1986. Visual Resource Inventory. BLM Manual Handbook 8410-1.

BLM. 1996. Acid Rock Drainage Policy for Activities Authorized under CFR 3802/3809. Instruction Memorandum no. 96-79, April 2, 1996.

BLM. 1997. Idaho Standards for Rangeland Health and Guidelines for Livestock Grazing Management. August 1997.

BLM. 1998. BLM Manual Section 8270, Paleontological Resource Management. July 13, 1998.

BLM. 2000. Final Environmental Impact Statement, Dry Valley Mine - South Extension Project.

BLM. 2007a. Documentation of Land Use Plan Conformance and NEPA Adequacy (DNA). Federal Phosphate Lease I-012890 – Minor Modification to existing Smoky Canyon Mine Plan and Reclamation Plan, Panels A, B, and C. Draft. April.

BLM. 2007b. Instruction Memorandum-009, Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands. October 15, 2007.

BLM. 2008a. Documentation of Land Use Plan Conformance and NEPA Adequacy (DNA). Federal Phosphate Leases I-01289 and I-26843 - Minor Modification to existing Smoky Canyon Mine, Mine & Reclamation Plan, Panels A, B and C. August.

BLM. 2008b. Final EIS for the Pinedale Field Office. Proposed Resource Management Plan. Appendix 22 – Probable Fossil Yield classification. August 2008.

BLM. 2010a. Smoky Canyon Mine Panel B Modification, IDI-012890, IDI-26843. Environmental Assessment # DOI-BLM-ID-I000-2010-0001-EA. March.

BLM. 2010b. FONSI/Decision Record for Environmental Assessment # DOI-BLM-ID-I000-2010-0001-EA. Smoky Canyon Mine Panel B Modification, IDI-012890, IDI-26843.

BLM. 2010c. BLM Pocatello Idaho Land Use BMP Examples. Appendix C: Guidelines/Techniques/Practices. April.

BLM. 2010d. Proposed Resource Management Plan and Final Environmental Impact Statement. April 2010. Available online at: http://www.blm.gov/id/st/en/fo/pocatello/planning/pocatello_resource.html

BLM. 2010e. Memorandum of Understanding Between the U.S. Department of Interior Bureau of Land Management and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds. BLM MOU WO-230-2010-04.

BLM. 2011. Environmental Impact Statement Blackfoot Bridge Mine. ID-320-2006-EIS-1553U.S. Department of Interior, BLM. Pocatello Field Office, Pocatello, Idaho.

BLM. 2012. Record of Decision and Approved Pocatello Resource Area Resource Management Plan.

BLM. 2013a. Bond Requirements for Phosphate Mining Operations Memorandum. Idaho State Director. September 10, 2013.

BLM. 2013b. Documentation of Land Use Plan Conformance and NEPA Adequacy for the Husky Exploration additional groundwater wells in the Dry Valley Area. DOI-BLM-ID-020-2013-0038-DNA.

BLM. 2015a. Categorical Exclusion Documentation and Review. DOI-BLM-ID-I020_2015_0012_CX. February.

BLM. 2015b. Idaho and Southwestern Montana Greater Sage-Grouse Approved Resource Management Plan Amendment. September 2015.

BLM. 2017. ArcGIS Layer "PhosMine_SurfDisturb_v1" created 1/9/2017 by Brian Holmes, BLM GIS Specialist. Based upon 2015 NAIP imagery.

BLM and Office of Energy and Mineral Resources (OEMR). 2017. Memorandum of Understanding Between United States Department of the Interior (BLM) and Idaho Governor's Office of Energy and Mineral Resources (OEMR). September.

BLM and United States Forest Service (USFS). 1992. Final Environmental Assessment BLM #ID-030-03-06, J.R. Simplot Company, Smoky Canyon Phosphate Mine, Idaho, Phosphate Lease I-01890. Mine Plan Proposal, Panel D. Mine Plan Modification, United States Forest Service, Special Use Permit application. United States Department of the Interior, Bureau of Land Management, Pocatello Resource Area. United States Department of Agriculture, Forest Service, Soda Springs Ranger District, Montpelier Ranger District. November 9, 1992.

BLM and USFS. 1998. Caribou National Forest Phosphate Leasing Proposal for the Manning Creek and Dairy Syncline Tracts. Final EIS 980087. IDI-030-98-035.

BLM and USFS. 2000. Final Environmental Impact Statement, Dry Valley Mine, South Extension Project for FMC Corporation. U.S. Department of the Interior, Bureau of Land Management, Pocatello Resource Area. U.S. Department of Agriculture, Forest Service, Caribou National Forest.

BLM and USFS. 2002a. Supplemental Environmental Impact Statement: Smoky Canyon Mine, Panels B & C. U.S. Department of the Interior, Bureau of Land Management, Pocatello Field Office, Pocatello, Idaho. U.S. Department of Agriculture, Forest Service, Caribou National Forest.

BLM and USFS. 2002b. Record of Decision for the Supplemental Environmental Impact Statement: Smoky Canyon Mine, Panels B & C. U.S. Department of the Interior, Bureau of Land Management, Pocatello Field Office, Pocatello, Idaho. U.S. Department of Agriculture, Forest Service, Caribou National Forest.

BLM and USFS. 2007. Final Environmental Impact Statement: Smoky Canyon Mine, Panels F & G. U.S. Department of the Interior, Bureau of Land Management, Pocatello Field Office, Pocatello, Idaho. U.S. Department of Agriculture, Forest Service, Caribou National Forest.

BLM and USFS. 2014. Final Environmental Impact Statement Smoky Canyon Mine, Panels F & G Lease and Mine Plan Modification Project. U.S. Department of the Interior, Bureau of Land Management, Pocatello Field Office, Pocatello, Idaho. U.S. Department of Agriculture, Forest Service, Caribou National Forest. December.

BLM and USFS. 2015. Idaho and Southwestern Montana Greater Sage-Grouse Proposed Land Use Plan Amendment and Final Environmental Impact Statement. Prepared by the U.S. Department of Interior, Bureau of Land Management and the U.S. Department of Agriculture, Forest Service. June.

BLM and USFS. 2016. Final Environmental Impact Statement. Rasmussen Valley Mine. Caribou County, Idaho. Prepared by the U.S. Department of Interior, Bureau of Land Management and the U.S. Department of Agriculture, Forest Service. September.

BLM, USFS, Idaho Department of Environmental Quality (IDEQ), and Idaho Department of Lands (IDL), Simplot. 2014. Memorandum of Understanding (MOU) for J.R. Simplot Company, Proposed Smoky Canyon East Panel Mine and Reclamation Plan Environmental Impact Statement. August.

Butler, R. B. 1978. A Guide to Understanding Idaho Archaeology: the Upper Snake and Salmon River Country. 3rd ed. A Special Publication of the Idaho Museum of Natural History, Pocatello, Idaho.

Butler, R. B. 1986. "Prehistory of the Snake and Salmon River area." Pp. 127 – 134 in Handbook of Native American Indians, eds. W. D'Azevedo and W. C. Sturtevant. Smithsonian Institute, Washington, DC.

Call & Nicolas, Inc. (CNI). 2017. East Smoky Canyon Mine Feasibility-Level Pit Slope Angle Geotechnical Study. Prepared for J.R. Simplot. February.

Canfield, J. E., L. J. Lyon, J. M. Hillis, and M. J. Thompson. 1999. Ungulates. Pages 6.1-6.25 in G. Joslin and H. Youmans, coordinators. Effects of Recreation on Rocky Mountain Wildlife: A Review for Montana. The Wildlife Society, Helena, Montana, USA.

Carambelas, K. R., K. N. Lupo, and D. N. Schmitt. 1994. The Cedar Field cultural survey: a Class III cultural resources inventory of 2.240 acres in Power County, Idaho. Desert West Research Technical Report no.102. U.S. Department of the Interior, Bureau of Land Management, Burley District, contract no. D910C30063. (Copies available from the Idaho Historic Preservation Office, Boise, Idaho.)

Caribou County Idaho. 2006. 2006 Comprehensive Plan Caribou County Idaho. Adopted by the Board of County Commissioners May 22, 2006.

Causey, J.D. and P.R. Moyle. 2001. Digital Database of Mining-Related Features at Selected Historic and Active Phosphate Mines, Bannock, Bear Lake, Bingham, and Caribou Counties, Idaho. USGS Open-File Report 01-142. Report and Digital Data.

Center for Climate Strategies (CCS). 2008. Idaho Greenhouse Gas Inventory and Reference Case Projections 1990-2020. Spring. Available online at: http://www.deq.idaho.gov/media/345475-ghg_inventory_idaho_sp08.pdf

Chadwick Ecological Consultants, Inc. (Chadwick). 2001. Aquatic Biological Baseline Study for the Supplemental Environmental Impact Statement, Smoky Canyon Phosphate Mine Panels B and C.

Chapman, P. M. 2007. Selenium Thresholds for Fish from Cold Freshwaters. Human and Ecological Risk Assessment, v. 13, p. 1.

Chapman P.M., W.J. Adams, M.L. Brooks, C.G. Delos, S.N. Luoma, W.A Maher, H.M. Ohlendorf, T.S. Presser and D.P. Shaw (eds). 2010. Ecological Assessment of Selenium in the Aquatic Environment. SETAC Press, Pensacola, FL, USA.

Clements, L. J., and H. S. Forbush, eds. 1970. History of Teton Valley, Idaho, by B.W. Driggs (1926). Eastern Idaho Publishing Company, Rexburg, Idaho.

Connelly, J. W., S. T. Knick, M. A. Schroeder, and S. J. Stiver. 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Western Association of Fish and Wildlife Agencies. Unpublished Report, Cheyenne, Wyoming.

Connor, J.L. 1980. Geology of the Sage Valley 7.5 Minute Quadrangle, Caribou County, Idaho and Lincoln County, Wyoming. April 1980.

Copeland, J. P, J. M. Peek, C. R. Groves, W. E. Meliquist, K. S. McKelvey, G. W. McDaniel, C. D. Long, and C. E. Harris. 2007. Seasonal Habitat Associations of the Wolverine in Central Idaho. Journal of Wildlife Management 71:2201-2212.

Covington, S. 2016. Personal communication [Comments sent to Stantec Consulting Services Inc. October 10 RE: Draft Fisheries and Aquatics Baseline Report. Fisheries Biologist, Formation Environmental].

Covington, S. 2017. Personal communication [March 6 Phone call between Sean Covington, Fisheries Biologist, Formation Environmental, and Dave Kikkert, Stantec Consulting Services Inc and follow up comments sent November 10 RE: Preliminary Draft EIS, fisheries and aquatics sections].

Cox, M., D. W. Lutz, T. Wasley, M. Fleming, B. B. Compton, T. Keegan, D. Stroud, S. Kilpatrick, K. Gray, J. Carlson, L. Carpenter, K. Urquhart, B. Johnson, and C. McLaughlin. 2009. Habitat Guidelines for Mule Deer: Intermountain West Ecoregion. Mule Deer Working Group, Western Association of Fish and Wildlife Agencies.

Cressman, E. R. 1964. Geology of the Georgetown Canyon-Snowdrift Mountain Area, Southeastern Idaho. Bulletin 1153. U.S. Department of the Interior, Geological Survey.

Dealy, J.E. 1985. Tree Basal Area as an Index of Thermal Cover for Elk. Research Note PNW-425. Pacific Northwest Forest and Range Experiment Station, Forest Service. Juneau, AK.

DeForest, D.K., K.V.Brix, J.R. Elphick, C.J. Rickwood, A.M.H. deBruyn, L.M. Tear, G. Gilron, S.A. Hughes, and W.J. Adams. 2017. Lentic, lotic, and sulfate-dependent waterborne selenium screening guidelines for freshwater systems. Environmental Toxicology and Chemistry 36: 2503-2513.

Deiss, C. 1949. Phosphate Deposits of the Deer Creek-Wells Canyon Area, Caribou County, Idaho. Bulletin 955-C. U.S. Department of the Interior, Geological Survey.

Department of the Interior (DOI). 1995. Departmental Manual, Series: Intergovernmental Relations, Part 512: American Indian and Alaska Native Programs, Chapter 2. Departmental Responsibilities for Indian Trust Resources. Effective Date: 12/01/95.

Derkey, Pamela Dunlap, Bea Johnston, Pamela Palmer, and R. David Hovland. 1984. Maps Showing Selected Geology and Phosphate Resources of the Sage Valley Quadrangle, Caribou County, Idaho. Mineral Investigations Resource Map MR-73. U.S. Department of the Interior, Geological Survey.

Dobrich, V. W. 2011. Northern Goshawk Population Monitoring and Inventory. Report 2011 USDA, Caribou-Targhee National Forest, Idaho Falls, Idaho.

Dobrich, V. W. 2012. Northern Goshawk Population Monitoring and Inventory: 2011 Final Report. Challenge Cost Share Project 08-CS-11041563-024. Caribou-Targhee National Forest, Idaho Falls, Idaho.

Dobrich, V. W. 2013. Northern Goshawk Population Monitoring and Inventory: 2012 Final Report. Challenge Cost Share Project 08-CS-11041563-024. Caribou-Targhee National Forest, Idaho Falls, Idaho.

Douglas, D. C., J. T. Ratti, R. A. Black, and J. R. Alldredge. 1992. Avian habitat associations in riparian zones of Idaho's Centennial Mountains. Wilson Bulletin 104:485-500.

Druss, Mark, Max Dahlstrom, Claudia Druss, and Steve Wright. 1981. Archeological Investigations in the Smoky Canyon Area, 1980. Idaho State University.

Druss, M., M. Dahlstrom, S. Wright, C. Hallock, and P. Rosa. 1979. Final report: intensive field study of archeological resources at drill locations and proposed roads. Smoky Canyon lease I-012890, J.R. Simplot Company, fall 1978. Idaho State University, Pocatello, Idaho.

Druss, M., M. Dahlstrom, C. Hallock, and S. Wright. 1980. Final report: stage I investigation & analysis of archeological resources in pit area, mill sites, & dump site. Smoky Canyon lease #I-012890, J.R. Simplot Company, summer and fall 1979. Idaho State University, Pocatello, Idaho.

Dubovsky, J. A. 2003. Trumpeter swan survey of the Rocky Mountain population winter 2003. U.S. Fish and Wildlife Service, Lakewood, Colorado.

Earthworks. 2017. Tests reveal increased selenium pollution in trout downstream of Smoky Canyon Mine. Online article published January 10, 2017. Accessed online June 28, 2017 at: https://www.earthworksaction.org/media/detail/tests_reveal_increased_selenium_pollution_in_trout_downstream_of_smoky_cany#.WVPhE-vyvRY

Endicott, C., L. Nelson, S. Opitz, A. Peterson, J. Burckhardt, S. Yekel, D. Garren., T.M. Koel, and B. Shepard. 2016. Range-wide status assessment for Yellowstone cutthroat trout (*Oncorhynchus clarkii bouvieri*): 2012. Report prepared for Yellowstone Cutthroat Trout Interagency Coordination Group.

Environmental Protection Agency (EPA). 1981a. Noise in America: The Extent of the Noise Problem. EPA/9-81-101. U.S. EPA, Washington, DC.

EPA. 1981b. Office of Noise Abatement and Control. 1981. Noise Effects Handbook EPA 500-9-82-106, National Association of Noise Control Officials, Fort Walton Beach, Florida.

EPA. 1994. Technical Document, Acid Mine Drainage Prediction. EPA/530/R/94/036. December 1994.

EPA. 2002. Draft Aquatic Life Criteria for Selenium – 2002. Prepared for United States Environmental Protection Agency, Office of Water, Washington, DC, by Great Lakes Environmental Center, Traverse City, MI.

EPA. 2004. Draft Aquatic Life Criteria for Selenium – 2004. U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology, Washington, D.C. November.

EPA. 2014. Determining Groundwater Exposure Point Concentrations. Office of Solid Waste and Emergency Response. OSWER Directive 9283.1-42. February.

EPA. 2016a. National Ambient Air Quality Standards (NAAQS). Retrieved March 17, 2016, from U.S. EPA Technology Transfer Network: https://www3.epa.gov/ttn/naaqs/criteria.html

EPA. 2016b. Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater 2016. U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology, Washington, D.C. June.

EPA. No Date (n.d.). National Emissions Inventory 2011. Retrieved September 28, 2015, from U.S. EPA Technology Transfer Network: https://www3.epa.gov/ttn/chief/net/2011inventory.html

Environmental Waste Management Program (EWMP). 2014. Culturally Significant Plants Database for the Shoshone – Bannock Tribes. June 2014.

Enviroscientists, Inc. 2015. Dairy Syncline Environmental Impact Statement Project Final Social Values and Economics Memorandum. Submitted to David Alderman – Bureau of Land Management. March 30, 2015.

Erickson, W.P., G.D. Johnson, and D.P. Young, Jr. 2005. A summary and comparison of bird mortality from anthropogenic causes with an emphasis on collisions. USDA Forest Service Gen. Tech. Rep. PSW-GTR-191. Pp 1029-1042.

Fahrig, Lenore. 2003. Effects of Habitat Fragmentation on Biodiversity. Annual Review of Ecology, Evolution, and Systematics. Vol. 34:487-515.

Federal Highway Administration (FHWA). 2006. Highway Construction Noise Handbook.

Ffolliott, P.F., and W.P. Clary. 1975. Differences in herbage-timber relationships on sedimentary and igneous soils in Arizona ponderosa pine stands. Progress in Agriculture in Arizona 17(3):6–7.

Field, C.B., V.R. Barros, K.J. Mach, M.D. Mastrandrea, M. van Aalst, W.N. Adger, D.J. Arent, J. Barnett, R. Betts, T.E. Bilir, J. Birkmann, J. Carmin, D.D. Chadee, A.J. Challinor, M. Chatterjee, W. Cramer, D.J. Davidson, Y.O. Estrada, J.-P. Gattuso, Y. Hijioka, O. Hoegh-Guldberg, H.Q. Huang, G.E. Insarov, R.N. Jones, R.S. Kovats, P. Romero-Lankao, J.N. Larsen, I.J. Losada, J.A. Marengo, R.F. McLean, L.O. Mearns, R. Mechler, J.F. Morton, I. Niang, T. Oki, J.M. Olwoch, M. Opondo, E.S. Poloczanska, H.-O. Pörtner, M.H. Redsteer, A. Reisinger, A. Revi, D.N. Schmidt, M.R. Shaw, W. Solecki, D.A. Stone, J.M.R. Stone, K.M. Strzepek, A.G. Suarez, P. Tschakert, R. Valentini, S. Vicuña, A. Villamizar, K.E. Vincent, R. Warren, L.L. White, T.J. Wilbanks, P.P. Wong, and G.W. Yohe, 2014: Technical summary. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 35-94.

Fiori, F. A. 1981. "Historic Themes." In Southeastern Idaho Cultural Resource Overview, Burley and Idaho Falls Districts, ed. J. Fanzen. Final Report R-2 196. Commonwealth Associates, Inc., Jackson, Michigan.

Fletcher, J.L., 1980. Effects of noise on wildlife: a review of relevant literature 1971-1978. Pages 611-620 in J.V. Tobias, G. Jansen, and W.D. Ward, eds. Proceedings of the Third International Congress on Noise as a Public Health Problem. Am. Speech-Language-Hearing Assoc., Rockville, MD.

Food and Agriculture Organization (FAO). 2015. World Fertilizer Trends and Outlook to 2018.

Formation Environmental LLC. (Formation Environmental). 2012. Fall 2011 Monitoring Activities and Results. Long-Term Aquatic Monitoring. Smoky Canyon Mine. Unpublished report prepared for the J.R. Simplot Company. March.

Formation Environmental. 2014. Final Smoky Canyon Mine Remedial Investigation/Feasibility Study. Remedial Investigation Report. Prepared for J.R. Simplot Company. September 2014.

Formation Environmental. 2016a. East Smoky Panel Mine Baseline Fishery and Aquatic Resources Report– Caribou County, Idaho. Unpublished report prepared for Stantec Consulting Services, Inc. February.

Formation Environmental. 2016b. Fall 2015 Monitoring Activities and Results. Long-Term Aquatic Monitoring. Smoky Canyon Mine. Unpublished report prepared for the J.R. Simplot Company. March.

Formation Environmental. 2016c. Unpublished fisheries and macroinvertebrate data provided to Stantec. December.

Formation Environmental. 2017. Proposed Site-Specific Selenium Criterion for Hoopes Spring, Sage Creek, and Crow Creek Near the Smoky Canyon Mine. Prepared for J.R. Simplot Company. Submitted to Idaho Department of Environmental Quality. August 2017.

Formation Environmental and Habitech, Inc. (Habitech). 2012. Proposed site-specific selenium criterion, Sage and Crow Creeks, Idaho. Unpublished report prepared for J.R. Simplot Company.

Franklin, A. B. 1988. Breeding biology of the great gray owl in Southeastern Idaho and Northwestern Wyoming. The Condor 90:689-696.

Frid, A. and L. Dill. 2002. Human-caused Disturbances Stimuli as a Form of Predation Risk. Conservation Ecology. Vol. 6, No. 1.

Fryer, Janet L. 2002. Pinus albicaulis. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). [May 16, 2012]. Available online at: http://www.fs.fed.us/database/feis/

Gabler, K. I., L. T., Heady, and J. W. Laundre. 2001. A habitat suitability model for pygmy rabbits in southeastern Idaho. Western North American Naturalist 61:480-489.

Gehr, E. A., E. Lee, G. Johnson, J. D. Merritt, and S. Nelson. 1982. Southwestern Idaho class I cultural resources overview. U.S. Department of the Interior, Bureau of Land Management, Boise and Shoshone District, Idaho.

Gillan, J.K., E.K. Strand, J.W. Karl, K.P. Reese, T. Laning. 2013. "Using spatial statistics and point-pattern simulations to assess the spatial dependency between Greater Sage-Grouse and anthropogenic features." Wildlife Society Bulletin 37:301-310.

Gillerman, V.S. and G.H. Bennett. 2007. Idaho Mining and Exploration. Mining Engineering. Vol. 60(5). Pp. 84-88.

Goodyear, A. C. 1979. A hypothesis for the use of cryptocrystalline raw materials among Paleo-Indian groups of North America. Research Manuscript Series 156. South Carolina Institute of Archaeology and Anthropology, Columbia, South Carolina.

Grafe, C.S., ed. 2002. Idaho Small Stream Ecological Assessment Framework: An Integrated Approach. Idaho Department of Environmental Quality; Boise, Idaho.

Grauch, R.I., Desborough, G.A., Meeker, G.P., Foster, A.L., Tysdal, R.G., Herring, J.R., Lowers, H.A., Ball, B.A., Zielinski, R.A. and Johnson, E.A., 2004. Petrogenesis and Mineralogic Residence of Selected Elements in the spect Peak Phosphatic Shale Member of the Permian Phosphoria Formation, Southeast Idaho. In: Life Cycle of the Phosphoria Formation: From Deposition to Post-Mining Environment, Hein, James R., ed. p. 189-226.

Groves, C. R., B. Butterfield, A. Lippincott, B. Csuti, and J. M. Scott. 1997. Atlas of Idaho's wildlife. A cooperative project of IDFG Idaho Conservation Data Center, The Nature Conservancy, University of Idaho and U.S. Geological Survey. Idaho Department of Fish and Game, Boise, Idaho.

Gruhn, R. 1961. The archaeology of Wilson Butte Cave, south-central Idaho. Occasional Papers of the Idaho State University Museum, vol. 6. Pocatello, Idaho.

Gruver and Keinath. 2003. Species Assessment for Townsend's Big-Eared Bat (*Corynorhinus Plecotus townsendi*) in Wyoming. Prepared for BLM Wyoming State Office. Cheyenne, Wyoming. 63 pages.

Habib, L., E.M. Bayne, and S. Boutin. 2007. Chronic industrial noise affects pairing success and age structure of ovenbirds (*Seiurus aurocapilla*). Journal of Applied Ecology 44: 176-184.

Hamilton, S. J. 2004. Review of selenium toxicity in the aquatic food chain. Science of the Total Environment, v. 326, pp. 1-31.

Hamilton S. J.; Buhl, K. J. and Lamothe, P. J. 2004. Selenium and other trace elements in water, sediment, aquatic plants, aquatic invertebrates, and fish from streams in southeast Idaho near phosphate mining, pp. 483 526 in Life Cycle of the Phosphoria Formation: From Deposition to Post-Mining Environment, ed., J. R. Hein, v. 8 of Handbook of Exploration and Environmental Geochemistry, ed., M. Hale., Elsevier B.V., Amsterdam.

Hansen, A.J., W.C. McComb, R. Vega, M. Raphael, and M. Hunter. 1995. Bird habitat relationships in natural and managed forests in the West Cascades of Oregon. Ecological Applications 5:555–569.

Hansley, P. L. and G. R. Beauvais. 2004. Species assessment for Brewer's sparrow in Wyoming. Prepared for U.S. Bureau of Land Management, Cheyenne, Wyoming.

Harvey, B. C., R. J. Nakamoto, and J. L. White. 2006. Reduced streamflow lowers dry-season growth of rainbow trout in a small stream. Transactions of the American Fisheries Society 135:998-1005.

Hayward, G. D. 1994. The flammulated, boreal, and great gray owl assessments. Chapter 1 *In* Hayward, G. D. and J. Verner, editors. Flammulated, Boreal, and Great Gray Owls in the United States: A Technical Conservation Assessment. USDA- FS GTR RM-253. U.S. Forest Service, Rocky Mountain Experimental Station, Fort Collins, Colorado.

Hedrick, D.W., J.A. Young, J.A.B. McArthur, and R. F. Keniston. 1968. Effects of Forest and Grazing Practices on Mixed Coniferous Forests of Northeastern Oregon. Agricultural Experiment Station, Oregon State University, Corvalis, Technical Bulletin 103.

Hogrefe, T. C., C. L. Bailey, P. D. Thompson, and B. Nadolski. 2005. Boreal toad (*Bufo boreas boreas*) conservation plan in the State of Utah. Utah Division of Wildlife Resources Publication Number 05-37, Salt Lake City, Utah.

Holm, J., Palace, V., Siwik, P., Sierling, G., Evans, R., Baron, C., Werner, J. and Wautier, K. 2005. Developmental effects of bioaccumulated selenium in eggs and larvae of two salmonid species. Environmental Toxicology and Chemistry, v. 24, pp. 2371-2381.

Holmer, R. N. 1986. "Common projectile points of the intermountain west." Pp. 89 – 115 in Anthropology of the Desert West: Essays in Honor of Jesse D. Jennings, eds. C. J. Condie and D. D. Fowler. University of Utah Anthropological Papers, no.110. Salt Lake City, Utah.

Homer, C. G. 1998. Idaho/western Wyoming landcover classification report and metadata. Department of Geography and Earth Resources. Utah State University, Logan, Utah.

HydroGeo Group (HGG). 2015. Plan of Study for Numerical Modeling, East Smoky Panel, Smoky Canyon Mine. Caribou, County, Idaho. October.

HGG. 2016a. Technical Memorandum: Revised Conceptual Site Model and Request to Modify the Numerical Model Domain, East Smoky Panel of the Smoky Canyon Mine. August 2016.

HGG. 2016b. Technical Memorandum: Numerical Model Development & Calibration, East Smoky Panel of the Smoky Canyon Mine. November 25, 2016.

HGG. 2018. Technical Memorandum: East Smoky Panel of the Smoky Canyon Mine, Numerical Modeling Report. Final. January.

Idaho Cooperative Fish and Wildlife Research Unit (ICFWRU). 2000. Idaho gap analysis project 2. University of Idaho Web Site. Accessed February 1, 2014 at: http://www.wildlife.uidaho.edu/data.htm.

Idaho Department of Environmental Quality (IDEQ). 2004. Final Area Wide Risk Management Plan: Removal Action Goals and Objectives, and Action Levels for Addressing Releases and Impacts from Historic Phosphate Mining Operations in Southeast Idaho. February.

IDEQ. 2006. 2006 Selenium Project, Southeast Idaho Phosphate Mining Resource Area, Water Quality Sampling for Metals - Blackfoot River and Tributaries (HUC 17040207), Selected Bear River Tributaries (HUC 16010201), and Selected Salt River Tributaries (HUC 1704105), May 2006.

IDEQ. 2008. Greenhouse Gas Inventory and Reference Gas Projections 1990-2020. Center for Climate Strategies. Spring 2008.

IDEQ. 2010. Annual Ambient Air Quality Monitoring Network Plan. July 1.

IDEQ. 2012a. Annual Ambient Air Quality Monitoring Network Plan. July 1.

IDEQ. 2012b. Air Quality Permit to Construct. J.R. Simplot Company Smoky Canyon Mine. Permit Number P-2012.0012. May 25, 2012.

IDEQ. 2015a. Mining Point-of-Compliance Determination. Accessed on June 19, 2015 at: http://www.deq.idaho.gov/water-quality/ground-water/monitoring/points-of-compliance/.

IDEQ. 2015b. 2013 Air Quality Monitoring Data Summary. April 2015.

IDEQ. 2016. Water Body Assessment Guidance. 3rd Edition. Prepared by IDEQ Water Quality Division, Boise, Idaho. October.

IDEQ. 2017a. Idaho's 2014 Integrated Report. Final. Boise, Idaho. February.

IDEQ. 2017b. Salt River Subbasin Assessment and Total Maximum Daily Loads. Final. Prepared by Hannah Harris, IDEQ Pocatello Regional Office August.

IDEQ. 2017c. Supplement to Salt River Subbasin Assessment and Total Maximum Daily Loads: Development of Sediment Wasteload Allocations for the Smoky Canyon Mine Using Multiple Non-Linear Regression Equations for Ungaged Streams and Rivers in Idaho. June.

Idaho Department of Fish and Game (IDFG). 2005a. Idaho Comprehensive Wildlife Conservation Strategy. Idaho Conservation Data Center, Idaho Department of Fish and Game, Boise, Idaho. Accessed February 1, 2014 at: http://fishandgame.idaho.gov/public/wildlife/cwcs/.

IDFG. 2005b. Columbia Spotted Frog (populations south of the Snake River). Fact Sheet. September. Available online at: https://fishandgame.idaho.gov/ifwis/cwcs/pdf/Columbia%20Spotted%20Frog%20(populations%20south%20of%20the%20Snake%20River).pdf.

IDFG. 2008. Idaho Mule Deer Management Plan 2008 – 2017. Boise, Idaho. March 2008.

IDFG. 2010. Elk progress report. July 1, 2008 to June 30, 2009. Project W-170-R-33. Compiled and edited by J. Rachael, State Game Manager. Idaho Department of Fish and Game, Boise, Idaho.

IDFG. 2011. Annual report: mule deer, July 1, 2010-June 30, 2011. Idaho Department of Fish and Game, Boise, Idaho.

IDFG. 2013a. List of state listed species. Accessed February 1, 2014 at: https://fishandgame.idaho.gov/ifwis/portal/page/species-status-lists.

IDFG. 2013b. Idaho Fish and Game Species Catalog, observation of Lynx (Lynx canadensis) reported January 25, 2013 – 1:43 pm by idfg-aschmidt. Accessed May 17, 2016 at: https://idfg.idaho.gov/species/observation/503243.

IDFG. 2014a. Idaho Fish and Wildlife Information System, Species Diversity Database, Idaho Natural Heritage Data, Boise, Idaho.

IDFG. 2014b. Idaho elk management plan, 2014-2024. Idaho Department of Fish and Game, Boise, Idaho. Accessed July 15 at: http://fishandgame.idaho.gov/public/wildlife/planElk.pdf.

IDFG. 2017. Long-term monitoring data for southeast Idaho. Unpublished data provided by Idaho Game and Fish Department.

IDFG and Nez Perce Tribe. 2014. 2013 Idaho wolf monitoring progress report. Idaho Department of Fish and Game, Boise, Idaho; Nez Perce Tribe Wolf Recovery Project, Lapwai, Idaho.

Idaho Department of Labor. 2015a. Bannock County Workforce Trends. Accessed March 24, 2015. http://labor.idaho.gov/publications/lmi/pubs/BannockProfile.pdf .

Idaho Department of Labor. 2015b. Caribou County Workforce Trends. Accessed March 24, 2015. http://labor.idaho.gov/publications/lmi/pubs/CaribouProfile.pdf.

Idaho Department of Labor. 2015c. Power County Workforce Trends. Accessed March 24, 2015. http://labor.idaho.gov/publications/lmi/pubs/PowerProfile.pdf.

Idaho Department of Lands (IDL). 2017a. Rules Governing Exploration, Surface Mining, and Closure of Cyanidation Facilities. Accessed online December 5, 2017 at https://adminrules.idaho.gov/rules/current/20/0302.pdf.

IDL. 2017b. Idaho Statute Title 47 Mines and Mining Chapter 15 Surface Mining. Accessed only December 5, 2017 at https://legislature.idaho.gov/statutesrules/idstat/Title47/T47CH15/.

Idaho Department of Parks and Recreation. (IDPR). 2013. 2013-2017 Statewide Comprehensive Outdoor Recreation and Tourism Plan.

IDPR. 2014. Future Focus: 2015 – 2019 Strategic Plan for the Idaho Department of Parks and Recreation.

Idaho Museum of Natural History (IMNH). 2011. Digital atlas of Idaho: biology (mammals). Accessed February 1, 2014 at: http://imnh.isu.edu/digitalatlas/bio/mammal/mamfram.htm.

IMNH. 2017. Digital Atlas: Caribou County, Idaho. Accessed July 26, 2017 at: http://imnh.isu.edu/digitalatlas/counties/caribou/caribou.htm.

Idaho State Department of Education (ISDE). 2015. 2014-2015 Fall Enrollment Statistics: Enrollment by District and Charter School. Accessed March 24, 2015. http://www.sde.idaho.gov/site/statistics/fall_enrollment.htm.

Idaho State Historical Society (ISHS). 1971. “Site report: stage lines – Salt Lake – Montana.” Reference Series no. 147. Retrieved September 2004, from http://www.idahohistory.net/Reference%20Series/0147.doc.

ISHS. 1981a. “Site report – Soda Springs area.” Reference Series no. 654. Retrieved September 2004, from www.idahohistory.net/Reference%20Series/0654.doc.

ISHS. 1981b. “Site report: Caribou Mountain – Tincup Creek.” Reference Series no. 205. Retrieved September 2004, from www.idahohistory.net/Reference%20Series/0205.doc.

Intermountain West Joint Venture (IWJV). 2005. Coordinated implementation plan for bird conservation in Idaho. Accessed February 1, 2014 at: http://iwjv.org/6/iwjv-state-plans.html.

Iowa Department of Natural Resources. 2009. Water Quality Standards Review: Chloride, Sulfate and Total Dissolved Solids. Iowa Department of Natural Resources Consultation Package. February.

Jameson, D.A. 1967. The relationship of tree overstory and herbaceous understory vegetation. Journal of Range Management 20:247–249.

JBR Environmental Consultants, Inc. (JBR). 2000. Technical Report 8.0 Fisheries and Aquatics, Smoky Canyon Mine Panels B&C, SEIS, October.

JBR. 2006. Technical Memo regarding "Selenium Increases from dust Fallout at Panels F& G", July 12, 2006.

JBR. 2012. Dairy Syncline Mine Project, Final Baseline Technical Report, Wildlife Resources. April 2012. Prepared for J.R. Simplot, Pocatello, Idaho. Prepared by JBR, Sandy, Utah.

JBR. 2013. Panel G proposed lease and mine modification area, baseline data collection summary, wildlife resources. September 2013. Prepared for J.R. Simplot, Afton, Wyoming. Prepared by JBR. Sandy, Utah.

Jerde, C.L., A.R. Mahon, W. L. Chadderton, and D.M. Lodge. 2011. Sight-unseen detection of rare aquatic species using environmental DNA. Conservation Letters 4: 150-157.

Kappler, C. 1941. Un-ratified Indian Treaties of the United States. Government Printing Office. Washington.

Keeley, E.R., J.R. Blakney, and J.L. Loxterman. 2012. Distribution, Abundance, and Genetic Population Structure of Northern Leatherside Chub in the Snake River Basin of Idaho. Prepared for the U.S. Fish and Wildlife Service, Department of Biological Sciences, Idaho State University, Pocatello, Idaho.

Keinath, D. and M. McGee. 2005. Boreal toad (*Bufo boreas boreas*): a technical conservation assessment. U.S. Forest Service, Rocky Mountain Region.

Kelly, R. L. and L. C. Todd. 1988. Coming into the country: early Paleo-Indian hunting and mobility. American Antiquity 53: 231-244.

Knick, S.T. and J.T. Rotenberry. 2002. Effects of habitat fragmentation on passerine birds breeding in Intermountain shrubsteppe. Studies in Avian Biology 25: 130-140.

Koplin, J. R. 1969. The numerical response of woodpeckers to insect prey in a subalpine forest in Colorado. The Condor 71:436-438.

Kruse, C. G., W. A. Hubert, and F. J. Rahel. 2000. Status of Yellowstone cutthroat trout in Wyoming waters. North American Journal of Fisheries Management 20:693-705.

Kuck, L. 1984. Impacts of phosphate mining on mule deer, elk, and moose in southeast Idaho. Idaho Fish and Game Department, Boise, Idaho.

Leckenby, D.A., D.P. Sheehy, C.H. Nellis, R.J. Scherzinger, I.D. Luman, W. Elmore, J.C. Lemos, L. Doughty, and C.E. Trainer. 1982. Wildlife Habitats in Managed Rangelands, The Great Basin of Southeastern Oregon, Mule Deer. General Technical Report PNW-139. Pacific Northwest Forest and Range Experiment Station.

Lehman, R.N. 2001. Raptor electrocution on power lines: current issues and outlook. Wildlife Society Bulletin 29(3): 804-813.

Lemly, A.D. 1985. Toxicology of selenium in a freshwater reservoir: Implications for environmental hazard evalutaion and safety. Ecotoxicol. Environ. Safety. 10: 314-338.

Letourneau, P. D. 1992. Folsom raw material use on the southern plains. Paper presented at the 57th annual meeting of the Society for American Archaeology, Pittsburgh, Pennsylvania.

Lincoln County. 1998. Lincoln County Community Profile. Available from Lincoln County, Wyoming County Government.

Lohse, E. S. 1993. "Southeastern Idaho Native American prehistory and history." In Manual for Archaeological Analysis: Field and Laboratory Analysis Procedures. Department of Anthropology, Miscellaneous Paper no. 92-1 (revised), Idaho Museum of Natural History, Pocatello, Idaho.

Loss, S.R., T. Will, and P.P. Marra. 2014. Refining estimates of bird collision and electrocution mortality at power lines in the United States. PLOS One 9(7): e101565.

Lowell, W. R. 1952. Phosphatic rocks in the Deer Creek-Wells Canyon area, Idaho. Bulletin 982-A. U.S. Department of the Interior, Geological Survey.

Lutz, D.W., J.R. Heffelfinger, S.A. Tessmann, R.S. Gamo, and S. Siegel. 2011. Energy Development Guidelines for Mule Deer. Mule Deer Working Group, Western Association of Fish and Wildlife Agencies, USA.

Mabey, L. 2017. Personal communication [Email sent to Dave Kikkert, Stantec Consulting Services Inc. March 6 RE: East Smoky Baseline Report Fish.] Fisheries Biologist, USFS.

Mackowiak, C.L. and M.C. Amacher. 2003. Plant uptake of selenium in phosphatic shale deposits and mine waste rock dumps. Western Nutrient Management Conference 5: 136-148.

Mackowiak, C., M. Amacher, J. Hall, and J. Herring. 2004. Uptake of Selenium and other Contaminant Elements into Plants and Implications for Grazing Animals in Southeast Idaho. In Life Cycle of the Phosphoria Formation: From Deposition to Post-Mining Environment, Hein, James R., ed. p. 527-558.

Madsen, D. B. 1982. "Get it where the gettin's good: a variable model of Great Basin subsistence and settlement based on data from the eastern Great Basin." Pp. 207 – 226 in Man and Environment in the Great Basin, eds. D. B. Madsen and J. F. O'Connell. Society for American Archaeology (SAA) Paper no. 2. Washington, D.C.

Maffly, B. 2014. Are wolverines back in Utah? July 2. Salt Lake Tribune Online. Accessed July 3, 2014 at: http://www.sltrib.com/sltrib/news/58142331-78/wolverine-utah-species-wildlife.html.csp.

Mallea-Olaetxe, J. 2000. Speaking Through the Aspens: Basque Tree Carvings in California and Nevada. University of Nevada Press, Reno and Las Vegas.

Mancuso, M. 2003. Occurrence updates, field surveys, and monitoring for sensitive plant species in the Bear River Range, Caribou-Targhee National Forest. Idaho Department of Fish and Game, Boise, Idaho.

Mancuso, M. and R.K. Moseley. 1990. Field investigations of Astragalus jejunus (starveling milkvetch), Cryptantha breviflora (Uinta Basin cryptath) and Eriogonum brevicaule var. laxifolium (varying buckwheat) on the Caribou National Forest. Idaho Department of Fish and Game, Boise, Idaho.

Manning, A. and S. Deaver. 1992. "Ethnohistoric (aboriginal) resources." Pp. 4-1 – 4-32 in American Falls Reservoir Class I Inventory, vol.1 (draft), eds. J. S. Bruder, S. E. Burke, and D. L. Douglas. Research Paper no. 1. Dames and Moore Intermountain Cultural Resource Services, Boise, Idaho.

Mansfield, G.R. 1927. Geography, Geology, and Mineral Resources of Part of Southeastern Idaho: U.S. Department of the Interior, Geological Survey, Professional Paper 152.

Manville, A.M. 2005. Bird strikes and electrocutions at power lines, communication towers, and wind turbines: state of the art and state of the science – next steps toward mitigation. USDA Forest Service Gen. Tech. Rep. PSW-GTR-191. Pp 1051-1064.

Mariah Associates (Mariah). 1980. Baseline aquatic ecology report for the Smoky Canyon phosphate lease, southeast Idaho. Prepared for J.R. Simplot Company, March 1980.

Maxim Technologies, Inc. (Maxim). 2004a. Baseline technical report: wildlife resources. Manning and Deer Creek phosphate lease areas (panels F & G), Smoky Canyon Mine, Caribou County, Idaho. Prepared for J.R. Simplot Company, Pocatello, Idaho.

Maxim. 2004b. Baseline technical report: fisheries and aquatic resources. Manning and Deer Creek phosphate lease areas (panels F & G), Smoky Canyon Mine, Caribou County, Idaho. Prepared for J.R. Simplot Company, Pocatello, Idaho.

Maxim. 2004c. Final Baseline Technical Report: Land Use, Access, Recreation and Grazing. Manning and Deer Creek Phosphate Lease Areas (Panels F & G), Smoky Canyon Mine, Caribou County, Idaho. Prepared for J.R. Simplot Company, Pocatello, Idaho.

Mayo, A.L., Muller, A.B., and Ralston, D.R. 1985. Hydrogeochemistry of the Meade Thrust Allochthon, southeastern Idaho, USA, and its relevance to stratigraphic and structural groundwater flow control: Journal of Hydrology, v. 76, p. 27-61.

Mayo and Associates, LLC. 2016. Review of the Existing Conceptual Site Model and Recommended Changes, East Smoky Panel, Smoky Canyon Mine. Prepared for Stantec, Sandy UT. July 2016.

McClure, C.J.W., H.E. Ware, J. Carlisle, G. Kaltenecker, and J.R. Barber. 2013. An experimental investigation into the effects of traffic noise on distributions of birds: avoiding the phantom road. Proceedings of the Royal Society B 280: 20132290.

McKelvey, V. E. et al. 1959. The Phosphoria, Park City, and Shedhorn Formations in the Western Phosphate Field. Professional Paper 313-A. U.S. Department of the Interior, Geological Survey.

Meaney, C. and G. P. Beauvais. 2004. Species assessment for gray wolf in Wyoming. Prepared for U.S. Bureau of Land Management, Cheyenne, Wyoming. Accessed July 8, 2014 at: http://www.blm.gov/pgdata/etc/medialib/blm/wy/wildlife/animal-assessments.Par.50140.File.dat/GrayWolf.pdf.

Meatte, D. S. 1990. Prehistory of the western Snake River basin. Occasional Papers of the Idaho Museum of Natural History, no.35. Pocatello, Idaho.

Mech, L. D. 1989. Wolf population survival in an area of high road density. American Midland Naturalist 121:387-389.

Merrit, R.W. and K.W. Cummins. 1984. An introduction to the aquatic insects of North America. Second ed. Kendall/Hunt Publishing Company, Dubuque, Iowa, 722 pp.

Miller, R.F., and W.C. Krueger. 1976. Cattle use on summer foothill rangelands in northeastern Oregon. Journal of Range Management 29(5):367–371.

Mojica, E.K., B.D. Watts, J.T. Paul, S.T. Voss, and J. Pottie. 2009. Factors contributing to bald eagle electrocutions and line collisions on Aberdeen Proving Ground, Maryland. Journal of Raptor Research 43(1): 000.

Montgomery, K. M. and T. M. Cheney. 1967. Geology of the Stewart Flat Quadrangle, Caribou County, Idaho. Bulletin 1217. U.S. Department of the Interior, Geological Survey.

Morin, K. and Hutt, N. 1994. Observed Preferential Depletion of Neutralization Potential over Sulfide Minerals in Kinetic Tests: Site Specific Criteria for Safe NP/AP Ratios. In proceedings of the International Land Reclamation and Mine Drainage Conference, and Third International Conference on the Abatement of Acidic Drainage, Pittsburgh, PA, April 24-29, vol. 1, pp. 148-156.Moyle, P., and Piper, P., 2004. Western Phosphate Field – Depositional and Economic Deposit Models. In Life Cycle of the Phosphoria Formation: From Deposition to Post-Mining Environment, Hein, James R., ed. p. 575-598.

Moseley, R.K. 1996. Report on the conservation status of *Lesquerella paysonii* in Idaho. Idaho Department of Fish and Game, Boise, Idaho.

Mote, P., A. K. Snover, S. Capalbo, S. D. Eigenbrode, P. Glick, J. Littell, R. Raymondi, and S. Reeder. 2014. Ch. 21: Northwest. Climate Change Impacts in the United States: The Third National Climate Assessment. J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds. U.S. Global Change Research Program. 487-513.

Muller, A.B., and Mayo, A.L. 1983. Ground-water circulation in the Meade thrust Allochthon evaluated by radiocarbon techniques: Radiocarbon, v. 25, n. 2, p. 357-372.

Murphy, R. F., and Y. Murphy. 1986. "Northern Shoshone and Bannock." Pp. 284-307 in Handbook of Native American Indians: Great Basin, eds. W. D'Azevedo and W. C. Sturtevant. Smithsonian Institute, Washington, DC.

National Agricultural Statistics Service (NASS). 2012. 2012 Census of Agriculture. Volume 1, Chapter 2: County Level. Accessed May 15, 2014. http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/.

National Park Service (NPS). 1998. Assessment of Air Quality and Air Pollutant Impacts in National Parks of the Rocky Mountains and Northern Great Plains. August 1998.

NPS. 2003. 2000 Air Emissions Inventory, Grand Teton National Park, Wyoming. February.

NPS. 2013. 2011 Air Emissions Inventory, Craters of the Moon National Monument and Preserve, Idaho.

Nevada Governor's Sage-Grouse Conservation Team (NGSGCT). 2010. Nevada Energy and Infrastructure Development Standards to Conserve Greater Sage-Grouse Populations and their Habitats. April 2010.

NewFields. 2005. Final Site Investigation Report for Smoky Canyon Mine - Area A, Caribou County, Idaho. Prepared for J.R. Simplot Company. July 2005.

NewFields 2006. Technical Memorandum: Water Quality Monitoring Data Report, May – June 2006. Smoky Canyon Mine Area A. July 20, 2006.

NewFields. 2007. Technical Memorandum: Water Quality Monitoring Data Report, Fall 2006, Smoky Canyon Mine – Area A. January 29, 2007.

Niswonger, Richard G, Sorab Panday, and Motomu Ibaraki. 2011. MODFLOW-NWT, A Newton formulation for MODFLOW-2005. USGS Techniques and Methods Series, #6-A37. USGS Nevada Water Science Center. Oakleaf, J. K, D. L. Murray, J. R. Oakleaf, E. E. Bangs, C. M. Mack, D. W. Smith, J. A. Fontaine, M. D. Jimenez, T. J. Meier, and C. C. Niemeyer. 2006. Habitat selection by recolonizing wolves in the Northern Rocky Mountains of the United States. Journal of Wildlife Management, 70:554-563.

Oakleaf, John K., Dennis L. Murray, James R. Oakleaf, Edward E. Bangs, Curt M. Mack, Douglas W. Smith, Joseph A. Fontaine, Michael D. Jimenez, Thomas J. Meier, and Carter c. Niemeyer. 2006. Habitat Selection by Recolonizing Wolves in the Northern Rocky Mountains of the United States. Journal of Wildlife Management, 70(2):554-563.

Office of Natural Resources Revenue (ONRR). 2015. Statistical Information. Accessed March 24, 2015. http://statistics.onrr.gov/ReportTool.aspx.

Office of Natural Resources Revenue (ONRR). 2016. Statistical Information. Accessed October 12, 2016. http://statistics.onrr.gov/ReportTool.aspx.

Olson, D. 2012a. Trumpeter swan survey of the Rocky Mountain population, U.S. breeding segment, Fall 2012. U.S. Fish and Wildlife Service, Lakewood, Colorado.

Olson, D. 2012b. Trumpeter swan survey of the Rocky Mountain population, Winter 2012. U.S. Fish and Wildlife Service, Lakewood, Colorado.

Ortega, C.P. 2012. Effects of noise pollution on birds: A brief review of our knowledge. Ornithological Monographs 2012(74):6-22.

Overton, C.K., S.P. Wollrab, B.C. Roberts, and M.A. Radko. 1997. R1/R4 (Northern Intermountain Regions) Fish and Fish Habitat Standard Inventory Procedures Handbook. General Technical Report INT-GTR-346. U.S. Forest Service, Intermountain Research Station, Ogden, UT.

Pagano, Sandy Chynoweth. 2014a. An Intensive Level Cultural Resource Survey for the Proposed GW-29 Exploration Area, J. R. Simplot East Smoky Panel, Caribou County, Idaho. Caribou-Targhee National Forest Report No. CB-14-689 Sagebrush Consultants Cultural Resource Report No. 2053. Sagebrush Consultants, Ogden, Utah.

Pagano, Sandy Chynoweth. 2014b. A Class III Cultural Resource Inventory of Proposed Borrow Areas, Categorical Exclusion Sites, East Smoky Panel, Smoky Canyon Mine, Caribou County, Idaho. BLM Report No. 2014-PFO-15. Sagebrush Consultants Cultural Resource Report No. 2052. Sagebrush Consultants, Ogden, Utah.

Pagano, Sandy Chynoweth. 2014c. An Intensive Level Cultural Resource Survey for the Proposed GW-30 Groundwater Monitoring Well, J. R. Simplot East Smoky Panel, Caribou County, Idaho. Caribou-Targhee National Forest Report No. CB-15-694. BLM Report No. 2015-PFO-3. Sagebrush Consultants Cultural Resource Report No. 2064. Sagebrush Consultants, Ogden, Utah.

Pagano, Sandy Chynoweth. 2015. An Intensive Level Cultural Resource Survey For The Proposed J. R. Simplot East Smoky Panel, Smoky Canyon Mine, Caribou County, Idaho. Sagebrush Consultants, Ogden, Utah. Caribou-Targhee National Forest Report No. CB-15-692; BLM Report No. 2015-PFO-4; Sagebrush Consultants Cultural Resources Report No. 2050. February 4.

Paige, C. and S. A. Ritter. 1999. Birds in a sagebrush sea: managing sagebrush habitats for bird communities. Partners in Flight Western Working Group, Boise, Idaho.

Parker, P. L., and T. F King. 1998. Guidelines for Evaluating and Documenting Traditional Cultural Properties. National Register Bulletin 38. U.S. Department of the Interior, National Park Service, Interagency Resources Division. U.S. Government Printing Office, Washington D.C.

Perkins, J. M. and J. R. Peterson. 1997. Bat distribution in the juniper woodlands of the Idaho Owyhee Mountains, summer 1996. Idaho Department of Land Management Technical Bulletin #97-4.

Peterson, Steven. 2013. Economic Impacts of the Idaho Mining Association Member Firms. University of Idaho, December 16, 2013.

Pierson, E. D., M. C. Wackenhut, J. S. Altenbach, P. Bradley, P. Call, D. L. Genter, C. E. Harris, B. L. Keller, B. Lengus, L. Lewis, B. Luce, K. W. Navo, J. M. Perkins, S. Smith, and L. Welch. 1999. Species Conservation Assessment and Strategy for Townsend's Big-eared Bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Idaho Conservation Effort, Idaho Department of Fish and Game, Boise, Idaho.

Platts, W.S. and R.L. Nelson. 1988. Fluctuations in trout populations and their implications for land-use evaluation. North American Journal of Fisheries Management 8:333-345.

Power County. 2010. Power County Multi-Jurisdiction All Hazard Mitigation Plan. January 21, 2010.

Ralston, D.R., 1979. Hydrogeology of the Smoky Canyon Mine Site, A reconnaissance: unpublished consulting report, August 1979.

Ranere, A. J. 1971. Stratigraphy and stone tools from Meadow Canyon, eastern Idaho. Occasional Papers of the Idaho State University Museum, no.27.

Ravenholt, H.B., W.R. Glenn, and K.N. Larson. 1976. Soil Survey of Star Valley Area, Wyoming-Idaho, parts of Lincoln County, Wyoming, and Bonneville and Caribou Counties, Idaho.

Reijnen R and R. Foppen 1994. The effects of car traffic on breeding bird populations in woodland. Breeding dispersal of male willow warblers (*Phylloscopus trochilus*) in relation to the proximity of a highway. Journal of Applied Ecology 31: 95-101.

Reynolds, L., A. T. Herlihy, P. R. Kaufmann, S. V. Gregory, and R. M. Hughes. 2003. Electrofishing effort requirements for assessing species richness and biotic integrity in western Oregon streams. North American Journal of Fisheries Management 23:450-461.Richardson, C.T. and C.K. Miller. 1997. Recommendations for protecting raptors from human disturbance: a review. Wildlife Society Bulletin 25(3): 634-638.

Ringe, B. L., R. N. Holmer, and W. G. Reed. 1987. Current perspectives on the prehistory of the eastern Snake River plain. Paper presented at the 41st Annual Northwest Anthropological Conference, Tacoma, Washington.

Ritter, S. 2000. Idaho Partners in Flight: Idaho bird conservation plan. Version 1.0. Accessed February 1, 2014 online at: http://www.blm.gov/wildlife/plan/pl_id_10.pdf.

Rocky Mountain Elk Foundation (RMEF). 2015. M.A.P. Elk habitat project, winter and summer elk range. GIS Dataset, last modified February 18, 2015. Scale 1:250,000.

Rocky Mountain Research Station (RMRS), National Genomics Center for Wildlife and Fish Conservation. 2016. Preliminary eDNA results for northern leatherside chub. Email communication between Mike Young, RMRS Research Fisheries Biologist and Dave Kikkert, Stantec Environmental Scientist.

Rodhouse, T. J., E. Madison, K. Oelrich, and L. K. Garrett. 2009. Mammal inventory of City of Rocks National Reserve 2003. Upper Columbia Basin Network. Natural Resource Technical Report NPS/UCBN/NRTR – 2009/198. U.S. Park Service, Natural Resource Program Center. Fort Collins, Colorado.

RTP Environmental Associates, Inc. (RTP). 2015. Annual Monitoring Data Report. Simplot Smoky Canyon Mine. PSD-Preconstruction Air Quality and Meteorological Monitoring Program. Submitted to Idaho Department of Environmental Quality, Division of Air Quality. September 2015.

Ruediger, Bill, Jim Claar, Steve Gniadek, Bryon Holt, Lyle Lewis, Steve Mighton, Bob Naney, Gary Patton, Tony Rinaldi, Joel Trick, Anne Vandehey, Fred Wahl, Nancy Warren, Dick Wenger, and Al Williamson. 2000. Canada lynx conservation assessment and strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication #R1-00-53, Missoula, MT. 142 pp.

Sage Grouse National Technical Team (NTT). 2011. A Report on National Greater Sage-grouse Conservation Measures. December 21.

Sallabanks, R. 2006. Idaho bald eagle nest monitoring: 2006 annual report. Idaho Department of Fish and Game. Boise, Idaho. Accessed July 7, 2014 at: https://research.idfg.idaho.gov/wildlife/Wildlife%20Technical%20Reports/Forms/Show%20All%20Reports.aspx.

Sant, M. B. and D. L. Douglas. 1992. "Prehistoric resources." Pp. 3-2 – 3-47 in American Falls Reservoir Class I Inventory, vol.1 (draft), eds. J. S. Bruder, S. E. Burke, and D. L. Douglas. Dames and Moore, Intermountain Cultural Resource Services, Research Paper no.1. Submitted to Bureau of Reclamation, Boise, Idaho.

Schier, G.A., J.R. Jones, and R.P. Winokur. 1984. Vegetative Regeneration. Pages 29-33 in: DeByle, N.V. and R.P. Winokur, eds. Aspen: Ecology and Management in the Western United States. United States Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. General Technical Report RM-119. 294 pages.

Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Broderson, W.D. (editors). 2012. Field book for describing and sampling soils, Version 3.0. Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE.

Schroeder, M.A. 2010. Greater Sage-Grouse and Power Lines: Reasons for Concern. Washington Department of Fish and Wildlife. Bridgeport, Washington. 6 pages.

Shive, J.P., C.R. Peterson, and S.R. Burton. 2000. Occurrence, distribution, and relative abundance of amphibians and reptiles at the Smoky Canyon Mine Area, Caribou National Forest, Caribou County, Idaho.

Shoshone-Bannock Tribes. 1994. The policy of the Shoshone-Bannock tribes for management of Snake River Basin resources. November 1994.

Shoshone-Bannock Tribes. 2003. Comment letter in response to agency scoping for the Simplot Smoky Canyon Mine Panels F & G Project. Letter dated October 17, 2003.

Shoshone-Bannock Tribes. 2005. Draft: The Shoshone-Bannock Tribes' Position Paper Regarding the Transfer of Federal Lands. June 27, 2005. Shoshone-Bannock Tribes, Fort Hall, Idaho.

Shoshone-Bannock Tribes. 2016. Landing Page for the Shoshone-Bannock Tribal Website. Accessed October 20, 2016. http://www.shoshonebannocktribes.com/.

Simms, Steven R. 1990. Fremont transitions. Utah Archaeology 3: 1-18.

J.R. Simplot Company (Simplot). 2000. Smoky Canyon Mine Typical Cross Section (looking north) with text. August 2000.

Simplot. 2013. Mine and Reclamation Plan for East Smoky Panel, Federal Phosphate Leases I-012890, I-026843 and I-015259. Prepared for U.S. Department of Interior Bureau of Land Management, Pocatello Field Office and Idaho Department of Lands.

Simplot. 2015. Mine and Reclamation Plan Update for East Smoky Panel, Federal Phosphate Leases I-012890, I-026843 and I-015259. Prepared for U.S. Department of Interior Bureau of Land Management, Pocatello Field Office and Idaho Department of Lands.

Simplot. 2016a. Employment Data as of April 15, 2016; Excel spreadsheet provided by Simplot.

Simplot. 2016b. Excel spreadsheet titled "Simplot Employees_&_Expenditures".

Simplot. 2016c. Email from Lori Hamann, Simplot, to Greg Brown, Stantec Consulting Services Inc. showing property taxes paid in Idaho by Simplot in 2014 and 2015.

Simplot. 2016d. Email dated 10/14/16 from Lori Hamann, Simplot, to Greg Brown, Stantec Consulting Services Inc. showing royalty payments from the Smoky Canyon Mine between Fiscal Year End (2013-2016).

Simplot. 2017. East Smoky Mine Panel, Alternative 2: Modified Pit Shell. June.

Soil Survey Staff. 1993. Soil Survey Manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 2006. Major Land Resource Areas. USDA Agricultural Handbook 296. Accessed April 2015 via MLRA Explorer operated by Pennsylvania State University at: http://apps.cei.psu.edu/mlra/.

Soil Survey Staff. 2008. Geomorphic Description System, version 4.11. Natural Resources Conservation Service.

Soil Survey Staff. 2014a. Keys to Soil Taxonomy, Twelfth Edition. Natural Resources Conservation Service. United States Department of Agricultural.

Soil Survey Staff. 2014b. National Soil Information System (NASIS) interpretation "ENG: Construction Materials - Reclamation" with pH ranges updated for Caribou-Targhee National Forest, Idaho.

Soil Survey Staff. 2015. Official Soil Series Descriptions. Accessed September 2014. Natural Resource Conservation Service. U.S. Department of Agriculture. https://soilseries.sc.egov.usda.gov/.

Sommers, L. K., and F. A. Fiori. 1981. "Lifeways of nonnative groups." Pp. 201 – 220 in Southeastern Idaho Cultural Resource Overview Burley and Idaho Falls Districts: Final Report R-2 196, ed. J. Fanzen. Commonwealth Associates. Jackson, Michigan.

Squires, J.R. and P.L. Kennedy. 2006. Northern Goshawk Ecology: An Assessment of Current Knowledge and Information Needs for Conservation and Management. Pages 8-62 In Morrison, M.L., ed. The Northern Goshawk: A Technical Assessment of its Status, Ecology, and Management. Studies in Avian Biology No. 31. Cooper Ornithological Society, Camarillo, California. 340 pp.

Stantec Consulting Services Inc. (Stantec). 2015a. Public Scoping Summary Report for the Smoky Canyon Mine East Smoky Panel Mine EIS. July.

Stantec. 2015b. Order 2 Soil Survey for the East Smoky Panel Study Area. Smoky Canyon Mine, East Smoky Panel Mine EIS. December.

Stantec 2015c. Proposed Habitat Equivalency Analysis Plan of Study for the East Smoky Panel Mine EIS. February 2015.

Stantec. 2016a. Final Geology, Minerals, and Paleontology Technical Report. Smoky Canyon Mine, East Smoky Panel Mine EIS. January.

Stantec. 2016b. Final Air Resources Baseline Technical Report. Smoky Canyon Mine, East Smoky Panel Mine EIS. June.

Stantec. 2016c. Noise Technical Report. Smoky Canyon Mine, East Smoky Panel Mine EIS. January.

Stantec. 2016d. Water Resources Baseline Technical Report. Smoky Canyon Mine, East Smoky Panel Mine EIS. June.

Stantec. 2016e. Wildlife Resources Technical Report. Smoky Canyon Mine, East Smoky Panel Mine EIS. June.

Stantec. 2016f. Land Use, Range Resources, and Special Designations Technical Report. Smoky Canyon Mine, East Smoky Panel Mine EIS. September.

Stantec. 2016g. Recreation and Transportation Baseline Report. Smoky Canyon Mine, East Smoky Panel Mine EIS. July.

Stantec. 2016h. Visual Resources Baseline Technical Report. Smoky Canyon Mine, East Smoky Panel Mine EIS. September.

Stantec. 2016i. Socioeconomics and Environmental Justice Baseline Technical Report. Smoky Canyon Mine, East Smoky Panel Mine EIS. November.

Stantec. 2017a. Supplement to Water Resources Baseline Technical Report. East Smoky Panel Mine EIS. February.

Stantec. 2017b. Vegetation and Wetland Resources Technical Report Smoky Canyon Mine, East Smoky Panel Mine EIS. May.

Stantec. 2017c. Fisheries and Aquatic Resources Technical Report. Smoky Canyon Mine, East Smoky Panel Mine EIS. June.

Stantec 2017d. Preliminary East Smoky F&T Results. Memo from Brian Buck – Stantec to Kyle Free – BLM, dated May 17, 2017.

Stantec 2017e. Preliminary East Smoky F&T Results – Alternate Model. Memo from Brian Buck – Stantec to Kyle Free – BLM, dated June 5, 2017.

Stantec. 2017f. Unsaturated Flow Modeling for the East Smoky Panel Mine Proposed Action Cover. Smoky Canyon Mine, East Smoky Panel Mine EIS. March.

Stantec. 2017g. Source Term for the East Smoky Panel EIS Fate and Transport Modeling. Memo from Brian Buck – Stantec to Kyle Free – BLM, dated October 18, 2017.

Stantec 2017h. Draft East Smoky Panel Mine Habitat Equivalency Analysis Calculations and Results. April 12, 2017.

State Historic Preservation Office (SHPO). 2015. Determination of Significance and Effect. March 5, 2015.

Stewart, J. H. 1938. Basin-plateau aboriginal socio-political groups. Bulletin 120. Smithsonian Institution Bureau of American Ethnology.

Stonegate Agricom Ltd. 2017. Paris Hills Phosphate Project Description. Downloaded September 22, 2017 from http://www.stonegateagricom.com/s/ParisHills.asp.

Swanson, E. H. 1972. Birch Creek papers no.1: an archaeological reconnaissance in the Birch Creek valley of eastern Idaho. Occasional Papers of the Idaho State University Museum, no.13.

Swanson, E. H. 1974. The Snake River plain. Idaho Yesterdays 18: 2-14.

Tapia, L.A.B., P.F. Ffolliott, and D.P. Guertin. 1990. Herbage production-forest overstory relationships in two Arizona ponderosa pine forests. Journal of Range Management 43(1):25–28.

Tetra Tech. 2013. Vegetation and Wetlands Baseline Plan of Study for the Husky 1 North Dry Ridge Mine EIS Project. July 2013.

Townsend, Peter H. 2017. Hoopes Springs selenium concentration graph presented in Simplot/Formation Environmental comments on East Smoky Panel Mine PDEIS. November 2017.

TRC Environmental Corporation (TRC). 2008. Aquatic Monitoring Program for the Smoky Canyon Mine, Southeast Idaho: 2007 Results. Unpublished report prepared by TRC Environmental Corporation for the J.R. Simplot Company. February.

United States Census Bureau (U.S. Census). 2010. Profile of General Population and Housing Characteristics: 2010. Accessed April 16, 2014. http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk.

U.S. Census. 2015a. State & County Quick Facts: Bannock County, Idaho. Accessed May 25, 2015. http://quickfacts.census.gov/qfd/states/16/16005.html.

U.S. Census. 2015b. State & County Quick Facts: Caribou County, Idaho. Accessed May 25, 2015. http://quickfacts.census.gov/qfd/states/16/16029.html.

U.S. Census. 2015c. State & County Quick Facts: Lincoln County, Wyoming. Accessed May 25, 2015. http://quickfacts.census.gov/qfd/states/56/56023.html.

U.S. Census. 2015d. State & County Quick Facts: Power County, Idaho. Accessed May 25, 2015. http://quickfacts.census.gov/qfd/states/56/56023.html.

U.S. Census. 2016. Population Estimates. Accessed February 17, 2016. http://www.census.gov/popest/data/index.html.

United States Congress. 1868. Articles of a Treaty with the Shoshoni (Eastern Band) and Bannock Indians, made the third Day of July, 1868, at Fort Bridger, Utah Territory (Fort Bridger Treaty of 1868). United States Statutes at large, 40th Congress, 1867-1869, Volume 15 pp. 673-678.

U.S. Department of Agriculture (USDA). 1990. Soil survey of the Caribou National Forest, edited by John T Lott.

U.S. Forest Service (USFS). 1982. ROS Users Guide. Accessed December 3, 2015. http://www.fs.fed.us/cdt/carrying_capacity/rosguide_1982.pdf.

U.S. Forest Service (USFS). 1985. Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington. Publication No. R6-F&WL-192-1985. Pacific Northwest Region, Forest Service. Portland, OR.

USFS. 1995. Landscape Aesthetics: A Handbook for Scenery Management. Agriculture Handbook No. 701.

USFS. 2000a. 2000 cutthroat trout distributions survey report, Webster Creek. Unpublished report prepared by the Caribou-Targhee National Forest.

USFS. 2000b. 2000 cutthroat trout distributions survey report, Draney Creek. Unpublished report prepared by the Caribou-Targhee National Forest.

USFS. 2003a. Revised Forest Plan for the Caribou National Forest. U.S. Department of Agriculture. Idaho Falls, Idaho.

USFS. 2003b. Final Environmental Impact Statement for the Revised Forest Plan for the Caribou National Forest. U.S. Department of Agriculture. Idaho Falls, Idaho.

USFS. 2003c. Canada Lynx Linkage Areas for Northern Rockies Lynx Amendment Area. U.S. Forest Service. GIS dataset.

USFS. 2003d. 2003 cutthroat trout distributions survey report, Draney Creek. Unpublished report prepared by the Caribou-Targhee National Forest.

USFS. 2003e. Caribou Targhee National Forest 2002 – 2003 Monitoring Report. US Department of Agriculture, Forest Service, Caribou-Targhee National Forest, Idaho Falls, Idaho.

USFS. 2005a. Caribou National Forest, Travel Plan Final Environmental Impact Statement (EIS) (revised). U.S. Department of Agriculture, Idaho Falls, Idaho.

USFS. 2005b. Soda Springs Ranger District System and Non-System Roads Existing Conditions.

USFS. 2007. Final Environmental Impact Statement, Northern Rockies Lynx Management Direction. National Forests in Montana, and parts of Idaho, Wyoming, and Utah. March 2007.

USFS. 2008a. Roadless Area Conservation, National Forest Lands in Idaho Final Environmental Impact Statement.

USFS. 2008b. Memorandum of Understanding between the USDA Forest Service and the USFWS to promote the conservation of migratory birds. FS Agreement # 08-MU-1113-2400-264.

USFS. 2010. 2010 cutthroat trout distributions survey report, Draney Creek. Unpublished report prepared by the Caribou-Targhee National Forest, Montpelier Ranger District.

USFS. 2012. Idaho bald eagle midwinter bald eagle count. Unpublished data. January 10, 2012. USFS, Caribou-Targhee National Forest, Montpelier, Idaho.

USFS. 2013. Idaho bald eagle midwinter bald eagle count. Unpublished data. January 8, 2013. USFS, Caribou-Targhee National Forest, Montpelier, Idaho.

USFS. 2014. Idaho bald eagle midwinter bald eagle count. Unpublished data. January 9, 2014. USFS, Caribou-Targhee National Forest, Montpelier, Idaho.

USFS. 2015a. Greater Sage-grouse Record or Decision. Idaho and Southwest Montana, Nevada, Utah. September.

USFS. 2015b. Annual Operating Instructions for the Pole Draney Allotment. File Code 2210. May 8.

USFS. 2016. Welcome to the Caribou-Targhee National Forest. Accessed online April 4, 2016 at http://www.fs.usda.gov/main/ctnf/home

USFS. 2017a. Watershed Condition Framework, Watershed Condition and Prioritization Interactive Map Website. Accessed online November 27, 2017 at https://www.fs.fed.us/biology/watershed/condition_framework.html

USFS. 2017b. Caribou National Forest Erosion Tank Monitoring Network 30-Year Summary (1982-2012). Compiled by K. Green, CTNF Soil Scientist. April.

USFS, National Park Service, and USFWS. 2010. Federal Land Managers' Air Quality Related Values Work Group (FLAG): Phase I Report—Revised (2010). Natural Resource Report NPS/NRPC/NRR—2010/232. National Park Service, Denver, Colorado.

United States Fish and Wildlife Service (USFWS). 2009. Post-delisting monitoring plan for the bald eagle (*Haliaeetus leucocephalus*) in the contiguous 48 States. U.S. Fish and Wildlife Service, Divisions of Endangered Species and Migratory Birds and State Programs, Midwest Regional Office, Twin Cities, Minnesota.

USFWS. 2011. Fact sheet for leatherside chub. Last updated October 11, 2011.

USFWS. 2015. Endangered Species Program. Accessed online February 13, 2015 at: http://www.fws.gov/endangered/species/

USFWS, IDFG, Montana Fish, Wildlife & Parks, Nez Perce Tribe, NPS, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Wind River Tribes, Confederated Colville Tribes, Spokane Tribe of Indians, Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, Utah Department of Natural Resources, and U.S. Department of Agriculture Wildlife Services. 2016. Northern Rocky Mountain wolf recovery program 2015 interagency annual report. M. D. Jimenez and S. A. Becker (editors). USFWS, Ecological Services, Helena, Montana.

U.S. Geological Survey (USGS). 1999a. Fertilizers--Sustaining Global Food Supplies. Fact Sheet FS-155-99. U.S. Department of the Interior, Geological Survey. September 1999.

USGS. 1999b. Electrocution. In: Friend, M. and J.C. Franson, eds. Field Manual of Wildlife Diseases. USGS Biological Resources Division, Information and Technology Report 1999-001. Pages 357-360.

USGS. 2001. A history of phosphate mining in southeastern Idaho. Prepared by William H. Lee. Open-File Report 00-425. 2001.

USGS. 2015a. Earthquake Hazards Program – Seismic Zone. Obtained online on May 12, 2015 from http://earthquake.usgs.gov/hazards/designmaps/choosing.php.

USGS. 2015b. Earthquake Archives – Search feature. Obtained online on May 14, 2015 from http://earthquake.usgs.gov/earthquakes/search/.

USGS. 2016. Mineral Commodity Summaries 2016. U.S. Geological Survey, 202 p., http://dx.doi.org/10.3133/70140094.

USGS. 2017. Mineral Commodity Summaries – Phosphate. January.

Urban, D.L. and T.M. Smith. 1989. Microhabitat pattern and the structure of forest bird communities. American Naturalist 133:811–829.

Van Every, L. 2017. Personal communication [Comments sent to Stantec Consulting Services Inc. March 1 RE: IDEQ comments on East Smoky Panel Fisheries Baseline Report]. IDEQ Water Quality Manager.

Western Regional Climate Center (WRCC). 2015. Climate summary for Afton, Wyoming. Accessed April 3, 2015 at http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?wy0027.

WRCC. 2016a. Climate of Idaho, Retrieved March 16th, 2016, from Western Regional Climate Center: http://www.wrcc.dri.edu/narratives/idaho/.

WRCC. 2016b. Soda Springs Airport Monthly Climate Summary. Retrieved February 19, 2016 from Western Regional Climate Center: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?id8535.

Whetstone Associates. 2016. Final Preliminary Evaluation of Phase 2 Testing Data, East Smoky Panel Baseline Geochemistry Study. Prepared for U.S. Department of Interior Bureau of Land Management, Idaho Falls District, Pocatello Field Office and U.S. Department of Agriculture, United States Forest Service, Caribou-Targhee National Forest, Soda Springs Rangers District.

Whetstone Associates. 2017. Final East Smoky Panel Baseline Geochemistry Study. Prepared for U.S. Department of Interior Bureau of Land Management, Idaho Falls District, Pocatello Field Office and U.S. Department of Agriculture, United States Forest Service, Caribou-Targhee National Forest, Soda Springs Rangers District. Document 4191A.170306. March.

W.H. West & Associates. 2004. Wildland Fire Mitigation Plan Caribou County, Idaho. Idaho Falls, Idaho. Prepared for: Caribou County Commissioners.

Wilcox, T.M., K.S. McKelvey, M.K. Young, A.J. Sepulveda, B.B Shepard, S.F. Jane, A.R. Whiteley, W.H. Lowe, and M.K. Schwartz. 2016. Understanding environmental DNA detection probabilities: A case study using a stream-dwelling char *Salvelinus fontinalis*. Biological Conservation 194: 209-216.

Woods, R.F., D.R. Betters, and E.W. Mogren. 1982. Understory herbage production as a function of Rocky Mountain aspen stand density. Journal of Range Management 35(5):380–381.

Wyoming Department of Education (WDE). 2015. Wyoming School District Statistical Report Series #2: Fall Enrollment Summary by School by Grade for: 2014-15. Accessed March 24, 2015. https://portals.edu.wyoming.gov/Reports/Public/wde-reports-2012/public-reports/stat-2/fallenrollmentsummarybyschoolbygradeannual.

Wyoming Department of Environmental Quality (WDEQ). 2013. Wyoming Surface Water Quality Standards. In Chapter 1 of Water Quality Rules and Regulations.

Wyoming Department of Fire Prevention and Electrical Safety (WDFPES). 2013. Wyoming Fire Service Directory. Accessed June 20, 2012. wsfm.wyo.gov.

Wyoming Game and Fish Department (WGFD). 2011. State Wildlife Action Plan, 2010. Wyoming Game and Fish Department, Laramie, Wyoming.

Zlatnik, E. 1999. "*Bouteloua hirsuta*" In: Fire Effects Information System, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer), available online at http://www.fs.fed.us/database/feis/.

## 7.2 ACRONYMS AND ABBREVIATIONS

| ACRONYM/ABBREVIATION | DEFINITION |
|---|---|
| $\mu g/m^3$ | Micrograms Per Cubic Meter |
| ABA | Acid-Base Accounting |
| ABDTPA | Ammonium Bicarbonate-Diethylenetriaminepentaacetic Acid |
| ACGIH TLV | Association Advancing Occupational and Environmental Health threshold limit value |
| Agencies | Collectively, Lead and Cooperating Agencies |
| AGP | Acid Generating Potential |
| AIRFA | American Indian Religious Freedom Act |
| AIZ | Aquatic Influence Zone |
| AMSL | Above Mean Sea Level |
| ANFO | Ammonium Nitrate/Fuel Oil |
| ANP | Acid Neutralization Potential |
| AOC | Administrative Order on Consent |
| APE | Area of Potential Effect |
| AQRV | Air Quality Related Value |
| ARARs | Applicable or Relevant and Appropriate Requirements |
| ARD | Acid Rock Drainage |
| ARMP | Approved Resource Management Plan |
| ARMPA | Approved Resource Management Plan Amendment |
| ARPA | Archaeological Resources Protection Act |
| ATV | All-Terrain Vehicle |
| AUM | Animal Unit Month |
| AWC | Available Water Capacity |

| ACRONYM/ABBREVIATION | DEFINITION |
|---|---|
| BA | Biological Assessment |
| BAF | Bioaccumulation Factor |
| $BAF_{median\ whole\text{-}body}$ | BAF calculated as median of brown trout tissue concentrations/dissolved selenium concentrations |
| BCSD | Bannon County Sheriff Department |
| BCY | Bank Cubic Yards |
| BCT | Bonneville Cutthroat Trout |
| BEA | Bureau of Economic Analysis |
| bgs | Below ground surface |
| BIA | Bureau of Indian Affairs |
| BLM | Bureau of Land Management |
| BMP | Best Management Practice |
| BOD | Biological Oxygen Demand |
| B.P. | Before Present |
| BT | Brown Trout |
| BURP | Beneficial Use Reconnaissance Program |
| $C_{egg\text{-}ovary}$ | selenium concentration in brown trout egg and ovary tissue in mg/kg dw |
| $C_{tissue}$ | selenium concentration in benthic macroinvertebrate tissue in mg/kg dw |
| $C_{water}$ | Concentration of selenium dissolved in water (µg/L) |
| CAA | Clean Air Act |
| $CaCO^3$ | Calcium Carbonate |
| CCC | Criterion Continuous Concentration |
| CCS | Center for Climate Strategies |

| ACRONYM/ABBREVIATION | DEFINITION |
|---|---|
| CCSO | Caribou County Sheriff's Office |
| CEA | Cumulative Effects Area |
| CEMPP | Comprehensive Environmental Monitoring Program Plan |
| CEQ | Council on Environmental Quality |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act |
| CF | Conversion Factor |
| CFR | Code of Federal Regulations |
| cfs | Cubic Feet Per Second |
| $CH_4$ | Methane |
| cm | Centimeters |
| CMC | Criterion Maximum Concentration |
| CNF | Caribou National Forest |
| CO | Carbon Monoxide |
| $CO_2$ | Carbon Dioxide |
| $CO_2e$ | Carbon Dioxide Equivalent |
| COD | Chemical Oxygen Demand |
| COPC | Contaminant of Potential Concern |
| Corps | United States Army Corps of Engineers |
| CPD | Chubbuck Police Department |
| CTNF | Caribou-Targhee National Forest |
| CY | Cubic Yards |
| DAP | Diammonium Phosphate |
| dB | Decibel |

| ACRONYM/ABBREVIATION | DEFINITION |
|---|---|
| dBA | Decibel-A Weighted |
| dBA Lmax | Maximum dBA Level |
| dBA Lmin | Minimum dBA Level |
| DBH | Diameter at Breast Height |
| DFC | Desired Future Conditions |
| DNA | deoxyribonucleic acid |
| DOI | Department of the Interior |
| DPS | Distinct Population Segment |
| DSAY | Discounted Service Acre Year |
| dS/m | deciSiemens Per Meter |
| dw | dry weight |
| ECe | Electrical Conductivity |
| eDNA | Environmental DNA |
| EE/CA | Engineering Evaluations/Cost Analyses |
| EIS | Environmental Impact Statement |
| EF | Enrichment Function |
| EO | Executive Order |
| EPA | Environmental Protection Agency |
| EPHA | Environmental Protection and Health Act |
| EPM | Environmental Protection Measure |
| EPT | Ephemeroptera, Plecoptera, and Trichoptera |
| ESA | Endangered Species Act |
| EWMP | Environmental Waste Management Program |

| ACRONYM/ABBREVIATION | DEFINITION |
|---|---|
| F | Fahrenheit |
| FEIS | Final Environmental Impact Statement |
| FHA | Federal Housing Administration |
| FBR | Fluidized Bed Reactor |
| FR | Federal Register |
| FS | Feasibility Study |
| FSS | Forest Structural Stage |
| FHWA | Federal Highways Administration |
| G&G | Garret & Gould |
| GAP | gap analysis program |
| GHG | Greenhouse Gas |
| GHMA | General Habitat Management Area |
| GLO | General Land Office |
| GIS | Geographic Information System |
| GMCV | Genus Mean Chronic Value |
| gpm | Gallons Per Minute |
| GPS | Global Positioning System |
| GST | Growth Sample Tree |
| GWP | Global Warming Potential |
| HAP | Hazardous Air Pollutant |
| HBI | Hilsenhoff's Biotix Index |
| HDPE | High Density Polyethylene |
| HEA | Habitat Equivalency Analysis |

| ACRONYM/ABBREVIATION | DEFINITION |
|---|---|
| HGG | HydroGeo Group |
| HUC | Hydrologic Unit Code |
| ICFWRU | Idaho Cooperative Fish and Wildlife Research Unit |
| IDAPA | Idaho Administrative Procedures Act |
| IDEQ | Idaho Department of Environmental Quality |
| IDFG | Idaho Department of Fish and Game |
| IDL | Idaho Department of Lands |
| IDPR | Idaho Department of Parks and Recreation |
| IDWR | Idaho Department of Water Resources |
| IFWIS | Idaho Fish and Wildlife Information System |
| IGS | Idaho Geological Survey |
| IM | Instruction Memorandum |
| IMA | Idaho Mining Association |
| IMNH | Idaho Museum of Natural History |
| IRA | Inventoried Roadless Area |
| IPCC | Intergovernmental Panel on Climate Change |
| ISDE | Idaho State Department of Education |
| ISHS | Idaho State Historical Society |
| ISP | Idaho State Police |
| ISTC | Idaho State Tax Commission |
| ISU | Idaho State University |
| ISCST3 | Industrial Source Complex Short Term, Version 3 |
| IWJV | Intermountain West Joint Venture |

| ACRONYM/ABBREVIATION | DEFINITION |
|---|---|
| IWI | Index of Watershed Indicators |
| km | Kilometer |
| KOP | Key Observation Point |
| KPLA | Known Phosphate Lease Area |
| kV | Kilovolt |
| L/g | Liters per gram |
| Ldn | Day-Night Sound Level |
| Leq | Equivalent Sound Level |
| LfT[DW] | Downwind Octave-Band Sound Pressure |
| LCPHD | Lincoln County Public Health Department |
| LCSO | Lincoln County Sheriff's Office |
| LCY | Loose Cubic Yard |
| LP | Lodgepole Pine |
| LWD | Large Woody Debris |
| M | Modification |
| M&RP | Mine and Reclamation Plan |
| MBTA | Migratory Bird Treaty Act |
| MCA | Mixed Conifer and Aspen |
| MCL | Maximum Contaminant Level |
| MDL | Method Detection Limit |
| mg/kg | Milligrams Per Kilogram or parts per million |
| mg/L | Milligrams Per Liter |
| $mg/m^3$ | Milligram Per Cubic Meter |

| ACRONYM/ABBREVIATION | DEFINITION |
|---|---|
| MIS | Management Indicator Species |
| MM | Maximum Modification |
| mm | milligrams |
| mmhos/cm | milliMhos Per Centimeter |
| MOU | Memorandum of Understanding |
| MSHA | Mine Safety and Health Administration |
| NAAQS | National Ambient Air Quality Standards |
| NAICS | North American Industry Classification System |
| NASIS | National Soil Information System |
| NASS | National Agricultural Statistics Service |
| NEI | National Emissions Inventory |
| NEPA | National Environmental Policy Act |
| NFS | National Forest System |
| NHPA | National Historic Preservation Act |
| NNP | Net Neutralization Potential |
| NOI | Notice of Intent |
| $NO_x$ | Nitrogen Oxides |
| $NO_2$ | Nitrogen Dioxide |
| $N_2O$ | Nitrous Oxide |
| NPDES | National Pollution Discharge Elimination System |
| NRCS | Natural Resources Conservation Service |
| NRHP | National Register of Historic Places |
| NS | Not Sampled |

| ACRONYM/ABBREVIATION | DEFINITION |
|---|---|
| NTT | National Technical Team |
| ODA | Overburden Disposal Area |
| OEMR | Office of Energy and Mineral Resources |
| OHV | Off-Highway Vehicle |
| ONRR | Office of Natural Resources Revenue |
| OSHA | Occupational Safety and Health Administration |
| $O_3$ | Ozone |
| P | Preservation |
| Pb | Lead |
| PCSO | Power County Sheriff's Office |
| PFYC | Potential Fossil Yield Classification |
| PHMA | Priority Habitat Management Area |
| PPD | Pocatello Police Department |
| $PM_{2.5}$ | Particulate Matter 2.5 Microns |
| $PM_{10}$ | Particulate Matter 10 Microns |
| ppb | Parts Per Billion |
| ppbv | Parts Per Billion by Volume |
| ppm | Parts Per Million |
| PR | Partial Retention |
| Project | Smoky Canyon Mine, East Smoky Panel |
| PSD | Prevention of Significant Deterioration |
| PV | Pore Volume |
| Q/D | Concentration/Distance |

| ACRONYM/ABBREVIATION | DEFINITION |
| --- | --- |
| R | Retention |
| RA | Removal Action |
| RFP | Revised Forest Plan |
| RI | Remedial Investigation |
| RIMS II | Regional Input-Output Modeling System |
| RM | Roaded Modified |
| RMEF | Rocky Mountain Elk Foundation |
| RN | Roaded Natural |
| RO | Reverse Osmosis |
| ROD | Record of Decision |
| ROM | Run-of-Mine |
| ROS | Recreation Opportunity Spectrum |
| ROW | Right-of-Way |
| RRA | Runoff Recharge Area |
| RTP | Revised Travel Plan |
| SAF | Society of American Foresters |
| SAR | Sodium Adsorption Ratio |
| SCORTP | Statewide Comprehensive Outdoor Recreation and Tourism Plan |
| SEI | Streambank Erosion Inventory |
| SHI | Stream Habitat Index |
| SHI2 | Stream Habitat Index 2 |
| SHPO | State Historic Preservation Office |
| SI | Site Investigation |

| ACRONYM/ABBREVIATION | DEFINITION |
|---|---|
| Simplot | J. R. Simplot Company |
| SIO | Scenic Integrity Objective |
| SIPHD | Southeast Idaho Public Health Department |
| SMI | Stream Macroinvertebrate Index |
| SMI2 | Stream Macroinvertebrate Index 2 |
| SNOTEL | National Water and Climate Center's Snow Telemetry |
| $SO_2$ | Sulfur Dioxide |
| SPCC | Spill Prevention, Control, and Countermeasures |
| SPLP | Synthetic Precipitation Leach Procedure |
| SPNM | Semi-Primitive Non-Motorized |
| SPM | Semi-Primitive Motorized |
| SRI/CSE | Stream Reach Index/Channel Stability Evaluation |
| SSPD | Soda Springs Police Department |
| SSSC | Site-Specific Selenium Criterion |
| SUA | Special Use Authorization |
| SWPPP | Stormwater Pollution Prevention Plan |
| T&E | Threatened and Endangered |
| t $CaCO_3$/kt | Calcium Carbonate Per Kiloton |
| TCP | Traditional Cultural Property |
| TDS | Total Dissolved Solids |
| TEOM | Tapered Element Oscillating Method |
| TEPC | Threatened, Endangered, Proposed, and Candidate |
| TMDL | Total Maximum Daily Load |

| ACRONYM/ABBREVIATION | DEFINITION |
|---|---|
| TOC | Total Organic Carbon |
| TPA | Trees per Acre |
| TP2 | Tailings Pond 2 |
| TPY | tons per year |
| TR | Technical Report |
| TSS | Total Suspended Solids |
| TTF | Trophic Transfer Factor for benthic macroinvertebrate tissue |
| $TTF_{composite}$ | Trophic Transfer Factor for macroinvertebrates, sculpin, and trout |
| UCL | Upper Confidence Level |
| UISS | University of Idaho Seismic Station |
| U.S.C. | United States Code |
| USDA | United States Department of Agriculture |
| USFS | United States Forest Service |
| USFWS | United States Fish and Wildlife Service |
| USGCRP | U.S. Global Change Research Program |
| USGS | United States Geological Survey |
| VES | Visual Encounter Surveys |
| VFD | Volunteer Fire Department |
| VMS | Visual Management System |
| VOC | Volatile Organic Compound |
| VQO | Visual Quality Objective |
| VT | Vegetation Type |
| WCF | Watershed Condition Framework |

| ACRONYM/ABBREVIATION | DEFINITION |
|---|---|
| WDE | Wyoming Department of Education |
| WDFPES | Wyoming Department of Fire Prevention and Electrical Safety |
| WGFD | Wyoming Game and Fish Department |
| WHP | Wyoming Highway Patrol |
| WLA | Waste Load Allocation |
| WOUS | Waters of the United States |
| WPPA | Wet Process Phosphoric Acid |
| WRCC | Western Regional Climate Center |
| WTPP | Water Treatment Pilot Plant |
| YCT | Yellowstone Cutthroat Trout |

## 7.3 GLOSSARY

**Acid Rock Drainage (ARD)**. Water with pH less than 5, elevated TDS, SO4, and trace metal concentrations that result from the oxidation of acid generating sulfide minerals with subsequent dissolution and transport of the oxidation products.

**Aliquots**. Portions of a sample separated for individual analysis; subsamples.

**Allochthon**. A geological formation not formed in the region where found and moved to its present location by tectonic forces.

**Alluvial**. Pertaining to material or processes associated with transportation or deposition of soil and rock by flowing water (e.g., streams and rivers).

**Alluvium**. Soil and rock deposited by flowing water (e.g., streams and rivers); consists of unconsolidated deposits of sediment, such as silt, sand, and gravel.

**Ambient**. Surrounding, existing, background conditions.

**Animal Unit Month (AUM)**. A unit used in federal and state livestock grazing permits to mean the amount of forage (i.e., food) required for one animal unit. An animal unit refers to the equivalent of one mature cow.

**Anticline**. An arch of stratified rock in which the layers bend downward in opposite directions from the crest.

**Anthropogenic**. Of, relating to, or resulting from the influence of human beings on nature.

**Aquatic Influence Zones (AIZs)**. Defined by the National Forest as the areas between streams or water bodies and the adjacent upland area that have an influence on water quality.

**Best Management Practices (BMPs)**. Methods that have been determined to be the most effective and practical means of preventing or reducing non-point source pollution to help achieve water quality goals. They may also include vegetative and structural methods to control erosion and sedimentation.

**Biological Assessment**. Information prepared by or under the direction of the federal agency concerning listed species that may be present in the action area and the evaluation of potential effects of the action on such species and habitats. The purpose of the biological assessment is to evaluate the potential effects of the action on listed or proposed species or designated or proposed critical habitat and determine whether any such species and habitats are likely to be adversely affected by the action. Biological Assessments are conducted for major federal construction projects requiring an EIS.

**Bird Conservation Plan (BCP)**. Plans initiated by Partners in Flight to guide conservation and for birds.

**Beneficial Use Reconnaissance Program (BURP)**. A surface water monitoring program to monitor trends in water quality.

**Carbon Dioxide Equivalent (CO2e)**. A quantity that describes the amount of CO2, when measured over a specific time, that would have an impact on global warming potential.

**Cubic Feet per Second (cfs)**. Metric of water flow that describes a cubic foot of water that passing over a given point on a water body (i.e., stream or river).

**Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)**. A federal law that requires potentially responsible parties to fund remediation of releases of hazardous substances. Also known as "Superfund."

**Chert**. A hard, dense microcrystalline or cryptocrystalline sedimentary rock, consisting chiefly of interlocking crystals of quartz; it may contain amorphous silica (opal). It has conchoidal fracture and may be white or variously colored. Chert occurs principally as nodular or concretionary segregations, or nodules in limestone and dolomite, and less commonly as layered deposits, or bedded chert; it may be an organic or inorganic precipitate or a replacement product.

**Contaminants of Potential Concern (COPCs)**. A contaminant which may cause risk or adverse effects to humans or other plants and animals.

**Contrast (visual)**. The effect of a striking difference in form, line, color, or texture of the landscape features within the area being viewed.

**Critical (Crucial) Habitat/Range**. Habitat that is present in minimum amounts and is a determining factor for population maintenance and growth.

**Damage Zone**. The volume of deformed wall rocks around a fault surface that results from the initiation, propagation, interaction and build-up of slip along faults.

**Decibel-A Weighted (dBA)**. The sound pressure levels in decibels measured with a frequency weighing network corresponding to the A-scale on a standard sound level meter. The A-scale tends to suppress lower frequencies (e.g., below 1,000 Hz).

**Decibel (dB)**. One-tenth of a Bel is a measure on a logarithmic scale that indicates the ratio between two sound powers. A ratio of 2 in power corresponds to a difference of 3 decibels between two sounds. The decibel is the basic unit of sound measure.

**Desired Future Conditions (DFCs)**. A USFS term that describes what an area of NFS lands should be like after implementation of a particular management direction.

**Deterministic model**. A numerical model that is based on a single set of model parameters and predicts a single outcome; used for groundwater modeling as well as other subjects.

**Discounted Service Acre Year (DSAY)**. The basic unit of measurement for using the Habitat Equivalency Assessment is typically a discounted-service-acre-year (DSAY). A DSAY used in this EIS represents the value of all of the wildlife habitat services provided by one acre of the habitat in one year. Services for future years are discounted, placing a lower value on benefits that will take longer to accrue. Therefore, additional acres of habitat must be restored when restoration is delayed.

**Dissolution**. The process of dissolving.

**Distinct Population Segment (DPS)**. The designation of a taxonomic division of a species, as used under the Endangered Species Act.

**Environmental DNA (eDNA)**. Genetic material obtained directly from environmental samples (soil, sediment, water, etc.) without any obvious signs of biological source material, which in the case of determining presence or absence of a fish species. It can improve upon traditional electrofishing, which may have poor capture efficiency for non-game fish species.

**Electrical Conductivity (or Specific Conductance)**. The ability of a water or a soil-water paste to transmit electrical current, used to estimate ion concentration.

**Embeddedness**. The extent to which rocks (gravel, cobbles, and boulders) are buried by silt, sand, or mud on a stream bottom, used to assess aquatic habitat quality.

**Endangered Species**. Species in danger of extinction throughout all or a significant portion of its range.

**Engineering Evaluations/Cost Analyses (EE/CA)**. An evaluation of methods and alternatives for restoration or cleanup of the environment.

**Environmental Impact Statement (EIS)**. A document prepared under the National Environmental Policy Act that describes environmental effects of an action that may result in significant impacts.

**Environmental Protection Measures (EPMs)**. Standards used to protect the environment.

**Equivalent Sound Level (Leq)**. A term that describes the noise in the environment, as a value of sound for a specific duration.

**Fahrenheit (F)**. A metric of temperature.

**Fate and Transport**. Description of the movement of a contaminant through a groundwater system which may include the effects of dilution, dispersion, attenuation and various chemical reactions.

**Floodplain**. The low and relatively flat areas adjacent to rivers and streams. A 100-year floodplain is that area subject to a 1 percent or greater chance of flooding in any given year.

**Forage**. Vegetation used for food by wildlife, particularly big game wildlife and domestic livestock.

**Forbs**. Any herbaceous plant other than a grass.

**Game Species**. Animals commonly hunted for food or sport.

**Geographic Information Systems (GIS)**. A system that presents spatial geographic data.

**Graminoid**. Grasses, or more technically graminoids, are monocotyledonous, usually herbaceous plants with narrow leaves growing from the base. They include the "true grasses", of the family Poaceae, as well as the sedges and the rushes.

**Greenhouse Gases (GHGs)**. An atmospheric gas such as water vapor, CO2, methane, and ozone, that absorb and emits radiation.

**Grizzly**. In mining, a grating placed over the top of a chute or ore pass used to sort various sizes of rock or ore particles. Also, a bear.

**Habitat Equivalency Analysis (HEA)**. A quantitative ecological model used in this EIS to assess and disclose amounts of positive and negative impacts to wildlife habitat including, elimination of habitat by mining, restoration of habitat achieved through reclamation, benefits to habitat from any related mitigation proposed, and the final residual impacts that will occur to overall wildlife habitat after consideration of the positive and negative impacts to the habitat over time.

**High Density Polyethylene (HDPE)**. A product commonly used in the production of plastic bottles, piping, and geomembranes because of its high strength to density ratio.

**Hydraulic Conductivity**. A coefficient of proportionality describing the rate at which water can move through a permeable medium.

**Hydrologic Unit Code (HUC)**. A number that is used to identify a watershed.

**Instruction Memorandum (IM)**. Supplementary documents used by the BLM to provide specific policy guidance, interpret policies, and provide immediate instruction.

**Intermittent Stream**. Stream that flows only part of the time or during part of the year; some segments of the stream may flow year-round.

**Intermountain West Joint Venture (IWJV)**. A partnership to conserve bird habitats in the western United States.

**Kilometer (km)**. A unit that measures length equivalent to 0.621 miles.

**Known Phosphate Leasing Area**. A land area known to contain phosphate minerals subject to competitive leasing for federally owned phosphate under authority and direction of the Mineral Leasing Act.

**Land Use Plan**. The organized direction or management of the use of lands and their resources to best meet human needs over time, according to the land's capabilities. Under the Federal Land Policy and Management Act (FLPMA) and the Multiple Use Sustained Yield Act of 1960, BLM and USFS prepare land use plans that direct management of local public lands and resources for "multiple use and sustained yield".

**Limestone**. A sedimentary rock consisting chiefly of the mineral calcite (calcium carbonate), with or without magnesium carbonate. Common impurities include chert and clay. Limestone is the most important and widely distributed of the carbonate rock and is the consolidated equivalent of limy mud, calcareous sand, and/or shell fragments. It yields lime on calcination.

**Macroinvertebrate**. Organisms without backbones, which are visible to the eye without the aid of a microscope, and in this case are the aquatic larval stages of insects found in stream bed substrate.

**Management Prescriptions**. Includes desired conditions, standards, and goals that are specific to each forest type, as applied in USFS planning terminology. NFS lands are assigned various prescriptions that have different attributes and that require different management emphasis.

**Mesic**. Moist habitats associated with springs, seeps, and riparian areas.

**Memorandum of Understanding (MOU)**. A document describing an agreement of interaction between two or more parties.

**Milligrams per kilogram (mg/kg)**. A commonly used measure of concentration; equivalent to parts per million.

**Milligrams per liter (mg/L)**. A unit of mass in volume measurement.

**Migratory Bird Treaty Act (MBTA)**. A law that makes it unlawful to pursue, hunt, take, capture, kill, or sell birds such raptors and songbirds.

**Mine and Reclamation Plan (M&RP)**. A plan that describes the mining and reclamation activities of a mine.

**Mitigation**. Actions to avoid, minimize, reduce, eliminate, replace, or rectify the impact of a management practice.

**Morphology**. The study of form or structure. Used in this EIS in regard to stream channel morphology.

**Notice of Intent (NOI)**. A formal announcement from the federal government that an Environmental Impact Statement will be prepared.

**Off Highway Vehicle (OHV)**. Any vehicle that can drive off a paved or gravel road.

**Overburden**. Sub-economic or waste rock or soil that must be removed in order to recover the ore associated with a mineral deposit.

**Overburden Disposal Area (ODA)**. An area where overburden is placed and stored.

**Oxidation**. A geochemical process involving chemical and mineralogic changes to rock or soil materials to atmospheric oxygen and water. The process occurs naturally, but is accelerated by mining activity.

**Peak Flow**. The greatest flow attained during melting of winter snowpack or during a large precipitation event.

**Percolation Rate**. Movement of water through soil or similar material.

**Perennial Stream**. A stream that flows throughout the year and from source to mouth.

**Permeability**. The capacity of porous rock, sediment, or soil to transmit a fluid.

**pH**. The negative log10 of the hydrogen ion activity in solution; measure of acidity or alkalinity of a solution.

**Particulate Matter (PM)**. Small particles or liquid droplets that are in the air. Can also be known as Particle Pollution.

**PM2.5**. Particulate matter less than 2.5 microns in aerodynamic diameter.

**PM10**. Particulate matter less than 10 microns in aerodynamic diameter.

**Pore Volume (PV)**. The total volume of very small openings in a bed of adsorbent particles, in this case the volume of void in broken rock or soil that can be occupied by leachate.

**Prevention of Significant Deterioration (PSD)**. A permit program to prevent environmental impacts from large sources of air pollution.

**Raptor**. A bird of prey (e.g., eagles, hawks, falcons, and owls).

**Riparian**. Situated on or pertaining to the bank of a river, stream, or other body of water. Riparian is normally used to refer to plants of all types that grow along streams, rivers, or at spring and seep sites.

**Record of Decision (ROD)**. An official record that explains why a federal action was approved, based on alternatives and public comment assessed in a Final Environmental Impact Statement.

**Recreation Opportunity Spectrum (ROS)**. A system for managing opportunities for recreation, often on federal lands.

**Revised Forest Plan (RFP)**. A Plan that has been updated to reflect changes to an existing Forest land use plan. In this EIS it is the federal land use plan governing activities within the Caribou portion of the Caribou-Targhee National Forest.

**Resource Management Plan (RMP)**. Document that establishes direction for the use of resources to best meet the needs of humans over time, according to the resource potential or capability. In this EIS it is the federal land use plan governing activities within the BLM Pocatello Field Office.

**Roadless Area**. Natural or federal lands that are without roads.

**Run-of-Mine (ROM) Overburden**. Sub-economic rock mined from the phosphate deposit, which is and placed in surface dumps or as pit backfill.

**Salinity**. Measure of solute concentration, in grams per kilogram; "saltiness".

**Scenic Integrity Objective (SIO)**. Scenic integrity is how visually intact people perceive the landscape to be**.** A SIO is an objective that defines how visually intact the landscape should be.

**Scoping**. Procedures by which agencies solicit input from the public, other agencies, and Indian tribes, to determine the extent of analysis necessary for a proposed action, (i.e., the range of actions, alternatives, and impacts to be addressed; identification of significant issues related to a proposed action; and the depth of environmental analysis, data, and task assignments needed).

**Sediment Load**. The amount of sediment (sand, silt, and fine particles) carried by a stream or river.

**Seleniferous**. In the context of this EIS, this term describes a material, most generally shale, that contains selenium or other contaminants of potential environmental concern that may pose a risk of release to the environment, primarily to water and reclamation vegetation resources.

**Semi-primitive Motorized (SPM)**. Areas that are managed for a natural-looking environment, but vehicle assess is allowed on low standard roads and trails.

**Sensitive (as in Species)**. Those plant or animal species that are susceptible or vulnerable to activity impacts or habitat alterations.

**Shale**. A fine-grained detrital sedimentary rock, formed by the compaction of clay, silt, or mud. It has a finely laminated structure, which gives it a fissility along which the rock splits readily, especially on weathered surfaces. Shale is well indurated, but not as hard as argillite or slate. It may be red, brown, black, or gray.

**Significant**. As used in NEPA, requires consideration of both context and intensity. Context means that the significance of an action must be analyzed in several contexts such as society as a whole, and the affected region, interests, and locality. Intensity refers to the severity of impacts (40 CFR 1508.27).

**Sinuosity (of a stream)**. A stream channel's tendency to move back and forth across its floodplain in an S-shaped pattern, over time.

**Site Investigation (SI)**. An investigation to evaluate and report the nature and extent of contamination and fate and transport of contaminants associated with past mining practices, performed in accordance with requirements in an Administrative Order on Consent.

**State Implementation Plan (SIP)**. A Plan created by a state for compliance with the Clean Air Act at sites that are polluted.

**Stochastic Model**. A numerical model type whose approach is one where model parameters that are not well defined are varied randomly within a reasonable range based on known conditions, and the results from multiple model runs are analyzed statistically.

**Sodium Adsorption Ratio (SAR)**. Ratio of dissolved sodium to calcium and magnesium in water; provides a prediction of cation exchange reaction potential.

**Special Use Authorization (SUA)**. A permit that authorizes the use of or action on National Forest System lands.

**Split Estate**. Lands are those where the surface rights are in private or State of Idaho ownership and the mineral resources are owned and managed by the federal government.

**Storm Water Pollution Prevention Plan (SWPPP)**. A plan that is used to reduce pollutants entering waterbodies during storm (i.e., rain) events. Includes sources of pollution and control measures.

**Stream Habitat Index (SHI)**. An aquatic habitat index that includes 10 habitat measures indicative of water quality conditions.

**Stream Macroinvertebrate Index (SMI)**. An aquatic habitat index that includes 9 metric measures indicative of macroinvertebrate habitat.

**Student's *t*-Statistic**. In statistics, a method of testing hypotheses about the mean of a small sample drawn from a normally distributed population when the population standard deviation is unknown.

**Swell**. The increase in volume exhibited by certain soils and rocks on absorption of water; an enlarged place in an orebody.

**Taxa**. Plural of taxon, which is a group of one or more populations of an organism or organisms seen by taxonomists to form a unit.

**Threatened Species**. Any species of plant or animal which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

**Thrust Fault**. A low-angle reverse fault produced in rocks subjected to thrust.

**Total Suspended Particulate/Particles (TSP)**. Particulates less than 100 microns in diameter (Stokes equivalent diameter).

**Total Dissolved Solids (TDS)**. Total amount of dissolved material, organic or inorganic, contained in a sample of water.

**Ultimate Maximum Recovery**. A term specified in 43 CFR 3594.1 and defined in 43 CFR 3509.0-5 to mean that all portions of a leased Federal mineral deposit be mined, based on standard industry operating practices.

**Upper Confidence Limit (UCL)**. The value that when calculated for a random data set equals or exceeds the true mean a certain percentage of the time.

**Visual Quality Objective (VQO)**. A desired level of excellence based on physical and sociological characteristics of an area. Refers to degree of acceptable alteration of the characteristic landscape.

**Watershed**. Drainage basin for which surface water flows to a single point.

**Wetlands**. Areas inundated by surface water or groundwater with a frequency sufficient to support vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.

## 7.4 INDEX

# APPENDICES

# APPENDIX 4A

# CNF RFP AND BLM ARMP CONSISTENCY

# TABLE OF CONTENTS



## LIST OF TABLES

# APPENDIX 4A CNF RFP AND BLM ARMP CONSISTENCY

## 1. INTRODUCTION

**Chapter 4** presents the results of environmental impact analyses for the various resources that may be affected by the Proposed Action or Alternative 1 and described and disclosed direct and indirect changes in the human environment. The significance, intensity, and duration of effects are also disclosed.

This appendix is a continuation of assessing impacts. Specifically, it contains information related to compliance of the Proposed Action and Alternative 1 to the CNF RFP and the BLM ARMP. The relationship of this EIS to federal land management agency plans, including the RFP and ARMP, was described in **Section 1.5.1** of the EIS.

The CNF RFP (USFS 2003a) establishes forest-wide requirements that apply to - and regulate - future management activities. The USFS evaluates all proposed activities against these requirements (i.e., standards and guidelines). According to the RFP:

- *Standards are used to promote the achievement of the desired future condition and objectives and to assure compliance with laws, regulations, Executive Orders or policy direction established by the Forest Service. Standards are binding limitations on management activities that are within the authority of the Forest Service to enforce. A standard can also be expressed as a constraint on management activities or practices.*

- *Guidelines are used in the same way as standards but tend to be operationally flexible to respond to variations, such as changing site conditions or changed management circumstances. Guidelines are a preferred or advisable course of action, and they are expected to be carried out, unless site-specific analysis identifies a better approach.*

Because the Project involves split-estate lands where private land overlies BLM managed federal mineral estate, the Project would need to be in compliance with certain BLM ARMP goals, objectives, and actions for these lands.

The focus in the following tables apply to both the Proposed Action and Alternative 1, unless noted otherwise. In most cases where acres are provided, they apply to the Proposed Action, since Alternative 1 would result in approximately 78 acres less disturbance within essentially the same Project Area.

# 2. RESOURCES

RFP and ARMP compliance information is presented below in tables organized by resource and/or topic, by order in which resources appeared in **Chapter 4**. The relevant RFP standards and guidelines are presented, along with a discussion of whether or not the Project would be in compliance with the particular standard or guideline. The standards and guidelines for Drastically Disturbed Lands, including prescriptions in Category 8.2 that are specific to phosphate lease areas are also included in the table for the applicable resource. Some resources do not have standards and guidelines that are relevant to the Project; only those that do are included in the following sections. Similarly, tables are presented to address BLM compliance on split-estate lands for various resources.

## 2.1 Soil Resources

**Table 1** summarizes compliance with applicable standards and guidelines from the BLM ARMP with regard to soil resources under the Project.

**Table 1 Compliance with Applicable BLM ARMP Goals, Objectives, and Actions for Soil Resources**

| GOAL/OBJECTIVE/ACTION | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Action SW-1.1.1.** Appropriate management techniques, guidelines or practices (Appendix A) will be implemented to limit soil loss to an amount, generally 5 tons per acre per year (5 ton/acre/year) (Schertz 2006 as cited in BLM 2012) that will not affect its long-term quality, productivity or hydrological function. | Soil stockpiles would be protected from erosion by seeding and establishment of short-term vegetation cover. Incorporation of slash and vegetative materials into the growth medium during stripping would increase the organic matter content of the material and elevate the production potential.<br>Reclamation would entail placing a topsoil cover and revegetating disturbed areas. This would return topsoil to a productive resource use, and along with the accompanying grading and reestablishment of drainage patterns would conserve soil by reducing erosion potential. |
| **Action SW-1.1.2.** Reclamation of disturbed sites will be done as soon as conditions (e.g., soil moisture, weather) will support or promote success. | Under the Project reclamation of disturbed areas that are no longer required for active mining operations would be conducted concurrent with other mining operations. |

## 2.2 Vegetation Resources

**Table 2** summarizes compliance with applicable standards and guidelines from the CNF RFP (USFS 2003a) with regard to vegetation resources under the Project.

**Table 2 Compliance with Applicable CNF RFP Standards and Guidelines for Vegetation Resources under the Project**

| STANDARD OR GUIDELINE | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Vegetation Standard 2:** In each $5^{th}$ code HUC which has the ecological capability to produce forested vegetation, the combination of mature and old age classes (including old growth) shall be at least 20 percent of the forested acres. At least 15 percent of all the forested acres in the HUC are to meet or be actively managed to attain old-growth characteristics (RFP 3-19). | The existing CTNF vegetation GIS coverage in the two relevant HUCs show over 90% (97% and 94%) of the forested vegetation within mature or old age structural classes. All of the forested stands that would be impacted by the Project are in mature/old age classes. However, on-site inventory showed that no acres that currently meet Region Four "Old-growth" definitions would be impacted on USFS lands. Therefore, the Project would not negatively impact the distribution of forest age classes, and would be consistent with maintaining at least 20 percent mature/old age classes in the 5th code HUC that encompasses the analysis area. Because of the prevalence of mature/old aspen stands on the landscape, it is likely that at least 15 percent of the aspen forest in the watershed would still remain to be actively managed to attain old-growth characteristics under the Project. |
| **Vegetation Guideline 1:** Manage to reduce the decline of aspen and promote aspen regeneration and establishment. Provide protection from grazing where needed and consistent with management objectives. | The Proposed Action would result in the permanent loss of 521.4 acres of aspen forest. This permanent loss is not expected to impact aspen on a forest-wide scale, particularly given that stands in the Study Area are naturally patchy. In addition, Simplot would coordinate with the current permittee as needed to ensure that protection from grazing is provided. |
| **Vegetation Guideline 3:** For aspen and conifer types, acres classified as mature and old growth should be in blocks over 200 acres in size unless the natural patch size is smaller (a block can consist of a combination of mature and old-growth forest types). Within these blocks:<br>• Maintain the dead and down woody material guidelines for wildlife.<br>• Silvicultural techniques may be used to maintain or improve old-growth and mature forest characteristics.<br>If a catastrophic event (such as fire) reduces the acres of old-growth and mature forest below 20 percent of the forested acres in a principal watershed, identify replacement forested acres. When necessary, use silvicultural techniques to promote desired characteristics in the replacement acres. | While the aspen forest in the Study Area is naturally patchy, none of the individual aspen stands surpass 200 acres in size (Stantec 2017h). The Proposed Action would result in a permanent loss of 521.4 acres of aspen or mixed aspen forest. This would further reduce the size of mature and old-growth areas (blocks) in the Study Area and thus further reduce mature and old-growth forest availability for wildlife habitat management. |

| STANDARD OR GUIDELINE | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Plant Species Diversity Standard 1**: Projects and activities shall be managed to avoid adverse impacts to sensitive plant species that would result in a trend toward federal listing or loss of viability. | There are no identified plant species listed as threatened, endangered, or proposed under the Endangered Species Act (ESA) in Caribou County (**Section 3.7.6**). No CTNF sensitive plant species or CTNF Forest Watch rare plant species have been documented in the baseline studies. The Project is in compliance with this guideline. |
| **Plant Species Diversity Guideline 1:** Native plant species from genetically local sources should be used to the extent practical for erosion control, fire rehabilitation, riparian restoration, road rights-of-way seeding, and other revegetation projects. | Native plant species from genetically local sources would be used to the extent practical. The Project would be in compliance with this guideline. |
| **Plant Species Diversity Guideline 2:** Where practical, disturbed sites should be allowed to revegetate naturally where the seed source and soil conditions are favorable (e.g., low erosion potential, deeper soils) and noxious weeds are not expected to be a problem. | The existing seed mix used for the Smoky Canyon Mine is approved by the USFS and BLM and would be used for the Project. Natural revegetation would be allowed as applicable and as directed by the USFS on NFS lands. The Project would be in compliance with this guideline. |
| **Plant Species Diversity Guideline 3:** Known occurrences or habitat for rare plants on the "Forest Watch" list and rare or unique plant communities on the Forest should be maintained. | No CTNF sensitive plant species or CTNF Forest Watch, rare plant species have been documented in the baseline studies. The Project is in compliance with this guideline. |
| **Plant Species Diversity Guideline 4:** Maintain, and where possible, increase unique or difficult-to-replace elements such as areas of high species diversity aspen, riparian areas, tall forbs, rare plant communities, etc. | The Project would be consistent with this guideline, as it would not result in the loss of riparian areas or rare plant communities. Some aspen communities which are high in species diversity would be removed as specified in Vegetation Guideline 3 compliance. |
| **Plant Species Diversity Guideline 5:** The Forest Botanist or Ecologist should review seed mixes used for revegetation to insure no adverse impacts to threatened, endangered, sensitive species; other species at risk; and the overall native flora within the analysis area. | The existing seed mix used for the Smoky Canyon Mine is approved by the USFS and BLM and would be used for the Project. Natural revegetation would be allowed as applicable and as directed by the USFS on NFS lands. The Project would be in compliance with this guideline. |
| **Drastically Disturbed Lands Standard 7:** Reclamation vegetation shall be monitored for bioaccumulation of hazardous substances prior to release for multiple-use management. | **Section 2.5** and Simplot's existing CEMPP that is reviewed and approved by the USFS identifies the environmental monitoring activities that would be undertaken at the mine to ensure the effectiveness of BMPs and mitigation measures. The Project would be in compliance with this standard. |
| **Drastically Disturbed Lands Standard 10:** Within mine areas, native vegetation shall be retained undisturbed when disturbance of the site is not necessary for minerals development or safety. | Existing vegetation would be protected to the extent practicable by limiting surface disturbance to those areas needed for operations. The Project would be in compliance with this standard. |

| STANDARD OR GUIDELINE | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Drastically Disturbed Lands Guideline 2:** Selection of plant species for establishment should reflect the surrounding ecosystem and post-remedial land use. Plant materials used should be adapted to the climate of the site. Consideration and preference should be given to promoting natural succession, native plant species, and structural diversity. | Agency-approved seed mixes containing native seeds would be applied. The Project would be in compliance with this guideline. |
| **Drastically Disturbed Lands Guideline 3:** Prescribe reclamation plant species known to reduce the risk of bioaccumulation of hazardous substances, if such risk is present. | Under the Project, a seed mix has been developed to encourage uptake of water from the upper soil horizon and avoid the use of selenium accumulator species. These seed mixes do not contain any trees, legumes, or deep-rooted species, which typically accumulate selenium to a greater extent than grasses and shrubs (Mackowiak and Amacher 2003; Mackowiak et al. 2004). The Project would be in compliance with this guideline. |
| **Prescription 8.2.2 Goal 4:** Emphasize the use of native plant species in reclamation but allow the use of non-natives when natives will not achieve reclamation goals. | Agency-approved seed mixes containing native seeds would be applied. The Project would be in compliance with this guideline. |

<u>Noxious Weeds</u>

**Table 3** summarizes applicable CNF RFP Standards and Guidelines for Noxious Weeds. The Project would be in compliance with these goals/objectives/actions, standards, and guidelines by use of a native seed mix that would be applied to complement the existing plant communities and reclaimed areas and by actively controlling identified noxious weeds. Appropriate BMPs, in compliance with the goals/objectives/action, standards, and guidelines listed in **Tables 3**, **4**, and **5** would be implemented to control invasive and noxious species throughout the life of proposed mining activities. Examples of these BMPs include treatment of identified invasive species, using state-certified noxious weed free hay/straw when needed, use of a seed mix that is certified as weed-free, and monitoring for noxious weeds. There is a low occurrence of noxious weeds in the Project Area, and BMPs would be implemented to minimize their potential spread. Therefore, the effects of noxious weeds from the Project would be short-term and minor.

**Table 3 Compliance with Applicable CNF RFP Standards and Guidelines for Noxious Weeds**

| STANDARD OR GUIDELINE (FOREST-WIDE DIRECTION) | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Noxious Weeds and Invasive Species Standard 1:** Only weed-free hay, straw, pellets, and mulch shall be used on the Forest. | Simplot would comply with this guideline by using only certified weed-free mulch, straw bales, etc. |
| **Noxious Weeds and Invasive Species Standard 2**: All seed used shall be certified to be free of noxious weed seeds from weeds listed on the current *All States Noxious Weeds List*. | Simplot would comply with this guideline by using only certified weed-free seed. |

| STANDARD OR GUIDELINE (FOREST-WIDE DIRECTION) | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Noxious Weeds and Invasive Species Standard 3:** Gravel or borrow material sources shall be monitored for noxious weeds and other invasive species. Sources infested with noxious weeds shall be closed until the weeds are successfully controlled. | The Project would comply with this standard. |
| **Noxious Weeds and Invasive Species Standard 4:** Noxious weeds shall be aggressively treated throughout the Forest, unless specifically prohibited, following the Caribou Noxious Weed Strategy. Using Integrated Weed Management, methods of control, and access shall be consistent with the goals of each prescription area. | The Project would comply with this standard as Simplot would continue to implement their current noxious weed program that is approved by the USFS. |
| **Noxious Weeds and Invasive Species Guideline 1:** Weed treatment projects, especially those using herbicides, should be timed to achieve desired effects on target vegetation, while having minimal effects on non-target vegetation. | The Project would comply with this guideline as Simplot would continue to implement their current noxious weed program that is approved by the USFS. |
| **Noxious Weeds and Invasive Species Guideline 3**: Monitor, as needed, disturbed areas, such as landings, skid trails, roads, mines, burned areas, etc., for noxious weeds or invasive species and treat where necessary. | The Project would comply with this guideline as Simplot would continue to implement their current noxious weed program that is approved by the USFS through their CEMPP. |
| **Noxious Weeds and Invasive Species Guideline 4:** Evaluate the potential for invasion by noxious weeds into proposed vegetation units and wildland fire use plan areas and modify units or mitigate where necessary. | The Project would comply with this guideline as Simplot would continue to implement their current noxious weed program that is approved by the USFS through their CEMPP. |

## Table 4 Compliance with Applicable BLM ARMP Goals, Objectives, and Actions for Vegetation Resources

| GOAL/OBJECTIVE/ACTION | COMPLIANCE UNDER PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Action ME-2.1.4.** Applicable Idaho Standards for Rangeland Health (BLM 1997) will be employed to determine the success of reclamation, rehabilitation, or restoration activities following major surface disturbances on public lands. | The Project would be consistent with this action because proposed reclamation activities are designed to comply and the seed mixtures selected for reclamation contain a variety of native grass, forb, and shrub species that could provide forage for livestock and wildlife.<br><br>Additional native species are predicted to colonize reclaimed areas over time through natural successional processes.<br><br>Weed control would also be undertaken. |

| GOAL/OBJECTIVE/ACTION | COMPLIANCE UNDER PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Action ME-2.2.1.** Reclamation Plans for mineral development operations will be designed to attain and final reclamation will meet applicable standards (BLM 1997) consistent with the rehabilitation potential of the disturbed site. | The Project would be consistent with this action because proposed reclamation activities are designed to comply and the seed mixtures selected for reclamation contain a variety of native grass, forb, and shrub species that could provide forage for livestock and wildlife.<br><br>Additional native species are predicted to colonize reclaimed areas over time through natural successional processes.<br><br>Weed control would also be undertaken. |
| **Action ME-2.2.2. Operational Standard 9:** Within development areas, soils and native vegetation will be retained undisturbed when disturbance of the site is not necessary for minerals development or safety. | This standard would be met for the Project as disturbance would be limited to the minimum area necessary, and areas would be reclaimed and revegetated when no longer needed for mining. |
| **Action ME-2.2.2. Operational Guideline 1:** Selection of plant species for establishment will reflect the surrounding ecosystem and post-development land use. Plant materials selected for reclamation use will be adapted to the climate of the site. Consideration and preference will be given to promoting natural succession, native plant species, and structural diversity. | This guideline would be met by the Project as areas would be reclaimed with a variety of predominantly native plant species (**Table 2.4-2**) that are adapted to the local climate. The seed mixes include bunchgrasses, forbs, and shrubs for structural diversity. Reclaimed areas would also be subject to natural succession over time. |
| **Action ME-2.3.5.** In reclamation activities, plant species known to reduce the risk of bioaccumulation of hazardous substances, such as selenium, will be used if such risk is present. | The Project would be consistent with this Action. Seed mixes were designed to include predominantly shallow-rooted species, and no selenium accumulator species were included in seed mixes. The store and release cover system, which would consist of approximately two feet of chert, overlain by three feet of Dinwoody and/or Salt Lake Formation and, finally, a topsoil layer estimated at a minimum of six to twelve inches used under the Proposed Action is designed to eliminate adverse bioaccumulation of selenium. Under Alternative 1, a topsoil-only cover would be used because the potential for selenium bioaccumulation would not occur. |
| **Action ME-2.3.6.** Prior to release of any performance bond or relinquishment of a mineral lease/permit, reclamation vegetation will be monitored for bioaccumulation of hazardous substances for a period of time to be determined appropriate by the Authorized Officer. | The Project would be consistent with this Action. Simplot would conduct monitoring according to its CEMPP. |

**Table 5 Compliance with Applicable BLM ARMP Goals, Objectives, and Actions for Noxious Weeds and Invasive Species**

| GOAL/OBJECTIVE/ACTION | COMPLIANCE UNDER PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Action VE-2.1.3.** When authorizing new permitted/authorized activities, stipulations will be incorporated for the prevention and treatment of invasive species/noxious weeds as applicable. Examples of such stipulations to consider will promote:<br>• The replacement of invasive species/noxious weeds by perennial plant cover which includes purchasing and<br>• planting of desirable seeds or plants.<br>• The use of perennial green fire breaks when emergency stabilization and rehabilitation (ES&R) or restoration efforts are planned/implemented.<br>• Invasive species/noxious weed management being integrated into any new or renewal of permitted/authorized activities resulting in major surface disturbance. | The Project would be consistent with this action because proposed reclamation activities are designed to comply and the seed mixtures selected for reclamation contain a variety of native grass, forb, and shrub species that could provide forage for livestock and wildlife.<br><br>Additional native species are predicted to colonize reclaimed areas over time through natural successional processes.<br><br>The Project would comply with this action as Simplot would continue to implement their current noxious weed program that is approved by the BLM through their CEMPP. |
| **Action VE-2.1.4.** As appropriate, chemical, biological, mechanical, and manual methods will be used in treating invasive species/noxious weeds. The use of biological control agents will be promoted when reasonable as identified through current BLM policy. | The Project would comply with this action as Simplot would continue to implement their current noxious weed program that is approved by the BLM through their CEMPP. |
| **Action VE-2.1.5.** Herbicide use will be consistent with current BLM policy (e.g., Record of Decision. Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States. Programmatic Environmental Impact Statement. US Department of the Interior, Bureau of Land Management. September 2007.) | The Project would comply with this action as Simplot would continue to implement their current noxious weed program that is approved by the BLM through their CEMPP. |
| **Action VE-2.1.6.** Projects involving the application of herbicides, pesticides and insecticides that may affect Special Status Species will be analyzed at the project level and designed such that applications will support species conservation and recovery and minimize risks of exposure. | The Project would comply with this action as Simplot would continue to implement their current noxious weed program that is approved by the BLM through their CEMPP. |
| **Action VE-2.1.7.** Control of invasive species/noxious weeds will be coordinated with adjacent land owners and local governments through cooperative management programs. | The Project would comply with this action as Simplot would continue to implement their current noxious weed program that is approved by the BLM through their CEMPP. |
| **Action VE-2.1.8.** Fuels and restoration projects will be coordinated with other programs to reduce the risk of invasive species/noxious weeds. | The Project would comply with this action as Simplot would continue to implement their current noxious weed program that is approved by the BLM through their CEMPP. |
| **Action VE-2.1.9.** Suppression equipment will be washed for invasive species/noxious weeds at designated sites. | The Project would comply with this action as Simplot would continue to implement their current noxious weed program that is approved by the BLM through their CEMPP. |

| GOAL/OBJECTIVE/ACTION | COMPLIANCE UNDER PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Action VE-2.1.11.** Where hay or straw will be used on public lands for permitted/authorized and internal BLM activities, state-certified noxious weed free hay/straw will be required. | The Project would comply with this action as Simplot would continue to implement their current noxious weed program that is approved by the BLM through their CEMPP. Simplot would comply with this action by using only certified weed-free mulch, straw bales, etc. |
| **Action VE-2.1.12.** Integrated weed management strategies will be coordinated and developed with Tribal, Federal and State agencies and local governments at appropriate scales to restore affected BLM-administered public lands. Such strategies or actions may include but are not limited to:<br>• coordination of treatment efforts;<br>• identification of priority areas;<br>• promote public awareness; and<br>• develop educational material regarding control, prevention, etc. | The Project would comply with this action as Simplot would continue to implement their current noxious weed program that is approved by the BLM through their CEMPP. |

## 2.3 Wildlife Resources

The CNF manages forest wildlife resources and their uses according to the CNF RFP (USFS 2003a). The DFCs and objectives for wildlife resources are achieved through the implementation of the forest-wide standards and guidelines as well as the standards and guidelines for biological elements specified in the management prescriptions of the CNF RFP. CNF uses the planning process and ongoing monitoring, evaluation, and adjustment of fish, wildlife, and rare plant standards to prevent listing of species under the ESA and to avoid the extirpation of species (USFS 2003a).

Management Prescription 8.2.2(g) of the CNF RFP lists specific standards and guidelines for wildlife in phosphate mine areas (USFS 2003a).

Bald Eagle

CNF RFP (2003a) contains a number of standards and guidelines for occupied nesting zones and home ranges. The Project would be consistent with these standards and guidelines given that no occupied nesting zones or home ranges are known to occur in or near the Study Area (**Table 6**).

**Table 6 Compliance with Applicable CNF RFP Standards and Guidelines for Bald Eagle**

| STANDARD OR GUIDELINE (FOREST-WIDE DIRECTION) | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| Activities and developments should be designed to minimize conflicts with bald eagle wintering and migration habitat. | The Project would be consistent with this guideline, as impacts to bald eagle wintering and migration habitat would be minimal relative to the species' home range size and dispersal capabilities. The nearest wintering habitat is located in Crow Creek and would not be impacted. |

Boreal Owl

The CNF RFP (USFS 2003a) contains one guideline specific to boreal owls (**Table 7**).

**Table 7 Compliance with Applicable CNF RFP Standards and Guidelines for Boreal Owl**

| STANDARD OR GUIDELINE (FOREST-WIDE DIRECTION) | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| Within a 3,600-acre area around all known boreal owl nest sites, maintain over 40 percent of the forested acres in mature and old age classes. | This guideline would be met under the Project because there are no known nest sites in the Study Area, and if they are discovered, the Project would not impact enough forested habitat to change the distribution of forest age classes (which are already all either mature or old [see **Table 4.7-2**]) in the Study Area. |

Columbian sharp-tailed and greater sage grouse

CNF RFP (USFS 2003a) management guidelines for Columbian sharp-tailed grouse would be the same as those described for greater sage-grouse below. In addition, the CNF RFP includes one standard specific to Columbian sharp-tailed grouse (**Table 8**). Note that the USFS management directions for greater sage-grouse were reviewed and determined to not be applicable as no PHMAs, IHMAs, GHMAs or sagebrush focal areas would be impacted by the Project.

**Table 8 Compliance with Applicable CNF RFP Standards and Guidelines for Columbia Sharp-tailed and Greater Sage Grouse**

| STANDARD OR GUIDELINE (FOREST-WIDE DIRECTION) | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| Cooperate with other state and federal agencies and private landowners to survey, inventory, and manage habitats for sage grouse and Columbian sharp-tailed grouse. | The Project would not hinder cooperation with other state and federal agencies or private landowners to survey, inventory, or manage grouse habitats. |
| Current guidelines for sage and sharp-tailed grouse management, such as Connelly et al. (2000), should be used as a basis to develop site-specific recommendations for proposed sagebrush treatments. | There are no known active sage or Columbian sharp-tailed grouse leks within 2 miles of the Study Area, and impacts are not expected to affect the species at the population level. |
| Management activities should consider proximity to active lek locations during site-specific project planning. Those within 10 miles of an active sage grouse lek and 2 miles of active sharp-tailed grouse leks should be considered further for suitability as grouse habitat. | There are no known active sage or Columbian sharp-tailed grouse leks within 2 miles of the Study Area, and impacts are not expected to affect the species at the population level. |
| If management activities would impact courtship, limit physical, mechanical, and audible disturbances in the breeding complex during the breeding season (March to May) within three hours of sunrise and sunset each day. | There are no known active sage or Columbian sharp-tailed grouse leks within 2 miles of the Study Area, and impacts are not expected to affect the species at the population level |
| Where management actions will disturb nesting grouse, avoid manipulation or alteration of vegetation during the nesting period (May to June). | There are no known sage or active Columbian sharp-tailed grouse leks within 2 miles of the Study Area, and impacts are not expected to affect the species at the population level. |

Flammulated Owl

The CNF RFP (USFS 2003a) contains one guideline specific to flammulated owls (**Table 9**).

**Table 9 Compliance with Applicable CNF RFP Standards and Guidelines for Flammulated Owl**

| STANDARD OR GUIDELINE (FOREST-WIDE DIRECTION) | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| Do not allow timber harvest activities within a 30-acre area around all known flammulated owl nest sites. | This guideline would be met under the Project because there are no known nest sites in the Study Area. |

Great Gray Owl

The CNF RFP (USFS 2003a) contains the following guidelines (**Table 10**) specific to great gray owl habitat.

**Table 10 Compliance with Applicable CNF RFP Standards and Guidelines for Great Gray Owl**

| STANDARD OR GUIDELINE (FOREST-WIDE DIRECTION) | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| Within a 1,600-acre area around all known great gray owl nest sites, maintain over 40% of the forested acres in mature and old age classes. | The Project would likely not be consistent with the guideline regarding nest sites. There were two known active great gray owl nests discovered in the Study Area (**Figure 3.8-2**); however, one location was blown down as noted during baseline surveys (Stantec 2016e). The other nest site likely does not currently contain 40% of the forested acres in mature and old age classes within a 1,600-acre area because of existing vegetation communities. The Project could potentially eliminate or reduce the forested acres surrounding the nest site due to mining activities. The nest site would eventually need to be removed when it is not occupied.<br><br>The Project Area is intended to be managed under Prescription 8.2.2, Phosphate Mine Areas, which applies to Federal Phosphate leases where mining is taking place and allows for the exploration or development of existing leases. |
| Restrict the use of strychnine poison to control pocket gophers within a ½ mile buffer around all active great gray owl nest sites. | No strychnine use would occur for this Project. |

Northern goshawk

The CNF RFP (USFS 2003a) provides standards and guidelines for management of forest habitat within active and historical northern goshawk nesting territories. Management standards and guidelines for nest areas (within 200 acres of the nest) and post-fledging family areas (within 400 acres of the nest), as described in the CNF RFP (2003a), would be followed from September to March during ground-disturbing activities, if a nest was discovered. Protective measures include, but are not limited to, no new road systems in nest and post-fledging family areas, maintain size class distribution of trees, and limit the maximum created canopy opening to less than 40 acres for post-fledgling family areas (0 acres of created openings permitted in nest areas). Because the Study Area is not currently known to contain any active nesting territories, the Project would be consistent with the RFP relative to impacts on northern goshawks.

Peregrine falcon

The CNF RFP (USFS 2003a) contains the following standard and guideline specific to peregrine falcon habitat (**Table 11**).

**Table 11 Compliance with Applicable CNF RFP Standards and Guidelines for Peregrine Falcon**

| STANDARD OR GUIDELINE (FOREST-WIDE DIRECTION) | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| Within 15 miles of all known nest sites, prohibit all use of herbicides and pesticides which cause egg shell thinning as determined by risk assessment. | The Project would be in compliance with this standard because Simplot would use only agency-approved herbicides and pesticides. |
| For proposed projects within two miles of known peregrine falcon nests, minimize such items as: (1) human activities (rock climbing, aircraft, ground and water transportation, high noise levels, and permanent facilities) which could cause disturbance to nesting pairs and young during the nesting period between March 15 and July 31; (2) activities or habitat alterations which could adversely affect prey availability. | This guideline would be met because there are no known peregrine falcon nests within 2 miles of the Project. |

Trumpeter swan

The CNF RFP (USFS 2003a) provides one standard for trumpeter swan nesting habitat (**Table 12**).

**Table 12 Compliance with Applicable CNF RFP Standards and Guidelines for Trumpeter Swan**

| STANDARD OR GUIDELINE (FOREST-WIDE DIRECTION) | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| Maintain suitable trumpeter swan nesting habitat conditions in Elk Valley Marsh and other sites. | Since there is no known trumpeter swan nesting habitat in the Study Area, the Project would be in compliance with this standard. |

General Wildlife Resources

**Table 13** summarizes compliance with the CNF RFP with regard to wildlife resources for the Project. The following standards and guidelines were also reviewed but do not apply to the effects of mining on wildlife resources:

- Dead and Down Material Guideline 1
- Snag/Cavity Nesting Habitat Standards 1 through 3 and Guidelines 1 through 5
- Big Game Guideline 3

**Table 13 Compliance with Applicable CNF RFP Standards and Guidelines for Wildlife Resources**

| STANDARD/GUIDELINE | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Big Game Guideline 1:** Provide for vegetation buffers of at least one sight distance (Thomas 1979) around big game concentration/use areas, such as wallows and mineral licks. Sight distance is the distance at which 90 percent of a deer or elk is hidden from an observer. This will vary depending on site specific stand conditions. | The Project would be in compliance with this guideline because no big game concentration areas, such as wallows or mineral licks, have been identified in the Study Area. |
| **Big Game Guideline 2:** Provide for security or travel corridors near created openings. | Over the short term, this guideline would not be met under the Project. As a result of noise and human presence, it is likely that wildlife such as big game would avoid a larger area than the actual disturbance footprint, reducing the amount of security habitat and potentially disrupting local travel corridors in the vicinity of the Project. However, the relatively small area of disturbance of the Project is not anticipated to impact security or travel corridors on a Forest-wide scale. |
| **Prescription 8.2.2 Wildlife Guideline 1:** Mining operations should be designed to accommodate big game migration. | No major big game migration corridors have been identified within the Study Area; however, because of the presence of winter range in and around the Project Area, it is likely that the Project would disrupt big game movements, at least during the short-term period of active mining. Following final reclamation and cessation of human disturbance, it is anticipated that big game would no longer avoid the area. |
| **Prescription 2.7.1 (d) Elk and Deer Winter Range Critical and 2.7.2 (d) Elk and Deer Winter Range, Wildlife Standard 1**: Biological potential for woodpeckers shall be allowed to fluctuate with natural disturbance processes and management actions designed to maintain productive winter range. | The Proposed Action would result in the long-term loss of 130 acres of elk winter range, including some aspen habitat therein that would be permanently lost. Quality of undisturbed winter range in or near the Project has the potential to be affected in the short term during construction and active mining, when human presence and noise could influence big game to avoid otherwise suitable habitats in or near the disturbance footprint. However, with final reclamation (including successful reemergence of native grass and shrub species) and cessation of human disturbance, it is anticipated that big game would return to use winter range in the impacted areas. |

| STANDARD/GUIDELINE | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Prescription 8.2.2 Wildlife Guideline 3:** Consider vegetation species that contribute to wildlife habitat needs when developing reclamation plans and create wildlife structures (slash piles, logs, rock piles) using native vegetation and materials to provide habitat diversity in created opening, where possible. | The Project would be in compliance with this guideline as a variety of native and desirable non-native grasses, forbs, and shrubs would be used in the seed mixes for reclamation to promote post-reclamation use by wildlife. Reclamation plans do not specifically incorporate the use of wildlife structures however; these structures may be used as appropriate in accordance with this guideline. |
| **Prescription 8.2.2 Wildlife Guideline 4:** Encourage construction of ledges on suitable pit walls to accommodate cliff-dwelling species. | The Project would be in compliance with this guideline as the remaining pit walls, highwalls and benches would be available for cliff-dwelling species. |

Migratory Birds

**Table 14** summarizes compliance with the CNF RFP with regard to migratory birds for the Project.

**Table 14 Compliance with Applicable CNF RFP Standards and Guidelines for Migratory Birds**

| STANDARD/GUIDELINE | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Landbirds Guideline 1:** Stands of mature trees (including snags and dead-topped trees) should be maintained next to wet meadows. | Not applicable as no wet meadows occur within the Study Area. |
| **Landbirds Guideline 2:** Where feasible, maintain 30 to 50 percent of the sagebrush habitat in a 5th code HUC in contiguous blocks greater than 320 acres to support sagebrush obligate species. | The Project would be consistent with this guideline because it would not reduce any contiguous blocks of big sagebrush habitat to less than 320 acres. |
| **Landbirds Guideline 3:** Practices which stabilize or increase native grass and forbs cover in sagebrush habitats with 5% to 25% sagebrush canopy cover should be implemented. | The Project would be consistent with this guideline over the long term (though up to 55 acres of sagebrush habitat would be removed during the Project. A variety of native and desirable non-native grass and forb species would be used in the seed mix. |
| **Landbirds Guideline 4:** In sagebrush habitats, manage herbaceous cover to conceal nests through the first incubation period for ground and low shrub-nesting birds. | The Project would be consistent with this guideline over the long term (though up to 55 acres of sagebrush habitat would be removed in the short term). Reclaimed areas are predicted to achieve six percent cover of sagebrush by year 90 after mining, at which point, associated herbaceous and grass cover would allow for concealment of ground and low-shrub nests. |

Gray wolf

The CNF RFP includes the following management guidance (**Table 15**) for gray wolves.

**Table 15 Compliance with Applicable CNF RFP Standards and Guidelines for Gray Wolves**

| STANDARD OR GUIDELINE (FOREST-WIDE DIRECTION) | COMPLIANCE UNDER THE PROPOSED ACTION OR ALTERNATIVE 1 |
|---|---|
| Restrict intrusive human disturbances (motorized access, vegetation management, livestock grazing, etc.) within one mile around active den sites and rendezvous sites between April 1 and June 30 when there are five or fewer breeding pairs of wolves in the Yellowstone Nonessential Experimental Population Area (applies to the portion of the Forest east of Interstate 15) or the Central Idaho Nonessential Experimental Population Area (applies to the portion of the Forest west of Interstate 15). After six or more breeding pairs become established in each experimental population area, land use restrictions will not be necessary. | The Project would be consistent with this guidance as there are no known den sites or rendezvous sites within the Study Area. |
| If and when wolves are de-listed, they will be managed in accordance with approved state management plans. | The Project would be consistent with this guidance if and when the species is de-listed. |

Canada lynx

Compliance with applicable USFS for Canada lynx is summarized in **Table 16**. In addition, the following management direction was reviewed and found to not be applicable to the Project:

- CNF RFP (USFS 2003a) Lands Objective 1 and Lands Standard 1

Note that Simplot, where appropriate, will reference the 2013 Canada Lynx Conservation Assessment Strategy as best available science when implementing measures per the USFS and BLM plans.

**Table 16 Compliance with USFS Management Directions for Canada Lynx**

| MANAGEMENT DIRECTIONS | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Forest Vegetation DFC-1:** Forested habitats display a diversity of structure and composition. Productive and diverse populations of plants are maintained or restored. | The Project would not hinder attainment of or progress toward this DFC. There would be an estimated removal of 583 acres of forested habitat. On a forest-wide scale, this is minor and insignificant, amounting to only 0.1 percent of the total 550,000 acres of forest habitat available in the CNF (USFS 2003). |
| **Forest Vegetation DFC 2:** In conifers, a range of structural stages exists where 30 to 40 percent of the acres are in mature and old age classes. Early successional stages are maintained through endemic insect and disease disturbance, vegetation management and fire. Patterns are within historical ranges of variability with functional corridors present. | The Project would not hinder this DFC. |
| **Forest Vegetation DFC 3:** Conifer types are maintained and disturbance processes are restored through vegetation management, endemic insect / disease disturbances, & fire. | The Project would not hinder attainment of or progress towards this DFC. |

| MANAGEMENT DIRECTIONS | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Forest Vegetation DFC 4:** Quaking aspen communities are moving towards historical ranges with fire and other practices influencing structural class distribution and patterns across the landscape. Aspen forests are managed to achieve desired vegetative conditions with 20 to 30 percent in mature and old age classes, and to reduce the decline of aspen acres as a result of succession of aspen to conifer. | The Project would not hinder attainment of or progress towards this DFC. Impacts to aspen communities would be minor (90 acres). Currently, 93 percent of the aspen stands in the 5th code HUC are in old/mature age classes based on USFS mapping. All of the aspen stands that would be impacted under the Project are in mature/old age classes. On-site inventory showed that no acres that currently meet Region Four "Old-growth" definitions would be impacted. Therefore, the Project would not negatively impact the distribution of aspen forest age classes and would be consistent with maintaining at least 20 percent mature/old age classes in the 5th code HUC that encompasses the Study Area. |
| **Non-forest DFC-1:** Non-forested ecosystems: are resilient, diverse, and functioning within their site potential; display a diversity of structure and composition; and are within their historical range of variability (HRV). | The Project would not hinder attainment of or progress towards this DFC. Impacts to non-forested ecosystems would largely be temporary, and they would be reclaimed with a variety of native plant species. |
| **Non-forest DFC-2**: Non-forested ecosystems reflect a mosaic of multiple-aged shrubs, forbs, and native grasses with management emphasis on maintaining a diverse sustainable plant community. Fire regimes exist on an approximate 20 to 40-year return cycle. Patterns are within historical ranges with 30 to 50 percent of the shrubs in greater than fifteen percent canopy cover class. | The Project would not hinder attainment of or progress towards this DFC. Impacts to non-forested ecosystems would largely be temporary, and they would be reclaimed with a variety of native plant species. |
| **Non-forest DFC-3**: Rehabilitation or restoration of native shrub communities is accomplished, where site potential permits. | The Project would not hinder attainment of or progress towards this DFC. |
| **Non-forest DFC-4**: On areas capable of tall forb dominance, tall forb types reflect historical ranges of ground cover leading into the winter season. Composition reflects a mosaic dominance of tall forb indicator species. Disturbance regimes demonstrate stable or upward trend in tall forb indicator species. Patterns are within the historical range. Historical tall forb sites, which currently are not capable of tall forb dominance, are managed to maintain watershed stability. | The Project would not hinder attainment of or progress towards this DFC as areas capable of tall forbs would re-establish in reclaimed areas from surrounding habitats. |
| **Non-forest DFC-5**: Woodland types including mountain mahogany, juniper and maple have multiple-aged shrub layers and a balanced shrub/herbaceous understory. Patterns are within historical ranges. | The Project would not hinder attainment of or progress towards this DFC. The Study Area does not contain these woodland types. |
| **Vegetation Goal 1**: Diverse forested and non- forested ecosystems are maintained within their historic range of variability or restored through time with emphasis on aspen, aspen-conifer, mixed conifer, big sagebrush, mountain brush and tall forbs. | Short-term impacts from the Project would not be consistent with this goal; however, after reclamation activities were completed and the site had recovered to high-elevation rangeland habitat (110 years), the goal would be met. |

| MANAGEMENT DIRECTIONS | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Vegetation Goal 2**: Aspen forests are managed to reduce or halt the decline of aspen acres as a result of succession of aspen to conifer. | The Project would be inconsistent with this goal, as it would permanently remove 90 acres of aspen. However, lost aspen habitat would be expected to return to high-elevation rangeland (not conifer habitat), which over time and through succession could eventually return to aspen habitat. |
| **Vegetation Goal 3**: Forested ecosystems are moving towards a balance of age and size classes in each forested vegetation type on a watershed or landscape scale. Early seral species are recruited and sustained while still providing a diversity of successional stages. | The Project would be consistent with the attainment of or progress towards this goal. The removal of 583 acres of forest habitat would not impact the distribution of forest stand age classes on the CNF or at the landscape scale. Currently, 93 percent of the aspen stands in the 5th code HUC are in old/mature age classes based on USFS mapping. All of the aspen stands that would be impacted by the Project are in mature/old age classes. On-site inventory showed that no acres that currently meet Region Four “Old-growth” definitions would be impacted. Therefore, the Project would not negatively impact the distribution of aspen forest age classes and would be consistent with maintaining at least 20 percent mature/old age classes in the 5th code HUC that encompasses the Study Area. |
| **Vegetation Goal 4**: Sagebrush steppe and mountain shrub habitats are moving toward a balance of age, canopy cover, and size class on a watershed or landscape scale that is within their HRV. | The Project would be consistent with attainment of or progress towards this goal after reclamation activities were completed and the site had recovered to big sagebrush and high- elevation rangeland habitat types. |
| **Vegetation Goal 7**: Biodiversity is maintained or enhanced by managing for a diverse array of habitats tied to natural process occurrence and distribution of plant communities. | The Project would be consistent with attainment of or progress towards this goal. Habitat changes resulting from the Project would be localized to the mine footprint. Maintenance of existing biodiversity on the CNF is expected. |
| **Vegetation Standard 2**: In each 5th code HUC which has the ecological capability to produce forested vegetation, the combination of mature and old age classes (including old growth) shall be at least 20 percent of the forested acres. At least 15 percent of all the forested acres in the HUC are to meet or be actively managed to attain old growth characteristics. | The Project would be consistent with this standard. Currently, 93 percent of the aspen stands in the 5th code HUC are in old/mature age classes based on USFS mapping. All of the aspen stands that would be impacted by the Project are in mature/old age classes. On-site inventory showed that no acres that currently meet Region Four “Old-growth” definitions would be impacted. Therefore, the Project would not negatively impact the distribution of aspen forest age classes and would be consistent with maintaining at least 20 percent mature/old age classes in the 5th code HUC. |
| **Wildlife Goal 2**: Wildlife biodiversity is maintained or enhanced by managing for vegetation and plant communities within their historical range of variability. | The Project would be consistent with attainment of or progress towards this goal. Habitat changes resulting from the Project would be localized to the mine footprint. Maintenance of existing wildlife biodiversity on the CNF is expected. |

| MANAGEMENT DIRECTIONS | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Wildlife Goal 3**: Maintain multiple vegetation layers in woody riparian habitats that are stable or increasing with all age classes (seedlings, young plants, mature and decadent) represented to support native bird communities and other wildlife. | The Project would be consistent with this goal as no riparian areas would be impacted by the Project. |
| **Wildlife Goal 5**: Maintain, and where necessary and feasible, provide for habitat connectivity across forested and non-forested landscapes. | The Project would be consistent with attainment of or progress towards this goal. Over the short term, the haul road and other mine facilities would fragment some of the habitats in the Study Area, but these areas would be reclaimed following active mining; therefore, habitat connectivity would not be impacted over the long term. |

Townsend's big-eared bat

The CNF RFP (USFS 2003a) includes the following guideline (**Table 17**) for sensitive bat species.

**Table 17 Compliance with Applicable CNF RFP Standards and Guidelines for Townsend's Big-eared Bat**

| STANDARD OR GUIDELINE (FOREST-WIDE DIRECTION) | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| All abandoned underground mines should be evaluated as bat habitat prior to closure. As an alternative to collapsing mine entrances, gate abandoned mines to retain roosting and hibernation habitat for bats. (Idaho Conservation Effort, 1995, M-1) | The Project is in compliance with the applicable USFS and BLM direction for sensitive bats as no mines or caves known to be occupied by bats would be closed or otherwise impacted. |
| Gating of mines should be considered where human disturbance is disturbing/displacing bats. Where gates are used, they should be designed in accordance with published literature (i.e., Tuttle and Taylor, 1994). (Idaho Conservation Effort, 1995, Appendix B) | The Project is in compliance with the applicable USFS and BLM direction for sensitive bats as no mines or caves known to be occupied by bats would be closed or otherwise impacted. |
| Discourage or restrict entry to mines and caves known to be occupied by hibernating bats or bats with young. Exceptions include surveys conducted by qualified personnel (Idaho Conservation Effort, 1995, I-3,4). | The Project is in compliance with the applicable USFS and BLM direction for sensitive bats as no mines or caves known to be occupied by bats would be closed or otherwise impacted. |
| Prior to closure of inactive or abandoned underground mines, surveys for cave-dependent species should be completed and mitigation measures implemented | The Project is in compliance with the applicable USFS and BLM direction for sensitive bats as no mines or caves known to be occupied by bats would be closed or otherwise impacted. |

North American Wolverine

Compliance with applicable USFS management directions for North American wolverine is summarized in **Table 18**.

**Table 18 USFS Management Direction for the North American Wolverine**

| MANAGEMENT DIRECTION | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| Wildlife, Desired Future Conditions, Objective 1 (Wolverine Habitat): Within two years of singing the ROD, complete a GIS analysis to identify potential wolverine natal den sites. Within four years of the ROD, survey potential wolverine natal den sites to document wolverine presence and assess suitability as natal denning habitat. | There is no potential for denning sites as the Study Area is located at too low an altitude and lacks talus slopes that could provide denning habitat. |
| Wolverine Guideline 1: Restrict intrusive disturbance within one mile around known active den sites, March 1 to March 15. | No wolverine den sites are known to occur within or near the Study Area. The Study Area does not provide suitable denning habitat. |
| Wildlife, Sensitive Species, Guideline 1: Survey for the presence of sensitive species if suitable habitats are found within a project area a minimum of once prior to or during project development. | Winter track surveys were conducted for the Project in and no tracks were observed. |

Further, the BLM ARMP has several general wildlife resources goals, objectives, and actions as shown in **Table 19.**

**Table 19 Compliance with BLM ARMP Goals, Objectives, and Actions for Wildlife Resources**

| GOAL/OBJECTIVE/ACTION | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Goal FW-1.** Manage wildlife habitats so vegetation composition and structure assures the continued presence of fish and wildlife as part of an ecologically healthy system. | The Project would be consistent with this objective over the long term because the majority of disturbed areas would be reclaimed to grassland and shrubland habitats. Over the short term, the Project would result in reduced habitat and forage for big game and other species. |
| **Objective FW-1.1.** Maintain and improve wildlife habitats to support IDFG management objectives. | The Project would be consistent with this objective over the long term because the majority of disturbed areas would be reclaimed to grassland and shrubland habitats. Over the short term, the Project would result in reduced habitat and forage for big game and other species. |

| GOAL/OBJECTIVE/ACTION | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Action FW-1.1.1.** As appropriate and practical, elk and deer habitat on public lands will be managed as identified below in order to generally support IDFG management objectives for southeast (SE) Idaho management units.<br>Riparian areas will be managed for habitat and population linkage areas by applying appropriate management techniques that may include but are not limited to:<br>• Fencing,<br>• Providing adjacent cover strips, and<br>• Controlling noxious weeds.<br><br>Aspen will be treated by applying appropriate management techniques that may include but are not limited to:<br>• Removing encroaching conifer in Aspen clones.<br>• Slashing old age aspen clones while leaving snags and some live trees.<br>• Fencing degraded aspen clones.<br>• Pursuing the use of prescribed fire.<br>• Plowing Aspen roots to release clones.<br><br>Degraded riparian areas will be restored. | The Project would be consistent with this Action because this Action item applies mostly to BLM habitat enhancement projects, which a mine is not.<br><br>Reclamation activities for the Project have been designed to incorporate wildlife habitat needs as well as installing a cover on backfill and overburden that eliminates wildlife exposure to COPCs. Reclamation of disturbed areas would provide long-term wildlife habitat, although there would be habitat conversion from baseline.<br><br>No riparian areas are anticipated to be disturbed by the Project. |
| **Goal FW-2.** Provide for the diversity of native and desired non-native species as part of an ecologically healthy system. | The Project would be consistent with this goal because the majority of disturbed areas would be reclaimed with a mixture of native and desirable non-native grass, forb, and shrub species. Plant species richness on reclaimed areas is anticipated to be similar to baseline species richness. |
| **Objective FW-2.1.** Maintain or improve native and desired non-native species habitat and the connectivity among habitats. | The Project would be consistent with this objective because the majority of disturbed areas would be reclaimed with a mixture of native and desirable non-native grass, forb, and shrub species. While wildlife may avoid the mine site during active mining, the habitats in the Study Area are naturally patchy, and the Project is not anticipated to significantly disrupt habitat connectivity over the long term. |

## 2.4 Fisheries and Aquatics

**Table 20** summarizes compliance with the CNF RFP with regard to AIZs for the Project. **Table 21** lists the applicable BLM ARMP goals, objectives, and actions for fisheries and aquatics.

**Table 20 Compliance with Applicable CNF RFP Standards and Guidelines for AIZs**

| MANAGEMENT DIRECTIONS | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Prescription 2.8.3 Minerals/Geology Guideline 1:** Locate new structures, support facilities, and roads outside AIZs. Where no alternative to siting facilities in AIZs exists, locate and construct the facilities in ways that avoid or reduce impacts to desired AIZ attributes. Where no alternative to road construction exists, keep roads to the minimum necessary for the approved mineral activity. | There would be 20.9 acres of direct disturbance to AIZs. The majority of this disturbance would be in intermittent drainages, and with the exception of a very small area near Smoky Creek where a transmission line corridor would occur, AIZs associated with perennial streams would be avoided. |
| **Prescription 2.8.3 Minerals/Geology Guideline 4:** Do not locate debris, mine overburden, excess material, leaching pads, and other facilities within Aquatic Influence Zones, unless no other alternatives are available. If no other alternative exists, ensure that safeguards are in place to prevent release or drainage of toxic or other hazardous materials onto these lands. | There would be 20.9 acres of direct impacts to AIZs. The majority of this would be direct impacts to intermittent drainage for the placement of mine facilities. These intermittent drainages do not provide aquatic habitat themselves, but may contribute to flow in downstream (unconnected) areas. Measures would be implemented to reduce COPC transport throughout the Study Area. |
| **Prescription 2.8.3 General Riparian Area Management Guideline 1:** Felled trees should remain on site when needed to meet woody debris objectives and desired AIZ attributes. | Felled trees would likely not remain on site, but would be removed. However, the AIZs impacted are intermittent drainages without defined channels or aquatic habitat and woody debris objectives are not applicable. |
| **Prescription 2.8.3 General Riparian Area Management Guideline 2:** Use herbicides, pesticides, and other toxicants and chemicals only as needed to maintain desired AIZ attributes. | There would be no herbicide, pesticide, toxicants, or chemicals used within AIZs. |
| **Prescription 2.8.3 General Riparian Area Management Guideline 3:** Avoid storage of fuels and other toxicants or refueling within AIZs unless there are no other alternatives. Any refueling sites within an AIZ should have an approved spill containment plan. | There would be no storage of fuels or toxicants, and no refueling within AIZs. |
| **Prescription 2.8.3 Roads and Trails Guideline 1:** Avoid constructing roads within the AIZ unless there is no practical alternative. | The proposed haul road would impact AIZs. Impacts would be mitigated to the extent feasible to reduce impacts to desired AIZ attributes. Measures would be implemented to reduce erosion and sedimentation. |
| **Prescription 2.8.3 Roads and Trails Guideline 2:** Culverts (permanent and temporary) should be sized so that the probability of flow exceedance is 50 percent or less during the time the culvert is expected to be in place. Consider bedload and debris when sizing culverts. | Culverts would be designed to accommodate 100-year, 24-hour or 50-year, 24-hour flow conditions. |

| MANAGEMENT DIRECTIONS | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Prescription 2.8.3 Roads and Trails Guideline 3:** When feasible, use bridges, arches, and open-bottom culverts in fish-bearing streams. | No fish bearing streams would be impacted. |
| **Prescription 2.8.3 Roads and Trails Guideline 4:** Avoid placing ditch relief culverts where they may discharge onto erodible slopes or directly into streams. | Ditch relief culverts would be avoided where they may discharge onto erodible slopes or directly into streams. All culverts will be designed to minimize erosion. |
| **Prescription 2.8.3 Roads and Trails Guideline 5:** Where feasible, install cross-drainage above stream crossings to prevent ditch sediments from entering streams. | Where feasible, cross-drainage would be installed above stream crossings. Further, ditches and sediments and erosion associated with any other area of impact would be mitigated. |
| **Prescription 2.8.3 Roads and Trails Guideline 6:** New or reconstructed roads and trails should cross the AIZ riparian areas as perpendicular as possible. | No riparian areas are present in the mapped AIZs that would be impacted. However, where culverts are necessary, they would be placed perpendicular to the area to be crossed if possible. |
| **Prescription 2.8.3 Roads and Trails Guideline 7:** Avoid making channel changes on streams or drainages. | Several intermittent drainages would be changed or removed due to construction of the pit and associated facilities. |
| **Prescription 2.8.3 Roads and Trails Guideline 8:** Design and install drainage crossings to reduce the chances of turning stream flows down the road prism in case of a blocked or overflowing culvert. | Culverts would be installed to reduce the chances of turning stream flows down the road prism in case of a blocked or overflowing culvert. |
| **Prescription 2.8.3 Roads and Trails Guideline 9:** Road drainage patterns should avoid disruption of natural hydrologic flow paths. | Roads have been designed such that drainage patterns would not disrupt natural hydrologic low paths. |

## Table 21 Compliance with Applicable BLM ARMP Goals, Objectives, and Actions for Fisheries and Aquatic Resources

| GOAL/OBJECTIVE/ACTION | COMPLIANCE UNDER PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Action SW-2.1.4.** Stream crossings, if necessary, will be designed to minimize adverse impacts on soils, water quality, and riparian vegetation and provide for fish passage, as appropriate. | Culverts would be installed to conform to the natural streambed and slope so that a minimum depth of water is always available in the culvert for fish passage. Thus, the Project would comply with BLM's action. |
| **Action SW-2.1.5.** As appropriate, new or existing roads and trails adjacent to streams or riparian areas that impact water quality may be redesigned, repaired, maintained, or re-located to a location not impacting the water quality. | Roads constructed for the Project are not anticipated to impact water quality to streams and riparian areas from new or existing roads because these resources are not present in the Project Area, plus implementation of EPMs and BMPs to control sedimentation and runoff. |

| GOAL/OBJECTIVE/ACTION | COMPLIANCE UNDER PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Action ME-2.2.2.** The following operation standards and guidelines would be applied as appropriate to reduce environmental impacts from mineral exploration and development operations:<br><br>**Operational Standards:**<br>1. Locate surface disturbing activities, including support facilities, outside riparian zones (e.g., riparian habitat conservation areas (RHCAs) or areas where surface disturbance will impact the PFC of the riparian areas) and fish bearing waters. Cutthroat trout guidance will be considered as identified in Appendix C of the ARMP. Where no feasible alternative site exists, operate and construct facilities in ways that will avoid or reduce impacts on riparian zone attributes. | No riparian areas and/or fish bearing waters would be impacted by surface disturbing activities for the Project, thus compliance with this action would be met. |

## 2.5 Land Use

The Project would comply with CNF RFP standards and guidelines for grazing management (**Table 22**) and recreation (**Table 23**).

**Table 22 Compliance with Applicable CNF RFP Standards and Guidelines for Grazing Management Action**

| STANDARD/GUIDELINE | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Range Resources Guideline 3:** Seeding or establishment of monocultures should be avoided, and efforts should be made to establish and/or maintain a variety of desirable grass, forbs, and shrub species. | This guideline would be met for the Project. Areas no longer needed for mining would be reclaimed with a variety of predominantly native plant species that are adapted to the local climate. The seed mix includes bunchgrasses, forbs, and shrubs for structural diversity. |
| **Forage Utilization Guideline 1:** Apply upland forage utilization levels to all allotments as shown in Table 3.6 in the CNF RFP, unless determined through development of site-specific standards in the allotment management. | This guideline would be met for the Project through issuance of Annual Operating Instructions as applicable. |
| **Livestock Grazing Permits Guideline 1:** Permittees may be allowed motorized access to maintain or develop range improvements assigned in their grazing permits or for other authorized administrative activities. AMPs and Annual Operating Instructions should include direction to comply; travel permits should be issued to authorize this use. | This guideline would be met for the Project through issuance of Annual Operating Instructions as applicable. |

| STANDARD/GUIDELINE | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Prescription 2.7.2(d)/Livestock Grazing Guideline 1:** Livestock grazing use in the uplands should not exceed the utilization levels below unless site specific analysis shows that higher levels are appropriate:<br>20 percent of the current year's growth of key browse species.<br>45 percent of the current year's growth of key herbaceous species. | This guideline would be for the Project through issuance of Annual Operating Instructions as applicable. |
| **Prescription 8.2.2/Livestock Grazing Guideline 1:** These areas may be opened to grazing after meeting the restoration criteria identified in the mine reclamation plan. | This guideline would be met for the Project following successful restoration. |

**Table 23 Compliance with Applicable CNF RFP Standards and Guidelines for Recreation**

| STANDARD/GUIDELINE | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Transportation/Access Guideline 1:** The construction of new or maintenance of existing, motorized and non- motorized access routes should be consistent with the ROS class in which they are located. | This guideline would be met; the construction of any new ATV trails following active mining operations would be consistent with the ROS class in which they are located, although none are anticipated for the Project. |
| **Transportation/Trails Guideline 1:** Protection measures for forest system trails should be included in management activity plans and authorizations. | Not applicable as there are not forest system trails within the Project Area. |

## 2.6 Visual Resources

**Table 24** describes the CNF RFP standard for scenic resources.

**Table 24 Compliance with Applicable CNF RFP Standards and Guidelines for Visual Resources**

| STANDARD AND GUIDELINE | COMPLIANCE UNDER THE PROPOSED ACTION AND/OR ALTERNATIVE 1 |
|---|---|
| **Scenic Resources Guideline 1:** Opportunities to improve scenic integrity should be considered in proposed vegetative treatments. | Project design features, BMPs, and the MRP (Simplot 2015) are the elements of the Project designed to reduce environmental impacts to visual resources. Existing vegetation would be protected to the extent practical by limiting surface disturbance to those areas needed for operations. Reclamation would include providing final soil cover and replanting native vegetation.<br>Phasing the mining and limiting the amount of disturbance at any one time would also provide opportunities to improve scenic integrity during mining activities. |

# APPENDIX 4B

# ADAPTIVE MANAGEMENT PLAN

# Adaptive Management Plan

# Smoky Canyon Mine, East Smoky Panel Mine Project

Stantec

Prepared for:
J.R. Simplot Company

Prepared by:
Stantec Consulting Services Inc.
8160 S. Highland Drive
Sandy, Utah 84093

January 2018

This page intentionally left blank.

## Table of Contents

# Abbreviations

| | |
|---|---|
| AMP | Adaptive Management Plan |
| BLM | Bureau of Land Management |
| BMPs | Best Management Practices |
| CEMPP | Comprehensive Environmental Monitoring Program Plan |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act |
| COPC | Contaminants of Potential Concern |
| CTNF | Caribou-Targhee National Forest |
| EIS | Environmental Impact Statement |
| EPA | Environmental Protection Agency |
| IDEQ | Idaho Department of Environmental Quality |
| IPDES | Idaho Pollutant Discharge Elimination System |
| MSGP | Multi Sector General Permit |
| NFS | National Forest System |
| NPDES | National Pollution Discharge Elimination System |
| ODA | Overburden Disposal Area |
| POC | Point of Compliance |
| SWPPP | Stormwater Pollution Prevention Plan |
| USFS | U.S. Forest Service |
| WTPP | Water Treatment Pilot Plant |

# 1.0 INTRODUCTION AND BACKGROUND

This Adaptive Management Plan (AMP) has been developed for J.R. Simplot Company's (Simplot) East Smoky Mine Panel Project (the Project) at the Smoky Canyon Mine, based upon comments from the Environmental Protection Agency (EPA) to the Bureau of Land Management (BLM), Pocatello Field Office and the U.S. Forest Service (USFS), Caribou-Targhee National Forest (CTNF) with cooperation from Idaho Department of Environmental Quality (IDEQ) for this Project. This AMP has been developed to address water management issues during operations and beyond.

The Smoky Canyon Mine is an open pit phosphate operation that has been in place since 1983. It is located about 10 miles southwest of Afton, Wyoming, in Caribou County, Idaho. The operation has included mining with standard open pit techniques in seven mine panels and then concentrating the phosphate content of the ore in an onsite mill. The concentrate is pumped through a buried pipeline to Simplot’s existing fertilizer manufacturing plant in Pocatello, Idaho. Tailings from the Smoky Canyon milling operation are disposed in two on-site, permitted tailings disposal ponds located on private land owned by Simplot. Site-specific water management activities have been ongoing throughout operations, as well as application of numerous other best management practices (BMPs).

Despite the implementation of agency-approved water management techniques, elevated selenium concentrations in both surface waters and groundwater water were discovered down gradient of the existing Smoky Canyon Mine in the mid-1990s. Since that time, water management has continued to evolve, along with a developing understanding of the relationship between management of mined overburden materials and their effects on water quality. Due to ongoing Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) investigations, Simplot has changed its overburden material handling practices as well as its water management strategies. Remediation of existing contaminated water is ongoing, including reducing the contact of surface water with overburden materials and collection/treatment of contaminated water at some major springs before it is released to the environment downstream.

Selenium is the primary constituent addressed in the ongoing CERCLA investigations and remediation activities. It has been found to be in more problematic concentrations in surface water media than other contaminants of potential concern (COPC) at the site. Mining and reclamation design at the Smoky Canyon Mine now focuses on managing seleniferous overburden to reduce its impact on surface water and groundwater quality. The Project reflects that focus.

As described in the Draft Environmental Impact Statement (EIS) for the East Smoky Panel Mine Project, Simplot proposes to: 1) mine the East Smoky Panel ore body with open pit methods; 2) transport the ore from the East Smoky Panel to the existing mill for beneficiation; 3) place initial overburden mined onto the Panel B backfill area and place the remaining overburden as backfill into the East Smoky Panel open pit; and 4) utilize an earthen evapotranspiration cover over the East Smoky Panel backfill to reduce net percolation of precipitation into the backfill material and direct surface runoff off the backfill. An Action Alternative (Alternative 1) would steepen the proposed pit slopes to eliminate mining of the Cherty Shale thereby reducing the selenium concentration in the pit backfill and potential seepage from the backfill. The Agency Preferred Alternative (Alternative 1) would reduce the proposed mine disturbance area, and reduce the amount of leachable selenium in the pit backfill.

This Project, analyzed in the Draft EIS, includes the same types of approaches to water management as are currently being used at the mine. Designed structures would control surface water so that it does not significantly degrade other waters. Impacts to groundwater from the East Smoky Panel mining operations would be similar to the other mine panels in that surface water infiltrating through the pit backfills would leach selenium and other COPCs from the backfill and contribute dissolved contaminants to the underlying Wells Formation aquifer.

The water quality impacts for the East Smoky Panel have been estimated by groundwater modeling and selenium concentrations have been shown to temporarily (< 60 years) exceed 0.05 mg/L directly under the pit backfill and reach maximum concentrations of 0.001 mg/L or less where the groundwater discharges at Hoopes Springs. These maximum impacts are expected to arrive at the springs 80 to 90 years following mining at East Smoky Panel. No water quality impacts from the East Smoky Panel are predicted for the South Fork Sage Creek Springs.

# 2.0 OBJECTIVES

The overarching goal of this AMP is to ensure that the quality of surface water downstream of the Hoopes Springs would be protected to the extent necessary to meet applicable Clean Water Act and State of Idaho surface water standards both in the short term during operations and in the long term, well after the mine has been reclaimed. Several objectives will help to meet this goal:

- Implement measures for the design, installation, and maintenance of mine-site mitigation measures associated with water management that will adequately control on-site water.
- Ensure that all terms of the Points of Compliance (POC) approval between Simplot and IDEQ are met.
- Monitor the quality of on-site and off-site waters with appropriate spatial and temporal considerations to document water quality patterns and trends, with an emphasis on selenium.
- Establish specific contingencies and practices if monitoring shows that water quality is not meeting defined numeric triggers.

# 3.0 CONSULTATION

Several agencies are party to the East Smoky Panel Draft EIS and/or have active roles in environmental permitting/compliance issues at the Smoky Canyon Mine. This AMP has been prepared to address the individual and collective concerns of those agencies.

The BLM administers the federal phosphate leases associated with the Smoky Canyon Mine and the USFS manages the land surface within the boundaries of the CTNF. BLM and USFS are the lead agencies for the Draft EIS due to their responsibilities for the mineral resource and the National Forest System (NFS) lands, respectively. As such, they will make separate but coordinated decisions related to this Project. Their decisions will be based on the Final EIS and applicable laws, regulations, and policies.

EPA is currently responsible for administering the National Pollution Discharge Elimination System (NPDES) program under Section 402 of the Clean Water Act in Idaho. Simplot currently has permit coverage for stormwater discharges under EPA's NPDES Multi-Sector General Permit (MSGP) for industrial stormwater discharges. As this AMP is written, IDEQ is seeking approval to gain primacy over the NPDES program in the state through EPA approval of the Idaho Pollutant Discharge Elimination System (IPDES). If EPA approves the IPDES program (expected in 2018), IDEQ will administer this program in place of the NPDES program in Idaho, except for discharges to tribal water which would continue to be subject to the EPA NPDES program.

IDEQ administers Section 401 of the Clean Water Act, which includes issues related to compliance with Idaho water quality standards for surface streams. IDEQ also implements groundwater quality standards and ensures that they are complied with.

CERCLA investigations and remedial planning are ongoing at the Smoky Canyon Mine under the oversight of the EPA and/or the USFS and/or the IDEQ, exercising its authorities under state law. The BLM, Shoshone-Bannock Tribes, and U.S. Fish and Wildlife Service (USFWS) are participating as support agencies.

# 4.0 WATER MANAGEMENT PLAN

## 4.1 EAST SMOKY PANEL

Under the Agency Preferred Alternative (Alternative 1), Simplot would construct numerous stormwater management features in the East Smoky Panel area to control impacts to surface water from the active mining operations. This would include sediment ponds, ditches/channels, and associated road disturbance as presented in Chapter 2 of the East Smoky Panel Draft EIS. The design criteria and operational strategy for these features are the same as currently used for the existing operational areas of the Smoky Canyon Mine, which builds upon past experience with water management strategies and the resultant water quality implications.

While these sediment ponds would not often discharge, there would be no prohibition to them doing so, as discharge of stormwater is allowed under Simplot's existing stormwater permit. To control any such releases, all ponds would be designed with stable spillways so that any discharge does not erode the spillways or instigate structural failure of the ponds. Discharges would be sampled and assessed for COPCs as discussed in the Storm Water Pollution Prevention Plan (SWPPP) that is required by the stormwater permit.

Some of the precipitation and runoff would infiltrate into the pit backfill materials. This water would percolate through the pit backfill material, and eventually enter the underlying Wells Formation aquifer where it would be diluted and transported by the groundwater movement. The chemistry impact of this leaching of the pit backfills on percolating water has been estimated through column testing conducted with representative samples of the same overburden materials as would be incorporated into the backfills. These water chemistry inputs have then been used, along with modeling estimates of the infiltration rate into the backfill, to model potential water quality impacts to the aquifer water quality. Impacted groundwater under the East Smoky Panel moves in directions and velocities described by the groundwater modeling and can transport the added contaminants away from the pit backfill area itself. Modeling has shown that the only point where the affected groundwater would discharge to the surface environment is Hoopes Springs. All of this is described in the East Smoky Panel Draft EIS.

Past monitoring of Hoopes Springs has indicated that water quality discharging from the springs has already been impacted by the existing mining operations to a degree that Simplot has constructed a water treatment pilot plant (WTPP) to demonstrate treatment of dissolved selenium in the contaminated spring water. The collection and treatment technology for this pilot plant is described in the East Smoky Panel Draft EIS and various reports and planning documents in the CERCLA project record.

Contaminated water discharging from Hoopes Springs is collected and piped to the WTPP where physical, biological and chemical treatment steps are used to remove dissolved selenium from the water before it is returned to the stream downgradient of Hoopes Springs. The feasibility of the treatment process is being demonstrated as part of the CERCLA process through two phases of construction and operation of the facility with a current capacity of treating 2,000 gallons per minute.

Simplot has developed a Comprehensive Environmental Monitoring Program Plan (CEMPP) for the Smoky Canyon Mine that addresses required monitoring of the facilities and multiple environmental media at the mine including stormwater, seeps and springs, surface water streams, and groundwater quality at certain water supply and monitoring wells. Simplot would update this CEMPP as required by the agencies for the East Smoky Panel facilities.

## 4.2 GENERAL BMPS RELATED TO WATER MANAGEMENT

In addition to the ponds, basins, and ditches/channels, other structural and operational BMPs are part of Simplot's water management program or indirectly contribute to its goals. They include the following practices, among others:

- locating runoff and sediment control facilities off overburden disposal areas (ODAs) to the extent feasible to reduce infiltration of collected water into overburden fills;
- controlling snow melt by placing snow stockpiles in areas where infiltration or mixing of snow or snow melt into/with external overburden is reduced to the extent practicable;
- mining and disposing seleniferous overburden in a timely manner to reduce exposure of this material to surface weathering and oxidation;
- reducing the surface area of seleniferous ODAs to the extent practicable to limit the amount of water infiltration and potential release from these fills;
- doing pit backfilling, grading, and constructing final reclamation covers over seleniferous overburden fills contemporaneously with the mining operation in accordance with the agency-approved mining and reclamation plans;
- inspecting the facilities daily to ensure activities comply with all approvals, permits, and regulations; and,
- inspecting, maintaining, and repairing water management structures to ensure functionality.

Simplot routinely monitors and samples stormwater, groundwater, soil, sediment, aquatic biota, vegetation, and surface water, as required by the various permits and conditions of approvals. Water monitoring is described further in **Section 4.3** below.

## 4.3 WATER MONITORING

The CEMPP for the Smoky Canyon Mine, has incorporated any required monitoring activities for the various phases (panels) of mining at the site, and is reviewed by the Agencies each year and updated/revised as required.

Simplot also monitors stormwater that collects in various sediment ponds. This is required for compliance with the MSGP. While selenium and total suspended solids are the pollutant parameters that are required to be sampled and reported under the terms of the MSGP, additional analytes are included for some samples.

Further, CERCLA investigations include monitoring and data analysis focused on the portion of the Smoky Canyon Mine that is north of South Fork Sage Creek. The CERCLA project record provides an extensive discussion of this data.

In support of the East Smoky Panel EIS, groundwater monitoring was conducted at 32 wells at the Smoky Canyon Mine. These included 10 wells in the Wells Formation aquifer, 11 wells in the Dinwoody and Salt Lake Formations, 3 wells in the Rex Chert, and 8 wells in alluvium. The locations of these wells are shown on Figure 3.5-1 of the Draft EIS. Surface water monitoring in support of the Draft EIS was conducted at 17 springs or seeps and 21 stream channel locations. The locations of these monitoring sites are shown on Figure 3.5-13 of the Draft EIS.

Some of the above described monitoring locations are already part of the long-term monitoring program described in the CEMPP and continued monitoring of these sites would occur under that program. Other of the above described sites would not be monitored on an on-going basis unless they are added to the CEMPP through decisions made by the state and federal agencies authorizing the East Smoky Panel mining operations.

Simplot has not yet requested, as part of its compliance with the Idaho Ground Water Quality Rule (58.01.11) that the IDEQ establish “Points of Compliance” (POC) outside the active mining area for the East Smoky Panel. These locations would likely be monitoring wells and would be recommended in an application submitted by Simplot. IDEQ would then evaluate the hydrogeological characteristics of the mining area and surrounding land, considering the potential contaminants and their impact on groundwater quality and public health effects. If the IDEQ determined that adequate protections were ensured, a POC determination would be issued. As this AMP is being written, the description of this POC monitoring has not yet been established.

The potential site for groundwater discharge that could be impacted by the East Smoky Panel backfill is Hoopes Springs. The water quality at Hoopes Springs has been monitored for years and there is an extensive database of water quality records for this site. Sampling is done quarterly for a list of analytes including dissolved and total selenium.

Proactive, or indicator monitoring, for selenium contribution to Hoopes Springs via the groundwater pathway would be difficult because the predicted selenium concentrations at that location are so low (0.001 mg/L). The current (last 8 data points = baseline condition for East Smoky Panel) mean selenium concentration at the springs is 0.119 mg/L with a standard deviation of 0.008 mg/L, well above the predicted future contribution from the East Smoky Panel of 0.001 mg/L. Remedial actions at the Smoky Canyon Mine are anticipated to reduce the selenium concentration at the springs to a predicted future concentration of 0.025 mg/L in about 2050. Even at this lower future concentration the standard deviation of the future “baseline” could be greater than the predicted contribution from East Smoky Panel. Thus, being able to discriminate the arrival of the selenium contribution from the East Smoky Panel at Hoopes Springs is likely not technically feasible. Therefore, monitoring of the total (baseline plus any addition from East Smoky

Panel) selenium concentration at Hoopes Springs, without trying to discriminate the contribution from the East Smoky Panel, is the most reasonable approach to future monitoring at the site.

# 5.0 ADAPTIVE MANAGEMENT PLAN

Water management at the Smoky Canyon Mine has evolved over the years to respond to changing conditions and evolving understanding of site characteristics. This flexibility will continue in the future, as aided by this AMP.

## 5.1 ELEVATED SELENIUM CONCENTRATIONS IN HOOPES SPRINGS

It is expected that the CERCLA process at the Smoky Canyon Mine will eventually certify the pilot collection/treatment system as ready for ongoing remediation of the selenium concentration in Hoopes Springs. The current information from the CERCLA process predicts that the long-term selenium concentration at Hoopes Springs from existing sources will exceed the applicable Clean Water Act and Idaho selenium standards for the Sage Creek drainage downstream of the springs (currently 0.005 mg/L). Thus, long-term operation of the water treatment plant such that treated water complies with the applicable stream standards is reasonably foreseeable.

The predicted contribution of selenium from the East Smoky Panel (0.001 mg/L) would be a minor addition to the predicted long-term baseline concentration at Hoopes Springs (0.025 mg/L). The on-going collection and treatment of the contaminated water from the springs would mitigate the combined selenium load of the baseline and East Smoky Panel contribution.

If source remediation and natural changes in the selenium concentration at Hoopes Springs results in total selenium concentrations in compliance with the applicable receiving stream standards, operation of the collection/treatment system could be discontinued. In addition, future changes to the selenium stream standard for Sage Creek are possible, and could also affect the relative compliance of the Hoopes Springs water with the stream standards.

The Smoky Canyon Mine is committed to the development of effective collection and treatment of South Fork Sage Creek Spring water and Hoopes Spring water to comply with applicable selenium surface water standards for Sage Creek, downstream of the South Fork Sage Creek Springs and Hoopes Spring. This treatment work, performed by Simplot, is conducted under a CERCLA settlement agreement with the USFS to address past contamination plumes. The treatment technology is expected to address existing impacts to Hoopes Spring water quality, and the possibility of future impacts from the East Smoky Panel. The USFS and the State of Idaho will require Simplot to achieve compliance with water quality standards and maintain compliance into the future.

U.S. Bureau of Land Management • U.S. Forest Service
Idaho Department of Environmental Quality • Idaho Department of Lands
Idaho Office of Energy and Mineral Resources