3.14 Vegetation, Including Riparian Zones and Wetland Areas

3.14.1 Affected Environment

The study area for vegetation resources includes the proposed Plan of Operations (PoO) boundary; and the Bootstrap Haul Road, power connection yard, secondary access road entrance, and power transmission line corridor that occur outside of the proposed PoO boundary. The Cumulative Effects Study Area (CESA) for vegetation resources covers the four grazing allotments (Twenty Five, Boulder Field, T Lazy S, and Marys Mountain) located on the Carlin Trend in the vicinity of the study areas as well as the Boulder Creek Valley area between the T Lazy S and Twenty Five Grazing Allotment (**Figure 3.14-1**). The study area for riparian zones and wetland areas is the same as vegetation resources. The CESAs for riparian zones and wetland areas include the six watersheds (Willow Creek Valley, Rock Creek Valley, Maggie Creek Area, Susie Creek Area, Boulder Flat, and Marys Creek Area) associated with the Carlin Trend (**Figure 3.14-2**). The CESA for riparian zones and wetland areas encompasses the following hydrographic basins located along the Carlin trend: Susie Creek, Maggie Creek, Marys Creek, Boulder Flat, Rock Creek Valley, Willow Creek Valley and the adjoining portion of the Humboldt River (**Figure 3.14-2**). All six basins drain southward to the Humboldt River. The CESA for riparian zones and wetland areas in this Environmental Impact Statement (EIS) is identical to the CESA analyzed in the Cumulative Impact Analysis of Dewatering and Water Management Operations for the Betze Project, South Operations Area Project Amendment, and Leeville Project (Bureau of Land Management [BLM] 2000b), Betze Project Draft Supplemental EIS (BLM 2000c), Betze Pit Expansion Project Draft Supplemental EIS (BLM 2008b), Leeville Project Final Supplemental EIS (BLM 2010b), and South Operations Area Project Amendment Cumulative Effects Final Supplemental EIS (BLM 2010a).

3.14.1.1 General Vegetation

The vegetation study area is located in the Upper Humboldt Plains subdivision of the Central Basin and Range ecoregion. The Central Basin and Range ecoregion is the predominant ecoregion in Nevada and is composed of elevated internally drained xeric basins in between scattered mountain ranges (Bryce et al. 2003). The vegetation is a mosaic of sagebrush or saltbush-greasewood shrublands and salt flats. The climate is arid, with annual precipitation typically 10 to 12 inches (U.S. Department of Agriculture-Natural Resources Conservation Service [USDA-NRCS] 2010c). The elevation ranges from 5,260 to 6,060 feet above mean sea level (Cedar Creek Associates, Inc. [Cedar Creek] 2009). The Upper Humboldt Plains subdivision consists of rolling plains with occasional buttes and low mountains (Bryce et al. 2003). Due to its elevation range, this subdivision is cooler and wetter than the Central Basin and Range subdivisions, resulting in increased dominance of cool-season grasses in areas of shallow, stony soil (Bryce et al. 2003). Substrates consist of volcanic ash, rhyolite, and tuffaceous rocks.

Distribution of vegetation types in the study area is strongly influenced by variations in landscape position, soil type, moisture, elevation, and aspect. Plant species composition, abundance and vegetative structure have been affected by previous disturbances within the project area including wildfires, livestock grazing, and mine operations and reclamation. Vegetation cover and land use types, and plant community characterizations were compiled based on NRCS ecological site descriptions, existing National Environmental Policy Act (NEPA) documents and site-specific wetland and vegetation studies conducted within the study area (BLM 1997; SRK Consulting [U.S.], Inc. [SRK] 2009b,c; USDA-NRCS 2010a,c). Species nomenclature herein is consistent with the USDA-NRCS Plants Database (USDA-NRCS 2010b).

Table 3.14-1 summarizes the vegetation cover and land use types, specific vegetation types, ecological sites, and acreage calculations within the study area. An ecological site is a landform with specific physical characteristics, which differs from other landforms in its ability to produce distinctive kinds and amounts of vegetation and in its response to management. General vegetation types are comprised of multiple ecological sites. Five vegetation cover and land use types are located in the study area. The

Table 3.14-1 General Vegetation Cover and Land Use Types, Specific Vegetation Types, and Ecological Sites within the Study Area

General Vegetation Cover and Land Use Types	Specific Vegetation Types	Ecological Site Code	Ecological Site Name	Acres	Percent of Study Area
New Disturbance					
Grassland	--	025XY018NV	CLAYPAN 10-12 P.Z.	13	<1
Sagebrush Shrubland	Low Sagebrush Shrubland	025XY022NV	COBBLY CLAYPAN 8-12 P.Z.	1,851	48
	Big Sagebrush Shrubland	025XY014NV	LOAMY 10-12 P.Z.	963	25
	Wyoming Big Sagebrush	024XY005NV	LOAMY 8-10 P.Z.	22	1
Riparian Zones and Herbaceous Wetland Areas	--	--	--	5	<1
Previously Disturbed but Reclaimed					
Reclaimed Grasslands	--	--	--	728	19
Existing Disturbance					
Existing Disturbance	--	--	--	269	7

Source: USDA-NRCS 2010a,c.

dominant vegetation cover type is sagebrush shrubland. **Figure 3.14-3** illustrates the vegetation cover and land use types present within the study area.

Previously burned areas caused by wildfires occur in portions of the study area and have been reseeded as part of fire rehabilitation seeding projects in the 1960s and in the 2000s. Species used for the reseeding included crested wheatgrass (*Agropyron cristatum*), bluebunch wheatgrass (*Pseudoroegneria spicata*), smooth brome (*Bromus inermis*), intermediate wheatgrass (*Thinopyrum intermedium*), western wheatgrass (*Pascopyrum smithii*), slender wheatgrass (*Elymus trachycaulus*), bitterbrush (*Purshia tridentata*), and a grass-legume mixture (SRK 2009c). Crested wheatgrass was the predominant species used for reseeding during the 1960s and a native seed mixture was employed for the reseeding effort during the 2000s (SRK 2009c).

The dominant cover type within the study area, sagebrush shrubland, is composed of a dominant overstory of shrubs and a subdominant understory of herbaceous species. This vegetation type comprises 74 percent of the study area and consists of three specific vegetation types (low sagebrush, big sagebrush, and Wyoming big sagebrush). Usually found on dry flats and plains, alluvial fans, rolling hills, rocky hill slopes, saddles and ridges, the substrate for this vegetation type is typically deep, well-drained and non-saline soils. Exposure to desiccating winds is common for these areas. This cover type is found on both burned and unburned areas in the study area. The dominant shrub, depending on location, is mountain big sagebrush (*Artemisia tridentata* spp. *vaseyana*), basin big sagebrush (*Artemisia tridentata* ssp. *tridentate*), or Wyoming big sagebrush (*Artemisia tridentata* ssp. w*yomingensis*).

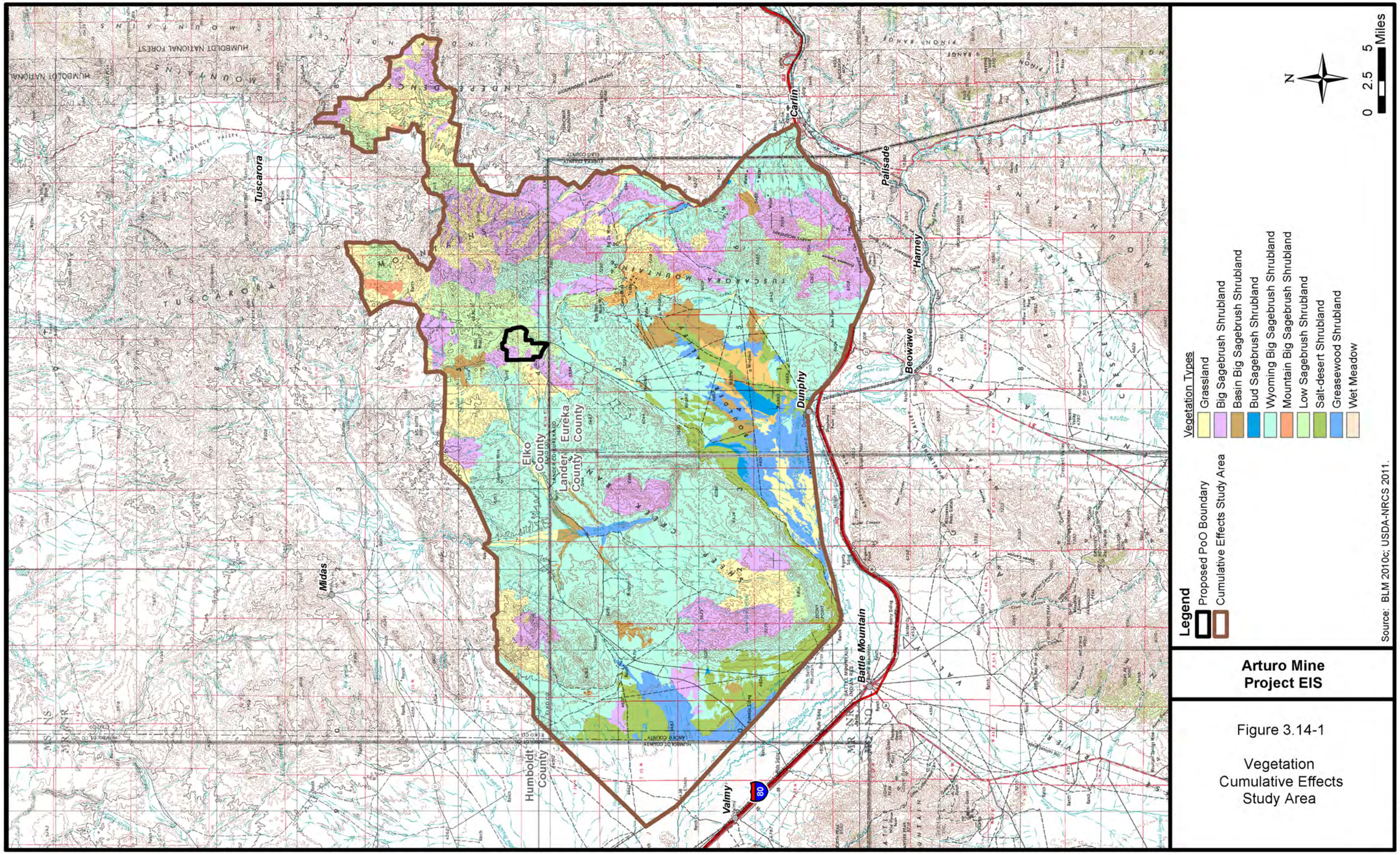

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Figure 3.14-1

Vegetation Cumulative Effects Study Area

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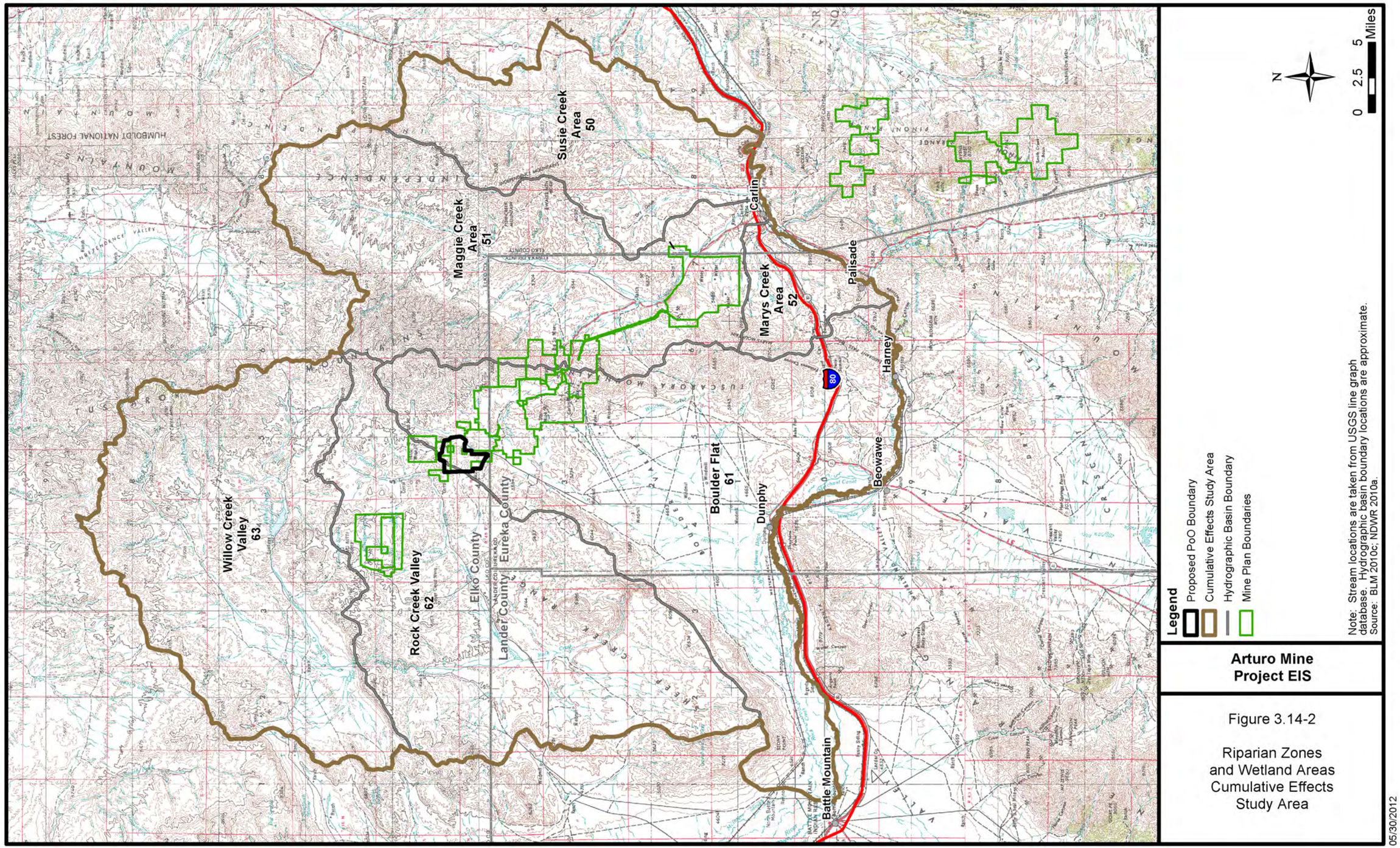
Susie Creek Area 50
Maggie Creek Area 51
Marys Creek Area 52
Boulder Flat 61
Willow Creek Valley 63
Rock Creek Valley 62
Carlin
Palisade
Harney
Beowawe
Dunphy
Battle Mountain
Elko County
Lander County
Eureka County
HUMBOLDT NATIONAL FOREST
INDEPENDENCE VALLEY
N
0 2.5 5 Miles
Legend
Proposed PoO Boundary
Cumulative Effects Study Area
Hydrographic Basin Boundary
Mine Plan Boundaries
Note: Stream locations are taken from USGS line graph database. Hydrographic basin boundary locations are approximate.
Source: BLM 2010c; NDWR 2010a.
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Figure 3.14-2
Riparian Zones and Wetland Areas Cumulative Effects Study Area
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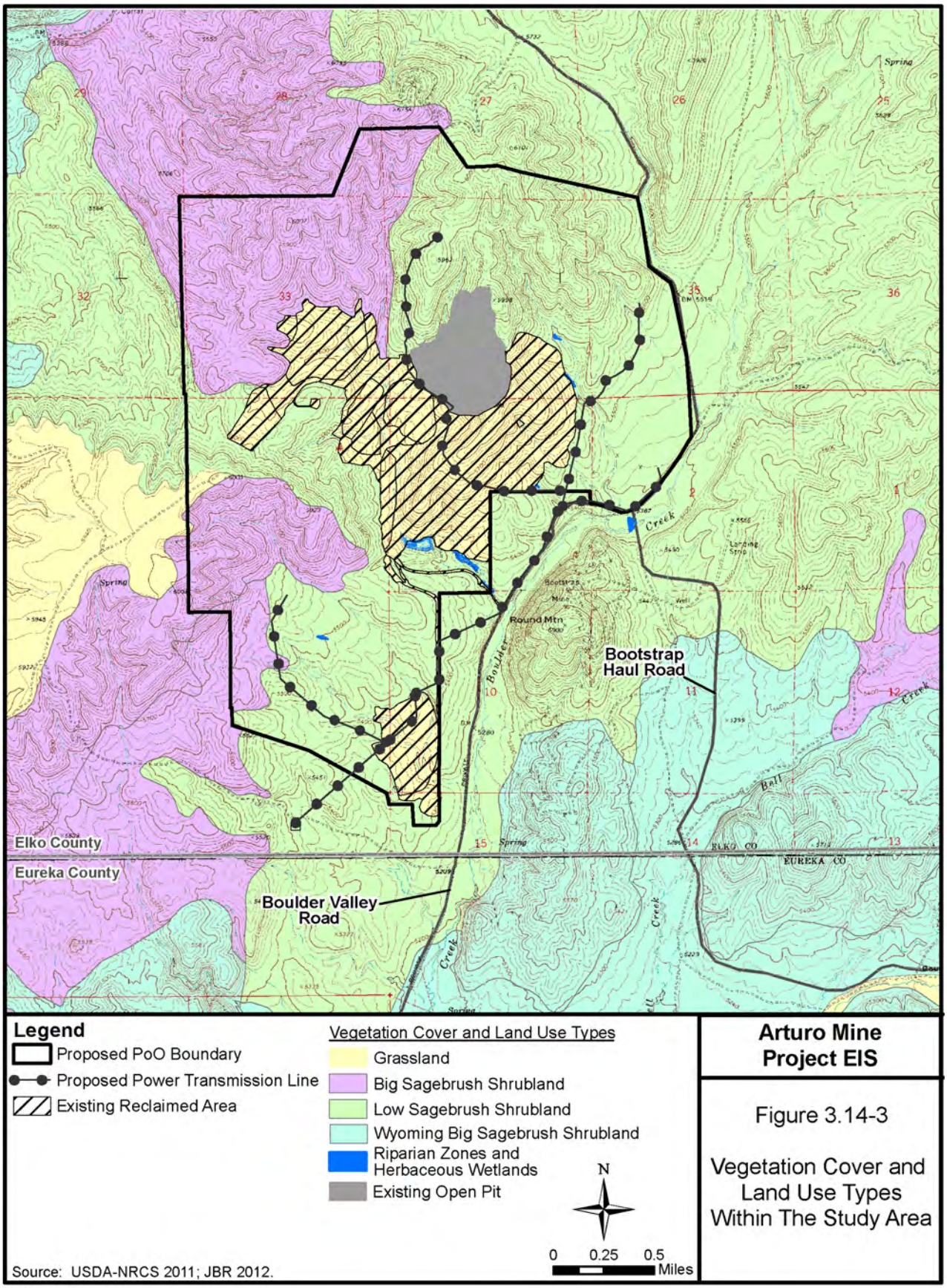

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Figure 3.14-3

Vegetation Cover and Land Use Types Within The Study Area

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Associated minor shrubs include rubber rabbitbrush (*Ericameria nauseosa*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), and bitterbush. Understory species consist of grasses and forbs including bluebunch wheatgrass, Sandberg bluegrass *Poa secunda*), cheatgrass (*Bromus tectorum*), bottlebrush squirreltail (*Elymus elymoides*), and lupine (*Lupinus* spp.). Soils associated with this vegetation cover type are typically deep, well-drained, and non-saline.

Grassland occupies less than 1 percent of the study area and is dominated by perennial grasses and forbs with an open to moderately dense shrub layer. Typical grass species include those used for reseeding efforts listed above, as well as basin wildrye (*Leymus cinereus*), bottlebrush squirreltail, bluegrass (*Poa* spp.), needlegrass (*Achnatherum* spp.), Sandberg bluegrass, Indian ricegrass (*Achnatherum hymenoides*), and cheatgrass (*bromus tectorum*). Forb species include long-leaf phlox (*Phlox longifolia*), sego lily (*Calochortus nuttallii*), royal penstemon (*Penstemon speciosus*), vetch (*Vicia* spp.), wild onion (*Allium* spp.), and tufted evening primrose (*Oenothera caespitosa*) (SRK 2009b). This vegetation cover type typically occurs on dry plains and mesas, deep-soiled to stony flats, ridges, nearly flat ridgetops, and mountain slopes. Substrates are often well drained sandy or loamy-textured soils derived from sedimentary parent materials but are quite variable and may include fine-textured soils derived from igneous and metamorphic rocks.

Reclaimed grassland occupies 19 percent of the study area and is composed of areas that were previously disturbed as part of the original Dee Mine that have been reclaimed. The seed mix used to reseed the reclaimed areas consisted of native and early successional herbaceous and shrub species (Great Basin Ecology, Inc. 2008). Several factors that determine the length of time for vegetation to re-establish include, but are not limited to, available moisture, plant nutritional requirements, seed availability, drought conditions, precipitation, soil condition, and soil chemical composition or characteristics determine the length of time for vegetation to re-establish. The benefit from factors such as these affecting the plant growth is the development of a mosaic vegetation pattern and a variable age class for the vegetation. A sustainable plant community consists of plants at various age classes and life cycle stages ranging from young immature to mature plants; reproduction of plants; a mosaic of vegetation patterns, and stable soils.

Species currently present in the reclaimed areas include those used for reseeding, native species not found in the seed mix, and invasive species (cheatgrass) (Great Basin Ecology, Inc. 2008). The typical species are similar to those listed for the grasslands vegetation cover type. Additional species include thickspike wheatgrass (*Elymus lanceolatus* ssp. *lanceolatus*), small burnet (*Sanguisorba minor*) and sagebrush (*Artemsia* spp.) Russian thistle (*Salsola* spp.) also is common in these areas.

Sagebrush requires a specific chemical in the soil to grow. Soils that contain this chemical and sagebrush seed were used to establish sagebrush on the reclaimed areas at the Dee Mine site. Sagebrush seed can also be inoculated prior to seeding. Sagebrush can establish rapidly at a reclaimed site depending on the availability of chemicals in the soil that sagebrush needs in order to grow. However, if the soils are lacking the chemicals that sagebrush requires, it may take years for sagebrush to establish or it may never establish on a site. Revegetation in the reclaimed areas was successful in developing a sustainable plant community.

Existing disturbance occupies 7 percent of the study area and is characterized by surface disturbance from previous and existing mine operations within the study area.

Riparian zones/herbaceous wetland areas and water features occupy <1 percent of the study area and are composed of stream channels, riparian/wetland vegetation, and open water. Section 3.14.1.2, Riparian Zones and Wetland Areas, provides specific information regarding riparian zones and wetland areas.

3.14.1.2 Riparian Zones and Wetland Areas

The study area for riparian zones and wetland areas is located in the Boulder Creek sub-basin of the Humboldt River drainage. The area is composed of rolling to moderately steep topography with ephemeral channels, seeps, springs, wetlands, and a sediment pond. Riparian zones and wetland areas in the region are characterized as herbaceous wetlands, seeps, catchments, and open water habitats (JBR Environmental Consultants, Inc. [JBR] 2012, 2009; Cedar Creek 2009). **Figure 3.14-4** illustrates riparian zones and wetland areas that occur in the study area.

The term wetland is defined in 33 Code of Federal Regulations 328, 7(b) as "those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." Note that the frequency and duration of saturation may vary by geographical region and is largely dependent upon local climatic conditions. Wetlands adjacent to other waters of the United States, such as streams, also are considered to be waters of the United States.

According to the United States Army Corps of Engineers (USACE's) 1987 Wetland Delineation Manual, a three-parameter approach is required for delineating USACE-defined wetlands (Environmental Laboratory 1987). Based on this approach, areas are identified as wetlands if they exhibit the following characteristics:

1. The prevalence of vegetation consisting of hydrophytic species or plants that have the ability to grow in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content and depleted soil oxygen levels.
2. The presence of soils that are classified as hydric or possessing characteristics that are associated with reducing soil conditions. Hydric soils are poorly drained and have a seasonal high water table within 6 inches of the surface.
3. An area that is inundated either permanently or periodically at mean water depths less than or equal to 6.6 feet or the soil is saturated to the surface at some time during the growing season of the prevalent vegetation.

The USACE (Environmental Laboratory 1987) requires that, under normal circumstances, all three of these conditions be met for an area to be considered a wetland under the USACE's definition.

Additional guidance on wetlands is provided in the Interim Regional Supplement to the USACE Wetland Delineation Manual: Arid West Region (USACE 2006). Riparian and wetland areas were delineated within the study area based on a review of aerial photography and subsequent field surveys of potentially jurisdictional wetland and riparian features. In 2008, Cedar Creek reviewed previous aerial delineations to determine which of 22 seeps, water catchments, or related features warranted further field investigations to determine if: 1) any of the features would be classified as wetlands as defined by the USACE; and 2) the delineated wetlands were jurisdictional. Of the 22 seeps, water catchments, or related features, 14 features warranted further field investigations. For the remaining 8 features (AR10, AR13, AR22, AR24, AR26, AR32, AR33, and AR34) field visits were not required, as previous determination of these features as seeps and catchments was sufficient. An additional detention pond (constructed in 1964) (AR36) was added to the list of water related features in 2009. The location of the water features are shown in **Figure 3.14-4** and listed in **Table 3.4-2**. JBR conducted additional field delineation surveys for water features along the Bootstrap Haul Road proposed road expansion area in 2012.

During the Cedar Creek field delineation surveys in 2008, 6 features (AR02, AR04, AR11, AR12, AR14, and AR15) were identified as seeps or catchments but were not classified as wetlands as defined by the USACE. The results of the field delineations identified six areas exhibiting sufficient characteristics to be

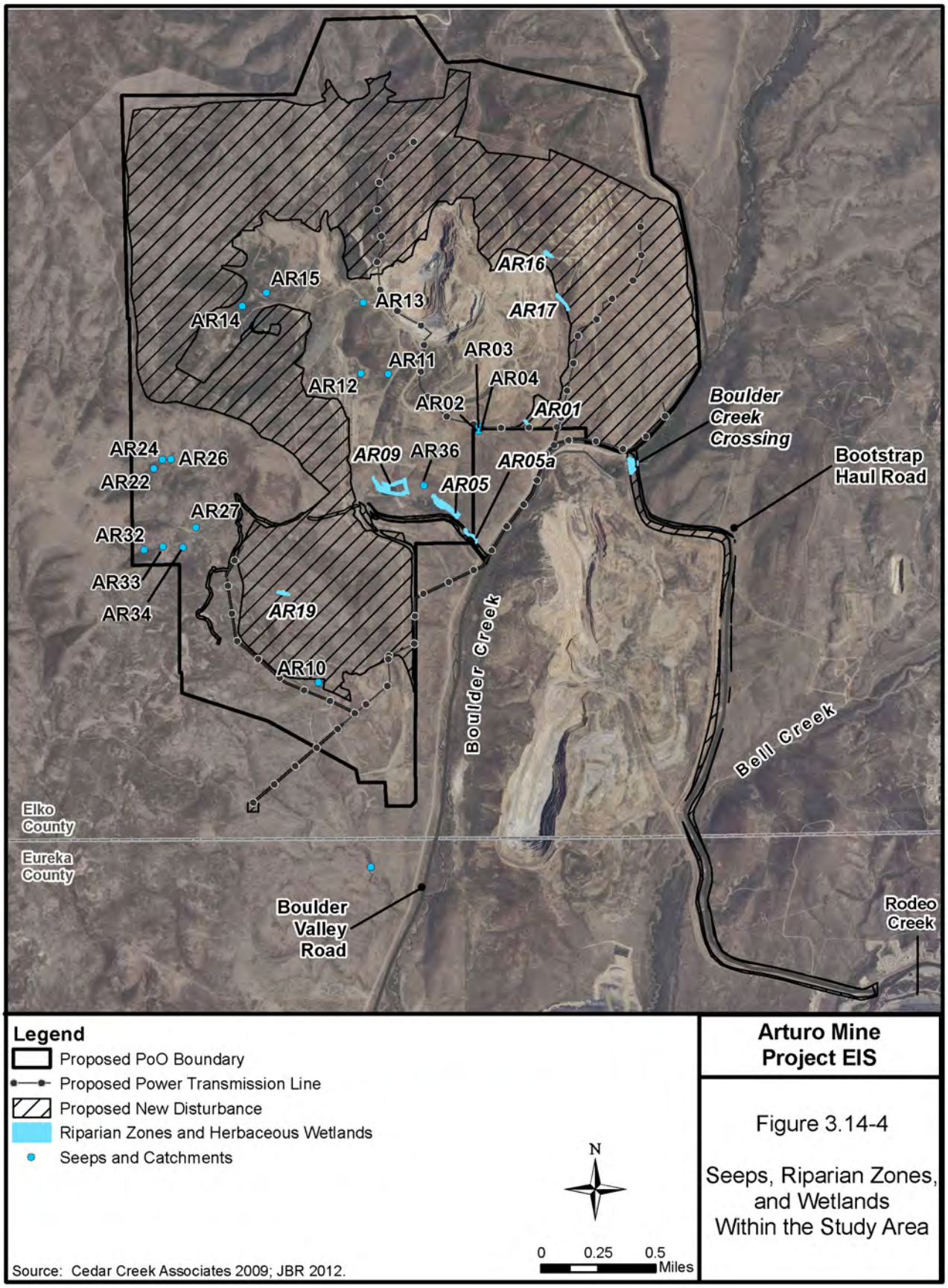

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Figure 3.14-4

Seeps, Riparian Zones, and Wetlands Within the Study Area

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classified as wetlands using USACE guidelines within the proposed PoO boundary (Cedar Creek 2009). One of the wetland areas can be divided into two identification areas, AR05 and AR05a. The results of the JBR 2012 field surveys identified two additional wetlands (on the north and south banks of the stream channel) of the Boulder Creek road crossing. The nine wetland areas and riparian zones within the study area are shown in **Table 3.14-2** and **Figure 3.14-4**.

Table 3.14-2 Riparian Zones and Wetland Areas Within the Study Area

Wetland ID	Location	Description	Acres
AR01	Isolated impoundment at the head of channel (affected by proposed project)	Wetland at the bottom of a drainage appears to have been translocated due to burial by a waste rock dump. Wetland flora observed includes meadow barley, rabbitfoot grass, and American speedwell.	0.06
AR05	Directly abuts channel	An associated wetland with AR05a is separated by a constructed sediment pond. Wetland due to upgradient seepage. Wetland flora observed includes broad-leaved cattail, Baltic rush, and American speedwell.	1.43
AR05a	Directly abuts channel	See description for AR05.	0.21
AR09	Impoundment at the head of channel	Constructed feature with sufficient inflows to develop wetland characteristics. Wetland flora observed includes American speedwell, meadow barley, foxtail barley, and curly dock.	2.01
AR16	Impoundment in channel (affected by proposed project)	Seep wetland appears to have been translocated due to burial by a waste rock dump.	0.25
AR17	Directly abuts channel (affected by proposed project)	Wetland at the bottom of a drainage appears to have been translocated due to burial by a waste rock dump. Wetland flora observed includes narrow-leaved cattail, foxtail barley, American speedwell, rabbitfoot grass, and hairy willowherb.	0.26
AR27	Isolated seep	Marginal wetland resulting from a natural seep flows into a low depression. Wetland flora observed includes annual hairgrass, blue vervain, curly dock, and poverty weed.	0.01
Boulder Creek Crossing 1 and 2	Stream channel with two associated wetlands (affected by the proposed project)	Riparian vegetation in the stream channel and associated wetlands on the north and south banks of Boulder Creek at the Boostrap Haul Road crossing. Wetland flora observed includes curly dock, rabbit's foot grass, and coyote willow.	1.06[1]
Total			**5.29**

[1] Total includes 0.7 acre of wetlands and 0.36 acre of riparian vegetation in the stream channel.

Source: BLM 2010b; Cedar Creek 2009; JBR 2012.

Typical species found in the wetlands along the ephemeral channels and more heavily vegetated portions of these wetlands include cattails (*Typha* spp.), meadow barley (*Hordeum brachyantherum*), and Baltic rush (*Juncus balticus*) (Cedar Creek 2009). Species that typically occur in the seeps and more sparsely vegetated wetlands are curly dock (*Rumex crispus*), annual rabbit's-foot grass (*Polypogon monspeliensis*), and other early successional wetland taxa (Cedar Creek 2009). Of the seven wetlands identified in the proposed PoO boundary, five abut ephemeral channels and two are isolated wetlands (JBR 2009). Most of the wetlands cover an area less than 1 acre. Only two wetlands are larger than 1 acre, with the largest mapped wetland being approximately 2 acres. Seeps that occur within the proposed PoO boundary are associated with either historic sediment and runoff control features or occur at the base of waste rock facilities or other features that had developed in relation to mine activities (Cedar Creek 2009). The wetlands identified along the Bootstrap Haul Road crossing are associated with Boulder Creek which was confirmed not to be a tributary of the Humboldt River. The wetlands cover less than 1 acre (0.70 acres) (JBR 2012).

Of the ephemeral stream channels in the project area, 5 do not extend beyond the project area, while 10 are tributaries of Boulder Creek (JBR 2009). Boulder Creek was confirmed to not be a tributary of Humboldt River as it dissipates approximately 17 stream miles downgradient of the project area (JBR 2009).

A delineation of jurisdictional waters (i.e., defined creek channels and wetlands) was conducted in the project PoO boundary, and along Boulder Creek from Boulder Valley Road to Rock Creek Ditch in August and September 2009 (JBR 2009). The results of the field investigations and a request for an approved jurisdictional determination were provided to the Sacramento District Office of the USACE in November 2009. The USACE provided a jurisdictional determination to Barrick Dee Mining Venture (BDMV) on August 13, 2010, for the proposed PoO boundary. The USACE determined that Channels 1, 2, 3, 4, 5, 6a, 6b, 6, 7, 8a, 8b, 8c, 8d, 8e, 8; East and West Swales; wetlands; and springs within the proposed PoO boundary are intrastate isolated waters with no apparent interstate or foreign commerce connection and, thus, not currently regulated by the USACE under Section 404 of the Clean Water Act (USACE 2010). The disturbance to widen the Bootstrap Haul Road will be less than 1 acre. The Bell Creek crossing will not require additional width as the road is sufficiently wide enough to accommodate haul road traffic. Boulder and Bell creeks also were determined by the USACE to be non-jurisdictional. The results of the April 2012 field surveys were not provided to the USACE. However, as Boulder Creek was determined to be non-jurisdictional, its associated wetlands are also non-jurisdictional. Therefore, the proposed project would not be required to obtain a USACE permit to proceed with project implementation.

3.14.2 Environmental Consequences

Primary issues related to vegetation resources include loss or degradation of upland and riparian/wetland vegetation communities. The potential impacts of the proposed project on vegetation can be classified as short-term (temporary) and long-term duration. Short-term impacts result from surface disturbances related to construction, operation and interim and final reclamation activities. Short-term impacts would cease upon mine closure and completion of successful reclamation. Long-term impacts consist of permanent changes to vegetation communities, irrespective of reclamation success.

3.14.2.1 Proposed Action

General Vegetation

Under the proposed project, mine development and operation would disturb approximately 2,774 acres from surface disturbance activities. Approximately 269 acres would occur in areas of existing disturbance, 543 acres would occur in previously disturbed but reclaimed areas, and 1,962 acres would occur in previously undisturbed areas. The majority of the disturbance would occur in the sagebrush shrubland type, upland areas, and/or areas previously disturbed by historical mining activities.

Table 3.14-3 lists the vegetation cover and land use types and acreages that would be disturbed from project construction and operation. Acres of vegetation impacted by geologic exploration activities were estimated by multiplying the percent of the area impacted by geologic exploration activities by the acreage of each vegetation type within the proposed PoO boundary. In addition, vegetation along existing access roads would be affected (e.g., reduction in growth rate) as a result of additional dust deposition.

Table 3.14-3 Proposed Action – Disturbed Acres of General Vegetation Cover and Land Use Types, and Specific Vegetation Types

General Vegetation Cover and Land Use Types	Specific Vegetation Types	Acres	Percent of Study Area
New Disturbance			
Grassland	--	<1	<1
Sagebrush Shrubland	Low Sagebrush Shrubland	1,396	50
	Big Sagebrush Shrubland	542	20
	Wyoming Big Sagebrush	22	<1
Riparian Zones and Herbaceous Wetland Areas[1]	--	2	<1
Previously Disturbed but Reclaimed			
Reclaimed Grasslands	--	543	20
Existing Disturbance			
Existing Disturbance	--	269	10

[1] Detail in **Table 3.14-4**.

Source: Cedar Creek 2009; JBR 2012; USDA-NRCS 2010a,c.

The goals of reclamation include providing a stable post-mining landform that supports defined land uses, such as wildlife habitat and domestic grazing; minimizing erosion damage and protecting water resources through control of water runoff and stabilization of components; establishing post-reclamation surface soil conditions conducive to the regeneration of a stable plant community; and revegetating disturbed areas with a diverse mixture of plant species in order to establish productive long-term plant communities compatible with existing land uses.

Project-related activities would result in the conversion of a shrub-dominated vegetation cover type to a grass/forb dominated vegetation cover type in the short term. Over the long term, shrubs would become re-established and increase in abundance within the majority of disturbed areas as a result of reclamation and natural re-colonization. The loss of 1,960 acres of shrub-dominated vegetation would represent a long-term impact as it could take up to 25 years following reclamation for mature shrub species to re-establish.

To minimize impacts to vegetation, reclamation would be conducted as soon as practical, with concurrent reclamation implemented to the maximum extent possible as discussed in Section 2.3.8, Closure and Reclamation Plan. Reclamation activities would include, but would not be limited to, grading

of final slopes; ripping of compacted soil; application of growth media; and broadcasting of seed. Interim seed mixes, as described in **Appendix A**, **Table A-3**, would be used for concurrent reclamation during project operations. The final reclamation mix to be used for revegetation activities post-operations is provided in **Appendix A**, **Table A-1**. The interim seed mix uses three species that stabilize areas quickly, while the reclamation seed mix consists of a variety of native grasses, forbs, and shrubs to revegetate disturbed areas. Satisfactory revegetation of mine-related disturbance areas (i.e., assuming the primary goal of soil stabilization through presence of adequate plant cover) is anticipated to occur approximately 3 to 15 years following reclamation. After 25 years, the reclaimed plant communities likely would consist of adequate herbaceous plant cover with sufficient diversity to substantially reduce the potential for soil erosion and provide suitable forage for livestock and wildlife.

Riparian Zones and Wetland Areas

The potential impacts of the proposed project on riparian zones and wetland areas would predominantly be considered long-term. Long-term impacts consist of permanent changes to wetland and riparian zones irrespective of post-closure and reclamation success. Impacts to wetlands would result from surface disturbances; changes in surface water and groundwater flows; and the removal of water sources related to construction, operation, and reclamation activities. The construction of the open pit would affect three wetlands (0.54 acre) (**Table 3.14-4**). The widening and realigning of the Bootstrap Haul Road would disturb 0.7 acres of wetlands and 0.36 acres of riparian vegetation in the stream channel at the Boulder Creek Crossing. The construction of the proposed pit wall and the proposed Heap Leach Pad No. 12 would result in the removal of several seeps either through direct impacts to the seep or the removal of the water source seeps, see Section 3.4, Water Resources and Geochemistry.

Indirect impacts to wetland areas as a result of soil erosion and sedimentation would be minimized with the implementation of erosion control measures as described in Section 2.3.9, Applicant-committed Environmental Protection Measures.

Table 3.14-4 Proposed Action – Disturbed Acres of Wetlands within the Study Area

Wetland ID	Acres
AR01	0.06
AR16	0.25
AR17	0.26
Boulder Creek Riparian Zones and Wetland Areas	1.06
Total	**1.63**

Source: Cedar Creek 2009; JBR 2012.

3.14.2.2 Single Waste Rock Disposal Facility Alternative

The Single Waste Rock Disposal Facility (WRDF) Alternative would be similar to the Proposed Action, except that the East WRDF would not be developed and the West WRDF would be expanded by approximately 54 acres. Overall, this alternative would result in approximately 128 fewer acres of disturbance.

General Vegetation

Table 3.14-5 lists the vegetation cover and land use types and acreages that would be disturbed from the proposed Single WRDF Alternative construction and operation. Acres of vegetation impacted by geologic exploration activities were estimated by multiplying the percent of the area impacted by geologic exploration activities by the acreage of each vegetation type within the proposed PoO boundary. In

Table 3.14-5 Single WRDF Alternative – Disturbed Acres of General Vegetation Cover and Land Use Types, and Specific Vegetation Types

General Vegetation Cover and Land Use Types	Specific Vegetation Types	Acres	Percent of Study Area
New Disturbance			
Grassland	--	<1	<1
Sagebrush Shrubland	Low Sagebrush Shrubland	1,250	1
	Big Sagebrush Shrubland	560	47
	Wyoming Big Sagebrush	22	21
Riparian Zones and Herbaceous Wetland Areas[1]	--	2	<1
Previously Disturbed but Reclaimed			
Reclaimed Grasslands	--	543	21
Existing Disturbance			
Existing Disturbance	--	269	10

[1] Detail in **Table 3.14-4**.

Source: Cedar Creek 2009; JBR 2012; USDA-NRCS 2010a,c.

addition, vegetation along existing access roads would be affected (e.g., reduction in growth rate) as a result of additional dust deposition.

The acres of proposed disturbance in areas of existing disturbance, and previously disturbed but reclaimed areas would be similar to the Proposed Action. Approximately 1,834 acres of vegetation in previously undisturbed areas would be disturbed by surface disturbance activities. There would be a long-term loss of 1,832 acres of shrub-dominated vegetation until reclamation has been completed and vegetation is reestablished.

Riparian Zones and Wetland Areas

Under the Single WRDF Alternative, impacts to riparian zones and wetland areas would be the same as the Proposed Action.

3.14.2.3 Partial Pit Backfill Alternative

The Partial Pit Backfill Alternative would be similar to the Proposed Action except that mining would be sequenced to allow backfilling portions of the open pit with waste rock during mining. The surface facilities and footprint for this alternative are identical to the Proposed Action. While the surface disturbance would be the same under this alternative as the Proposed Action, there are differences in the design height and capacity of the West and East WRDF, the amount of area to be reclaimed, and the surface area and locations of the final pit lakes.

General Vegetation

Under the Partial Pit Backfill Alternative, surface disturbance would be the same as described for the Proposed Action, except that during final reclamation, 291 additional acres would be reclaimed within the open-pit footprint as compared to the Proposed Action.

Riparian Zones and Wetland Areas

Under the Partial Pit Backfill Alternative, surface disturbance would be the same as described for the Proposed Action.

3.14.2.4 No Action Alternative

Under the No Action Alternative, the proposed project would not be developed and the related potential impacts to vegetation resources would not occur. Continuation of mining activities associated with the Storm Underground Mine, completion of closure and reclamation activities associated with existing disturbance, ongoing mineral exploration activities, and reclamation within the study area, would be conducted under existing authorizations. No additional ground-disturbing activities beyond those currently authorized would occur at the mine site.

3.14.3 Cumulative Impacts

The CESA for vegetation resources and riparian zones and wetland areas is defined in Section 3.14.1, Affected Environment, and is shown in **Figures 3.14-1** and **3.14-2**, respectively. Past, present, and reasonably foreseeable future actions (RFFAs) are discussed in Section 3.2, Past, Present, and Reasonably Foreseeable Future Actions. RFFAs from mining activities are identified in **Table 3.2-1** and their locations are shown in **Figures 3.2-1** and **3.2-2**.

3.14.3.1 Proposed Action

General Vegetation

Additional vegetation types that occur in the CESA but do not occur in the study area include salt-desert shrubland, greasewood shrubland, sagebrush shrubland, mountain big sagebrush, and wet meadow. Past, present, and RFFAs in the vegetation CESA have resulted, or would result, in approximately 36,455 acres of mine-related disturbance. Past, present, and RFFAs from utility and energy development (North Elko Pipeline and TS Power Plant) have resulted, or would result, in up to 740 acres of additional disturbance. The proposed project incrementally would increase disturbance by an additional 1,962 acres for a total cumulative disturbance of 39,157 acres. The proposed project disturbance represents approximately 5 percent of the total past, present, and RFFAs disturbance. It is assumed that portions of past mine-related disturbances in the CESA have been reclaimed, and ongoing reclamation at existing operations would continue. The incremental additional impacts to vegetation as a result of the proposed project would be temporary in nature for the majority of the project disturbance area, with the exception of the open pit, which would not be reclaimed.

Other surface disturbing activities in the CESA that contribute to cumulative effects of vegetation resources include the establishment and spread of noxious weeds and non-native invasive plant species, livestock grazing, and wildfires. Cumulative impacts to vegetation resources within the CESA are discussed specifically in the Leeville Project, Final Supplemental EIS (BLM 2010b).

Cumulative losses for vegetation resources potentially would include the reduction of native ecosystem functions such as soil stability, erosion control, livestock and wildlife forage, and wildlife habitat. The removal of woody species from these areas would result in a long-term change in vegetation structure since it may take up to 15 to 20 years for shrub species of similar stature to become re-established in these areas. Indirect impacts to vegetation resources associated with surface disturbance activities would include fugitive dust accumulation, and introduction and/or spread of noxious weeds and non-native invasive plant species. Fugitive dust from development activities can adversely impact native vegetation communities and alter vegetative composition (U.S. Fish and Wildlife Service 2008a). The cumulative effects of noxious weeds and non-native invasive plant species are discussed in Section 3.15, Noxious Weeds and Non-native Invasive Plant Species.

Livestock grazing has and would continue to influence vegetation composition and structure throughout the CESA. Potential for overgrazing may increase as land is converted to mining and transportation uses or land that is temporarily lost to wildfire; however, adjustment of stocking rates to account for changes in land use ensures vegetation communities are not overgrazed. Within the CESA, reductions in permitted grazing use would continue to occur as a result of mine development and wildfires; however, these impacts would be short-term as subsequent reclamation of mined areas and restoration of burned sites would allow for stocking rates to return to near pre-mining/pre-burn levels.

Numerous wildfires have occurred in the study area, creating additional regional impacts to vegetation within the CESA. **Figure 3.2-3** illustrates the locations of the wildfires in the region over the past 30 years. The cumulative effect of fires within the CESA is more pronounced because of the increased size and intensity of recent wildfires. Direct and indirect impacts to vegetation resources from wildfires include the complete loss or partial removal of upland vegetation species, potential removal of below ground biomass, soil hydrophobicity, and the potential spread and/or introduction of noxious weeds and non-native invasive plant species. See Section 3.13.3.1, Proposed Action, for a further discussion of the effects of wildfires on soil resources. The general effect in some areas from recent fires included the conversion of sagebrush habitat to cheatgrass, which form a persistent, non-native, monoculture that tends to dominate burned areas. The continued establishment of cheatgrass would increase the likelihood of wildfire, and could change the fire regime, community composition, and structure of plant communities indefinitely. Impacts to vegetation resources may vary depending on fire intensity, duration, and frequency. Recovery timeframes for herbaceous and woody species would be relatively similar to those previously described for other surface disturbance-related activities. Reseeding would improve vegetation structure and composition in burned areas and would benefit wildlife by providing forage, cover, and nesting habitat. Large areas affected by fire may take years to reestablish native vegetation. Completed and planned sagebrush and forage planting in burned areas would benefit a diversity of wildlife species including mule deer, pronghorn, sage grouse, and pygmy rabbit by providing forage, cover, and breeding habitat.

Reclamation of mine-related disturbances in the CESA would be incremental as various operations reach the end of active mining and begin closure activities. In many of the mines, permanent disturbance would be associated with the open pits that would not be reclaimed; some would be partially filled with water. Areas being reclaimed on public lands would be reclaimed to BLM standards and monitored to assess success of reclamation. Grasses with low densities of native forbs and shrubs would likely be the dominant vegetation on reclaimed areas.

Previously disturbed land has been reclaimed with a seed mix consisting of native grasses, forbs and shrubs. Currently, these reclaimed areas maintain a diverse plant community that is self-sustaining and resistant to erosion. The dominant plants within these reclaimed areas are basin wildrye, bluebunch wheatgrass, black sagebrush (*Artemisia nova*), Wyoming big sagebrush, and cheatgrass (*Bromus tectorum*) (Great Basin Ecology, Inc. 2008, SRK 2009b,c and BLM 2010b). Communities of big sagebrush, the most extensive pre-mining plant community, have proven difficult to re-establish on reclaimed lands when the soil characteristics do not contain the specific chemicals required by sagebrush to establish and grow (BLM 2010b).

Past, present, and RFFAs would cumulatively and incrementally reduce vegetation cover types until such time that reclamation is deemed successful and native plants are re-established. Although the cumulative surface disturbance would be greater than the proposed project disturbance, it would represent a small increment of the vast acreage of public lands in the area, and would have minimal effect on land uses displaced by past, present, and RFFAs in the CESA. The cumulative unreclaimed disturbance area that would remain after completion of the interrelated actions, including the pit areas of the proposed project, would be a small percentage of the total land area in the CESA, and would have a negligible effect on land uses. The loss of mature shrubs would be minimal relative to the total acreage of woody species communities that occur within the CESA.

Riparian Zones and Wetland Areas

Surface disturbing activities in the CESA that have resulted, or would result, in cumulative effects to riparian zones and wetland areas include wildfires, mining operations, utility and energy development, and agricultural activities. Within the CESA, impacts to riparian zones and wetland areas are discussed in the NEPA documents associated with the past and current projects (BLM 2010b, 2008b, 2007a, 2000b). Cumulative impacts to riparian zones and wetland areas within the Carlin Trend are discussed in the Leeville Project, Final Supplemental EIS (BLM 2010b). Cumulative impacts to riparian zones and wetland areas cannot be quantified but are discussed qualitatively.

A total of 4,530 acres of riparian/wetland habitat occur within the CESA; including 2,218 acres in Maggie Creek, 1,685 acres in Rock Creek (including Boulder Flat), 228 acres in Susie Creek, 388 acres in Humboldt River watersheds and 10 acres associated with small tributaries to the Humboldt River (BLM 2010b).

It is anticipated that the cumulative impacts to riparian zones and wetland areas in the Carlin Trend from past, present, and RFFAs would include degradation of riparian and wetland vegetation from livestock grazing; mining (surface disturbance and dewatering activity); conversion of native riparian/wetland plant communities to communities dominated by invasive non-native species; other industrial development (e.g., power plants and power transmission corridors); service roads; wildfire; and in some cases agricultural diversions (BLM 2010b). These activities may result in the temporary or permanent loss of riparian and wetland vegetation. Wildfires have had varying impacts on riparian and wetland habitats, depending on the condition and moisture levels of the riparian zone prior to the wildfire. Grazing has affected and will continue to affect riparian zones and wetland areas to varying degrees. Depending on the level of management, livestock grazing may have minimal to extensive impacts on riparian vegetation. Grazing in the annual hot season, combined with the establishment of noxious weeds and non-native invasive plant species has an increased potential for impacts to riparian and wetland resources through loss of habitat and decrease and/or loss of vegetation.

Over the last several decades, riparian zones have generally improved throughout portions of the study area in response to changes in livestock management. As the need and opportunity for further grazing management changes are identified and implemented, riparian zones are expected to continue to improve. Although some impacts due to dewatering have occurred, riparian zones and wetland areas have been improved and expanded in the CESA, through the Maggie Creek Watershed Restoration Project and Upper Willow Creek Habitat Enhancement Plans (BLM 2010b).

Under the proposed project the loss of the five wetlands and the portion of Boulder Creek riparian vegetation in the stream channel within the Bootstrap Haul Road expansion area (1.6 acres) would be a small but incremental addition to cumulative impacts to riparian zones and wetland areas within the CESA.

3.14.3.2 Single Waste Rock Disposal Facility Alternative

General Vegetation

Cumulative effects under the Single WRDF Alternative would be similar to cumulative effects associated with the Proposed Action, except that this alternative would incrementally add approximately 1,834 acres to the disturbance for a total cumulative disturbance of 39,029 acres. The Single WRDF Alternative disturbance represents approximately 5 percent of the total. Cumulative impacts to vegetation resources would be the similar to those described for the Proposed Action minus 128 acres of vegetation impacts from surface disturbance.

Riparian Zones and Wetland Areas

Cumulative effects under the Single WRDF Alternative would be the same as discussed under the Proposed Action.

3.14.3.3 Partial Pit Backfill Alternative

General Vegetation

Cumulative effects under the Partial Pit Backfill Alternative would be the same as discussed under the Proposed Action, except that an additional 291 acres would be reclaimed in the open pit during final reclamation.

Riparian Zones and Wetland Areas

Cumulative effects under the Partial Pit Backfill Alternative would be the same as discussed under the Proposed Action.

3.14.3.4 No Action Alternative

General Vegetation

Under the No Action Alternative, the proposed project would not be developed and no additional cumulative effects to vegetation resources would occur.

Riparian Zones and Wetland Areas

Under the No Action Alternative, the proposed project would not be developed and no additional cumulative effects to riparian zones and wetlands areas would occur. Cumulative impacts to riparian zones and wetland areas associated with past and current projects were identified in previous NEPA analyses in the area (BLM 2010b, 2008b, 2007a, 2000b).

3.14.4 Potential Monitoring and Mitigation Measures

3.14.4.1 General Vegetation

The following mitigation measures are recommended for vegetation resources.

Issue: Sagebrush is an important habitat in the study area, and the loss of sagebrush communities would have impacts on area wildlife. Sagebrush communities can take several decades to reclaim and often be unsuccessful without additional reclamation measures.

Mitigation Measure V-1: Additional reclamation measures would be implemented to assist in the reclamation of sagebrush shrubland communities in the PoO boundary. Additional reclamation measures to be implemented include:

- Application of mulch;
- Inoculation with arbusucular mychorrizea;
- Reduced seeding rate of grasses and forbs in the reclamation seed mixes to reduce competition;
- Growth media would be direct-placed, when possible; and
- Planting of sagebrush in small patches.

Effectivness: The implementation of the additional sagebrush measures would assist in the establishment of successful sagebrush communities by favoring the establishment of big sagebrush in the PoO boundary. Big sagebrush would be favored by decreasing competition with herbaceous species and noxious weeds, and the amelioration of site conditions through the addition of mulch, inoculation with arbusucular mychorrizea.

3.14.4.2 Riparian Zones and Wetland Areas

The following mitigation measures are recommended for riparian zones and wetland areas.

Issue: Development of the proposed project would affect 12.6 acres of riparian and wetland vegetation.

Mitigation Measure W-1: In order to offset project-related impacts that would remove or disturb approximately 1.6 acres of riparian zones and wetland vegetation, BDMV would install BLM-approved fencing around approximately 34 acres of vegetation, including three springs, located within the Water Canyon spring complex area (located in Section 12, Township 34N, Range 45E), in coordination with the BLM.

In March 2011, a Class III cultural resources inventory was conducted within the Water Canyon spring complex area to determine whether the installation of the fence would result in cultural impacts. The Class III inventory recorded three new prehistoric lithic scatter locations that are not eligible for the National Register of Historic Places.

Effectiveness: Implementation of this mitigation measure would offset project-related impacts to wetland vegetation by preventing livestock use within the fenced Water Canyon spring complex, enhancing and restoring existing wetland areas within the project region.

3.14.5 Residual Impacts

3.14.5.1 General Vegetation

Residual impacts to vegetation would include the permanent loss of 472 acres of vegetation in previously reclaimed or undisturbed areas associated with the expansion of the open pit, which would not be reclaimed. Under the proposed project, the loss of shrub-dominated communities would represent a long-term change in vegetation composition (i.e., shrub-dominated communities to grass/forb-dominated communities). In addition, fragmentation and the conversion of vegetation types may occur over the long term, depending on the success of reclamation and associated disturbances during the life of the project.

3.14.5.2 Riparian Zones and Wetland Areas

Residual impacts to riparian zones and wetland areas would be mitigated through implementation of Mitigation Measure W-1. Therefore, there would be no residual impacts to riparian zones and wetland areas.

3.15 Noxious Weeds and Non-native Invasive Plant Species

The study area for noxious weeds and non-native invasive plant species includes the proposed Plan of Operations (PoO) boundary; and the Bootstrap Haul Road, power connection yard, secondary access road entrance, and power transmission line corridor that occur outside of the proposed PoO boundary. The Cumulative Effects Study Area (CESA) for noxious weeds and non-native invasive plant species covers the four grazing allotments (Twenty Five, Boulder Field, T Lazy S, and Marys Mountain) located on the Carlin Trend in the vicinity of the study area and the Boulder Creek Valley area between the T Lazy S and Twenty Five Grazing Allotment (**Figure 3.15-1**).

3.15.1 Affected Environment

Under the Federal Plant Protection Act of 2000 (formerly the Noxious Weed Act of 1974 [7 United States Code (USC) SS 2801-2814]), a noxious weed is defined as "any plant or plant product that can directly or indirectly injure or cause damage to crops, livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment." The State of Nevada also regulates noxious weeds. Under the Nevada Revised Statute (NRS), a noxious weed is defined as "any species of plant which is, or is likely to be, detrimental or destructive and difficult to control or eradicate" (NRS 555.005 – Control of insects, pests, and noxious weeds). Noxious weeds have become a growing concern in Nevada, based on their ability to increase in cover relative to surrounding vegetation and exclude native plants from an area. Noxious weeds are classified into three categories based on the statewide importance, distribution, and the ability of eradication or control measures to be successful. Category A weeds are not currently found or have limited distribution throughout the state and eradication and control is required by the state, in all infestations; Category B weeds are found in scattered populations in some counties of the state; and control is required by the state in areas where populations are not well established or previously unknown to occur; and Category C weeds are currently established and generally widespread in many counties of the state and control is at the discretion of the state quarantine officer (NRS 555.010). A list of the noxious weed species designated by the state is provided in **Table 3.15-1**.

Table 3.15-1 State of Nevada Noxious Weeds

Common Name	Scientific Name	Category[1]
African rue	*Peganum harmala*	A
Austrian fieldcress	*Rorippa austriaca*	A
Austrian peaweed	*Sphaerophysa salsula/Swainsona salsula*	A
Black henbane	*Hyoscyamus niger*	A
Camelthorn	*Alhagi camelorum*	A
Common crupina	*Crupina vulgaris*	A
Dalmation toadflax	*Linaria dalmatica*	A
Dyer's woad	*Isatis tinctoria*	A
Eurasian water-milfoil	*Myriophyllum spicatum*	A
Giant reed	*Arundo donax*	A
Giant salvinia	*Salvinia molesta*	A
Goats rue	*Galega officinalis*	A
Green fountain grass	*Pennisetum setaceum*	A
Houndstongue	*Cynoglossum officinale*	A
Hydrilla	*Hydrilla verticillata*	A
Iberian starthistle	*Centaurea iberica*	A

Table 3.15-1 State of Nevada Noxious Weeds

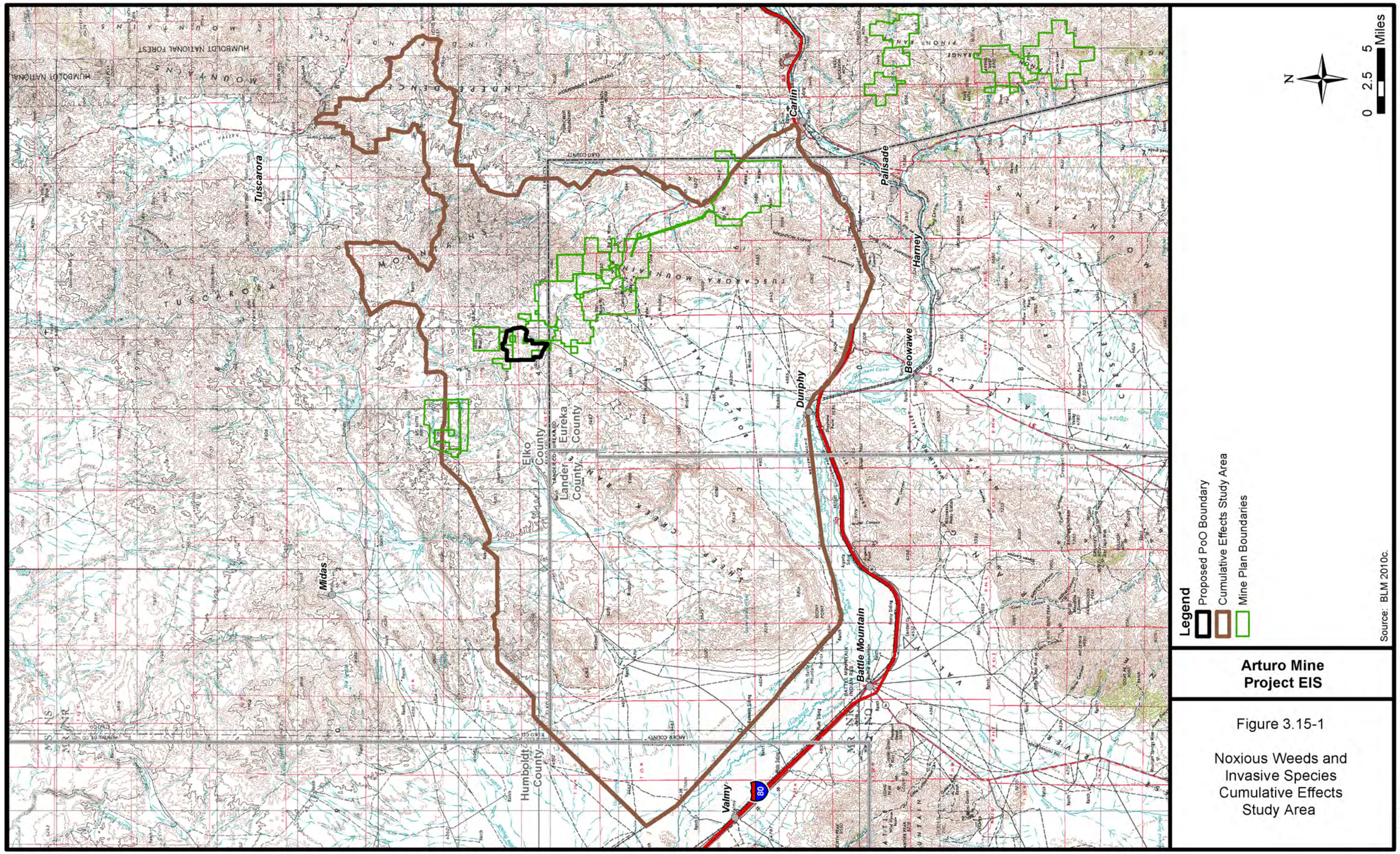
Common Name	Scientific Name	Category[1]
Klamath weed	*Hypericum perforatum*	A
Malta star thistle	*Centaurea melitensis*	A
Mayweed chamomile	*Anthemis cotula*	A
Mediterranean sage	*Salvia aethiopis*	A
Purple loosestrife	*Lythrum salicaria, L. virgatum* and their cultivars	A
Purple star thistle	*Centaurea calcitrapa*	A
Rush skeletonweed	*Chondrilla juncea*	A
Sow thistle	*Sonchus arvensis*	A
Spotted knapweed	*Centaurea masculosa*	A
Squarrose knapweed	*Centaurea virgata*	A
Sulfur cinquefoil	*Potentilla recta*	A
Syrian bean caper	*Zygophyllum fabago*	A
Yellow star thistle	*Centaurea solstiltialis*	A
Yellow toadflax	*Linaria vulgaris*	A
Carolina horse-nettle	*Solanum carolinense*	B
Diffuse knapweed	*Centaurea diffusa*	B
Leafy spurge	*Euphorbia esula*	B
Medusahead	*Taeniatherum caput-medusae*	B
Musk thistle	*Carduus nutans*	B
Russian knapweed	*Acroptilon repens*	B
Sahara mustard	*Brassica tournefortii*	B
Scotch thistle	*Onopordum acanthium*	B
White horse-nettle	*Solanum elaeagnifolium*	B
Canada thistle	*Cirsium arvense*	C
Hoary cress	*Cardaria draba*	C
Johnson grass	*Sorghum halepense*	C
Perennial pepperweed	*Lepidium latifolium*	C
Poison hemlock	*Conium maculatum*	C
Puncture vine	*Tribulus terrestris*	C
Salt cedar (tamarisk)	*Tamarix* spp.	C
Water hemlock	*Cicuta maculata*	C

[1] **Category A** includes noxious weeds, which are: 1) not found or limited in distribution throughout the state; 2) actively excluded from the state and actively eradicated wherever found; and 3) controlled by the state for all infestations.

Category B includes noxious weed species, which are: 1) established in scattered populations in some counties of the state; 2) actively excluded where possible; and 3) controlled by the state in areas where populations are not well established or previously unknown to occur.

Category C includes noxious weeds, which are: 1) currently established and generally widespread in many counties of the state; and 2) controlled and abated at the discretion of the state quarantine officer.

Source: Nevada Department of Agriculture 2006.


Tuscarora
Carlin
Palisade
Harney
Beowawe
Dunphy
Elko County
Eureka County
Lander County
Humboldt County
Midas
Valmy
Battle Mountain
80
N
0 2.5 5 Miles
Legend
Proposed PoO Boundary
Cumulative Effects Study Area
Mine Plan Boundaries
Source: BLM 2010c.
Arturo Mine Project EIS
Figure 3.15-1
Noxious Weeds and Invasive Species Cumulative Effects Study Area
05/24/2012

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In addition, the federal Noxious Weed Act of 1974, as amended (7 USC 2801 et seq.) requires cooperation with state, local, and other federal agencies in the application and enforcement of all laws and regulations relating to the management and control of noxious weeds. Recognizing these regulations, the Bureau of Land Management (BLM) requires that National Environmental Policy Act documents consider and analyze the potential for the spread of noxious weed species and provide preventative rehabilitation measures for each management action involving surface disturbance. The BLM considers plants invasive if they have been introduced into an environment where they did not evolve. As a result, they usually have no natural enemies to limit their reproduction and spread (Westbrooks 1998).

Within the proposed PoO boundary where existing disturbance has occurred, scotch thistle, salt cedar, and bull thistle have been visually observed during pedestrian surveys of the site (BLM 2010b; SRK 2009b,c). Scotch thistle populations are most prominent and occur throughout the existing disturbance area, including exploration roads. Control measures for this species have been and are currently being implemented in order to control or eradicate this species. Salt cedar populations are limited to Tailing Impoundment #2. Control measures for this species have been implemented and proven successful. Bull thistle and hoary cress populations generally occur along the periphery of the constructed wetlands areas. Hoary cress populations also have been observed along the exploration roads. While not a federal or state-designated noxious weed, cheatgrass (*Bromus tectorum*) has been observed in the existing disturbance area and is considered a non-native invasive plant species.

Dee Gold Mining Company has a noxious weed control program that has been actively treating noxious weeds at the existing Dee Mine. The noxious weed control program includes annual monitoring and herbicide and mechanical treatments, such as hand pulling.

3.15.2 Environmental Consequences

Primary issues related to noxious weeds and non-native invasive plant species include direct and indirect impacts associated with the introduction or spread of noxious weeds and non-native invasive plant species resulting in the loss or degradation of native vegetation communities, or preferred grazing areas.

3.15.2.1 Proposed Action

Under the proposed project, mine development and operation would disturb approximately 2,774 acres from surface disturbance activities. Approximately 269 acres would occur in areas of existing disturbance, 543 acres would occur in previously disturbed but reclaimed areas, and 1,962 acres would occur in previously undisturbed areas. The majority of the disturbance would occur in the sagebrush shrubland type.

Following surface disturbance activities, noxious weeds and non-native invasive plant species may readily colonize areas that typically lack or have minimal vegetation cover. It is anticipated that minor populations of weedy annual species (e.g., halogeton, cheatgrass) may become established in localized areas for extended periods of time. Surface disturbance and increased vehicle travel along new routes may readily spread noxious weeds and non-native invasive plant species and colonize areas that have minimal vegetative cover or that have been recently disturbed. Noxious weed species can degrade and modify native communities, reduce resources for native species, monopolize limited sources of moisture, and adversely affect native pollinators. In addition, noxious weeds and non-native invasive plant species can reduce wildlife habitat, alter fire regimes, and degrade wetland and riparian areas.

Implementation of the applicant-committed environmental protection measures, and Barrick Dee Mining Venture's (BDMV) Reclamation Plan and Weed Management Plan would reduce the potential for noxious weeds and non-native invasive plant species establishment in the study area. All surface disturbance would be reclaimed either concurrently during operations as areas become available or once mining is complete. The Weed Management Plan includes management strategies and control

techniques to prevent or minimize the establishment or spread of weed populations. Noxious weed management would continue during the post-mining reclamation period and the post-closure monitoring period.

BDMV would implement Best Management Practices to prevent the spread of noxious weeds, which would include seeding growth media stockpiles as soon as practical with an interim seed mix (**Appendix A**, **Table A-3**); using certified weed-free hay and straw; and reclaiming with an approved seed mix (**Appendix A**, **Table A-1**). Seeding the growth media stockpiles with the interim seed mix would stabilize the growth media and reduce soil erosion in addition to minimizing the potential for the establishment of noxious weeds and non-native invasive plant species. Successful reclamation of mine-related disturbance areas (except for the open-pit) would result in the establishment of a permanent vegetative cover, which would minimize the potential establishment of noxious weeds and non-native invasive plant species in the long term. The pit would not be reclaimed; however, due to the absence of soils and the formation of pit lakes, the potential for establishment of noxious weeds and non-native invasive plant species would be less likely.

3.15.2.2 Single Waste Rock Disposal Facility Alternative

The Single Waste Rock Disposal Facility (WRDF) Alternative would be similar to the Proposed Action, except that the East WRDF would not be developed and the West WRDF would be expanded by approximately 54 acres. Overall, this alternative would result in approximately 128 fewer acres of disturbance. As a result, the potential for the introduction or spread of noxious weeds and non-native invasive plant species would be less than the Proposed Action since 128 fewer acres would be disturbed.

3.15.2.3 Partial Pit Backfill Alternative

The Partial Pit Backfill Alternative would be similar to the Proposed Action except that mining would be sequenced to allow backfilling portions of the open pit with waste rock during mining. The surface facilities and footprint for this alternative are identical to the Proposed Action, therefore the acres of disturbance and potential impacts from noxious weeds and non-native invasive plant species would be the same as described for the Proposed Action.

3.15.2.4 No Action Alternative

Under the No Action Alternative, the proposed project would not be developed and subsequent impacts associated with the introduction or spread of noxious weeds and non-native invasive plant species would not occur. Continuation of mining activities associated with the underground Storm Mine, completion of closure and reclamation activities associated with existing disturbance, and ongoing mineral exploration activities within the study area, would be conducted under existing authorizations. Existing weed control measures would continue to be implemented to prevent the establishment of new populations and to control existing populations in mine-related disturbance areas.

3.15.3 Cumulative Impacts

The CESA for noxious weeds and non-native invasive plant species is described in Section 3.15.1, Affected Environment, and is shown in **Figure 3.15-1**. The past, present, and reasonably foreseeable future actions (RFFAs) are discussed in Section 3.2, Past, Present, and Reasonably Foreseeable Future Actions. RFFAs from mining activities are identified in **Table 3.2-1**, and their locations shown in **Figures 3.2-1** and **3.2-2**.

3.15.3.1 Proposed Action

Past, present, and RFFAs in the CESA have resulted, or would result, in approximately 36,455 acres of mine-related surface disturbance. Past, present, and RFFAs, from utility and energy development (North Elko Pipeline and TS Power Plant) have resulted, or would result, in up to 740 acres of additional

disturbance. The proposed project would add 1,962 acres of new disturbance for a total cumulative disturbance of 39,157 acres. The proposed project represents approximately 5 percent of the total past, present, and RFFAs disturbance. Noxious weeds and non-native invasive plant species currently exist in the CESA. Surface disturbance activities from implementation of the proposed project as well as other future projects could further spread noxious weeds and non-native invasive plant species into previously undisturbed areas, and may increase the acreage and population numbers of already established noxious weeds and non-native invasive plant species populations. Other surface disturbing activities in the CESA that contribute to cumulative effects noxious weeds and non-native invasive plant species include livestock grazing, wildfire, all terrain vehicles, and recreation use. Cumulative impacts to noxious weeds and non-native invasive plant species within the CESA would be the same as described in the Leeville Project, Final Supplemental Environmental Impact Statement (BLM 2010b).

It is anticipated that the cumulative impacts to noxious weeds and non-native invasive plant species in the CESA from past, present, and RFFAs would result in the potential for the increased spread of noxious weeds and non-native invasive plant species into disturbed area created from surface disturbances associated with grazing, wildfires, and the development of mining projects and utility corridors. Linear surface disturbances such as utility corridors, roads, and trails provide corridors for further introduction and spread of noxious weeds and non-native invasive plant species (Gelbard and Belnap 2003; Watkins et al. 2003). These networks of corridors can then serve as a source of propagules (D'Antonio et al. 2001) for noxious weeds and non-native invasive plant species to spread into adjacent undisturbed areas.

It is assumed that the majority of the surface disturbance-related impacts within the CESA would be reclaimed, minimizing the introduction and/or spread of noxious weeds and non-native invasive plant species. Implementation of BDMV's Reclamation Plan and Noxious Weed Control Plan would minimize the introduction and/or spread of noxious weeds and non-native invasive plant species within the proposed project disturbance areas, thereby minimizing the project's contribution to cumulative effects.

3.15.3.2 Single Waste Rock Disposal Facility Alternative

Cumulative effects under the Single WRDF Alternative would be similar to cumulative effects associated with the Proposed Action, except that this alternative would add approximately 1,834 acres of new disturbance for a total cumulative disturbance of 39,029 acres. The single waste rock disposal facility alternative represents approximately 5 percent of the total past, present, and RFFAs disturbance.

3.15.3.3 Partial Pit Backfill Alternative

Cumulative effects under the Partial Pit Backfill Alternative would be similar to cumulative effects associated with the Proposed Action.

3.15.3.4 No Action Alternative

Under the No Action Alternative, the proposed project would not be developed and no additional cumulative effects from noxious weeds and non-native invasive plant species would occur.

3.15.4 Potential Monitoring and Mitigation Measures

No additional mitigation measures are recommended for noxious weeds and non-native invasive plant species.

3.15.5 Residual Impacts

Noxious weeds and non-native invasive plant species may persist over the long term regardless of the implementation of weed control programs.

3.16 Range Resources

3.16.1 Affected Environment

The study area for range resources includes the proposed Plan of Operations (PoO) boundary, the areas enclosed by the proposed fenceline, and the Bootstrap Haul Road, power connection yard, secondary access road entrance, and power transmission line corridor that occur outside of the proposed PoO boundary. The Cumulative Effects Study Area (CESA) for range resources includes the grazing allotments (Boulder Field, Twenty Five, T Lazy S, and Marys Mountain) along the Carlin Trend (**Figure 3.16-1**).

Portions of two grazing allotments, Twenty Five and T Lazy S, occur in the study area. **Figure 3.16-1** illustrates these grazing allotments in relation to the study area. **Table 3.16-1** summarizes the active animal unit month (AUM) within the grazing allotments, acreage and projected AUM for each allotment within the study area, livestock type, season of use category, and percent of public land. The Twenty Five Allotment is the only grazing allotment within the proposed PoO boundary and is used for cattle and horses. The active cattle pasture is grazed year-round, while the active horse pastures are grazed in late winter and early spring. The Twenty Five Allotment consists of approximately 59 and 41 percent public and private land, respectively. Grazing management is determined for the Twenty Five Allotment, including individual pastures, on an annual basis in consultation with the Bureau of Land Management (BLM). The Bootstrap Haul Road crosses both the Twenty Five Allotment and a small portion of the T Lazy S Allotment. Livestock movement occurs in the study area during the fall and spring, especially in the vicinity of the Boulder Creek Road and Bootstrap Haul Road. The study area is located within and crossed by several BLM fences, which are part of the Boulder Seeding Fence. Water sources include intermittent and ephemeral streams, seeps, springs, and stock ponds. Range improvements in the study area include cattleguards, fences, and livestock ponds.

Table 3.16-1 Grazing Allotments in the Study Area and CESA

Grazing Allotment Name	Total Allotment Active AUMs[1,2]	Allotment Acreage within the CESA	Allotment Acreage within the Study Area	Livestock[1]	Season of Use[1]	Category	Percent of Public Land
Twenty Five	34,130	517,062	3,540	Cattle/ Horses	March 1 – February 28	Improve	59
T Lazy S	10,797	176,808	86	Cattle	February 15 – November 30	Improve	39
Boulder Field	838	11,888	N/A	Cattle	March 1 – May 31	Improve	51
Marys Mountain	1,408	34,951	N/A	Cattle	February 15 – October 31	Custodial	51

[1] The number and class of livestock, active AUMs, and stocking rates come from the full grazing permit numbers. Due to market conditions, rainfall, and amount of forage produced each year, actual numbers of livestock grazed and AUMs used are lower than the values above. Grazing permittees have the option to take non-use as conditions warrant.

[2] An AUM represents the quantity of forage necessary to sustain 1 cow-calf pair or 5 sheep for 1 month.

Source: BLM 2010c,f.

3.16.2 Environmental Consequences

Primary issues related to range resources include suspension of active AUMs due to direct loss of acreage caused by proposed disturbance or the potential for reduced forage production resulting from the loss of acreage and vegetation caused by the open pit mining operation; potential impacts to existing water sources and range improvements; and potential impacts to seasonal livestock movement within the Twenty Five Allotment.

3.16.2.1 Proposed Action

The potential impacts of the proposed project on range resources can be classified as short-term (temporary) and long-term duration. Short-term impacts result from surface disturbances, enclosures, and limited access to areas arising from construction, operation and interim and final reclamation activities. Short-term impacts would cease upon mine closure and completion of successful reclamation. Long-term impacts consist of permanent changes to forage availability and type, irrespective of reclamation success; permanent loss of range improvements, specifically water sources; and permanent changes in livestock management due to project related activities.

Under the proposed project, impacts to range resources would result from the installation of the perimeter fence around the proposed PoO boundary and surface disturbing activities associated with facilities located outside the proposed PoO boundary (i.e., Bootstrap Haul Road, electrical substation area, secondary access road entrance, and power transmission line corridor). The installation of the perimeter fence in combination with the current configuration of the Boulder Seeding Fence would exclude access to available forage inside the fenced areas. Outside the perimeter fence, surface disturbing activities would include the construction and operation of the associated ancillary facilities and the upgrade and widening of the Bootstrap Haul Road. **Table 3.16-2** lists the acreage of disturbance per allotment, number of AUMs per allotment, and the percentage of AUMs that could be lost from the installation of the perimeter fence around the proposed PoO boundary in combination with the current configuration of the Boulder Seeding Fence, and surface disturbing activities outside the perimeter fence. The proposed project would result in the exclusion of 3,333 acres of rangeland vegetation in the Twenty Five Allotment and 24 acres of rangeland vegetation in the T Lazy S Allotment from grazing. The proposed project would result in the reduction of approximately 687 AUMs in the Twenty Five Allotment. Taking into consideration the current configuration of the Boulder Seeding Fence in combination with the proposed project, an additional 585 AUMs (total of 1,272 AUMs) would be suspended during the life of the project. Long-term impacts would result in the loss of 472 acres and a reduction of 95 AUMs from the expansion of the open pit within the Twenty Five Allotment.

Table 3.16-2 Potential Impacts by Allotment

Grazing Allotment Name	Allotment Acreage Excluded from Grazing in Study Area	Projected Active AUMs Lost[1,2]	Percent Loss of Total Active AUMs
Twenty Five	3,333	687/1,272 [3,4]	2/4[3]
T Lazy S	24	<1	<1
Total	**3,357**	**687/1,272[3]**	**--**

1 An AUM represents the quantity of forage necessary to sustain 1 cow-calf pair or 5 sheep for 1 month.

2 Projected active AUMs lost and percent active AUM loss for Twenty Five Grazing Allotment were provided by BLM. For T Lazy S the project active AUMs lost and percent active AUM loss were calculated based on an average stocking rate within the surface disturbance-related impact area.

3 AUMs suspended based on the proposed project only/AUMs suspended based on the proposed project in combination with current configuration of the Boulder Seeding Fence.

4 Approximately 95 AUMs would represent a long-term loss from the expansion of the open pit, which would not be reclaimed.

Source: BLM 2010c,f.

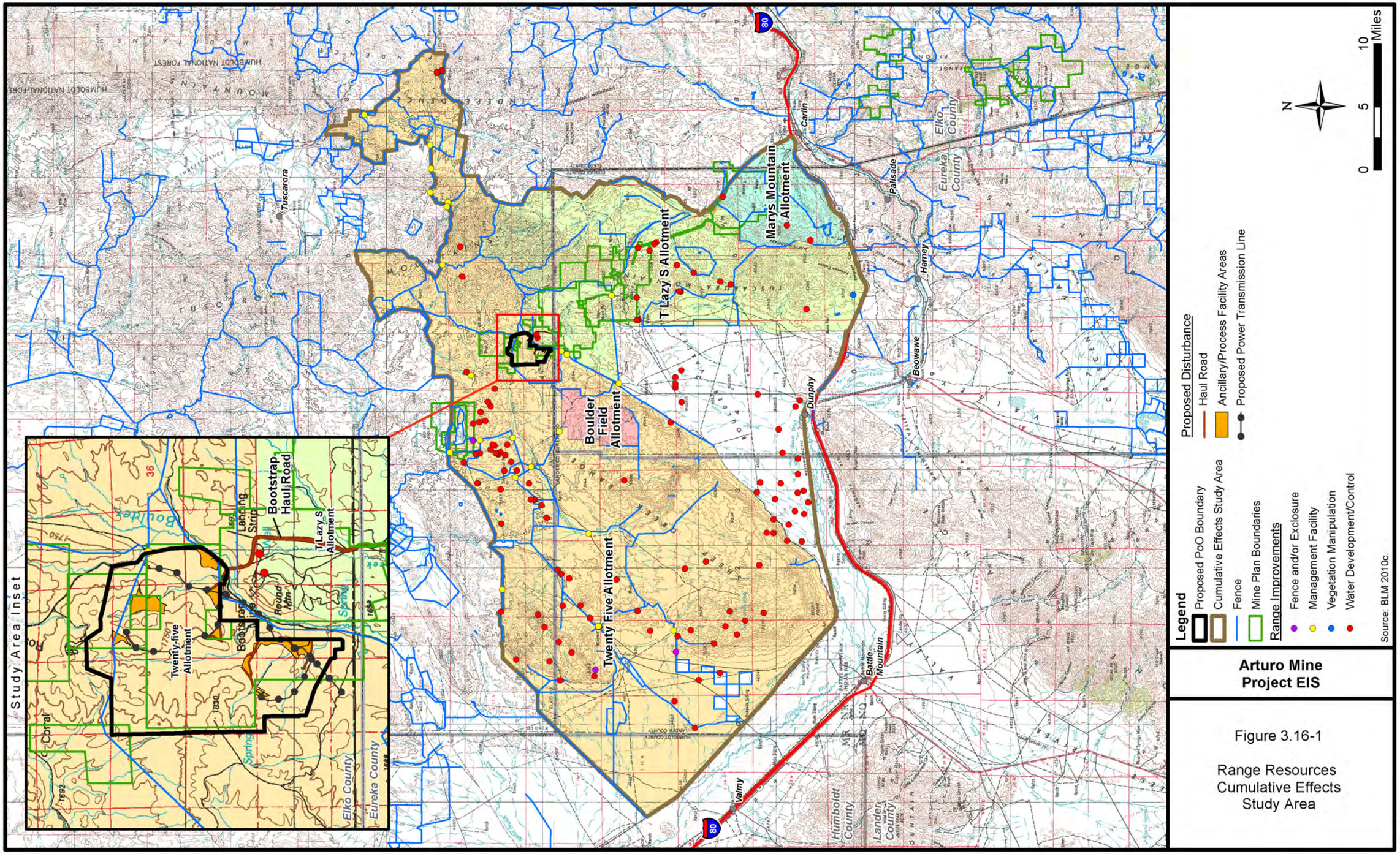


Figure 3.16-1

Range Resources Cumulative Effects Study Area

Direct effects to range resources would result from surface disturbing activities, increased vehicle traffic, potential damage to range improvements (e.g., fences, gates, and water sources), limited access to water sources, and expanded road and utility networks. The proposed project would result in the short-term loss of forage during facility construction, operation, and reclamation of the proposed project; and a long-term loss of forage from the expansion of the open pit that would not be reclaimed. The installation of the perimeter fence would result in the loss of forage, restrict cattle movement, and limit access to water sources. An increase in traffic, especially along the Bootstrap Haul Road, could lead to increased mortality and injuries to livestock, and cause disruptions to livestock management. Vehicle traffic along the Bootstrap Haul Road would disrupt livestock management during seasonal cattle movements between summer and winter grazing areas.

Indirect impacts would include the spread of noxious weeds and non-native invasive plant species, and fugitive dust that could result in a reduction of forage and forage quality. Following surface disturbance activities, noxious weeds and non-native invasive plant species may readily spread and colonize areas that typically lack or have minimal vegetative cover or areas that have been recently disturbed. Impacts from increased erosion and invasion and spread of noxious weeds and non-native invasive plant species could cause the potential conversion of native vegetative communities resulting in a loss of forage. The conversion of native vegetative communities and associated loss of forage could potentially be a permanent change resulting in a long-term impact. Water quality in ponds and reservoirs could be impacted as a result of erosion from construction activities.

Impacts to grazing allotments would be minimized through the implementation of the Barrick Dee Mining Venture (BDMV) applicant-committed environmental protection measures developed in consultation with the grazing allotment permittee and the BLM. BDMV has committed to several applicant-committed environmental measures specifically addressing the grazing allotment lease holder's concerns regarding cattle movement and access to water during construction and operation of the proposed project (Section 2.3.9, Applicant-committed Environmental Protection Measures). BDMV would establish cattleguards and associated fencing to prevent cattle movement into proposed project areas as shown in **Figure 2-2**). To facilitate cattle movement during seasonal cattle drives, BDMV would coordinate with the Twenty Five Allotment permittee and the BLM to identify measures to facilitate cattle movement during the seasonal cattle drives.

To address concerns about access to water sources during the spring and fall cattle drives for the life of the proposed project, BDMV has committed to providing additional sources of water by developing two new water supply wells, by trucking water to a tank, or by providing water via a water pipeline from the proposed Arturo project facilities area (Section 2.3.9.10, Cattle Movement and Access to Water). The remaining applicant-committed environmental protection measures, would minimize soil erosion, and the potential for the establishment of noxious weeds and non-native invasive plant species through erosion controls, and concurrent and post-reclamation. Satisfactory revegetation of mine-related disturbance areas (i.e., assuming the primary goal of soil stabilization through presence of adequate plant cover) is anticipated to occur approximately 3 to 15 years following reclamation. After 25 years, the reclaimed plant communities likely would consist of adequate herbaceous plant cover with sufficient diversity to substantially reduce the potential for soil erosion and provide forage for use by livestock.

Two range improvements are located within the vicinity of the study area: a cattleguard to restrict pronghorn access and a water well that is not currently flowing. It is anticipated that these range improvements would not be impacted by the proposed project.

3.16.2.2 Single Waste Rock Disposal Facility Alternative

The Single Waste Rock Disposal Facility (WRDF) Alternative would be similar to the Proposed Action, except that the East WRDF would not be developed and the West WRDF would be expanded by approximately 54 acres. Overall, this alternative would result in approximately 128 fewer acres of disturbance. Both the West and East WRDFs would be located within the same proposed perimeter

fence of the proposed PoO boundary. Therefore, the acres of disturbance and potential impacts to range resources would be the same as described for the Proposed Action.

3.16.2.3 Partial Pit Backfill Alternative

The Partial Pit Backfill Alternative would be similar to the Proposed Action except that mining would be sequenced to allow backfilling portions of the open pit with waste rock during mining. The surface facilities and footprint for this alternative are identical to the Proposed Action, therefore, the acres of disturbance and potential impacts to range resources would be the same as described for the Proposed Action.

3.16.2.4 No Action Alternative

Under the No Action Alternative, the proposed project would not be developed and the related potential impacts to range resources would not occur. Continuation of mining activities associated with the Storm Underground Mine, completion of closure and reclamation activities associated with existing disturbance, ongoing mineral exploration activities, and reclamation within the study area, would be conducted under existing authorizations.

3.16.3 Cumulative Impacts

The CESA for range resources is defined in Section 3.16.1, Affected Environment, and is shown in **Figure 3.16-1**. The past, present, and reasonably foreseeable future actions (RFFAs) are discussed in Section 3.2, Past, Present, and Reasonably Foreseeable Future Actions. RFFAs from mining activities are identified in **Table 3.2-1**; and their locations are shown in **Figures 3.2-1** and **3.2-2**.

3.16.3.1 Proposed Action

Four grazing allotments (Twenty Five, T Lazy S, Marys Mountain, and Boulder Field) are located within the grazing allotment CESA. **Table 3.16-1** summarizes the grazing allotment total active AUMs, allotment acreage, livestock type, season of use, and category for each grazing allotment within the CESA. The majority of the permitted use is for cattle grazing.

Past, present, and RFFAs in the CESA have resulted, or would result, in approximately 36,455 acres of mine-related surface disturbance. Past, present, and RFFAs from utility and energy development (North Elko Pipeline) would result in up to 140 acres of additional disturbance. The proposed project incrementally would add 3,357 acres to the disturbance for a total of 39,952 acres, an 8 percent increase over the total of past, present, and RFFAs disturbance. The acres of disturbance for the proposed project for range resources includes the surface disturbance associated with the proposed project and the expansion of the perimeter fence outside the proposed PoO boundary. It is assumed that portions of past mine-related disturbances in the CESA have been reclaimed, and ongoing reclamation at existing operations would continue to reduce the impacts to range resources.

Past, present, and RFFAs within the CESA have resulted, or would result, in the loss of approximately 36,595 acres from mining and utility and energy development, resulting in the exclusion of approximately 2,176 AUMs from active grazing preference. The proposed project incrementally would reduce the active grazing preference by an additional 3,357 acres (687 AUMs) resulting in a total cumulative disturbance of approximately 39,952 acres (2,863 AUMs - approximately 6 percent of AUMs within the CESA). Other surface disturbing activities in the CESA that contribute to cumulative effects for range resources include introduction and spread of noxious weeds and non-native invasive plant species and wildfire. Past, present, and RFFAs would cumulatively and incrementally reduce available acres from active grazing preference during construction and operation activities. Cumulative impacts to range resources within the CESA are discussed specifically in the Leeville Project, Final Supplemental EIS (BLM 2010b).

Much of the area encompassed by the CESA have been affected by wildfire (**Figure 3.2-3**). Some areas had adequate native perennial grasses and did not require herbaceous reseeding following wildfires. Other restoration projects have included fencing burned areas to allow vegetation to recover.

Additional disturbance associated with reasonably foreseeable mining and exploration project disturbance would have minimal affect on grazing allotments as most development would occur within existing permitted boundaries where adjustments to grazing use have previously occurred. Reclamation of mine-related disturbances in the CESA would be incremental as various operations reach the end of active mining and begin closure activities. In many of the mines, permanent disturbance would be associated with the open pits that would not be reclaimed; some would be partially filled with water. Following reclamation, the majority of mine sites would be made available for grazing.

Successful reclamation and revegetation of these areas would result in an increase in herbaceous vegetation that would then be available for forage. Following reclamation, these sites are often more productive than adjacent native sites as native cultivars are used for reclamation and competition is limited to only those few species in the seed mixture.

3.16.3.2 Single Waste Rock Disposal Facility Alternative

Cumulative effects under the Single WRDF Alternative would be similar to cumulative effects associated with the Proposed Action.

3.16.3.3 Partial Pit Backfill Alternative

Cumulative effects under the Partial Pit Backfill Alternative would be similar to cumulative effects associated with the Proposed Action.

3.16.3.4 No Action Alternative

Under the No Action Alternative, the proposed project would not be developed and no additional cumulative effects to range resources would occur.

3.16.4 Potential Monitoring and Mitigation Measures

The following mitigation measures are recommended for range resources.

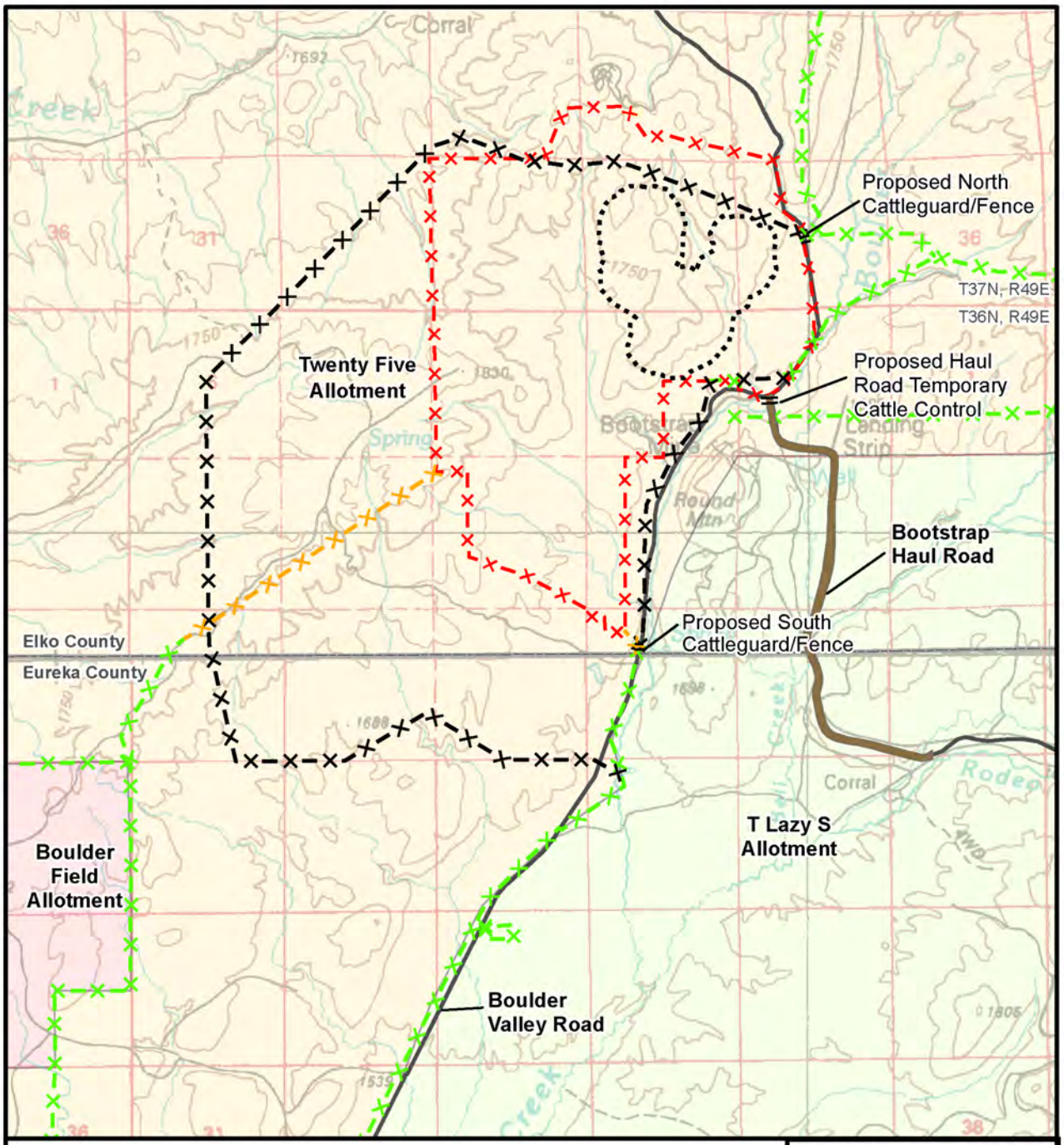
Issue: Development of the proposed project would reduce available land for grazing for the life of the project.

Mitigation Measure R-1: In order to offset project-related impacts to grazing, BDMV would repair five pit reservoirs at the Water Canyon spring complex area by dredging sediment from the existing pit reservoirs and installing liners at the bottom of the reservoirs to retain water runoff from nearby springs.

Effectiveness: Implementation of this mitigation measure would offset project-related impacts to grazing by improving an existing source of surface water for livestock within the project region.

Issue: The installation of the project fence in combination with the Boulder Seeding Fence would result in an additional 585 AUMs being suspended from livestock grazing.

Mitigation Measure R-2: Implement modifications to the Boulder Seeding Fence as shown in **Figure 3.16-2** that would remove portions of the fence, and add portions of fence to limit AUMs being suspended to only those affected by the installation of the proposed project fence.



Legend

- Proposed PoO Boundary and Fenceline
- Proposed Open Pit
- Bootstrap Haul Road
- Boulder Seeding Fence - Existing Sections to Remain in Place
- Boulder Seeding Fence - Existing Sections to be Removed
- Boulder Seeding Fence - Proposed New Fence

N

0 0.5 1 Miles

Source: BLM 2012.

Arturo Mine Project EIS

Figure 3.16-2

Proposed Range Fence Mitigation Measure

05/24/2012

Effectiveness: Mitigation Measure R-2 would adjust the Boulder Seeding Fence to limit the suspension of AUMs to only those within the proposed project fence.

Issue: Unidentified range improvements may be found within the study area during construction and operation activities.

Mitigation Measure R-3: If an unidentified range improvement is found to be within the construction footprint, impacts to the range improvement would be minimized through avoidance or by moving of the range improvement to an alternate location. If livestock water sources cannot be avoided, they would be moved a minimum of 200 feet away from construction and operation activities.

Effectiveness: Mitigation Measure R-3 would provide location information about range improvements and provide further mitigation measures if an unidentified range improvement is found. The mitigation measure would minimize impacts to unidentified water-related range improvements.

Issue: Fences could be damaged or destroyed during construction and operation activities.

Mitigation Measure R-4: Any fences damaged or destroyed during construction and operation would be repaired.

Effectiveness: Mitigation Measure R-4 would repair fences damaged or destroyed during construction and operation activities.

3.16.5 Residual Impacts

Residual impacts to range resources would include the permanent loss of 95 AUMs from the loss of forage in areas associated with the expansion of the open pit, which would not be reclaimed.

3.17 Wildlife and Aquatic Biological Resources

3.17.1 Affected Environment

The study area for wildlife and aquatic resources includes the proposed Plan of Operations (PoO) boundary; the Bootstrap Haul Road, power connection yard, secondary access road entrance, and the power transmission line corridor that occur outside of the proposed PoO boundary; and riparian, stream, spring/pond, and wetland habitats along Boulder Creek; and the haul road crossing at Bell Creek.

The Cumulative Effects Study Areas (CESAs) for wildlife resources generally extend from the northern end of the Independence Range northeast of the study area, south to the Humboldt River and the northern end of the Piñon Range. The wildlife CESAs were determined based on wildlife use within the project region and important seasonal habitats for species such as mule deer, pronghorn, and elk (**Figures 3.17-1** through **3.17-4**). The CESA for aquatic resources encompasses the Boulder Creek drainage located within the mine boundary, as well as downgradient sections of Boulder Creek through Boulder Flat (**Figure 3.17-5**). The rationale for selecting this CESA for aquatic biological resources was based on the impact conclusion of negligible impacts on surface water resources beyond the Boulder Creek watershed (Section 3.4, Water Resources and Geochemistry).

3.17.1.1 Wildlife Resources

As discussed in Section 3.14, Vegetation including Riparian Zones and Wetland Areas, three vegetation cover types and one land use cover type are located within the study area. The vegetation cover types include sagebrush shrubland, grassland, and herbaceous wetland habitats. The land use cover type found within the study area is primarily disturbed lands (i.e., mining disturbance). Sagebrush shrubland is the most common vegetation community within the study area. The majority of the proposed project consists of previously disturbed and reclaimed areas.

Wildlife species and habitats found within the study area are typical of the Great Basin region (Rawlings and Neel 1989). Available water for wildlife consumption is limited in the study area. Water sources, particularly those that maintain open water and riparian vegetation, support a greater diversity and population density of wildlife species than any other habitat types occurring in the study area (Rawlings and Neel 1989). Herbaceous wetland habitat occurs at six small sites within the proposed study area (Cedar Creek Associates, Inc. [Cedar Creek] 2009). In addition, herbaceous wetland habitat occurs along portions of Boulder Creek, which originates northwest of the study area in the Tuscarora Mountains. Boulder Creek is classified as intermittent through the study area (JBR 2012).

Information regarding wildlife species and habitat within the study area and CESAs was obtained from a review of existing published sources, site-specific surveys, Bureau of Land Management (BLM), Nevada Department of Wildlife (NDOW), and United States Fish and Wildlife Service (USFWS) file information, as well as Nevada Natural Heritage Program (NNHP) database information.

3.17.1.2 Big Game Species

Mule deer, pronghorn, and elk are the primary big game species within the project region (Miller 2010; NDOW 2010b,c). The study area occurs entirely within NDOW's Management Area 6, specifically hunting unit 068.

Population numbers for mule deer, pronghorn, and elk fluctuate slightly from year-to-year based on habitat conditions. Water availability and amount of quality habitat are the limiting factors within the study area. Water availability, forage quality, cover, and weather patterns typically determine the level of use and movement of big game species through the study area. Winter use in the vicinity of the study area depends on weather and forage availability.

Mule Deer

Population numbers for mule deer in Management Area 6 have shown a general decline over the last 10 years due to a reduction in winter habitat quality, primarily resulting from wildfires (**Figures 3.2-3** and **3.13-3**). Large scale fires from 1999 to 2007 have caused a severe reduction in available forage (i.e., shrub browse) and an overall increase of noxious weeds and invasive plant species such as thistle, white-top, and cheatgrass (BLM 2008b; NDOW 2010c). However, improved habitat conditions from increased precipitation in 2009 have resulted in a 12 percent increase in mule deer populations in 2010. During spring 2011 helicopter surveys, NDOW classified approximately 3,810 mule deer in Management Area 6 (NDOW 2011).

Mule deer use of the study area is highly variable but typically peaks during fall and spring migrations. The majority of the mule deer in the project region typically spend the summer months in the Tuscarora Mountains, north of the study area, and winter in Boulder Creek and the Dunphy Hills area, south of the study area (Area 6 Mule Deer Working Group 2010). The study area consists mainly of mule deer limited use habitat, which may be used by mule deer throughout the year depending on forage conditions. Approximately 1,344 acres of undisturbed (e.g., not burned) limited use habitat occurs within the study area. Due to the geographic location of the study area between mule deer summer and winter range, the study area also has been designated as an important mule deer migration corridor by the NDOW (**Figure 3.17-6**). This migration corridor is primarily used by mule deer; however, pronghorn also use the study area, including the migration corridor, depending on weather patterns and snow conditions. Details on the big game migration corridor are presented below.

The proposed project and other mining operations within the Carlin Trend are located in the vicinity of migration corridors that connect important summer and winter range for big game (mule deer, pronghorn, and elk). Over the past 10 to 20 years, seasonal big game movement corridors have been restricted due to mining operations in the project region (BLM 2010a,b, 2008b). By definition, a wildlife movement corridor is a linear habitat with a primary function of connecting at least two significant habitat areas (Sawyer et al. 2005). Throughout the western United States, big game species rely on seasonal ranges to satisfy their annual nutritional and energetic requirements (Sawyer et al. 2005).

In this region of Nevada, a large herd of mule deer migrates south from its summer range in the Tuscarora Mountains, Independence Range, and Bull Run Mountains to its winter range in the lower elevations of Boulder Valley and the Dunphy Hills (BLM 2010a,b, 2008b; NDOW 2010c). Little Boulder Valley and surrounding areas developed by mining operations (**Table 3.17-1**) were part of a historic mule deer migration corridor for movement to and from the winter range in the Dunphy Hills. In addition, mule deer also move through the Arturo/Rossi Mine area west to the Santa Renia Mountains. Historically, up to 4,000 deer migrated through these areas twice annually. From the 1960s to the 1980s, the vegetation in this part of the Carlin Trend was converted to cheatgrass following wildfires. Due to the expansion of mining developments along the east side of the Tuscarora Range, little opportunity remains for unimpeded north/south big game movement (BLM 2008b; NDOW 2010c).

However, the Carlin Trend is known for mining. As the mines continue to expand, the landscape would continue to change, which may create more impediments for mule deer migration and completely block the migration corridor in the future. The mines continue to conduct concurrent reclamation when possible. Mine reclamation in the area has converted areas vegetated with cheatgrass and crested wheatgrass into areas vegetated with native shrubs, grasses and forbs, which improves wildlife habitat. Some mule deer have moved to the eastern side of the mountain range for migration and cross through the area around the Carlin Mine.

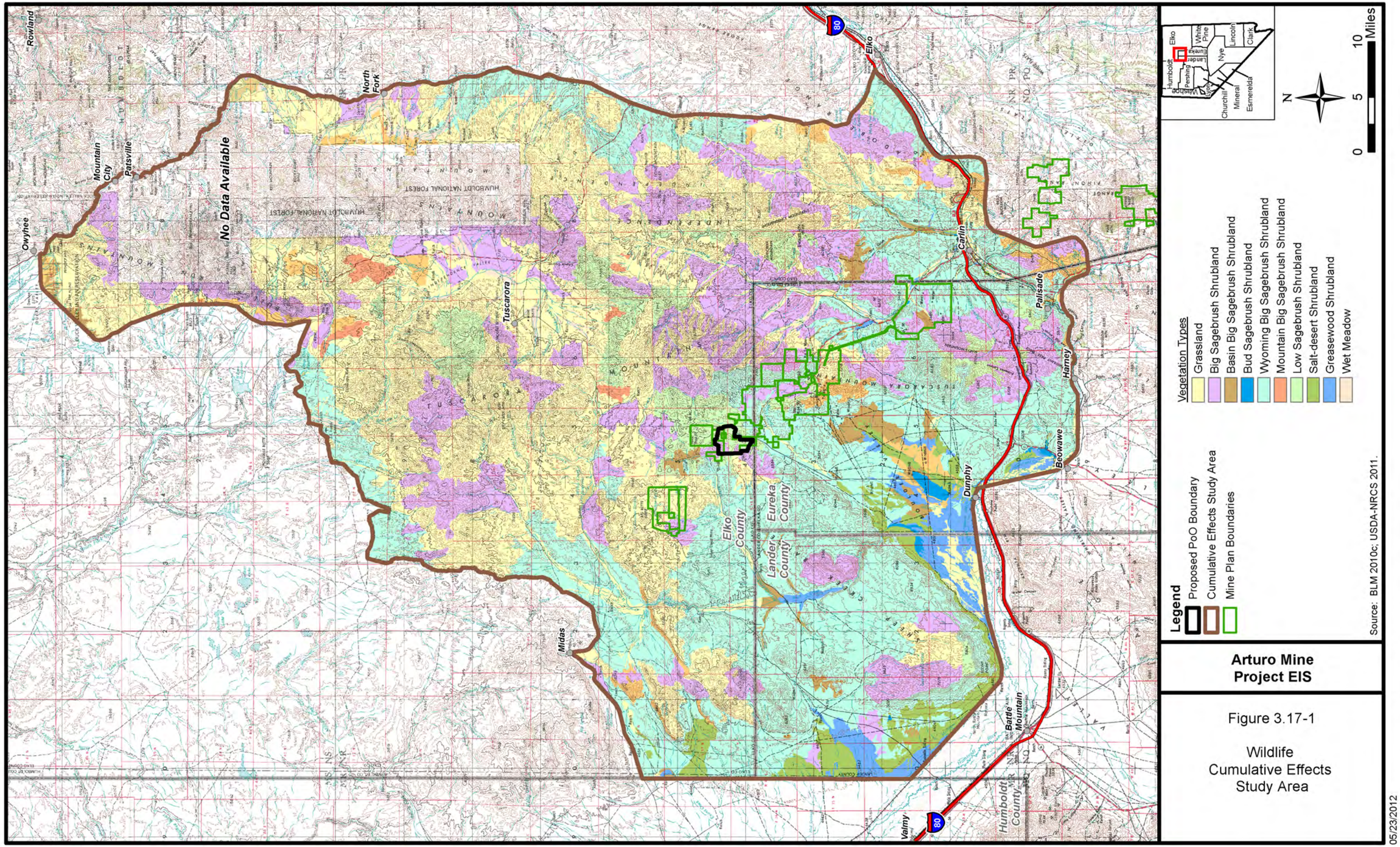


Figure 3.17-1

Wildlife Cumulative Effects Study Area

2012

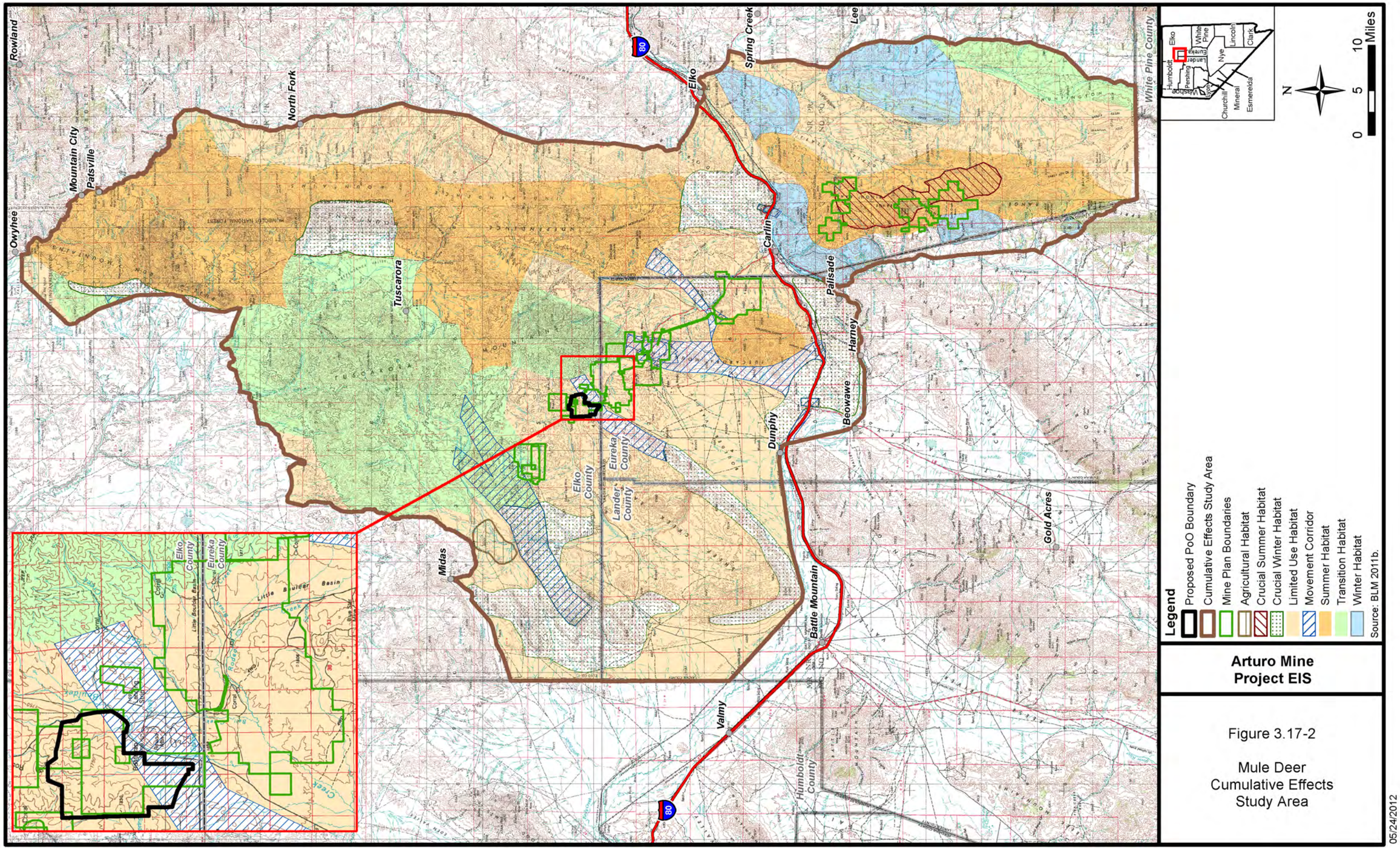


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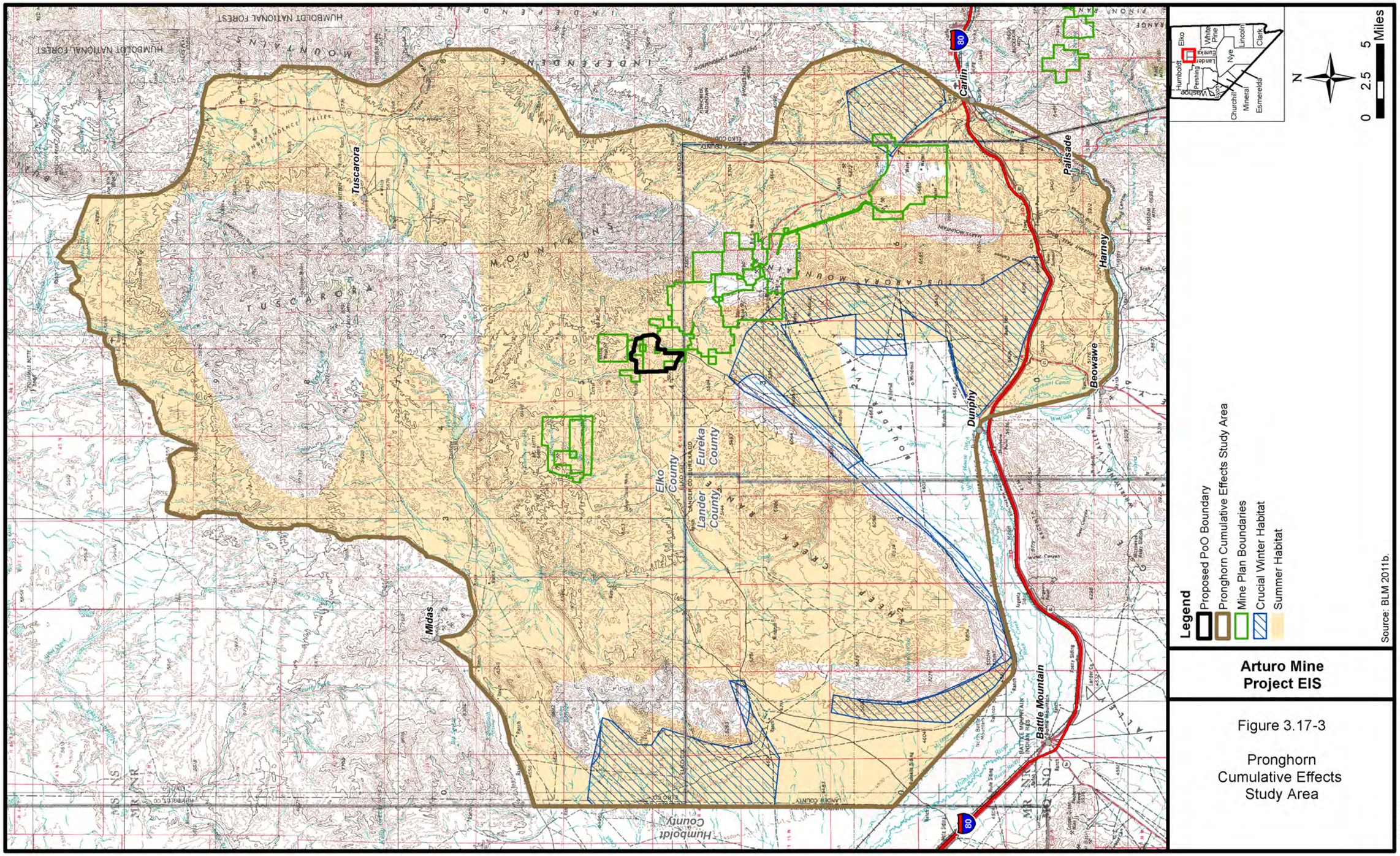
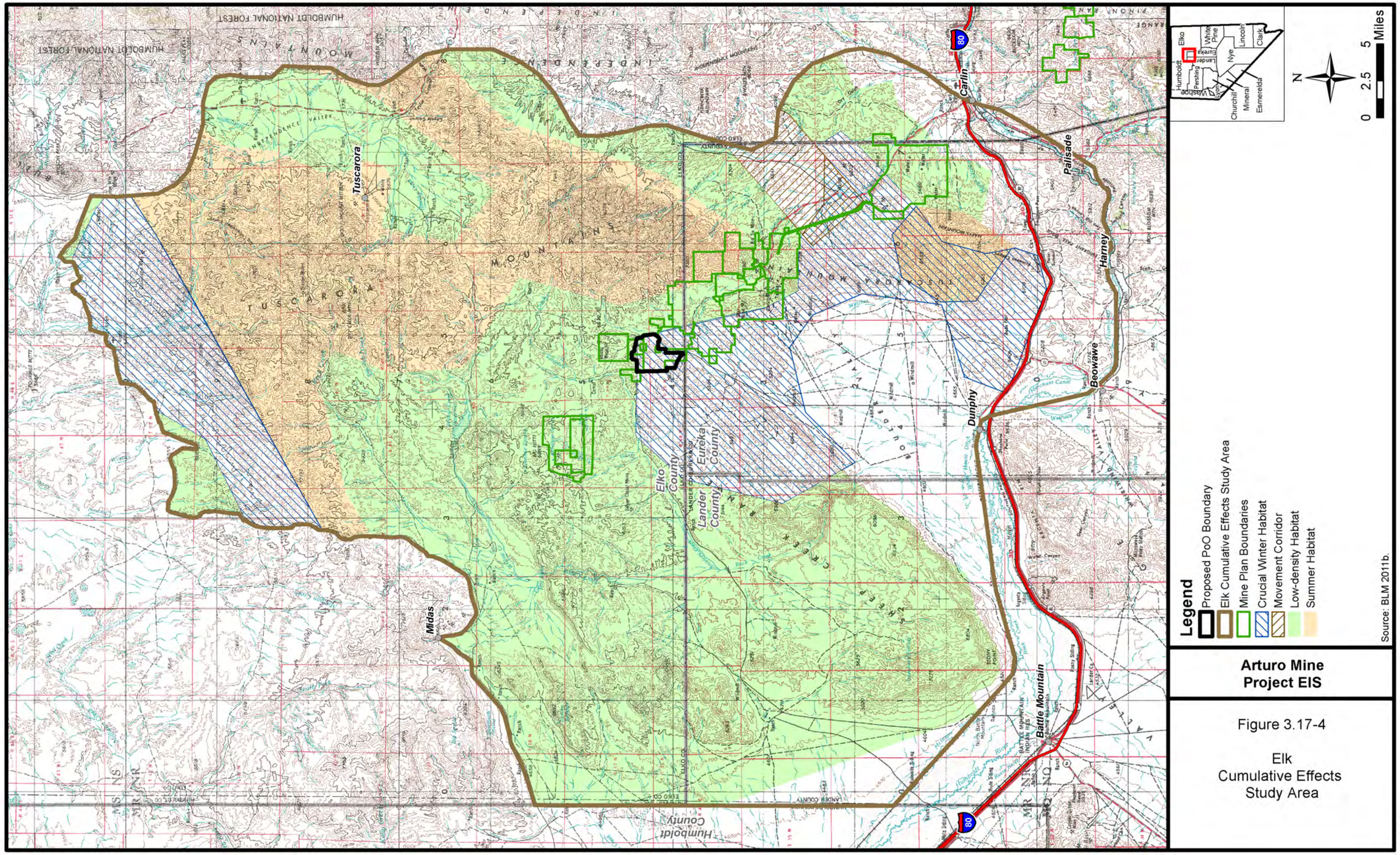
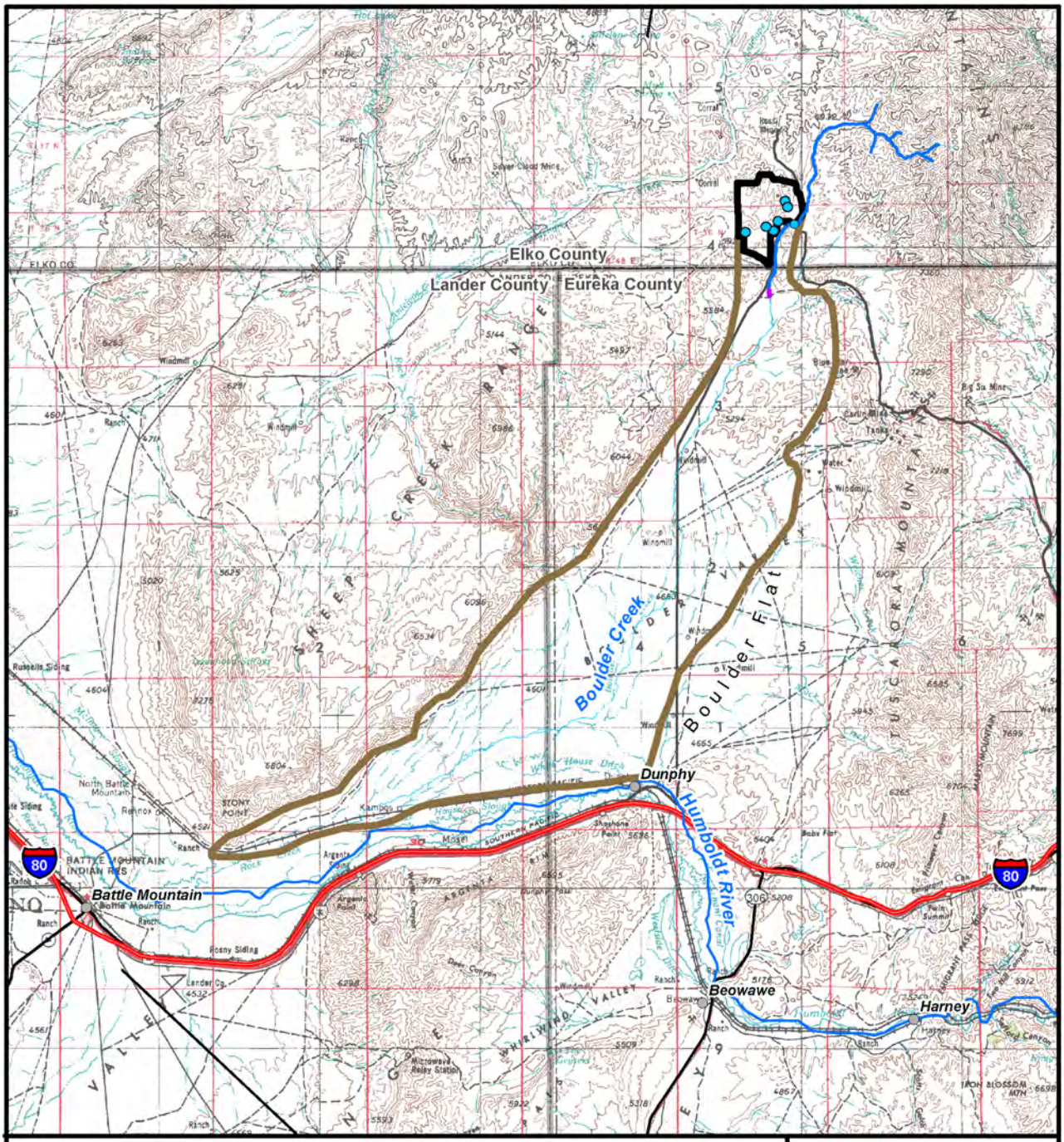
Figure 3.17-2

Mule Deer Cumulative Effects Study Area

2012


Legend
Proposed PoO Boundary
Pronghorn Cumulative Effects Study Area
Mine Plan Boundaries
Crucial Winter Habitat
Summer Habitat
Source: BLM 2011b.
Arturo Mine Project EIS
Figure 3.17-3
Pronghorn Cumulative Effects Study Area
05/23/2012
2012
0 2.5 5 Miles
N
Elko County
Eureka County
Lander County
Humboldt County
Carlin
Palisade
Harney
Beowawe
Dunphy
Battle Mountain
Tuscarora
Midas
TUSCARORA MOUNTAINS
INDEPENDENCE MOUNTAINS
HUMBOLDT NATIONAL FOREST
Elko
Humboldt
Lander
Eureka
Pershing
Churchill
Mineral
Esmeralda
Nye
Lincoln
White Pine
Clark
Washoe


Legend
Proposed PoO Boundary
Elk Cumulative Effects Study Area
Mine Plan Boundaries
Crucial Winter Habitat
Movement Corridor
Low-density Habitat
Summer Habitat
Source: BLM 2011b.
Arturo Mine Project EIS
Figure 3.17-4
Elk Cumulative Effects Study Area
05/23/2012
2012
0 2.5 5 Miles
N
Elko
Humboldt
Lander
Eureka
White Pine
Lincoln
Clark
Nye
Pershing
Churchill
Mineral
Esmeralda
Carlin
Palisade
Harney
Beowawe
Dunphy
Battle Mountain
Tuscarora
Midas
Elko County
Eureka County
Lander County
Humboldt County
TUSCARORA MOUNTAINS
INDEPENDENCE MOUNTAINS
HUMBOLDT NATIONAL FOREST
INDEPENDENCE VALLEY
BATTLE MOUNTAIN INDIAN RES
80



Legend

- Proposed PoO Boundary
- Cumulative Effects Study Area
- Wetlands Identified within the Study Area
- Perennial Stream Reach
- Discontinuous Flowing Stream Reach (interrupted flow that stops and starts)

N

0 2.5 5 Miles

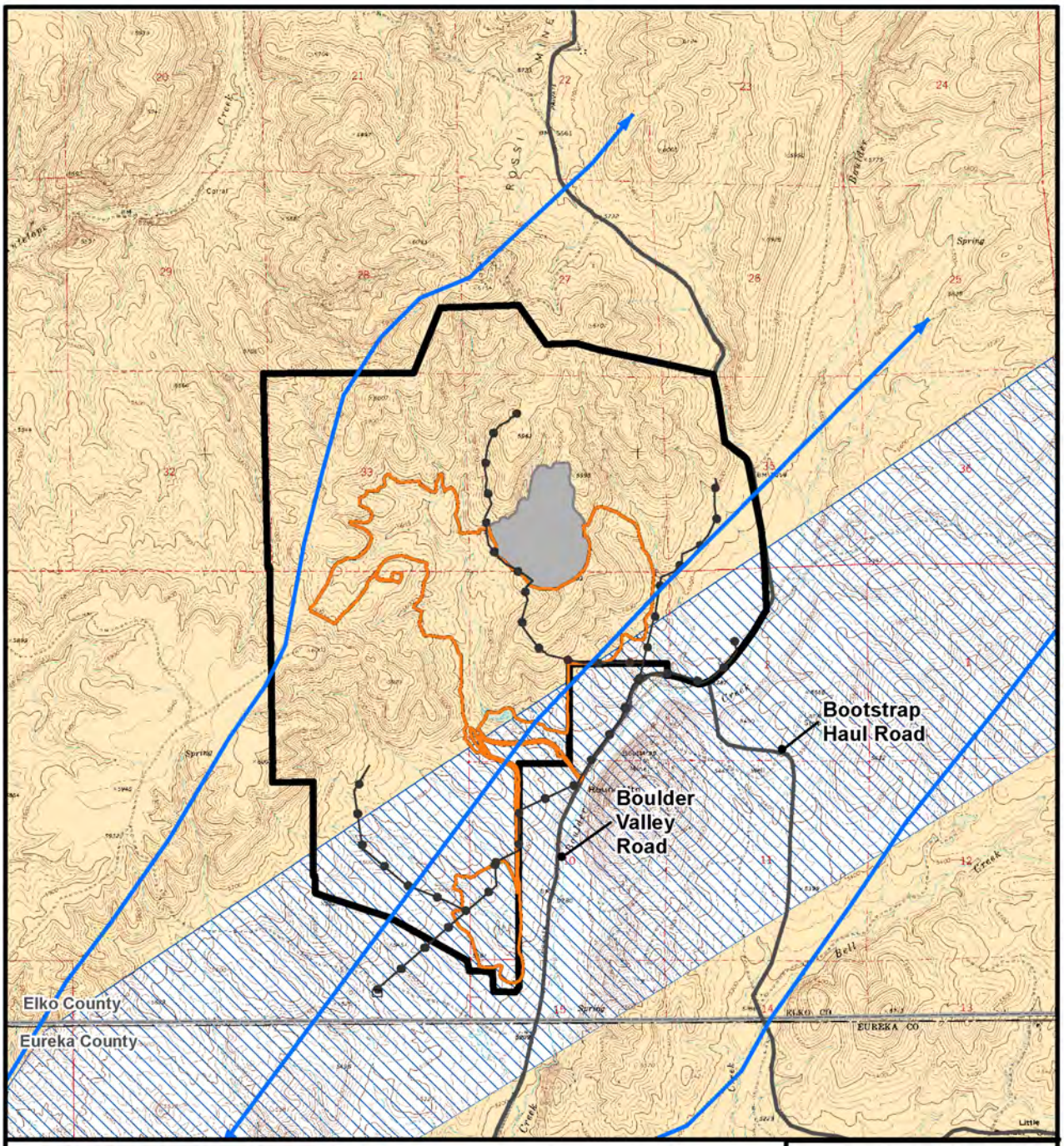
Source: BLM 2010c; Cedar Creek Associates 2009; JBR 2012.

05/20/2012

Arturo Mine Project EIS

Figure 3.17-5

Aquatic Biological Cumulative Effects Study Area



Legend

- Proposed PoO Boundary
- Proposed Power Transmission Line
- Non-suitable Habitat
- Existing Reclaimed Disturbance
- Limited Use Habitat
- Movement Corridor
- Migration Corridor

N

0 0.25 0.5 Miles

Source: BLM 2012.

Arturo Mine Project EIS

Figure 3.17-6

Mule Deer Habitat in the Study Area

05/24/2012

Table 3.17-1 Mines Impacting the Mule Deer Migration Corridor

Mining Company	Mine
Barrick Goldstrike Mines Inc. (BGMI)	Goldstrike Mine (Betze Project)
	Ren Mine
Newmont	Genesis/ Blue Star Mine
	Lantern Mine
	Carlin Mine
	Bootstrap/Capstone Mine
	Tara Mine
Halliburton	Rossi Mine
Marigold	Dee Mine

Pronghorn

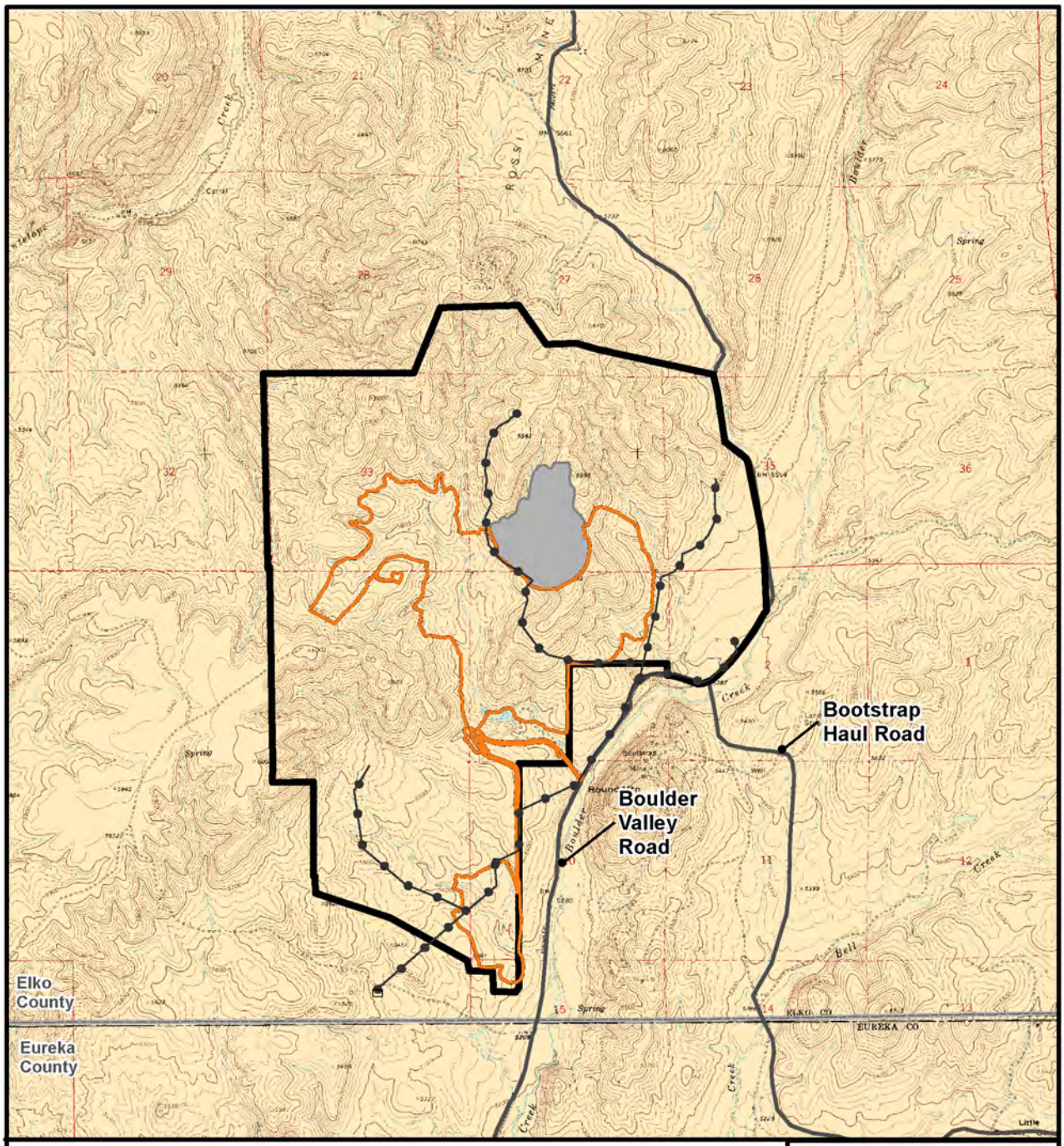
Pronghorn numbers have been stable to increasing in Management Area 6 over the past several years (BLM 2008b; NDOW 2010c). NDOW ground surveys classified 766 animals during January 2011 surveys (NDOW 2011). Use of the study area by pronghorn is highly dependent on water and forage availability. However, successful reclamation efforts within the proposed project have resulted in an increase in grasses and forbs favored by pronghorn. The entire study area is designated as summer habitat. Approximately 1,809 acres of undisturbed (e.g., not burned) summer habitat occurs within the study area (**Figure 3.17-7**). Crucial winter habitat occurs south of the study area along the north edge of Boulder Valley (**Figure 3.17-3**).

Elk

Elk numbers in Management Area 6 have increased over the last several years due to an increase in herbaceous forage as a result of wildfires (NDOW 2011). NDOW currently estimates the herd at approximately 550 animals (Miller 2010; NDOW 2011). Although elk are not typically found within the study area, small herds may occupy the area depending on weather and forage conditions. NDOW has designated a majority of the study area as crucial winter habitat with a small portion designated as low-density habitat (**Figure 3.17-8**). Approximately 1,645 acres of undisturbed (e.g., not burned) crucial winter habitat and 164 acres of undisturbed low-density habitat occur within the study area.

Mountain Lion

In Nevada, mountain lions also are classified as a big game species. Mountain lions are fairly common in north-central Nevada and typically occupy the higher elevations surrounding the study area. They often travel between mountain ranges and valleys depending on prey availability. Based on NDOW harvest data, mountain lion populations in eastern Nevada have been stable to increasing over the past 5 years (NDOW 2010c).



Legend

- Proposed PoO Boundary
- Proposed Power Transmission Line
- Non-suitable Habitat
- Existing Reclaimed Disturbance
- Summer Habitat

N

0 0.25 0.5 Miles

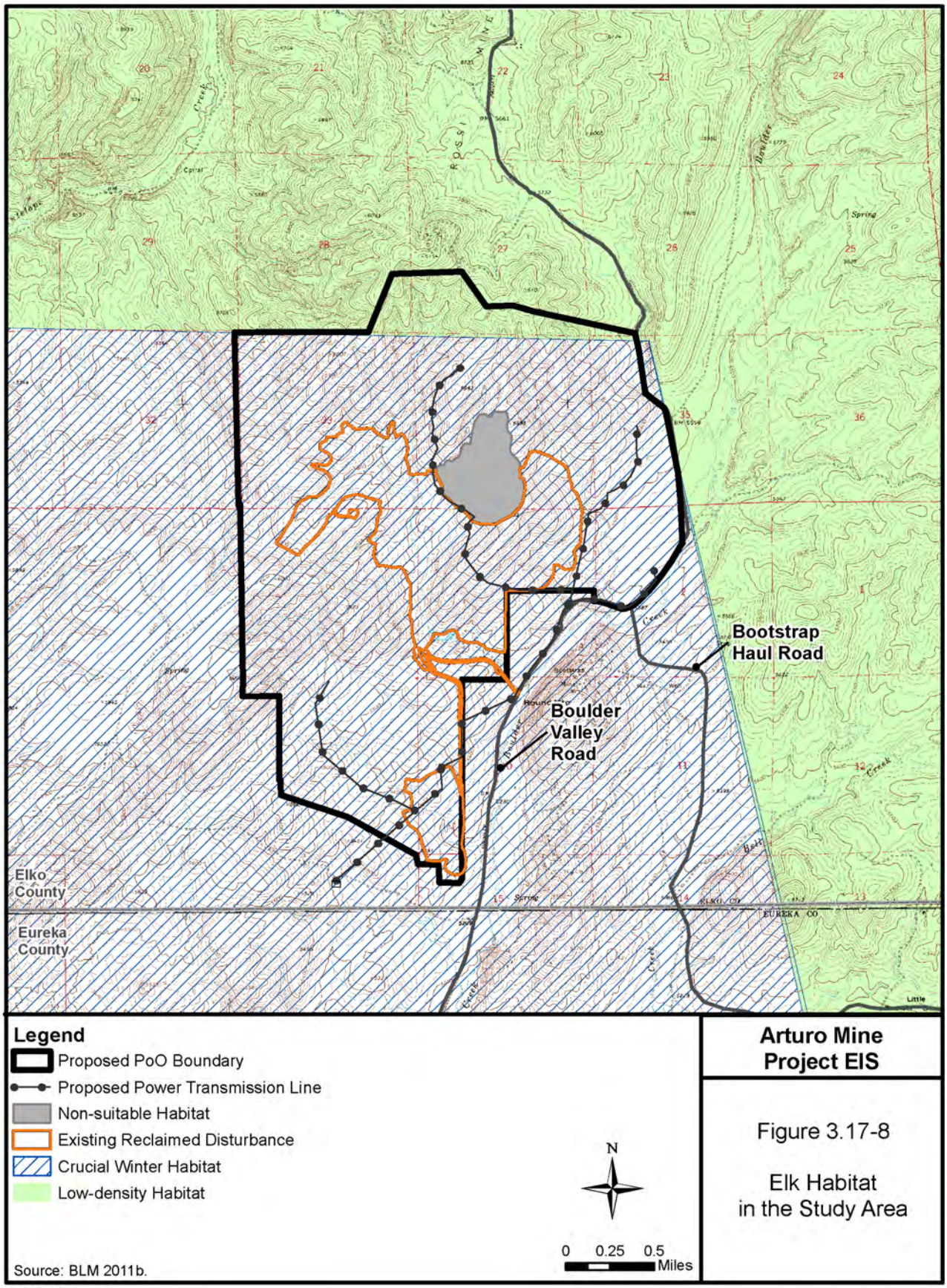
Source: BLM 2011b.

05/24/2012

Arturo Mine Project EIS

Figure 3.17-7

Pronghorn Habitat in the Study Area


Bootstrap Haul Road
Boulder Valley Road
Elko County
Eureka County
Legend
Proposed PoO Boundary
Proposed Power Transmission Line
Non-suitable Habitat
Existing Reclaimed Disturbance
Crucial Winter Habitat
Low-density Habitat
N
0 0.25 0.5 Miles
Source: BLM 2011b.
Arturo Mine Project EIS
Figure 3.17-8
Elk Habitat in the Study Area

05/24/2012

3.17.1.3 Small Game Species

Several upland game bird species are found within the study area. Species that occur within the area include greater sage-grouse, chukar, gray partridge, and mourning dove. Chukar occur in the hills surrounding the proposed project, especially on rocky ridges and hillsides with cheatgrass. Gray partridge are found in riparian zones along Boulder Creek (BLM 2008b; NDOW 2009). Mourning doves are found in a wide range of habitats in close proximity to water and are most likely to occur within the study area during spring, summer, and early fall (Floyd et al. 2007; Wildlife Action Plan Team 2006). The greater sage-grouse is a federal candidate and a BLM sensitive species and is discussed in detail in Section 3.18, Special Status Species.

Several rabbit species are known to occur within the study area, including the cottontail and pygmy rabbits. The pygmy rabbit has been documented at two locations in the project vicinity (Miller 2009). Although the pygmy rabbit is considered a game species in Nevada (NDOW 2009), it also is a BLM sensitive species and is discussed in Section 3.18, Special Status Species.

The Nevada Administrative Code (NAC) 503.025 classifies several mammal species as furbearers. Furbearer species that may occur within the study area include gray fox, kit fox, bobcat, muskrat, and mink (Wildlife Action Plan Team 2006). Due to increased structural diversity and available food sources, a higher diversity of furbearers is likely present along the riparian zone along Boulder Creek. Other mammal species that may occur within the study area include coyote, badger, short-tailed weasel, long-tailed weasel, spotted skunk, and black-tailed jackrabbit.

Due to limited habitat, waterfowl concentrations are limited to ponds, springs, and perennial streams located in the project region. Species that are likely to be found within the study area include mallard, blue-winged teal, cinnamon teal, wigeon, gadwall, pintail, ring-necked duck, and Canada goose (Floyd et al. 2007; Great Basin Ecology 2009; Wildlife Action Plan Team 2006).

3.17.1.4 Nongame Species

A diversity of nongame species (e.g., small mammals, passerines, raptors, reptiles, and amphibians) occupies the study area. Habitats found within the study area (e.g., sagebrush shrubland, grassland) support a variety of resident and seasonal nongame species. Nongame mammals include the deer mouse, western harvest mouse, vagrant shrew, Merriam's shrew, Ord's kangaroo rat, sagebrush vole, golden-mantled ground squirrel, least chipmunk, and desert woodrat (BLM 2008b; Wildlife Action Plan Team 2006). Rodent populations provide a large prey base for the area's predators.

<u>Bats</u>

A number of bat species are known to inhabit the project region; however, detection surveys for bat species has not been conducted within the proposed project. No historic mine workings or caves occur within the proposed project (Great Basin Ecology 2009). However, due to the presence of pit highwalls and riparian/wetland habitat, the proposed project contains suitable roosting and foraging habitat for several bat species, including the pallid bat, Townsend's big-eared bat, big brown bat, small-footed myotis, little brown myotis, California myotis, long-eared myotis, long-legged myotis, Yuma myotis, and western pipistrelle bat (BLM 2008b; Bradley et al. 2006; Great Basin Ecology 2009). All of the bats identified for the proposed project are currently BLM sensitive species and/or Nevada protected species (Bradley et al. 2006; NNHP 2010a). These species are presented in detail in Section 3.18, Special Status Species.

<u>Migratory Birds</u>

Nongame birds encompass a variety of passerine and raptor species including migratory bird species that are protected under the Migratory Bird Treaty Act (MBTA) (16 United States Code 703-711) and Executive Order 13186 (66 Federal Register 3853). Pursuant to Executive Order 13186, a Memorandum of Understanding (MOU) between the BLM and USFWS outlines a collaborative approach to promote

the conservation of migratory bird populations. The purpose of the MOU is to strengthen migratory bird conservation by identifying and implementing strategies that promote conservation and avoid or minimize adverse impacts on migratory birds in coordination with state, tribal, and local governments. This MOU identifies specific activities where cooperation between the BLM and USFWS would contribute to the conservation of migratory birds and their habitat. In addition, the BLM Nevada State Office prepared Migratory Bird Best Management Practices (BMPs) for the Sagebrush Biome in order to assist BLM field offices in the consideration of migratory birds in land management activities (BLM 2003b). In Nevada, all birds protected under the MBTA also are state protected (NAC 503.050). Many of the sensitive migratory bird species found in Nevada also are identified in the Nevada Partners in Flight (PIF) Bird Conservation Plan (Neel 1999). This plan, along with the Birds of Conservation Concern (BCC) Plan (USFWS 2008b), prioritizes migratory bird species for management actions according to habitat types.

Several baseline biological surveys have been conducted within the study area since 2008 (Great Basin Ecology 2009; SRK Consulting (U.S.) Inc. [SRK] 2009b). In addition, NDOW has documented several bird species within the study area. In total, 29 avian species have been found within the study area and are presented in **Table 3.17-2**.

Table 3.17-2 Inventory of Migratory and Resident Bird Species Potentially Occurring within the Study Area

Common Name	Scientific Name	Status[1]	Observed in Study Area[2]
American kestrel	*Falco sparverius*		No
American robin	*Turdus migratorius*		Yes
Bald eagle	*Haliaeetus leucocephalus*	BCC	No
Barn swallow	*Hirundo rustica*		Yes
Barn swallow	*Hirundo rustica*		Yes
Black-billed magpie	*Pica pica*		No
Brewer's blackbird	*Euphagus cyanocephalus*		No
Brewer's sparrow	*Spizella breweri*	BCC	Yes
Brown-headed cowbird	*Molothrus ater*		Yes
Bullock's oriole	*Icterus bullockii*		No
Burrowing owl	*Athene cunicularia*	BLM, PIF	Yes
Canada goose	*Branta canadensis*		Yes
Chipping sparrow	*Spizella passerina*		Yes
Chukar	*Alectoris chukar*		Yes
Cinnamon teal	*Anas cyanoptera*		No
Cliff swallow	*Hirundo pyrrhonota*		No
Common raven	*Corvus corax*		Yes
Common snipe	*Gallinago gallinago*		No
Ferruginous hawk	*Buteo regalis*	BLM, PIF	Yes
Gadwall	*Anas strepera*		Yes
Golden eagle	*Aquila chrysaetos*	BLM, BCC	Yes

Table 3.17-2 Inventory of Migratory and Resident Bird Species Potentially Occurring within the Study Area

Common Name	Scientific Name	Status[1]	Observed in Study Area[2]
Gray partridge	*Perdix perdix*		No
Greater sage-grouse	*Centrocercus urophasianus*	BLM, BCC, PIF	Yes
Horned lark	*Eremophila alpestris*		Yes
Juniper titmouse	*Baeolophus ridgwayi*	BLM, PIF	No
Killdeer	*Charadrius vociferus*		Yes
Lark sparrow	*Chondestes grammacus*		No
Lewis's woodpecker	*Melanerpes lewis*	BLM, BCC, PIF	No
Loggerhead shrike	*Lanius ludovicianus*	BLM, BCC, PIF	No
Long-billed curlew	*Numenius americanus*	BCC, PIF	Yes
Mallard	*Anas platyrhynchos*		Yes
Mourning dove	*Zenaida macroura*		Yes
Northern flicker	*Colaptes auratus*		No
Northern rough-winged swallow	*Stelgidopteryx serripennis*		Yes
Pinyon jay	*Gymnorhinus cyanocephalus*	BLM, BCC, PIF	No
Prairie falcon	*Falco mexicanus*	BLM, PIF	Yes
Red-tailed hawk	*Buteo jamaicensis*		Yes
Red-winged blackbird	*Agelaius phoeniceus*		Yes
Ring-necked duck	*Aythya collaris*		Yes
Rough-legged hawk	*Buteo lagopus*		No
Sage sparrow	*Amphispiza belli*	BCC, PIF	Yes
Sage thrasher	*Oreoscoptes montanus*	BCC, PIF	Yes
Say's phoebe	*Sayornis saya*		No
Short-eared owl	*Asio flammeus*	BLM, PIF	No
Swainson's hawk	*Buteo swainsoni*	BLM, PIF	Yes
Turkey vulture	*Cathartes aura*		No
Vesper sparrow	*Pooecetes gramineus*	BLM, PIF	Yes
Western kingbird	*Tyrannus verticalis*		No
Western meadowlark	*Sturnella magna*		Yes
Western wood-peewee	*Contopus sordidulus*		No

[1] BLM = BLM Sensitive; BCC = USFWS Birds of Conservation Concern; PIF = Nevada Partners in Flight Priority Bird Species.

[2] Identified during baseline biological surveys in 2008 and 2009 or by NDOW personnel during surveys.

Sources: BLM 2008b; Floyd et al. 2007; Great Basin Ecology 2009; Neel 1999; SRK 2009b; USFWS 2008b.

Many of these species are associated with a variety of habitat types and some occur within the project vicinity year-round (e.g., red-tailed hawk, chukar, gray partridge). However, due to the higher level of plant diversity and structure, more abundant potential nest sites, and greater food base, the riparian zone along Boulder Creek supports the highest diversity of bird species within the study area.

Raptor species that potentially occur as residents or migrants within the study area include eagles (bald and golden eagles), hawks (e.g., red-tailed hawk, Swainson's hawk, ferruginous hawk), falcons (e.g., prairie falcon, American kestrel), owls (e.g., short-eared owl and burrowing owl), northern harrier, and turkey vulture (Floyd et al. 2007; Herron et al. 1985). Two raptor nests have been documented within the vicinity of the study area including a prairie falcon nest approximately 7 miles northwest of the study area and an American kestrel nest approximately 6 miles north of the study area (Miller 2010). No raptor nest sites have been found within the study area; however, formal raptor nest surveys have not been conducted in recent years within the area. In addition, a suspected raptor migration route occurs near the study area along the Tuscarora Mountains and Sheep Creek Range (Herron et al. 1985). As a result, raptor use within the study area may increase during spring and fall.

Details on sensitive bird species such as bald eagle, golden eagle, prairie falcon, ferruginous hawk, short-eared owl, vesper sparrow, and loggerhead shrike would be discussed further in Section 3.18, Special Status Species.

Reptiles

Several species of reptiles are known to occur within the study area including the Great Basin whiptail, bull snake, western rattlesnake, Great Basin collared lizard, desert horned lizard, western skink, and western fence lizard. These species occupy a wide variety of habitats and are most active during the summer and early fall months (BLM 2008b, 1993).

3.17.1.5 Aquatic Biological Resources

Habitat

Streams

Aquatic habitat within the study area consists of streams, wetlands, ponds, and springs within the Boulder Creek drainage. The study area is drained by three unnamed ephemeral streams (i.e., waterbody with water presence that is short-lived or transitory) that are tributaries to Boulder Creek (JBR Environmental Consultants, Inc. [JBR] 2009). These ephemeral streams generally are less than 2 feet wide. Stream substrates mainly consist of gravel and cobble. The Bell Creek area crossed by the haul road also is an ephemeral stream.

The mainstem of Boulder Creek is considered intermittent, since flow occurs on a periodic basis in response to snowmelt or major precipitation events. Typically, Boulder Creek flows in one or more months in March through July. The flow is lost through evapotranspiration before it reaches the Rock Creek Ditch (JBR 2009; Water Management Consultants, Inc. 1994). Further discussion of flow conditions in Boulder Creek is provided in Section 3.4.1.2, Surface Water Resources. In the vicinity of the study area, Boulder Creek is a cobble and boulder-dominated channel, with a mean width of approximately 8 feet. From the proposed project toward Rock Creek Ditch, Boulder Creek is braided and very flat, with estimated gradients of less than 1 to 5 percent (Cedar Creek 2009; JBR 2009). Widths of individual channels vary from less than 2 to 30 feet depending on the presence of flow and water volume (JBR 2009). Aquatic habitat is considered poor quality due to the limited flow and lack of diversity in terms of pools, riffles, and runs. If water is present, stream depths typically are quite shallow (less than 6 inches) except for peak runoff periods.

Wetlands

Approximately 5 acres of non-jurisdictional riparian zones and/or wetlands have been delineated within the study area at sites within the PoO boundary and where the Bootstrap Haul Road crosses Boulder Creek (**Table 3.14-2** and **Figure 3.14-4**). These small wetland areas provide aquatic habitat on a seasonal basis. In addition, a sediment pond and two seep areas (AR05 and AR17) provide aquatic habitat on a consistent basis throughout the year. Detailed discussion of wetlands is provided in Section 3.14.1.2, Riparian Zones and Wetland Areas.

Springs

Surveys conducted in the Boulder Creek drainage have identified several seeps or springs along Boulder Creek (BLM 1996b, 1993; Cedar Creek 2009), as discussed in Section 3.14.1.2, Riparian Zones and Wetland Areas.

Aquatic Communities

Based on studies conducted in Boulder Creek in 1975 (NDOW 1975) and from 1987 through 1992 (JBR 1993), the presence of aquatic biota reflects species that are able to colonize intermittent or ephemeral habitats. Due to a lack of perennial flow, fish are not present in the sections of Boulder Creek within the study area. Lahontan speckled dace (*Rhinichthys osculus robustus*) have been collected in the headwaters of Boulder Creek, which is located upstream of the study area (JBR 1988 as cited in BLM 2000c). In addition, speckled dace have been collected in Boulder Creek during a high water year such as 1989 (JBR 1993). When water is present in Boulder Creek, macroinvertebrate communities are characterized by low densities. The JBR surveys reported mean densities ranging from 187 to 1,452 individuals/meter^2 at three sampling locations. Although macroinvertebrate taxa were not reported in Boulder Creek, groups tolerant of intermittent or low flows in the lower portions of Rodeo and Brush creeks likely are present during periods when water occurs in Boulder Creek. These taxa include chironomid midges, ceratoponid (biting) midges, oligochaete worms, and ostracods.

Permanent and temporary waterbodies such as wetlands and springs also provide habitat for aquatic species. Lahontan speckled dace and snails were observed in the inlet to the BLM detention pond (AR09) in July 2010 (BLM 2010i). Invertebrate communities in these habitats depend on the type of water source (permanent or temporary), water chemistry, outflow discharge, substrate, aquatic vegetation, and other habitat features (Erman 2002). Although aquatic macroinvertebrate surveys have not been conducted in springs or wetlands within the study area, surveys in other Nevada springs provide an indication of composition. Five major macroinvertebrate groups typically are present in all types of springs including nematodes, oligochaete worms, water mites (*Acari* spp.), caddisflies (*Trichoptera* spp.), and chironomid midges. Several groups, such as flatworms and stoneflies, are present only in springs with permanent water sources. Erman's (2002) studies also showed that the highest number of taxa were associated with stable springs that maintained water levels throughout a long-term period.

Potential amphibian habitat occurs within the wetlands and intermittent and ephemeral stream reaches and springs within the study area. An amphibian survey was completed by BLM and NDOW on July 23, 2010, at wetland sites AR01, AR16, and AR17. No amphibians were found during the survey (BLM 2010i). Although amphibian species have not been observed within the Boulder Creek drainage, species such as the Pacific chorus frog (*Pseudacris regilla*) have been identified in adjacent drainages such as Brush and Bell creeks. This species uses stream reaches, ephemeral ponds, and wetlands for breeding and early life stage development. Breeding typically occurs in the late winter or spring. After the breeding season is complete, individuals disperse back to upland areas surrounding the waterbodies (Bernard 2010). Details on sensitive amphibian species such as the Columbia spotted frog and northern leopard frog are discussed in Section 3.18, Special Status Species.

3.17.2 Environmental Consequences

Terrestrial and aquatic aquatic biological resources related issues were determined through consultation with the BLM, NDOW, and USFWS. The primary issues related to terrestrial wildlife include loss or alteration of native habitats; increased habitat fragmentation; animal displacement; and direct loss of wildlife. The primary issues for aquatic biological resources include habitat alteration and the impacts of sedimentation on aquatic species due to surface disturbance activities; loss of habitat and species due to placement of waste rock; and potential spills from vehicle traffic and equipment during construction and operation phases of the project within the Boulder Creek drainage.

The potential impacts of the proposed project on terrestrial wildlife and aquatic biological resources can be classified as short-term (temporary) and long-term in duration. Short-term impacts arise from habitat removal and disturbance as well as from activities associated with mine operation; these impacts would cease upon mine closure and completion of successful reclamation. Long-term impacts consist of permanent changes to habitats and the wildlife and aquatic populations that depend on those habitats, irrespective of reclamation success.

3.17.2.1 Proposed Action

Wildlife Resources

Surface Disturbance

The proposed project would result in the long-term reduction of approximately 2,505 acres of wildlife habitat, including approximately 1,960 acres of sagebrush shrubland, 543 acres of grassland, and 2 acres of riparian zones and herbaceous wetland areas. Woody species such as sagebrush would require up to 25 years to reach maturity. The disturbance associated with the proposed project would be reclaimed following completion of mining activities, with the exception of 472 acres of shrubland, grassland, and wetland associated with the expansion of the existing open pit.

Direct impacts to wildlife from mine-related surface disturbance would include short-term and long-term reduction or loss of habitat. Habitat loss or alteration would result in direct losses of smaller, less mobile species of wildlife, such as small mammals and reptiles, and the displacement of more mobile species into adjacent habitats. In areas where habitats are at, or near, carrying capacity, animal displacement could result in some unquantifiable reductions in local wildlife populations. Mine-related surface disturbance also would result in an incremental increase in habitat fragmentation at the mine site until reclamation has been completed and vegetation re-established. Indirect impacts would include increased noise, additional human presence, and the potential for increased vehicle-related mortalities. The degree of the impacts on wildlife species would depend on factors such as the sensitivity of the species, seasonal use patterns, type and timing of project activity, and physical parameters (e.g., topography, cover, forage, and climate).

The riparian habitat along Boulder Creek within the study area supports a greater number of species than other habitat types within the study area. As a result, it is anticipated that the potential mine-related displacement and habitat fragmentation impacts would be highest for wildlife species that use the riparian corridor along Boulder Creek.

Game Species

Potential direct impacts to mule deer would include the incremental long-term reduction of potential forage and the incremental increase in habitat fragmentation from vegetation removal associated with mine development activities. Displacement of big game, as a result of direct habitat loss and indirect reduction in habitat quality, has been widely documented (Irwin and Peek 1983; Lyon 1983, 1979; Rost and Bailey 1979; Ward 1976). Big game species tend to move away from areas of human activity and roads, reducing habitat utilization near the disturbance areas (Cole et al. 1997; Sawyer et al. 2006). Displacement distances are strongly influenced by the level and timing of human activity, topography,

and the presence of vegetation (Cole et al. 1997; Lyon 1979), presumably due to noise attenuation and visual cover. Displacement of big game is greatest for heavily traveled secondary and dirt roads. Most research has focused on displacement distances for elk and deer. Displacement distances indicate the distance from the road's centerline where animal densities are less than in surrounding areas (i.e., under-utilized habitat). In most circumstances, elk were not observed to habituate to human activities. Deer and pronghorn appear to be more tolerant of human activities than elk. For deer, displacement distances ranged from 330 feet to 0.6 mile, depending on the presence of vegetative cover (Ward 1976). For evaluation purposes, 660 feet was the most common displacement distance used for deer, especially in areas with minimal vegetative cover. Deer and pronghorn have been observed to habituate to vehicles. Displacement distances decreased when traffic was predictable, moving at constant speeds, and was not associated with out-of-vehicle activities (Ward 1976). In addition, big game may experience increased mortality rates due to increased vehicle traffic on the Bootstrap Haul Road and Boulder Valley Road. Vehicular traffic may injure or kill individuals, and local populations may experience higher levels of mortality due to increased use of roads in the immediate project vicinity.

The project would disturb approximately 1,391 acres of limited use habitat consisting primarily of sagebrush shrubland habitat. This anticipated loss of habitat would result in an incremental reduction in the amount of available habitat in the study area. The reduction of available habitat increases the use of disturbed areas by mule deer during migration. This behavioral shift to negotiate disturbed terrain and avoid mining activities increases the animals physiological energy expenditures due to elevated stress levels.

Impacts to pronghorn would be similar to those discussed above for mule deer. Potential direct impacts would include the incremental long-term reduction of approximately 2,505 acres of summer habitat. Potential direct impacts to elk would include the incremental long-term reduction of approximately 1,940 acres of crucial winter habitat within the study area and approximately 19 acres of low-density habitat. However, unlike mule deer and pronghorn, elk prefer grasses to sagebrush and are, therefore, less susceptible to the effects of large scale fires. In fact, the conversion of large tracts of sagebrush habitat to grassland habitat favors elk and may lead to population increases and expansion into previously unoccupied habitat. Impacts to mountain lions are expected to be low, as this species occurs at a low density in and around the study area.

To reduce impacts from the proposed project on big game, particularly mule deer, measures outlined in the guidelines of the Area 6 Mule Deer Working Group Habitat Management Plan would be implemented to the degree practical to reduce activity near the north end of the West Waste Rock Disposal Facility (WRDF) during migration periods (i.e., spring and fall). In addition, these areas would be reclaimed as soon as possible to increase the width of the remaining migration corridor and to encourage use by mule deer and other big game.

Direct impacts to small game species (e.g., chukar, Hungarian partridge, mourning dove) would include the incremental long-term reduction of approximately 2,505 acres of potentially suitable habitat. Impacts also would include displacement from the disturbance areas and increased habitat fragmentation, until reclamation has been completed and vegetation is re-established. In most instances, suitable habitat adjacent to disturbance areas would be available for use by these species. However, displacement would increase competition and could include some local reductions in wildlife populations if adjacent habitats are at carrying capacity. Potential impacts also could include nest and burrow abandonment or loss of eggs or young. However, potential impacts to small game from mine development are expected to be low. These temporary losses would reduce productivity for that breeding season.

Nongame Species

Impacts to nongame species would be similar to those discussed above for small game species. Direct impacts to nongame species (e.g., small mammals, passerine, raptors, and reptiles) would include the incremental long-term reduction of approximately 2,505 acres of potentially suitable habitat. Impacts also

would include displacement from the disturbance areas and increased habitat fragmentation, until vegetation is re-established. In most instances, suitable habitat adjacent to disturbance areas would be available for use by these species. However, displacement would increase competition and could result in some local reductions in wildlife populations if adjacent habitats are at carrying capacity. Potential impacts also could include nest and burrow abandonment or loss of eggs or young. However, potential impacts to nongame species from mine development are expected to be low. These temporary losses would reduce productivity for that breeding season.

Migratory Birds

A variety of resident and migratory bird species (e.g., raptors and songbirds) have been identified as potentially occurring within the study area. Potential direct impacts to bird species would include the temporary loss of approximately 2,505 acres of potentially suitable breeding, roosting, and foraging habitat. However, this temporary loss is expected to have little effect on local bird populations based on the amount of suitable breeding and foraging habitat in the surrounding area. In order to minimize impacts to raptors during the breeding season (March 1 to July 31), Barrick Dee Mining Venture (BDMV) has committed to conducting a breeding raptor survey and implementing appropriate mitigation measures, such as buffer zones around occupied nests, as needed. In addition, to protect other nesting bird species (e.g., passerines), removal of suitable habitat on currently undisturbed lands in the project area would be avoided to the extent possible between March 1 and July 31 to comply with the MBTA. Should removal of habitat be required during this period, BDMV would coordinate with the BLM and NDOW to conduct breeding bird surveys and implement appropriate mitigation, such as buffer zones around occupied nests, as needed. With implementation of these measures, residual impacts to nesting bird species within the study area would be limited primarily to temporary habitat loss. This loss is anticipated to have little impact given the extent of native habitats in the surrounding region.

As described in Section 2.3.6, Ancillary and Support Facilities, BDMV would construct new power transmission lines, a substation, and a power connection yard to accommodate project facilities. Power transmission lines pose an electrocution hazard for raptor species attempting to perch on the structures, as well as incrementally increase the collision potential for migrating and foraging bird species. However, collision potential typically is dependent on variables such as the location in relation to high-use habitat areas (e.g., nesting, foraging, and roosting), line orientation to flight patterns and movement corridors, species composition, visibility, and line design (Avian Power Line Interaction Committee [APLIC] 2006). As discussed in Section 2.3.9, Applicant-committed Environmental Protection Measures, BDMV has committed to design and construct power transmission lines in accordance with APLIC guidelines to minimize raptor electrocutions and collision potential.

Human Presence and Noise

The most common wildlife responses to noise and human presence are avoidance or accommodation. Avoidance would result in displacement of animals from an area larger than the actual disturbance area. The total extent of habitat loss as a result of the wildlife avoidance response is impossible to predict since the degree of this response varies from species to species and can even vary between individuals of the same species. Also, after initial avoidance of human activity and noise-producing areas, certain wildlife species may acclimate to the activity and begin to reoccupy areas formerly avoided. For example, during the initial development phases, it is likely that big game (i.e., pronghorn and deer) would be displaced from a larger area than the actual disturbance sites due to the avoidance response. However, these big game species have demonstrated the ability to acclimate to a variety of activities as long as human harassment levels do not increase substantially (Ward 1976). Therefore, it is possible that the extent of displacement would approximate the actual disturbance area after the first few years of mine operation (Ward 1976). In addition to avoidance response, increased human presence intensifies the potential for wildlife/human interactions ranging from harassment of wildlife to poaching and legal harvest.

Several factors would combine to minimize the potential impacts related to increased human presence in the study area. First, the proposed project is in the immediate vicinity of existing mine sites where human activity associated with mining operations continues to date. Second, to minimize wildlife/vehicle-related collision impacts during project operations, BDMV would require a mandatory employee education program for all personnel.

Water Management Activities

Wildlife populations within the study area could be affected by exposure to mine-related process solutions that may be present in ditches and ponds within the study area. To minimize impacts to wildlife from exposure to potentially toxic process solutions, BDMV has committed to constructing a BLM-approved 4-strand range fence, with 3-barbed strands and a smooth bottom strand, around the mine site to facilitate wildlife movement in the study area. In accordance with NDOW specifications, BDMV has also committed to constructing an 8-foot-high wire mesh fence around the process ponds as well as installing netting, pond covers, or floating “bird balls” as appropriate, over ditches and ponds that potentially contain toxic process solutions to minimize exposure of wildlife species, including volant (flying animals) and terrestrial wildlife species. In addition, the heap leach pads would be scarified to minimize ponding and pooling of process solutions.

A prospective screening-level ecological risk assessment (ERA) was conducted for the Arturo Mine Site (Arcadis 2010) to evaluate potential risk to ecological receptors from exposure to pit lake water and sediment in future open pits. The ERA was conducted in accordance with BLM Ecological Risk Assessment Guidelines for Open Pit Mine Lakes in Nevada (BLM 2004c) and United States Environmental Protection Agency (USEPA) Ecological Risk Assessment Guidance (USEPA 1998a, 1997b) to support the Environmental Impact Statement (EIS).

The goal of the ERA was to evaluate the potential for ecological risk (i.e., adverse impacts to biota from exposure to a stressor). Risk assessment at the screening-level stage is inherently conservative and utilizes conservative assumptions to eliminate those exposures that have no potential for adverse impacts. Reporting of potential risk does not imply that an adverse impact is present or likely to occur but rather indicates the need for further evaluation using other site-specific factors to refine the risk estimate.

Under the proposed project, development of the Arturo Mine would result in development of three pit lakes (North, South and East pit lakes) upon cessation of dewatering activities from the neighboring BGMI facility as described in Section 3.4 Water Resources and Geochemistry. For the purposes of the ERA, two permanent pit lake scenarios were assumed for each pit: a juvenile pit lake scenario (50 to 350 years after cessation of dewatering activities at the BGMI facility) and a mature pit lake scenario (approximately 400 years after the cessation of dewatering activities at the BGMI facility).

Biological development in the future pit lakes is dependent on physical characteristics, water chemistry, nutrient availability, and the regional environment. During the juvenile pit lake temporal scenario, rapidly rising water levels, pit wall erosion and sloughing, and high steep walls encompassing open water would limit access to the pit lakes by wildlife. Exposure to the pit lake environment during this juvenile stage is expected to be limited to migratory bird stop-over, and thus could provide a drinking water resource for birds and resting substrate for waterfowl. Once the pit lakes reach the mature scenario, small littoral and riparian zones may develop along the edges of the pit lakes. The mature pit lake environment could, therefore, attract a variety of wildlife and provide food (i.e., aquatic plants and invertebrates) and nesting substrates for wildlife. Fish could be present in the mature pit lakes if introduced by humans and could provide an additional food source for wildlife.

The ERA considered various representative indicator species that could conceivably utilize resources in the pit lakes. These include mammals (mule deer and little brown bat); birds (bald eagle, cliff swallow, killdeer, mallard, and western grebe); and fish (fish community). These species were selected as receptors to assess the juvenile pit lake environment because the other receptors are not reasonably

expected to utilize the pit lakes during this stage of pit lake development. All receptors were considered for evaluation of the mature pit lake scenario.

Because the ERA is prospective, future pit lake surface water metals concentrations were modeled for each of the three proposed mine pit lakes based on pit lake water quality prediction modeling performed by Schafer Limited LLC (Schafer) (2012a). The maximum concentration for each target chemical, considering all three pit lakes and both temporal scenarios, was compared to the defined surface water screening criteria (Arcadis 2010) to determine chemicals of potential concern (COPC) to be further evaluated in the ERA. The following target analytes had maximum predicted water concentrations in excess of applicable criteria and were retained as COPC:

- Juvenile Pit Lake Scenario (50 to 350 years after cessation of dewatering) – cadmium, nickel, selenium, and zinc; and
- Mature Pit Lake Scenario (approximately 400 years after cessation of dewatering) – antimony, barium, cadmium, copper, nickel, selenium, and zinc.

Rock geochemistry data collected from the Arturo pits was used to estimate sediment concentrations for all COPC determined under the future mature pit lake scenario, where development of littoral sediment and associated benthic communities may be expected to occur. These sediment data and the modeled surface water concentrations were applied in the exposure model to estimate exposure to wildlife.

In the exposure assessment, a conservative deterministic dose model (USEPA 1993) was applied to the evaluation of birds and mammals to assess potential exposure to the selected representative species. Exposure dose was based on direct contact and ingestion of sediment and surface water and indirect contact via uptake of food/biota. Conservative biota-sediment accumulation factors and bioaccumulation factors were applied to account for the biotransfer of COPCs from food sources to wildlife. This approach yields conservative dose estimates, as it is assumed that the wildlife population obtains all or a majority of food and water resources from the pit lake environment, an unlikely scenario in view of the limited habitat expected to develop and the general inaccessibility of the pit lake environment.

In an additional step, the impact analysis, chronic toxicity reference values (TRVs), were derived for comparison to the estimated exposure doses calculated for each representative species in the exposure assessment; TRVs are literature-based chemical concentrations at or below which adverse effects are not expected. Upper bound (lowest observed adverse effect level [LOAEL]) and lower bound (no observed adverse effect level [NOAEL]) TRVs were derived, representing the highest dose that would not result in an adverse impact and the lowest dose above that may result in an adverse impact, per standard risk assessment practice. For the evaluation of the fish community, upper bound and lower bound effect benchmark TRVs were derived that are specific for fish: no observed effect concentrations (NOECs) and lowest observed effect concentrations (LOECs).

The screening-level ERA concluded that no unacceptable risk would be expected for wildlife receptors and the fish community in the proposed Arturo pit lakes. The potential for risk is expressed as a hazard quotient (HQ) equal to the exposure dose divided by the TRV, where HQ≤1 indicates that there is no potential for adverse impacts and a HQ>1 suggests that the potential for risk cannot be excluded. Under the juvenile lake scenario, no HQ approached unity (HQ=1) and thus risk is not likely from pit water exposure under the juvenile pit lake scenario.

Under the mature pit lake scenario for wildlife, all upper bound risk estimates (HQ_{LOAEL}) were below unity, while lower bound risk estimate (HQ_{NOAEL}) for the killdeer marginally exceeded unity for selenium (HQ=1.1) based on exposure to water, sediment, and uptake of biota (food resources). The conservative assumptions required that the level of exposure be higher than reasonably expected. This includes an area use of 100 percent, which assumes year-round presence and use of the pit lake environment for all dietary and water resources, an unrealistic assumption. Considering that this and other assumptions

(e.g., 100 percent bioavailability of COPC) are unrealistically conservative, the risk assessment concluded that exposure to Arturo mine pit lake media likely would not result in unacceptable risk to wildlife under anticipated future (mature) pit lake conditions.

The ERA also concluded that no unacceptable risk would be expected based on exposure of fish to pit lake COPC under the mature pit lake scenario. Based on comparison to literature-derived toxicity thresholds, all upper bound (HQ_{LOEC}) and lower bound (HQ_{NOEC}) risk estimates were at or below unity indicating that risk to fish would not be expected.

Shallow Initial Pit Lake Scenario

Prior to formation of the permanent pit lake scenarios described above, shallow ponding would occur in the early years following cessation of dewatering at the BGMI facility as described in Section 3.4 Water Resources and Geochemistry. Supplemental water quality predictions for the Proposed Action were estimated (Schafer 2011d) and evaluated to determine the potential for unacceptable risk to ecological receptors for a shallow pit lake that is expected to develop prior to the formation of the juvenile pit lakes. These shallow pit lakes would initially be seasonally intermittent or ephemeral water bodies that would be perched above the regional water table; eventually transitioning to perennial water bodies. It is assumed that these shallow pit lakes would form immediately after cessation of BGMI dewatering and would persist until the regional water table rebounds and intersects the pit shell, at which time rapid filling would occur as described for the juvenile pit lake scenario. Prior to rapid filling, the shallow initial pit lakes may provide water and food resources to biological resources similar to those described for the mature pit lake scenario.

Sedimentation and the progressive development of aquatic vegetation and associated benthic communities may be expected to occur over time during the shallow pit lake phase. The sediment concentrations predicted for the mature pit lake scenario based on the existing Arturo Pit geochemistry provide estimates of expected concentrations of metals in sediment. These sediment concentrations and the predicted surface water concentrations were evaluated by comparison to mature pit lake risk estimates, holding all other exposure variables constant.

The following target analytes had maximum predicted water concentrations in excess of applicable criteria and were retained as COPCs under the Proposed Action for the shallow intial pit lake scenario: antimony, barium, copper, nickel, selenium, and zinc. With the exception of antimony, copper and nickel, which were below predicted values for the juvenile pit scenario, modest increases in predicted water quality concentrations relative to the mature pit scenario were noted. These increases do not result in a potential for unacceptable risk to wildlife species obtaining water resources from the shallow pit lakes; water-based exposures represent less than 10 percent of the total ingested (dietary) dose for wildlife. However, zinc exceeded the surface water concentrations protective of fish: exceeded both threshold EC_{NOEC} (0.43 mg/L) and upper bound EC_{LOEC} (1.2 mg/L) values (Arcadis 2010). This exceedance suggests the potential for unacceptable risk to fish from exposure to zinc in the shallow initial pit lakes.

Hazardous Materials Spill

The probability of a transportation-related spill of process chemicals along the transportation route is discussed in Section 3.7, Hazardous Materials and Solid Waste. The potential for wildlife exposure to toxic chemicals as a result of a transportation-related spill would be greatest if an accident were to occur near aquatic habitats (e.g., Boulder Creek). Spills in dryland habitat would pose only minimal risk to most wildlife species since these spills would be adjacent to highways and could be rapidly contained and cleaned up. In general, the materials of greatest concern would be sodium cyanide, sodium hydroxide, and diesel fuel. The impacts of a sodium cyanide or sodium hydroxide release would be highly variable and would depend on the quantity released, the location of the release (e.g., dry upland area, wet meadow area, or flowing stream area), the species exposed, and the chemical conditions at the release location. The most likely impact of a potential release of sodium cyanide would be the poisoning of

terrestrial or aquatic species. Animal species that drink contaminated water could suffer severe effects or death depending on the concentration of sodium cyanide and the volume of the water consumed. Sodium hydroxide has the potential to cause minor to extensive burns to exposed animals. A diesel spill has the potential to contaminate soil, surface water, and groundwater in addition to harming aquatic life and vegetation. Although unlikely, such a spill also could ignite from the accident and cause a range fire. Since cleanup actions would take place rapidly, diesel contamination has a low potential to result in long-term impacts to soil, surface water, and possibly groundwater. Hazardous chemicals would be transported via United States Department of Transportation-certified containers and transporters, and transportation of sodium cyanide and other chemical reagents would be in accordance with all applicable rules and regulations. In addition, as discussed in the PoO and Reclamation Permit Application (SRK 2009a), BDMV would implement their Spill Contingency Plan that establishes procedures for responding to accidental spills or releases of hazardous materials to minimize environmental risks.

Aquatic Biological Resources

Surface Disturbance

Direct impacts on aquatic habitat and species would involve disturbance to stream, wetland, or pond habitat as a result of activities within or near these waterbodies. Construction activities associated with the East WRDF and Septic Leach Field would occur in close proximity to Boulder Creek. In addition, the existing Bootstrap Haul Road would be widened to 140 feet including over crossings of Boulder Creek and Bell Creek as discussed in Section 3.14, Vegetation Including Riparian Zones and Wetland Areas. Other construction activities involving the expansion of the open pit, development of the West WRDF, and addition of a new heap leach facility would disturb soil from the drainage of Boulder Creek and catchment areas such as BLM retention pond AR09. These activities would result in soil disturbance and pose a risk of potential sediment input to the drainage. However, when considering the intermittent nature of Boulder Creek, sediment input to the drainage would be considered localized to areas near the proposed disturbance areas. Sediment could be dispersed during the snowmelt period or after storm events when stream flow is at its peak levels. However, these periods present a small portion of typical flow conditions during the year. Biological communities in Boulder Creek are limited to macroinvertebrates and attached algae that can tolerate intermittent flow and low water levels. The BLM retention pond contains Lahontan speckled dace. Applicant-committed environmental protection measures involving erosion and sediment control BMPs would be used to reduce sediment input from project facilities and disturbed areas into Boulder Creek, as defined by the site Storm Water Pollution Prevention Plan. By implementing the erosion control measures, project-related impacts of sediment on Boulder Creek and aquatic biota (when present) are considered to be minor.

The expansion of the pit also would result in the loss of three wetlands (designated as AR01, AR16, and AR17). One of these wetlands, AR17, has been observed to contain some standing water in the summer months. This wetland provides habitat for aquatic invertebrates and vegetation including algae and macrophyte (i.e., aquatic vegetation). No fish or amphibian species were observed in these three wetlands, based on a survey conducted in July 2010 (BLM 2010i). Two additional wetlands area would be disturbed where the Bootstrap Haul Road crosses Boulder Creek as shown in **Table 3.14-4**.

Water Management Activities

Water management activities would involve storm water control within the mine area. The system would be operated in a similar manner as the existing system. No impacts would occur to habitat along Boulder Creek and associated aquatic species.

Hazardous Materials Spill

Vehicle and equipment use in areas near Boulder Creek or wetlands such as AR09 and AR05 pose a risk to aquatic species from fuel spills or leaks reaching these waterbodies. If a spill occurred, the magnitude of the impact would depend upon the volume spilled and the extent of dispersal within the

waterbody. If fuel entered a stream or wetland with flowing or standing water, adverse effects on aquatic species (mainly invertebrates) could occur depending on the variable factors involving spill volume and hydrology conditions in the waterbody. Spilled fuel products could result in mortalities to aquatic species, sublethal effects on physiological functions, or habitat degradation due to impacts on water quality. As part of applicant-committed environmental protection measures, BDMV would maintain and implement a Spill Prevention, Control, and Countermeasure (SPCC) Plan for petroleum products. The SPCC Plan would reduce spill risks to a low level. As a result, potential spill impacts on aquatic species and their habitat is considered of low likelihood.

3.17.2.2 Single Waste Rock Disposal Facility Alternative

Surface Disturbance

The Single WRDF Alternative would be similar to the Proposed Action, except that the East WRDF would not be developed and the West WRDF would be expanded by approximately 54 acres. Overall, this alternative would result in approximately 128 fewer acres of wildlife habitat disturbance, including approximately 84 fewer acres of limited use mule deer habitat, 128 fewer acres of pronghorn summer habitat and 35 fewer acres of elk crucial winter habitat. However, the expansion of the West WRDF under this alternative would extend the WRDF approximately 0.25 mile north of the proposed West WRDF footprint, into a known mule deer migration corridor as well disturbed 58 additional acres of elk low-density habitat. Due to the already restricted mule deer migration corridor from mining activities along the Carlin Trend, this alternative would result in adverse impacts to seasonal mule deer movements within the project area. All other direct and indirect impacts associated with this alternative would be similar to the Proposed Action.

Under the Single WRDF Alternative, effects to aquatic biological resources would be less in comparison to the Proposed Action. Potential adverse impacts to water quality and aquatic habitat from sediment input to Boulder Creek would be reduced from the elimination of the East WRDF. Although fuel usage would be greater under this alternative, spill risk to aquatic habitat and species would be the same as the proposed project because the access roads would not cross waterbodies.

Water Management Activities

Under this alternative, the potential risk to ecological receptors from exposure to pit lake water and sediment would be the same as described for the Proposed Action.

3.17.2.3 Partial Pit Backfill Alternative

Surface Disturbance

Under the Partial Pit Backfill Alternative, impacts to wildlife and aquatic biological resources would be the same as described for the Proposed Action, except that an additional 291 acres would be reclaimed in the open pit during final reclamation.

Water Management Activities

Results and conclusions of the prospective screening-level ERA conducted for the Proposed Action (Arcadis 2010) were reviewed and compared to surface water quality predictions generated for the Partial Pit Backfill Alternative to assess the potential for unacceptable risk to ecological receptors under this alternative. Biological development and resulting ecological exposures in the lake formed within the North Pit under the Partial Pit Backfill Alternative are not expected to differ substantially from the Proposed Action. Water quality predictions for this alternative for each of the two temporal scenarios (i.e., juvenile, Years 50 to 350 or shallow initial pit lake; and mature, Year 400 where a hydraulic steady state/hydraulic equilibrium is achieved) were reviewed relative to the predicted concentrations and risk assessment results reported for the Proposed Action.

Juvenile Pit Lake Scenario

Water quality predictions for the juvenile pit lake scenario for the Partial Pit Backfill Alternative were generated for comparison with the Proposed Action (Schafer 2011c,d). Under the Partial Pit Backfill Alternative, all predicted concentrations were below the concentrations presented for the Proposed Action considering all pits. Although quantitative differences in the risk estimate reported in the Proposed Action are indicated, there is no qualitative change in the risk assessment results or conclusions using the predicted water concentrations derived under this alternative scenario from those reported previously for the Proposed Action.

Mature Pit Lake Scenario

Assuming hydrologic steady state conditions at Year 400, predicted water concentrations for the Partial Pit Backfill Alternative were similar to the North Pit values reported for the Proposed Action. Sediment concentrations corresponding to the Partial Pit Backfill Alternative were not estimated but were assumed to remain the same as those reported for the Proposed Action mature lake scenario (based wall rock data collected from the Arturo pits). With few exceptions, North Pit lake Partial Pit Backfill Alternative water concentrations were below predicted Proposed Action concentrations. A limited number of COPC (i.e., barium and zinc) had higher predicted concentrations than predicted for the Proposed Action at Year 400; however, the North Pit lake Partial Pit Backfill Alternative values were only marginally elevated above these values (i.e., ≤2.2 times the North Pit Proposed Action predicted water quality concentration) (Schafer 2011d).

Of note is the Partial Pit Backfill Alternative predicted water concentration for zinc, which increased by a factor of about 2 over those predicted for the Proposed Action. Although small, this increase results in the potential for unacceptable risk to fish from exposure to zinc in surface water based on exceedance of the lower bound (NOEC based) threshold toxicity benchmark (EC_{NOEC}=0.43 milligrams per liter); whereas no potential for unacceptable risk was reported for the Proposed Action. The upper bound toxicity level (EC_{LOEC}) protective of fish was not exceeded. No other qualitative changes to the results and conclusions defined in the Proposed Action were noted.

Shallow Initial Pit Lake Scenario

Shallow pit lake water quality was predicted for the Partial Pit Backfill Alternative (Schafer 2011c, d) to determine the potential for unacceptable risk to ecological receptors for the shallow initial pit lakes expected to develop prior to the formation of juvenile pit lakes. Based on the expected ecological habitat conditions and predicted water quality for this alternative, the COPC were the same as those identified for the Proposed Action. All predicted shallow initial pit lake concentrations were at or below those concentrations estimated for the Proposed Action juvenile pit lake scenario. Although predicted water concentrations for barium, nickel and zinc were elevated relative to the values predicted for the Proposed Action mature pit lake scenario, the risk conclusions remain unchanged.

3.17.2.4 No Action Alternative

Surface Disturbance

Under the No Action Alternative, the proposed project would not be developed, and impacts to wildlife and fisheries resources would not occur. Under this alternative, approximately 2,505 acres of wildlife habitat would not be disturbed or lost, as described under the Proposed Action. Additional habitat fragmentation and animal displacement would not occur, limiting the impacts to wildlife resources to existing conditions. The level of human use would remain the same as the current levels. Completion of closure and reclamation activities associated with existing disturbance, and mineral exploration activities within the study area, would be conducted under existing authorizations.

New disturbance would not occur near Boulder Creek under the No Action Alternative. Therefore, potential sedimentation impacts on aquatic species and their habitat would not result under the No

Action Alternative. In addition, the loss of several wetlands containing aquatic habitat would not occur, since the pit would not be expanded and the Bootstrap Haul Road would not be widened. A low level risk of fuel spills on aquatic habitat would continue to exist for the No Action Alternative, although the SPCC Plan would be implemented to reduce spill risks.

Water Management Activities

Prior to formation of the permanent pit lake scenarios described above, shallow ponding would occur in the early years following cessation of dewatering at the BGMI facility as described in Section 3.4 Water Resources and Geochemistry. Supplemental water quality predictions for the Proposed Action were estimated (Schafer 2011d) and evaluated to determine the potential for unacceptable risk to ecological receptors for a shallow pit lake that is expected to develop prior to the formation of the juvenile pit lakes. These shallow pit lakes would initially be seasonally intermittent or ephemeral water bodies that would be perched above the regional water table; eventually transitioning to perennial water bodies. It is assumed that these shallow pit lakes would form immediately after cessation of BGMI dewatering and would persist until the regional water table rebounds and intersects the pit shell, at which time rapid filling would occur as described for the juvenile pit lake scenario. Prior to rapid filling, the shallow initial pit lakes may provide water and food resources to biological resources similar to those described for the mature pit lake scenario.

Of the remaining COPC, with the exception of antimony and copper, which were below previously predicted values, modest increases in predicted water quality concentrations relative to the mature pit scenario were noted. These increases do not represent a potential for unacceptable risk to wildlife species obtaining water resources from the lakes; water-based exposures typically represent less than 10 percent of the total ingested (dietary) dose for wildlife. However, nickel and zinc exceed the surface water concentrations protective of fish: nickel exceeds the threshold benchmark (EC_{NOEC}) only, and zinc exceeds both threshold EC_{NOEC} and upper bound EC_{LOEC} values. These exceedances suggest the potential for unacceptable risk from these metals to fish, if present, in shallow pit lakes.

3.17.3 Cumulative Impacts

The CESA for wildlife and aquatic biological resources is defined in Section 3.17.1, Affected Environment, and is shown in **Figures 3.17-1** through **3.17-4**. The past, present, and reasonably foreseeable future actions (RFFAs) in this area are discussed in Section 3.2, Past, Present, and Reasonably Foreseeable Future Actions. RFFAs from mining are identified in **Table 3.2-1**, and their locations shown in **Figures 3.2-1** and **3.2-2**.

3.17.3.1 Proposed Action

Wildlife Resources

The CESAs for wildlife resources encompass a portion of NDOW's Management Area 6 (Hunting Units 062, 064, 067, and 068) as depicted in **Figures 3.17-1**, **3.17-2**, and **3.17-3**. The CESAs include a contiguous area that provides very important seasonal habitat for general wildlife species as well as mule deer and pronghorn. Cumulative impacts on wildlife in the CESAs have resulted primarily from wildfires, mineral exploration, mining activities, noxious weeds and non-native invasive plant species, livestock grazing, drought, urbanization, and seeding of native range with introduced herbaceous species (BLM 2010a,b). Other industrial development activities in the area such as a power plant, power transmission lines, and roads also contribute to impacts to wildlife (BLM 2010a,b). Development of reasonably foreseeable mine projects would continue to impact big game in their respective CESAs. However, most mine areas proposed for development within the Carlin Trend have been within or adjacent to existing mine areas (BLM 2010a,b).

Past, present, and RFFAs in the wildlife, mule deer, and pronghorn CESAs have resulted, or would result, in the direct disturbance of habitat (**Table 3.17-3**). A portion of the cumulative disturbance areas have been, or would be, reclaimed or have recovered materially (i.e., wildfire areas). The reclaimed

areas, and areas associated with habitat conversion, would be capable of supporting wildlife use; however, species composition and densities may change. Overall, most of the local wildlife populations (e.g., big game, raptors, migratory birds, amphibians) that occur in the CESAs would continue to occupy their respective ranges and breed successfully, although population numbers may decrease relative to the amount of cumulative habitat loss and disturbance from incremental development.

Cumulative impacts to wildlife resources primarily would be directly related to habitat loss, habitat fragmentation, and animal displacement. Big game, especially mule deer, would be most susceptible to these cumulative impacts since encroaching human activities along the foothills of the Tuscarora Range and the Carlin Trend have resulted in animal displacement and habitat fragmentation in areas that are utilized as migration corridors between summer and winter ranges. NDOW collaring data has shown that mule deer tend to avoid large-scale mine disturbance areas along the Carlin Trend and choose specific routes through mine sites (e.g., BGMI facility, Bootstrap, Dee Gold/Rossi, Carlin Pit, Pete Pit). These routes are the remnants of the migration corridor in the Carlin Trend and are threatened by encroaching human activities and mine expansions.

Within the wildlife, mule deer, and pronghorn CESAs (**Figures 3.17-1** through **3.17-3**) mining has removed wildlife habitat, primarily as a function of fencing and/or land disturbance associated with mining operations. In addition, wildfire has created one of the primary cumulative impacts on these species. As shown in **Table 3.17-3**, from 1999 to late August 2008, thousands of acres of wildlife habitat have been impacted by large-scale wildfires. Wildfire has resulted in the temporary to long-term loss of shrubs that provide forage and cover as habitat components, which has caused reductions in mule deer and pronghorn herds throughout their respective CESAs. Impacts of wildfires to terrestrial wildlife species include loss of habitat (forage and cover), which can lead to mortality of mule deer and pronghorn, as well as other species. The loss of canopy cover and forb and grass diversity is prevalent across the burned areas, and the recovery of these plant communities would vary in terms of time and cover. In many areas, native shrub communities have been replaced by cheatgrass-dominated grasslands (Area 6 Mule Deer Working Group 2010; BLM 2010a,b). A breakdown of cumulative disturbance by the proposed project, wildfire, mining operations, and utility and energy development is presented in **Table 3.17-3**.

Nesting raptor species also would be susceptible to these cumulative impacts since encroaching human activities along the Carlin Trend have resulted in bird displacement and habitat fragmentation in areas that may be at their relative carrying capacity for these resident species.

Many of the local wildlife populations (e.g., small game, migratory birds) that occur in the CESA would continue to occupy their respective ranges and breed successfully, although population numbers may decrease relative to the amount of cumulative habitat loss and disturbance from incremental development.

Mine groundwater pumping activities within the CESAs may result in a reduction or loss of flows in springs and seeps that support wildlife habitat (i.e., riparian zones and wetland areas) (BLM 2010b). Reductions or elimination of flows in springs and seeps could impact wildlife species dependent on these sites (e.g., big game and bats).

Aquatic Biological Resources

The CESA for aquatic biological resources includes the Boulder Creek drainage located within the proposed mine boundary through Boulder Flat (**Figure 3.17-5**). The CESA also includes wetland areas with aquatic habitat such as AR09, AR05, and AR17. The proposed project would result in minor adverse impacts on aquatic biological resources in Boulder Creek as a result of surface disturbance

Table 3.17-3 Cumulative Wildlife, Mule Deer, Pronghorn, and Elk Habitat Disturbance

CESA and Habitat Type[1]	Total Acres of Habitat	Acres of Habitat Disturbed by Fire[2]	Acres Disturbed by the Proposed Action	Acres of Habitat Disturbed by Mining Operations (Past, Present, and RFFAs[3])	Acres of Habitat Disturbed by Utility and Energy Development (Past, Present, and RFFAs)	Total Acres of Habitat Disturbed
Wildlife	2,389,947	1,131,690 (47%)	2,505 (<1%)	38,622 (2%)	3,210 (<1%)	1,176,027 (49%)
Mule Deer – Limited Use	1,087,735	468,255 (43%)	1,391 (<1%)	31,448 (3%)	3,040 (<1%)	504,134 (46%)
Pronghorn – Summer	1,199,893	723,871 (60%)	2,505 (<1%)	36,452 (3%)	2,610 (<1%)	765,438 (64%)
Elk – Crucial Winter	256,765	183,622 (72%)	1,940 (<1%)	2,651 (1%)	2,610 (<1%)	190,823 (74%)
Elk – Low-density	776,312	496,482 (64%)	19 (1%)	23,348 (3%)	2,610 (4%)	522,459 (67%)

[1] Habitat types such as mule deer crucial winter habitat, and pronghorn crucial winter habitat are not impacted by the proposed project and, therefore, not included in the cumulative analysis.

[2] Fire data used for this analysis has been further refined and modified since the Betze Pit Expansion Supplemental EIS (BLM 2008).

[3] See **Table 3.2-1** for breakdown of mining projects.

Source: BLM 2011b; NDOW 2010a; U.S. Geological Survey 2005.

activities and low risk from potential fuel spills. There would be a loss of aquatic habitat in wetland AR17 as a result of pit expansion. The proposed project would not result in dewatering impacts within the CESA. These impacts would combine with other past, present, and RFFAs in the Boulder Creek drainage. Actions that have resulted in past or present disturbance include the Dee, Bootstrap, and the BGMI facilities. Erosion control measures have been required on these mining projects to reduce sediment input to Boulder Creek. However, collectively, these projects likely have resulted in some low level of sediment input to the drainage. High flow periods typically disperse the sediment to downgradient sections of the stream.

Other activities such as livestock grazing and agricultural development in the CESA would act cumulatively in adversely affecting aquatic biological resources. Potential cumulative effects to aquatic habitat and species include degradation of habitat from livestock grazing, conversion of native riparian/wetland plant communities to vegetation dominated by noxious weeds and non-native plant species, new roads, and in some cases agricultural diversions. Mitigation programs required for other mining developments are expected to reduce these potential impacts in the Boulder Creek watershed.

3.17.3.2 Single Waste Rock Disposal Facility Alternative

Cumulative effects under the Single WRDF Alternative would be similar to wildlife resources discussed for the Proposed Action, except 128 fewer acres of wildlife habitat would be disturbed. Implementation of this alternative would result in greater cumulative impacts to seasonal movements of mule deer by further restricting a known mule deer migration corridor located in the northern-most portion of the study area. As a result, cumulative impacts to mule deer would be more pronounced under this alternative.

The cumulative impacts of the Single WRDF Alternative to aquatic biological resources would be similar to the Proposed Action, except potential sediment input to Boulder Creek and effects on aquatic habitat and species would be reduced due to the elimination of the East WRDF.

3.17.3.3 Partial Pit Backfill Alternative

Cumulative effects under the Partial Pit Backfill Alternative to wildlife and aquatic biological resources would be the same as discussed under the Proposed Action, except that an additional 291 acres would be reclaimed in the open pit during final reclamation.

3.17.3.4 No Action Alternative

Cumulative impacts to wildlife resources for the No Action Alternative generally would be the same as described for the proposed project. The exception would be 2,505 acres less habitat disturbance and reduced habitat fragmentation within the CESA associated with the No Action Alternative.

Under the No Action Alternative, potential sediment and fuel spill risks would continue to exist within the CESA. However, existing sediment-control and spill plans would be used to minimize impacts on the Boulder Creek drainage. These low level impacts would combine with other surface disturbance activities within the CESA.

3.17.4 Potential Monitoring and Mitigation Measures

The following mitigation measures are recommended for wildlife resources.

Issue: Development of the proposed project would affect approximately 1.6 acres of riparian and wetland habitat for wildlife species.

Mitigation Measure WL-1: In order to offset project-related impacts that would remove or disturb approximately 1.6 acres of riparian and wetland habitat for wildlife species, BDMV would install BLM-approved fencing around approximately 34 acres of wetland vegetation, including three springs, within

the Water Canyon spring complex area, in coordination with the BLM as discussed in Section 3.14.4.2, Riparian Zones and Wetland Areas.

BDMV also would repair five pit reservoirs at the Water Canyon spring complex area by dredging sediment from the existing pit reservoirs and installing liners at the bottom of the reservoirs to retain water runoff from nearby springs.

Effectiveness: Implementation of this mitigation measure would offset project-related impacts to wetland vegetation by preventing livestock use within the fenced Water Canyon spring complex and enhancing existing wetland habitat within the project region. The mitigation measure also would improve an existing source of surface water for wildlife within the project region.

Issue: The proposed project would affect a mule deer migration corridor that connects important summer and winter range. Migration corridors in the Carlin Trend have been modified by large wildland fires that have converted sagebrush communities to a cheatgrass landscape, and by past and present mining operations. The implementation of the proposed project would further reduce habitat for migrating mule deer in the Carlin Trend.

Mitigation Measure WL-2: In order to reduce project-related impacts that would remove or disturb 1,391 acres of sagebrush shrubland habitat for migrating mule deer between important summer and winter range, Barrick Dee Mining Venture (BDMV) would restore and enhance important summer and winter mule deer range located on Bureau of Land Management (BLM) land immediately northwest of Boulder Valley along the southeast flank of the Sheep Creek Range at a ratio of 1:1, approximately 1,400 acres. The locations of possible restoration areas are shown in **Figure 3.17-9**. Restoration activities that would be used to restore important summer and winter mule deer range include, but are not limited to:

<u>Seeding Treatments</u> – Possible seeding treatments include broadcast and drag, drill, broadcast/aerial, harrow, disking, and hand.

<u>Mechanical Treatment</u> – To provide for an adequate seedbed, mechanical treatments would include disking (plowing), harrowing and mowing of existing grasses.

<u>Livestock Grazing and Protective Fencing</u> – Rest from livestock grazing.

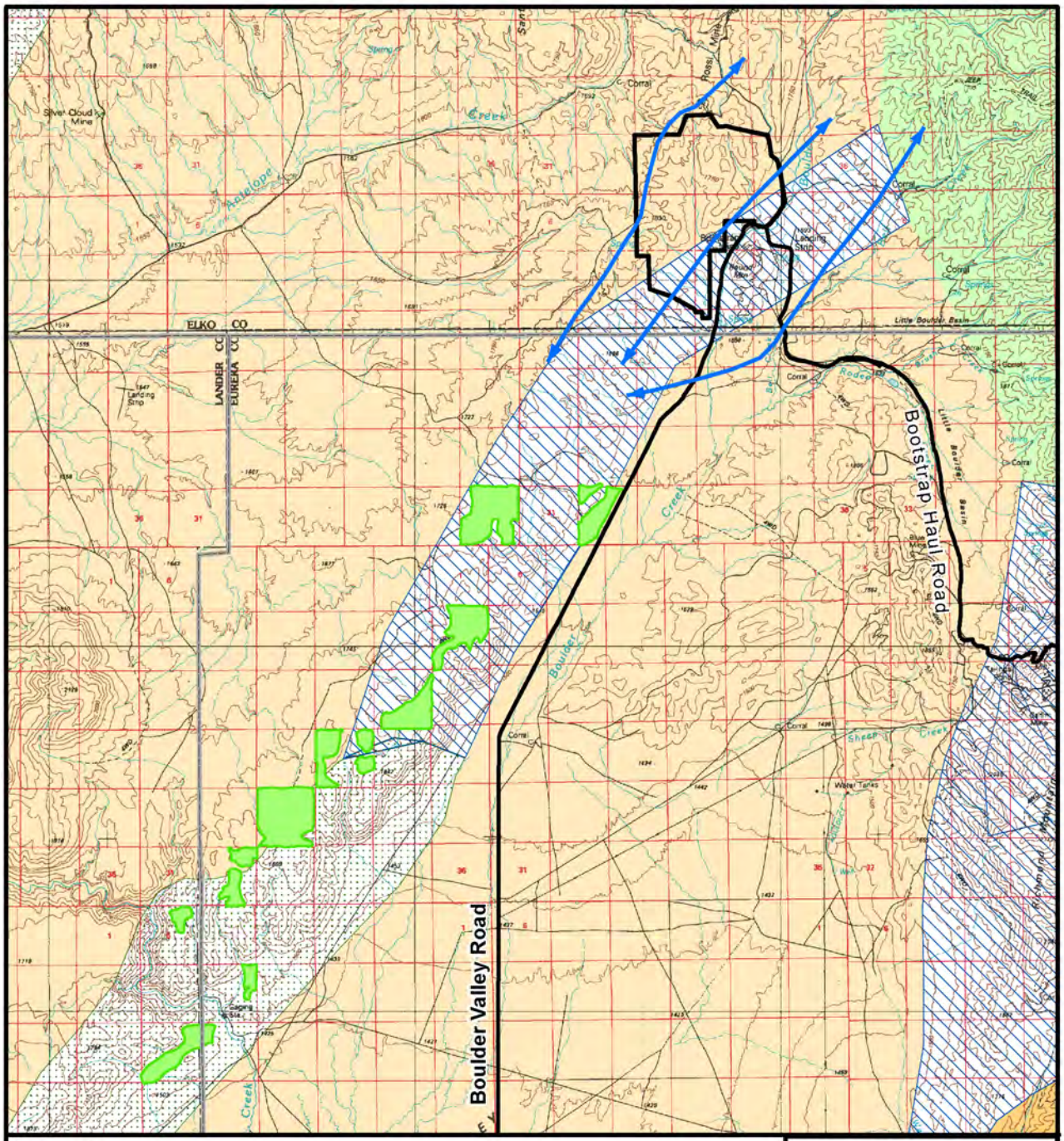
<u>Herbicide Treatment</u> – A combination of Imazapic and Glyphosate herbicide treatments would be used to suppress non-native annuals and crested wheatgrass in order to introduce shrubs, forbs and grasses into the treatment areas.

<u>Prescribed Burn Treatments</u> – Controlled burns would be use to reduce fuels, control competing vegetation, and improve wildlife habitat.

Restoration activities would occur within a 10-year period and would commence within 1 year of the initiation of project approval.

Effectiveness: Implementation of this mitigation measure would reduce project-related impacts to mule deer by restoring important summer and winter range within the CESA for this species. Monitoring programs would be developed and implemented to gauge the effectiveness of treatments and mitigation measures.

Vegetation rehabilitation treatments would be monitored using techniques outlined by the United States Geological Survey (USGS) in the *Strategy for Monitoring Post-fire Rehabilitation Treatments Handbook*. Treatment goals would be set on a site-by-site basis, taking into consideration site conditions pre-treatment, treatment method and species planted. Invasive species management treatments (including chemical, manual and mechanical treatments) would be considered effective if greater than 80 percent



Legend

- Proposed PoO Boundary
- Mule Deer Habitat Restoration Areas
- Crucial Winter Habitat
- Limited Use Habitat
- Movement Corridor
- Summer Habitat
- Transition Habitat
- Migration Corridor

Source: BLM 2012.

N

0 1 2 Miles

Arturo Mine Project EIS

Figure 3.17-9

Mule Deer Habitat Treatment Areas

05/16/2012

of the targeted weed species are affected by the treatment during the year. Infestation size and density would be measured annually to determine progress and to adapt management plans for treatment areas.

Resource Effects Analysis: Implementation of mitigation measure WL-2 would affect the following elements or resources: water, cultural, air quality, visual, soils, vegetation, noxious weeds and non-native invasive plant species, range, wildlife, and special status species.

Water Resources

Direct impacts would be limited to surface erosion during heavy rainfall. Any disturbance would be temporary and negated by reestablishment of vegetation. Although existing vegetation may be altered, a residue would remain and provide protection against rainfall.

Cultural Resources

In accordance with Section 106 of the National Historic Preservation Act (NHPA), as amended, the appropriate level of cultural resources inventory and Native American consultation would be conducted for the treatment areas. If historic properties are identified within these areas and cannot be avoided by restoration activities, mitigation measures would be developed and implemented through a Memorandum of Agreement (MOA) among BLM, Nevada State Historic Preservation Office (SHPO), and BDMV. The MOA would outline treatment to mitigate unavoidable adverse effects to the historic properties; identify who would be responsible for carrying out the agreed upon mitigation; and, provide documentary evidence that the BLM has met the requirements of Section 106. Once treatment is completed at the historic properties, compliance with Section 106 of the NHPA would be complete unless previously unknown historic properties or human remains are discovered in the areas.

Air Quality

Ground disturbing activities would result in increased dust and suspended particulate matter. These impacts would be more severe if treatments occurred on dry soils during windy conditions. Vehicle use would contribute to air quality impacts, resulting in increased dust and emissions from vehicle exhaust. Application of pesticides would result in short-term impacts to air quality, but would be minimized through proper use and adherence to pesticide labels. In the long term treatments would be expected to decrease the likelihood of blowing soil and dust, and would improve overall air quality.

Visual Resources

Visual resources would be affected by linear features created by some treatments (e.g., disking and seeding rows); however, these effects would only create weak to moderate contrasts. Overall, restoration treatments would enhance the color, form and texture of visual resources in the area. The treatments would help to alleviate contrast by increasing the vegetative diversity of the area through the establishment of a mix of perennial vegetation. The establishment of perennial vegetation would change the texture from uniform and fine to more patchy and coarse. Both form and color would be more varied with the different vegetative types. Once perennial vegetation is established, the project area would more closely approximate the color, form and texture of the native vegetation that existed prior to the cheatgrass monoculture. Moderate contrasts would occur with any adjacent cheatgrass areas.

Soils

Impacts to soils would occur during the short term as a result of mechanical surface disturbance. Restoration treatments would disturb soils from 1 to 6 inches in depth depending on the method used and existing soil conditions. Severity of impacts would depend on soil properties such as hazard of erosion by wind and water, T-Value (tolerable soil loss value), presence/absence of biological soil crusts, as well as antecedent conditions such as existing soil quality and moisture.

Treatments would indirectly improve soil quality in the long term by establishing more extensive vegetative cover. Vigorous vegetative canopies and root systems would provide numerous benefits for soil quality by improving aggregate stability, compaction, infiltration, organic matter, soil biota and reducing erosion by wind and water.

Vegetation Resources

Restoration treatment would eliminate the standing cheatgrass vegetation and the underlying thatch as well as suppress or inhibit the growth of cheatgrass by the use of chemicals means. Herbicide treatments would consist of the use of Glyphosate in areas where undesirable non-native annuals are dominate, and Imazapic in areas where some perennial vegetation exists. The treatments would help to restore many functions for the affected ecological sites and further reduce the risk of a permanent conversion to non-desirable species. The proposed treatments would reduce the potential for large wildfires by replacing the non native annual species with perennial species which are more fire resistant.

Noxious Weeds and Non-native Invasive Plant Species

Direct effects would include the short-term reduction of cheatgrass through chemical and mechanical control. Any noxious weed detected within the treatment window would also be treated. Overall, restoration treatments would include a reduction of cheatgrass and annual forbs with the long-term establishment of seeded shrubs, perennial grasses, and forbs. The establishment of perennial grasses, shrubs, and forbs would benefit the understory, out-compete non-native annuals, and create a more fire adapted ecosystem that is resilient to disturbance and thereby improve the Fire Regime Condition Class.

Range Resources

Impacts to livestock grazing would occur both in the short and long term. Short-term impacts would result from the temporary closure of treatment areas to livestock grazing. The closure may result in the temporary suspension of some Animal Unit Months (AUMs). Once the treated area has met the desired monitoring criteria, the area would be reopened to livestock grazing. In the event that the proposed treatment does not establish to the desired objectives after 2 years, the treatment would be evaluated to determine if additional rest from livestock grazing is needed. Restoration treatments would reduce the potential for increased fire cycles, which could result in a widespread fire closures to livestock closures throughout the allotments.

Wildlife Resources

Direct impacts to wildlife would include the short-term reduction of poor quality habitat, displacement by wildlife from the treatment areas, and increased habitat fragmentation until vegetation is re-established. In some instances, less mobile wildlife species that use burrows could be crushed by equipment. Indirect impacts would include increased noise and additional human presence during restoration activities. The degree of the impacts on wildlife species would depend on factors such as the sensitivity of the species, seasonal use patterns, type and timing of project activity, and physical parameters (e.g., topography, cover, forage, and climate).

The mitigation treatments would result in the reestablishment of shrub and perennial grass and forb cover for seasonal or yearlong use by wildlife. The proposed treatments also would protect intact habitat areas with a shrub component and mixed diversity of perennial grasses and forbs from wildland fire.

Special Status Species

Potential impacts to Special Status species would be same as discussed above for wildlife resources.

3.17.5 Residual Impacts

Residual impacts to wildlife resources under the Proposed Action would include the long-term loss of 2 acres of riparian zones and wetland areas and 1,960 acres of sagebrush shrubland including the

permanent loss of 472 acres of sagebrush shrubland and grassland habitat associated with the expansion of the open pit. The loss of shrub-dominated communities would represent a long-term change in wildlife habitat composition (i.e., shrub-dominated communities to grass/forb dominated communities) under the Proposed Action because it would take approximately 25 years for mature shrubs to become established in these communities.

Implementation of applicant-committed measures involving sediment control and the Spill Contingency Plan also would avoid residual impacts to aquatic habitat and species in the Boulder Creek drainage. The elimination of three wetlands associated with the open pit and two wetlands where the Bootstrap Haul Road crosses Boulder Creek would remove aquatic habitat, which would represent a residual impact on macroinvertebrates and plant communities that occur in waterbodies when water is present.

3.18 Special Status Species

3.18.1 Affected Environment

The study area for special status species includes the proposed Plan of Operations (PoO) boundary; the Bootstrap Haul Road, power connection yard, secondary access road entrance, and the power transmission line corridor, that occur outside of the proposed PoO boundary; and riparian, stream, spring/pond, and wetland habitats along Boulder Creek; and the haul road crossing at Bell Creek. The Cumulative Effects Study Areas (CESAs) for special status species, greater sage-grouse habitat, and greater sage-grouse preliminary priority habitat (PPH) and preliminary general habitat (PGH) extend from the northern end of the Independence Range northeast of the study area, south to the Humboldt River and the northern end of the Piñon Range (**Figures 3.18-1**, **3.18-2**, and **3.18-3**). Similar to the Wildlife CESA presented in Section 3.17, Wildlife and Aquatic Biological Resources, the Special Status Wildlife Species CESA and greater sage-grouse CESA are based on wildlife use within the project region and important seasonal habitats. The CESA for special status aquatic resources encompasses the Boulder Creek drainage located within the mine boundary as well as downgradient sections of Boulder Creek down to the Humboldt River (**Figure 3.18-4**). The rationale for selecting this CESA for special status aquatic species was based on the impact conclusion of negligible impacts on surface water resources beyond the Boulder Creek watershed (see Section 3.4, Water Resources and Geochemistry).

The study area for special status plant species is the same as described for vegetation in Section 3.14, Vegetation, Including Riparian Zones and Wetland Areas. No special status plant species have been identified as potentially occurring within the study area (Bureau of Land Management [BLM] 2010a; Nevada Natural Heritage Program [NNHP] 2010a; U.S. Fish and Wildlife Service [USFWS] 2010a). As a result, special status plant species have been eliminated from further discussion in this Environmental Impact Statement (EIS). State law under Nevada Revised Statute 527.060-527.120, regulates the commercial harvest, possession, transportation, and unlawful acts (removal, destruction, mutilation, or possession) of any cactus (*Cactaceae);* Christmas tree (i.e., evergreen trees); or member of the Yucca or Agave genera. These species may be present in the study area in low densities.

Special status species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed species that are protected under the Endangered Species Act (ESA), and species designated as sensitive by the BLM. In addition, there is a Nevada State protected animal list (Nevada Administrative Code 501.100-503.104) that the BLM has incorporated, in part, into its sensitive species list.

In accordance with the ESA, as amended, the lead agency (BLM) in coordination with the USFWS must ensure that any action that they authorize, fund, or carry out would not adversely affect a federally listed threatened or endangered species. In addition, as stated in Special Status Species Management Policy 6840 (6840 Policy) (Rel. 6-125), it also is BLM policy “to conserve and/or recover ESA-listed species and the ecosystems on which they depend so that ESA provisions are no longer needed for these species, and to initiate proactive conservation measures that reduce or eliminate threats to BLM sensitive species to minimize the likelihood of and need for listing of these species under the ESA.” The following discussion summarizes known data for the special status species identified for the proposed project by the applicable agencies.

A total of 46 special status species were identified as potentially occurring within the study area (Miller 2010, 2009; NNHP 2010a,b; USFWS 2010a). These species, their associated habitats, and their potential for occurrence within the study area are summarized in **Appendix B,** Special Status Species. Occurrence potential within the study area and CESAs was evaluated for each species based on their habitat requirements and/or known distribution. Based on these evaluations, 11 special status wildlife species have been eliminated from detailed analyses based on their habitat requirements and/or known distributions as discussed in **Appendix B,** Special Status Species. These species include the western

red bat, river otter, northern goshawk, peregrine falcon, least bittern, sandhill crane, black tern, black-rosy finch, Lahontan cutthroat trout, interior redband trout, and Mattoni's blue butterfly. The remaining 35 special status wildlife species identified as potentially occurring within the study area are described below.

3.18.1.1 Mammals

Special Status Bat Species

Federal and state sensitive bat species that have been identified as potentially occupying appropriate habitat types within or near the study area are presented in **Appendix B,** Special Status Species. Bat species that could occur within the study area include the pallid bat, Townsend's big-eared bat, big brown bat, silver-haired bat, hoary bat, California myotis, small-footed myotis, long-eared myotis, little brown myotis, long-legged myotis, Yuma myotis, western pipistrelle bat, and Brazilian free-tailed bat. Marginal roosting and suitable foraging habitat is present in portions of the study area (BLM 1993; Bradley et al. 2006). Additional roosting habitat within the vicinity of the study area includes forested habitat and rock outcrops. Piñon-juniper woodlands adjacent to the study area may provide roosting habitat for some bat species. Higher elevation forest habitats and cliffs are present east of the study area in the Tuscarora Range and may provide potential roosting habitat for area bats.

Pallid Bat

The pallid bat is a year-round resident in Nevada. Found primarily at low and mid elevations (1,300 to 8,400 feet above mean sea level [amsl]), this species occupies a variety of habitats such as piñon-juniper, blackbrush, cresote, sagebrush, and salt desert scrub (Bradley et al. 2006). This species feeds primarily on large ground-dwelling arthropods (e.g., scorpions, centipedes, grasshoppers), but also feeds on large moths (Bradley et al. 2006). The pallid bat is a colonial species, roosting in groups of up to 100 individuals (Arizona Game and Fish Department [AGFD] 1993). Roost sites consist of rock outcrops, mines, caves, hollow trees, buildings, and bridges (AGFD 1993; Bradley et al. 2006). The pallid bat is intolerant of roost sites in excess of 40 degrees Celsius (Bradley et al. 2006). This species has been documented southwest of the study area along Rock Creek and is likely to occur within the study area (Bradley et al. 2006). Based on its known range and the presence of suitable roosting and foraging habitat within the study area, the potential for this species to occur within the study area is considered high.

Townsend's Big-eared Bat

The Townsend's big-eared bat is a year-round resident found throughout Nevada from low desert to high elevation mountain habitats (690 to 11,400 feet amsl). This bat primarily occurs in piñon-juniper, mountain mahogany, white fir, blackbrush, sagebrush, salt desert scrub, agricultural lands, and urban habitats (Bradley et al. 2006). This species prefers caves, mines, and buildings that maintain stable temperatures and airflow for nursery colonies, bachelor roosts, and hibernacula. It does not make major migrations and appears to be relatively sedentary, not traveling far from summer foraging grounds to winter hibernation sites. Its distribution seems to be determined by suitable roost and hibernation sites, primarily caves and mines (Harvey et al. 1999). This bat is believed to feed entirely on moths, which are gleaned from foliage and other surfaces (Bradley et al. 2006; Harvey et al. 1999). This species has been documented southwest of the study area along Rock Creek and is likely to occur within the study area (Bradley et al. 2006). Based on its known range and the presence of suitable roosting and foraging habitat within the study area, the potential for this species to occur within the study area is considered high.

Big Brown Bat

The big brown bat is a year-round resident in Nevada. This species is found from low to high elevations (980 to 9,800 feet amsl) and occupies a variety of habitats including piñon-juniper, blackbrush, cresote,

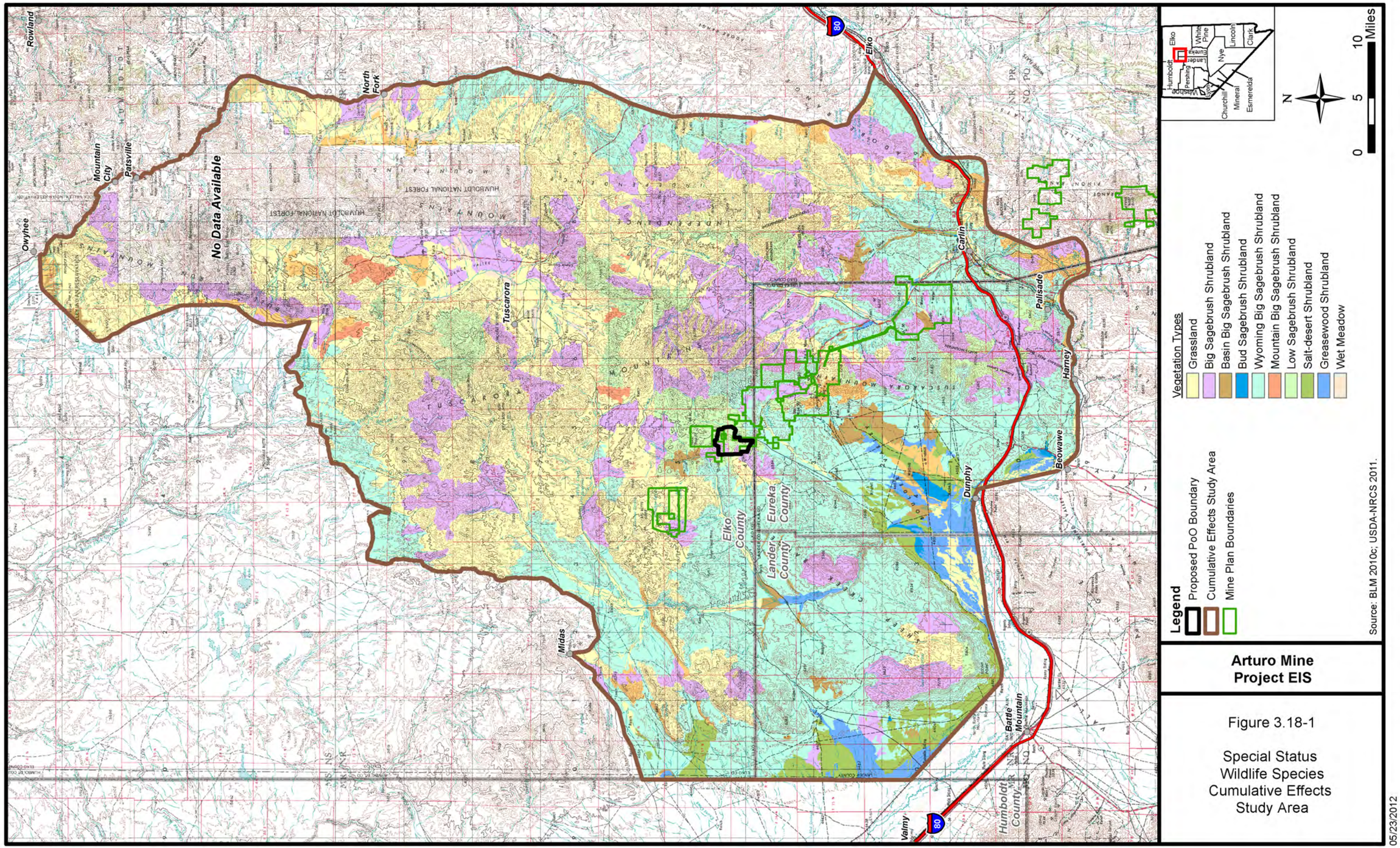
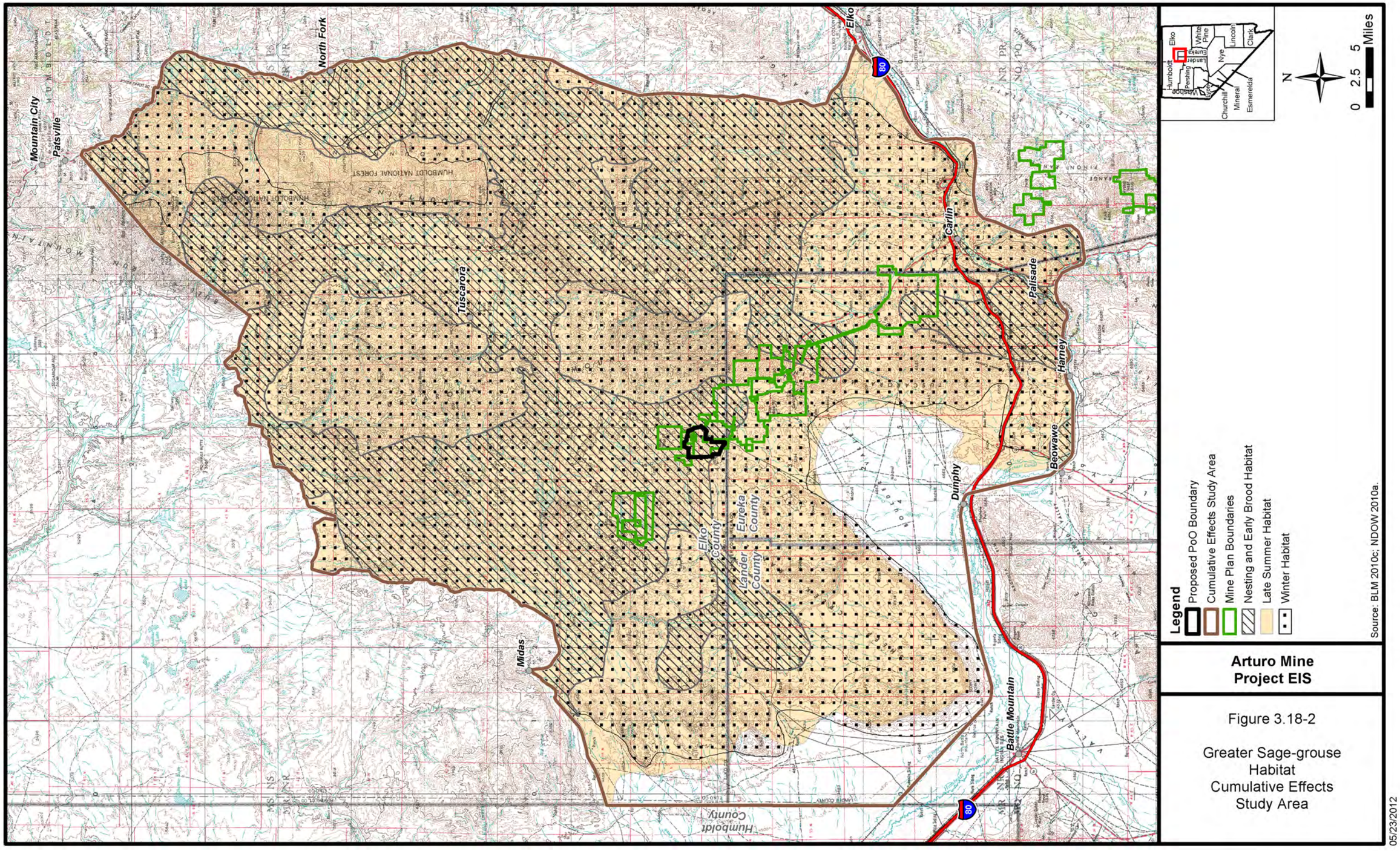


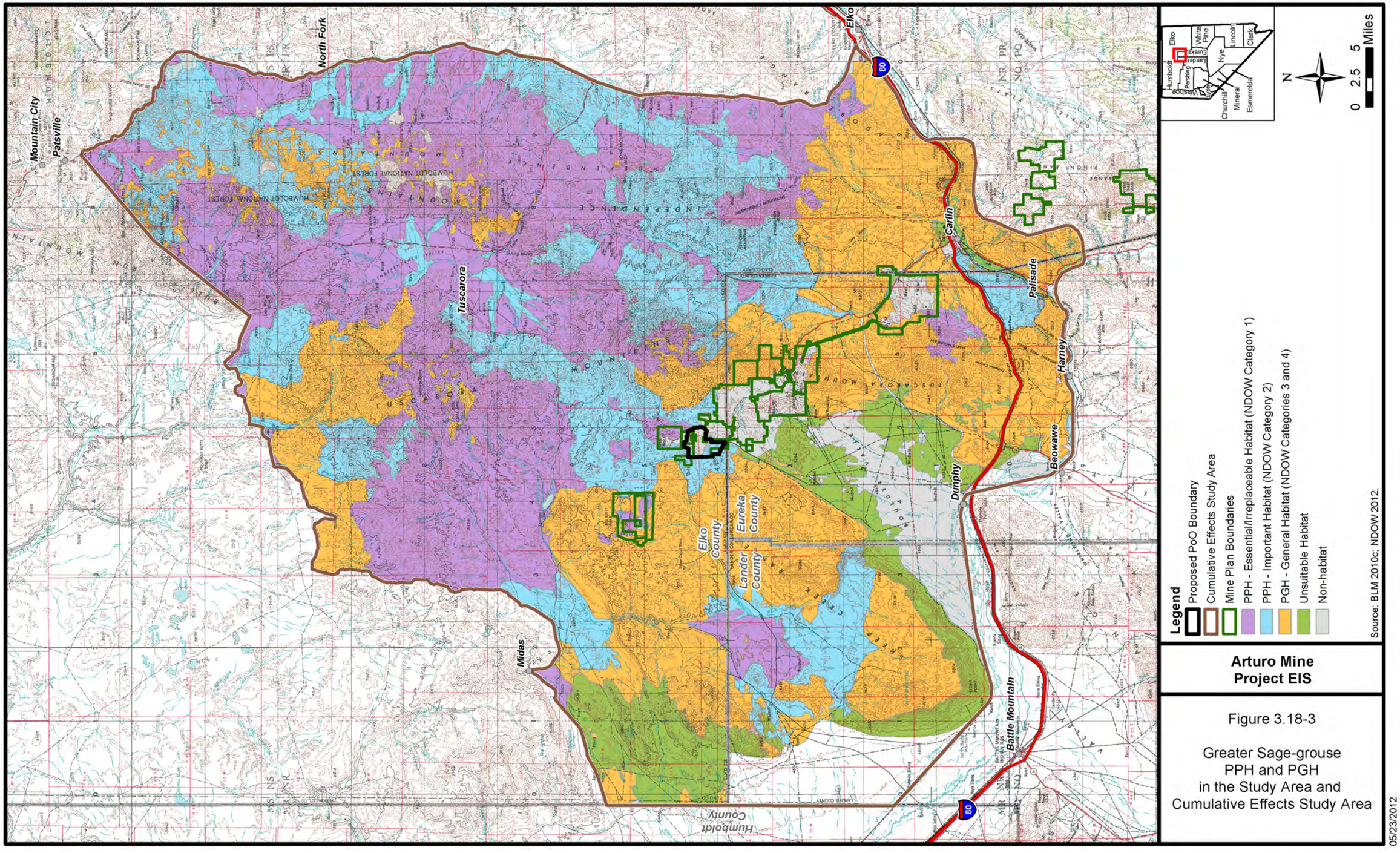
Figure 3.18-1

Special Status Wildlife Species Cumulative Effects Study Area

05/23/2012

2012

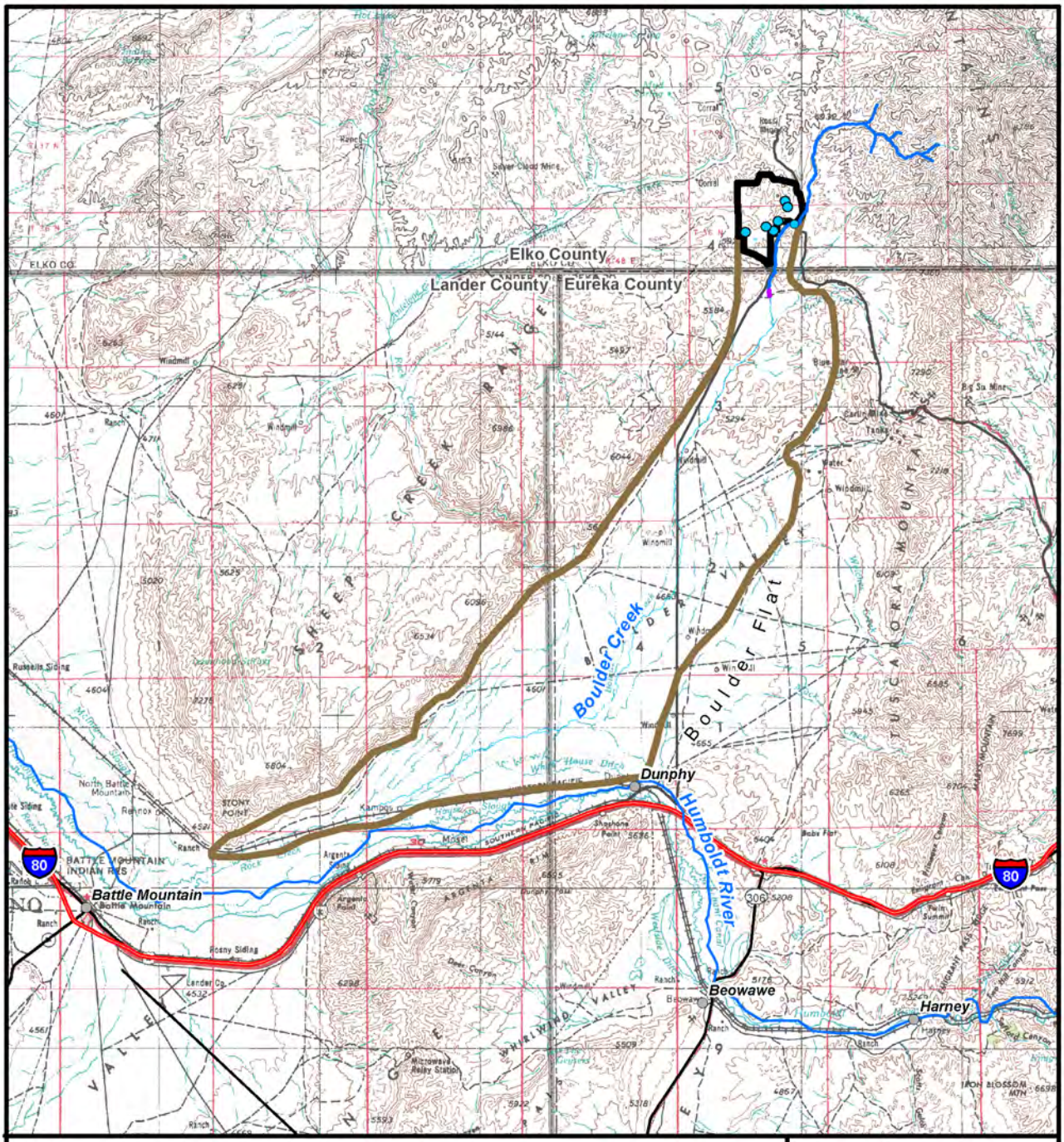

Elko
Mountain City
Patsville
North Fork
Tuscarora
Carlin
Palisade
Harney
Beowawe
Dunphy
Elko County
Eureka County
Lander County
Humboldt County
Midas
Battle Mountain
80
Humboldt
Elko
Lander
Eureka
White Pine
Lincoln
Clark
Nye
Pershing
Churchill
Mineral
Esmeralda
Legend
Proposed PoO Boundary
Cumulative Effects Study Area
Mine Plan Boundaries
Nesting and Early Brood Habitat
Late Summer Habitat
Winter Habitat
Source: BLM 2010c; NDOW 2010a.
N
0 2.5 5 Miles
Arturo Mine Project EIS
Figure 3.18-2
Greater Sage-grouse Habitat Cumulative Effects Study Area
05/23/2012



Arturo Mine Project EIS

Figure 3.18-3

Greater Sage-grouse PPH and PGH in the Study Area and Cumulative Effects Study Area



Legend

- Proposed PoO Boundary
- Cumulative Effects Study Area
- Wetlands Identified within the Study Area
- Perennial Stream Reach
- Discontinuous Flowing Stream Reach (interrupted flow that stops and starts)

N

0 2.5 5 Miles

Source: BLM 2010c; Cedar Creek Associates 2009; JBR 2012.

05/16/2012

Arturo Mine Project EIS

Figure 3.18-4

Special Status Aquatic Species Cumulative Effects Study Area

sagebrush, and salt desert scrub. This species gleans insects over water and open landscapes, as well as in both forested and edge settings. The big brown bat is a colonial species, roosting in groups up to several hundred. Roost sites include caves, mines, buildings, bridges, and trees. This species is known to be more tolerant of human habitation than other bat species (Bradley et al. 2006). This species has been documented northwest of the study area in the Santa Renia Mountains and is likely to occur within the study area (Bradley et al. 2006). Based on its known range and the presence of suitable roosting and foraging habitat within the study area, the potential for this species to occur within the study area is considered high.

Silver-haired Bat

The silver-haired bat is probably a transient spring and fall migrant that occupies low to mid elevations (1,500 to 8,200 feet amsl) in Nevada. This species inhabits coniferous and mixed deciduous/coniferous forests of piñon-juniper, subalpine fir, white fir, limber pine, aspen, cottonwood, and willow. This species gleans insects and moths in or near wooded areas and along edges of roads, streams, or waterbodies. This species roosts both singly or in small groups in hollow trees, rock crevices, mines, caves, and houses (Bradley et al. 2006). This species has not been documented in the project region. Based on occurrence records in Nevada and marginal roosting and foraging habitat within the study area, the potential for this species to occur within the study area is considered low.

Hoary Bat

The hoary bat is a summer resident in Nevada found at low to mid elevations (1,870 to 8,200 feet amsl) in forest habitats, including riparian and upland forests. This species also is found in valley basins containing pure stands of Rocky Mountain juniper as well as agricultural areas. The hoary bat forages primarily at high altitudes over the tree canopy and will follow watercourses for foraging and drinking. This species roosts in trees within foliage but may roost in caves and beneath rock ledges (Bradley et al. 2006). This species has not been documented in the project region. Based on occurrence records in Nevada and marginal roosting and foraging habitat within the study area, the potential for this species to occur within the study area is considered low.

California Myotis

The California myotis is a year-round resident found throughout Nevada at low and mid elevations (689 to 8,957 feet amsl). This species occurs in a variety of habitats from Lower Sonoran desert scrub to forests. The California myotis gleans insects above open habitat. This species typically roosts singly or in small groups, although some mines are known to shelter colonies of over 100 individuals. Roost sites include mines, caves, buildings, rock crevices, hollow trees, and under exfoliating bark. This species is known to forage throughout the winter (Bradley et al. 2006). This species has not been documented within the project region. However, based on the presence of suitable roosting and foraging habitat within the study area, the potential for this species to occur within the study area is considered moderate.

Small-footed Myotis

The small-footed myotis is found throughout Nevada from approximately 3,500 to 5,900 feet in elevation. This species inhabits a variety of habitats including desert scrub, grassland, sagebrush steppe, blackbrush, greasewood, piñon-juniper woodlands, pine-fir forests, agricultural lands, and urban areas. Day and maternity roosts have been found in crevices in cliffs, boulders, and on talus slopes (Bradley et al. 2006). Summer roosts are highly variable and include buildings, mines, under the bark on trees, and crevices in cliffs and boulders (AGFD 1993; Harvey et al. 1999). This species prefers small protected dry crevices. Night and hibernation roosts are located in small caves and abandoned mine adits. Buildings also are used as temporary night roosts between flights. This species forages for insects over the edge of rocky bluffs, in clearings, near rocks, and over forests (AGFD 1993; Bradley et al. 2006; Harvey et al. 1999). This species has been documented northwest of the study area in the Santa Renia Mountains and is likely to occur within the study area (Bradley et al. 2006). Based on its known range

and the presence of suitable roosting and foraging habitat within the study area, the potential for this species to occur within the study area is considered high.

Long-eared Myotis

The long-eared myotis is found throughout Nevada from approximately 2,260 to 6,790 feet in elevation but primarily is found at higher elevations. The long-eared myotis primarily is associated with coniferous forests, including piñon-juniper woodlands, but it also utilizes sagebrush and desert scrub habitats. Day roosts include hollow trees; under loose tree bark; crevices in rock cliffs and fissures in the ground; and occasionally in caves, abandoned mines, and buildings. Night roosts primarily occur in caves, mines, and abandoned buildings (AGFD 1993; Bradley et al. 2006; Harvey et al. 1999). This species is known to roost singly or in small groups. This species gleans insects (primarily small moths) over vegetation and open water (e.g., rivers, streams, and ponds) (Bradley et al. 2006). This species has been documented northwest of the study area in the Santa Renia Mountains and is likely to occur within the study area (Bradley et al. 2006). Based on its known range and the presence of suitable roosting and foraging habitat within the study area, the potential for this species to occur within the study area is considered high.

Little Brown Myotis

The little brown myotis is probably a year-round resident found primarily in the northern parts of Nevada at higher elevations. This species is often associated with coniferous forests. Foraging occurs in open areas among vegetation, along water margins, and above open water. Roost sites include hollow trees, rocky outcrops, buildings, and occasionally mines and caves (Bradley et al. 2006). This species has not been documented in the project region. Based on occurrence records in Nevada and marginal foraging habitat within the study area, the potential for this species to occur within the study area is considered low.

Long-legged Myotis

The long-legged myotis occupies piñon-juniper and montane coniferous forest habitats from approximately 3,050 to 11,220 feet in elevation in Nevada. Individuals typically day roost singly or in small groups in buildings, rock crevices, caves, abandoned mines, or in hollow trees, particularly large diameter snags or live trees within lightning scars (AGFD 1993; Bradley et al. 2006; Harvey et al. 1999). Night roosts and hibernacula are often in caves and mines. Foraging typically occurs in open areas, often at canopy height (Bradley et al. 2006). This species has been documented northwest of the study area in the Santa Renia Mountains and is likely to occur within the study area (Bradley et al. 2006). Based on its known range and the presence of suitable roosting and foraging habitat within the study area, the potential for this species to occur within the study area is considered high.

Yuma Myotis

The Yuma myotis is a year-round resident found primarily in the southern and western half of Nevada at low to mid elevations (1,476 to 7,677 feet amsl). This species occurs in a wide variety of habitats, including sagebrush, salt desert scrub, agriculture, playa, and riparian habitats. This species gleans aquatic insects over open water and above vegetation. Roost sites include buildings, trees, mines, caves, bridges, and rock crevices. Night roosts are usually associated with buildings, bridges, or other man-made structures (Bradley et al. 2006). This species has been documented east of the study area in the Tuscarora Mountains and is likely to occur within the study area (Bradley et al. 2006). Based on its known range and the presence of suitable roosting and foraging habitat within the study area, the potential for this species to occur within the study area is considered high.

Western Pipistrelle Bat

The western pipistrelle is a year-round resident in Nevada, occupying low and mid elevations (680 to 8,200 feet amsl) in desert habitats of blackbrush, creosote, salt desert scrub, and sagebrush, with

occasional occurrence in ponderosa pine and piñon-juniper, usually in association with rock features such as granite boulders and canyons. This species gleans insects over open habitats. This species roosts both singly or in small groups in mines, caves, or occasionally in buildings and vegetation. This species has been documented southwest of the study area along Rock Creek and is likely to occur within the study area (BLM 2008b; Bradley et al. 2006). Based on its known range and the presence of suitable roosting and foraging habitat within the study area, the potential for this species to occur within the study area is considered high.

Brazilian Free-tailed Bat

The Brazilian free-tailed bat is found throughout Nevada in a wide variety of habitats ranging from desert scrub to high elevation mountain habitats (680 to 8,200 feet amsl). This species roosts in a variety of structures including cliff faces, caves, mines, buildings, bridges, and hollow trees. Some caves are used as long-term transient stopover roosts during migration. The Brazilian free-tailed bat is known to travel long distances to foraging areas and often forages at high altitudes. This species has not been documented within the project region. The nearest record is approximately 25 miles southeast of the study area along the Humboldt River near Elko, Nevada (Bradley et al. 2006). Based on the presence of suitable foraging habitat within the study area, the potential for this species to occur within the study area is considered moderate.

Preble's Shrew

The Preble's shrew is found in a wide variety of habitats in Nevada including arid grasslands and shrublands, wetland and forest edges, and alpine tundra. This species is active year-round and may be active at any time throughout the day or night, but is probably most active during morning and evening hours (Wildlife Action Plan Team 2006). This species most likely resembles other shrews, feeding primarily on insects and other small invertebrates such as worms, mollusks, and centipedes (Wildlife Action Plan Team 2006). The Preble's shrew has been documented approximately 25 miles northeast of the study area near Sheep Creek and suitable habitat occurs within the study area (Ports and George 1990). The potential for this species to occur within the study area is considered high.

Fletcher Dark Kangaroo Mouse

This species is found throughout Nevada in a wide variety of habitats including intermountain desert scrub, sagebrush grasslands, badlands, desert playas, and ephemeral pools. This species' primary food source is seeds, but it also may eat insects. It does not appear to utilize free water and is believed to store food in seed caches within burrow systems. Activity for this species has been observed from March through October, with peak nocturnal activity occurring in the first 2 hours after sunset (Wildlife Action Plan Team 2006). This species has been recorded in Elko County approximately 55 miles east of the study area near Halleck, Nevada (O'Farrell and Blaustein 1974). Based on the presence of suitable habitat within the study area, the potential for this species to occur within the study area is considered high.

Pygmy Rabbit

The pygmy rabbit is distributed throughout the northern Great Basin, primarily in habitats dominated by dense stands of big sagebrush and rabbitbrush. This species is most abundant in areas with suitable soils (e.g., high clay content) for burrowing. Pygmy rabbits usually remain near dense cover, where they excavate burrows and create trail systems in the understory. Sagebrush is important forage for this rabbit and is consumed year-round (BLM 2004b). This species has been recorded within 5 miles of the study area and suitable sagebrush habitat occurs in portions of the study area (Great Basin Ecology 2009; Miller 2009). The potential for this species to occur within the study area is considered high.

3.18.1.2 Birds

Bald Eagle

The bald eagle is found throughout Nevada, but mainly as a migrant and winter resident (Floyd et al. 2007; Herron et al. 1985). This species generally roosts in close proximity to large water bodies including rivers, lakes, and reservoirs (Johnsgard 1990; Wildlife Action Plan Team 2006). Nests are typically large stick nests located in large trees such as cottonwoods. Bald eagles typically begin nesting in February and young fledge by July (Herron et al. 1985). This species has been documented within the project region and during winter surveys within the sub-basins of Rock, Boulder, and Maggie creeks (BLM 2008b). However, due to the lack of suitable habitat (i.e., large trees near waterbodies) within the study area, occurrences would be limited to migrating and foraging individuals. Therefore, the potential for this species to occur within the study area is considered moderate.

Swainson's Hawk

The Swainson's hawk is a summer resident of Nevada and is most abundant in the northern third of the state (Floyd et al. 2007; Herron et al. 1985). The majority of documented breeding territories in Nevada have been located in agricultural valleys. This species nests in a wide variety of vegetative communities from 4,000 to 6,500 feet in elevation. Nest sites primarily are found in deciduous trees; however, nests also have been documented in other vegetation types such as buffaloberry, serviceberry, and sagebrush. Swainson's hawks begin nesting in April and young typically fledge by July (Herron et al. 1985; Johnsgard 1990). This species is known to nest south of the study area along the Humboldt River (Herron et al. 1985). No nest sites have been documented within the study area. However, based on the presence of suitable foraging habitat within the study area, the potential for this species to occur within the study area is considered high.

Ferruginous Hawk

The ferruginous hawk is a common breeder in many areas of Nevada, particularly the central and east-central portions of the state (Floyd et al. 2007; Herron et al. 1985). This species often nests in trees, on promontory points, rocky outcrops, cut banks, or on the ground. Preferred breeding habitat in most of the state is scattered juniper forests at the interface between piñon-juniper and desert shrub communities that overlook broad valleys used for foraging. Ferruginous hawks begin nesting in March and young fledge by July (Herron et al. 1985; Johnsgard 1990). No nest sites have been documented within the study area. However, based on the presence of suitable nesting and foraging habitat within the study area, the potential for this species to occur within the study area is considered high.

Golden Eagle

The golden eagle is a yearlong resident and is considered to be a common breeder throughout Nevada; however, eagle densities and nesting activity are greatest in the northern third of Nevada (Floyd et al. 2007; Herron et al. 1985). Nesting golden eagles prefer suitable cliffs that overlook sagebrush flats, piñon-juniper forests, salt desert shrub, or other habitat capable of supporting a suitable prey base. The highest densities of nesting eagles typically are found along river systems where cliffs border the entire length of the river, and lower densities are found in piñon-juniper habitat and salt desert shrub communities. Golden eagles begin nesting in March and young fledge by July. Wintering golden eagles tend to congregate in broad valleys interspersed with agricultural croplands or sagebrush and desert shrub communities (Herron et al. 1985; Johnsgard 1990). No nest sites have been observed within the study area. However, this species has been observed in the project region (BLM 2008b). Based on the presence of suitable foraging habitat within the study area, the potential for this species to occur within the study area is considered high.

Prairie Falcon

Prairie falcons range throughout the Great Basin and are permanent residents of Nevada. Habitat requirements include steep cliff ledges and outcrops for nesting that border semi-arid valleys. The

highest nesting densities in Nevada occur in northern counties, particularly located in or near the mouth of narrow canyons, overlooking riparian vegetation and agricultural lands. Prairie falcons begin nesting in March and young typically fledge by July (Floyd et al. 2007; Herron et al. 1985; Johnsgard 1990). The nearest known prairie falcon nest occurs approximately 7 miles north of the study area (Miller 2009). However, based on the presence of suitable foraging habitat within the study area, the potential for this species to occur within the study area is considered high.

Greater Sage-grouse

The greater sage-grouse is found throughout Nevada in sagebrush dominated habitats (Floyd et al. 2007). Sagebrush is a key component of greater sage-grouse habitat on a yearlong basis. Sagebrush provides forage and nesting, security, and thermal cover for this species. Moist areas that provide succulent herbaceous vegetation during the summer months are used extensively as brood rearing habitat. Open, often elevated areas within sagebrush habitats usually serve as breeding areas (strutting grounds or lek sites). In Nevada, greater sage-grouse males begin displaying on leks in March and hens typically begin nesting in April and May. During winter, greater sage-grouse often occupy wind exposed areas where sagebrush is available (e.g., drainages, southern or western slopes, or exposed ridges) (Connelly et al. 2000; Floyd et al. 2007; Neel 1999; Wildlife Action Plan Team 2006). Based on Nevada Department of Wildlife (NDOW) records, the closest active greater sage-grouse lek occurs approximately 3.5 miles north of the study area (Miller 2009). While no leks occur within the study area, greater sage-grouse nesting, summer, and winter habitat is found throughout the study area (**Figure 3.18-5**). Approximately 1,809 acres of undisturbed (i.e., unburned) nesting, early brood, and late summer and winter habitat occur within the study area.

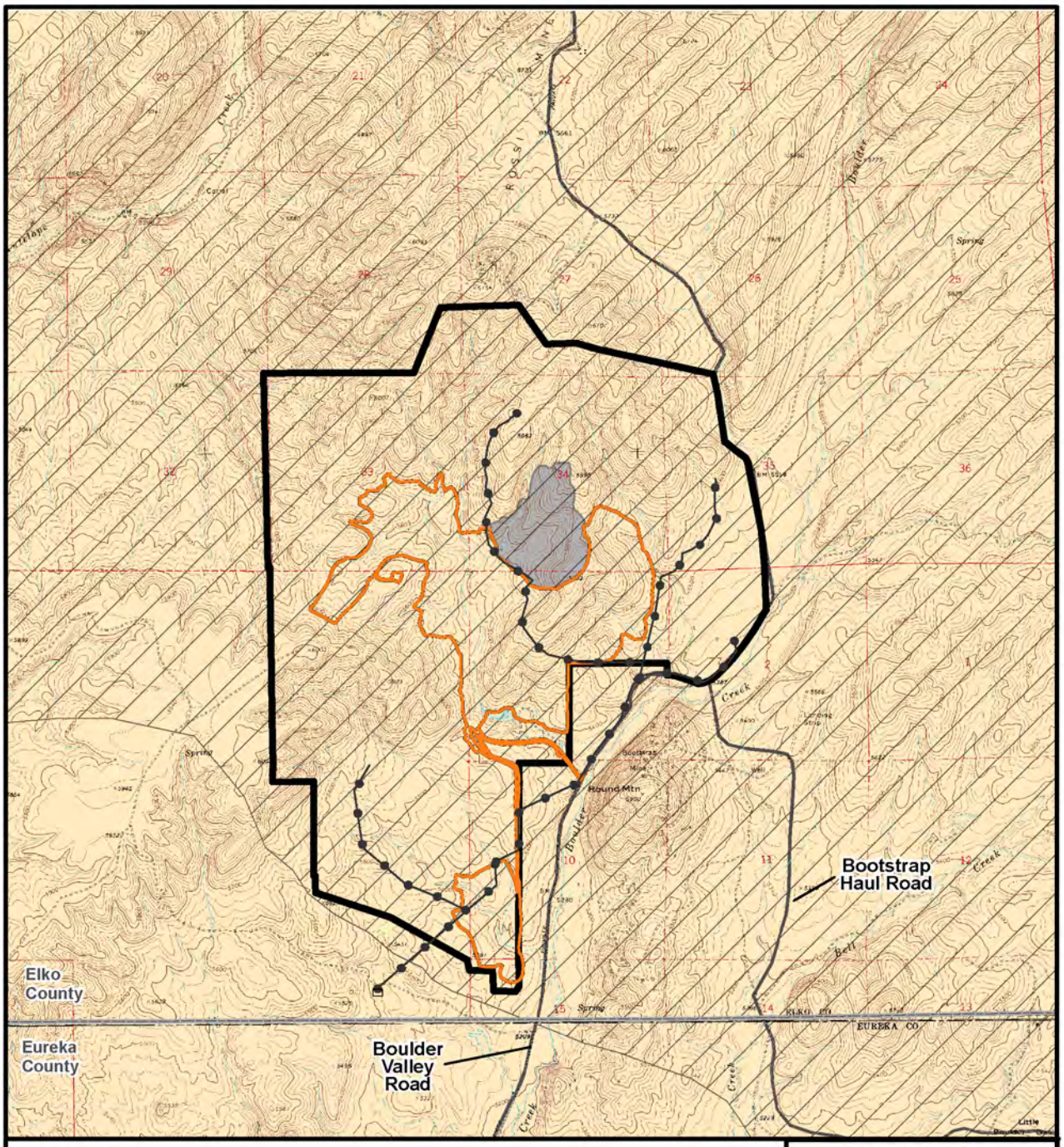
In addition to the NDOW designated habitat categories described above, the BLM has recently issued additional guidance on greater sage-grouse management. According to BLM Instruction Memorandum 2012-043, two habitat categories have been developed by the BLM and NDOW to help apply management guidelines designed to protect greater sage-grouse habitat. These habitat types are referred to as PPH and PGH. PPH comprises areas that have been identified as having the highest conservation value to maintaining sustainable greater sage-grouse populations. PPH comprises essential/irreplaceable habitat and important habitat (NDOW Categories 1 and 2) (note: these characterizations are preliminary and subject to change). PPH includes breeding, late-brood rearing, and winter concentration areas. Approximately 1,516 acres of PPH - important habitat occurs within the study area (**Figure 3.18-6**). PGH comprises habitat of moderate importance, low value habitat, or transitional habitat outside of priority habitat (NDOW Categories 3 and 4) (note: these characterizations are preliminary and subject to change). PGH does not occur within the study area. Due to the presence of suitable habitats, this species may occur occasionally within the study area. Therefore, the potential for this species to occur within the study area is considered moderate.

Long-billed Curlew

The long-billed curlew is known to breed at Sheldon National Wildlife Refuge in northern Washoe County, Ruby Lake National Wildlife Refuge in Elko County, Lahontan Valley in Churchill County, and Fish Creek Ranch in Eureka County. This species prefers short grasslands, wet meadows, wetlands, and marshes (Floyd et al. 2007; Wildlife Action Plan Team 2006). The breeding season for this species is April 15 to July 15. Limited habitat occurs within the study area but this species was observed in the study area in the spring of 2011. Therefore, the potential for this species to occur within the study area is considered high.

Western Yellow-billed Cuckoo

The western yellow-billed cuckoo is known from only a few locations in Nevada. This species has undergone dramatic population declines throughout western North America due to a loss of native riparian habitats. The yellow-billed cuckoo preferred habitat is old-growth riparian woodlands with a dense understory component (Floyd et al. 2007; Neel 1999; Wildlife Action Plan Team 2006). The



Legend

- Proposed PoO Boundary
- Proposed Power Transmission Line
- Nesting and Early Brood Habitat
- Late Summer and Winter Habitat
- Existing Reclaimed Disturbance
- Non-suitable Habitat

N

0 0.25 0.5 Miles

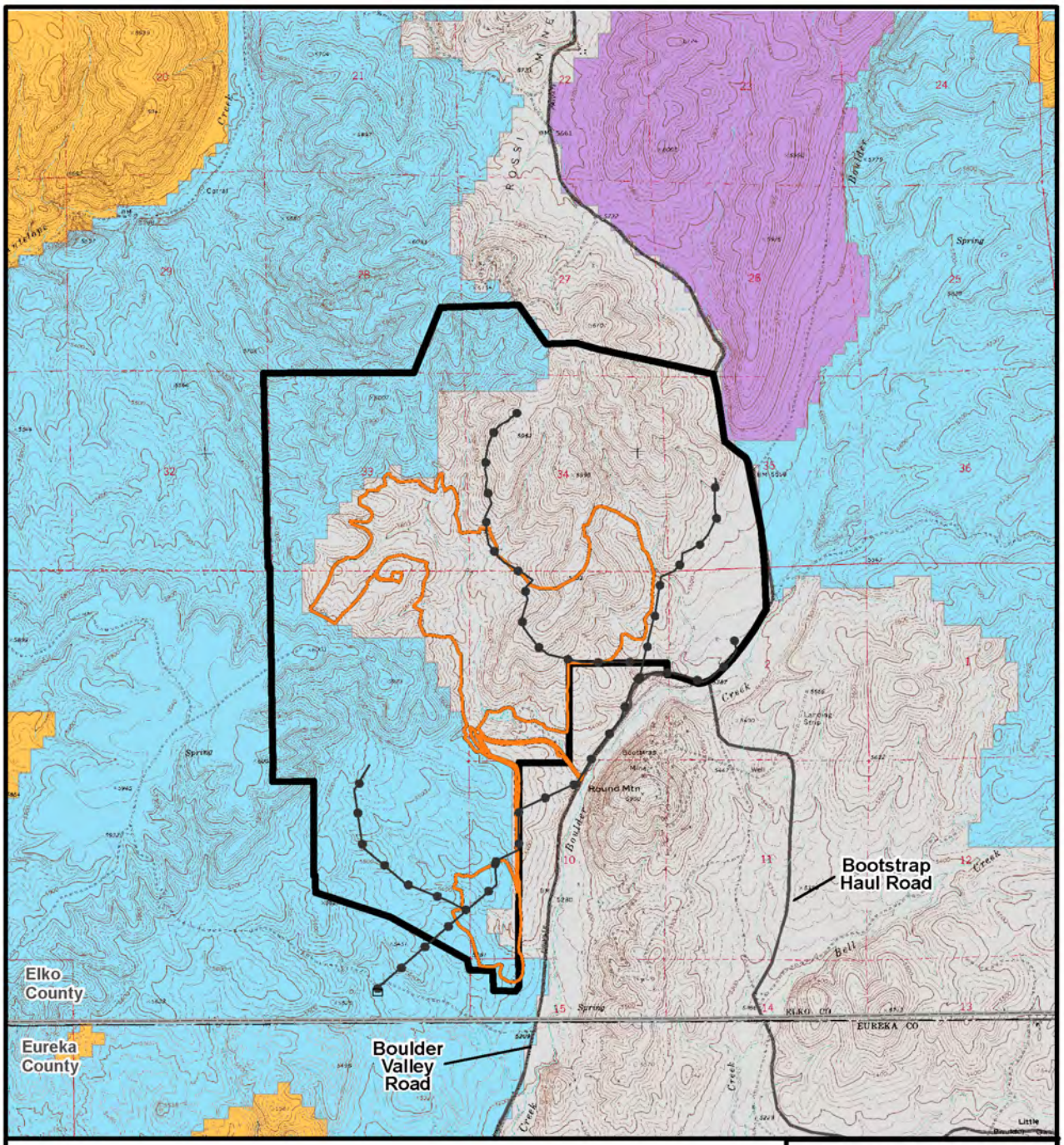
Source: NDOW 2010a.

Arturo Mine Project EIS

Figure 3.18-5

Greater Sage-grouse Habitat in the Study Area

05/24/2012



Legend

- Proposed PoO Boundary
- Proposed Power Transmission Line
- Existing Reclaimed Disturbance
- PPH - Essential/Irreplaceable Habitat (NDOW Category 1)
- PPH - Important Habitat (NDOW Category 2)
- PGH - General Habitat (NDOW Categories 3 and 4)
- Non-habitat

N

0 0.25 0.5 Miles

Source: NDOW 2012.

Arturo Mine Project EIS

Figure 3.18-6

Greater Sage-grouse PPH and PGH in the Study Area

05/17/2012

breeding season for this species is April 15 to July 15. Occurrence records are limited for Nevada and are mainly concentrated in the southern portion of the state in the Pahranagat Valley and along the Virgin River (Floyd et al. 2007). Due to marginal habitat occurring within the study area, the potential for this species to occur within the study area is considered low.

Western Burrowing Owl

The burrowing owl is known to breed throughout Nevada. The majority of the breeding population is known to migrate from northern Nevada to southern California and Mexico during the winter months. However, observations of this owl have been recorded in Nevada year-round (Floyd et al. 2007; Herron et al. 1985). Breeding is strongly dependent on the presence of burrows constructed by prairie dogs, ground squirrels, or badgers. Prime burrowing owl habitat must be open, have short vegetation, and contain an abundance of burrows. Burrowing owls begin nesting in April and young typically fledge by August (Floyd et al. 2007; Herron et al. 1985; Neel 1999). This species has been observed nesting in the vicinity of the study area along Boulder Creek (BLM 2008b; Great Basin Ecology 2009) and suitable nesting habitat occurs within the study area. Based on the presence of suitable nesting and foraging habitat within the study area, the potential for this species to occur within the study area is considered high.

Long-eared Owl

Long-eared owls occur within piñon-juniper woodlands, coniferous forests, and riparian areas at higher elevations. The majority of Nevada's population of long-eared owls is considered non-migratory, although individuals occurring outside of Nevada have been known to winter in Nevada. Long-eared owls begin nesting in February and young typically fledge by July (Floyd et al. 2007; Herron et al. 1985; Neel 1999). This species has been documented southwest of the study area in Boulder Valley (BLM 2008b). Suitable foraging habitat occurs within the study area. However, due to a lack of roosting and nesting habitat, the potential for this species to occur within the study area is considered low.

Short-eared Owl

Short-eared owls are year-round residents of Nevada, although few nest sites have been identified (Floyd et al. 2007; Herron et al. 1985). The species tend to nest in meadow and wetland habitats. Short-eared owls forage in open areas and are known to nest and roost on the ground. This species begins nesting in February and young typically fledge by July (Herron et al. 1985). Based on the presence of suitable nesting and foraging habitat occurs within the study area, the potential for this species to occur within the study area is considered high.

Lewis's Woodpecker

The Lewis's woodpecker breeds in isolated pockets in the northern half of Nevada. This species is found in open forest habitats such as ponderosa pine forests, burned-over Douglas fir forests, piñon-juniper woodlands, oak woodlands, and riparian areas. Nesting habitat consists of these habitats with a grassy or brushy understory (Floyd et al. 2007; Neel 1999; Wildlife Action Plan Team 2006). The breeding season for this species is April 15 to July 15. Based on the lack of suitable foraging and breeding habitat within the study area, the potential for this species to occur within the study area is considered low.

Pinyon Jay

The pinyon jay occurs throughout the western United States and is a permanent resident of Nevada. This species is strongly associated with piñon-juniper forest habitats and can be found along the piñon-juniper belt extending from the Humboldt River south to the Mojave Desert. Pinyon jays are semi colonial nesters and occur in large groups where food is abundant (Floyd et al. 2007; Neel 1999; Wildlife Action Plan Team 2006). The breeding season for this species is April 15 to July 15. Based on the lack of suitable foraging and breeding habitat within the study area, the potential for this species to occur within the study area is considered low.

Juniper Titmouse

The juniper titmouse is a year-round resident that is strongly associated with piñon-juniper woodlands. This species occurs along the piñon-juniper belt through Nevada, ranging from 4,500 to 7,500 feet in elevation. Dense foliage and closed canopies are preferred, while thin understory and ground cover are preferred for some feeding activities. This species often nests in cavities in riparian vegetation juxtaposed to piñon-juniper. As a result, the juniper titmouse tends to frequent the interface between piñon-juniper and riparian habitats (Floyd et al. 2007; Neel 1999; Wildlife Action Plan Team 2006). The breeding season for this species is April 15 to July 15. Based on the lack of suitable foraging and breeding habitat within the study area, the potential for this species to occur within the study area is considered low.

Loggerhead Shrike

The loggerhead shrike is a common resident throughout Nevada. This species is found in open grasslands along valley floors and the foothills of the Great Basin. In Nevada, it is commonly found in scrub habitat types such as sagebrush and greasewood. Loggerhead shrikes prefer shrubs or small trees for nesting, but nesting also can occur in piñon-juniper woodlands. This species can be found perching on wire, fences, or poles (Floyd et al. 2007; Neel 1999; Wildlife Action Plan Team 2006). The breeding season for this species is April 15 to July 15. Based on the presence of suitable nesting and foraging habitat within the study area, the potential for this species to occur within the study area is considered high.

Yellow-breasted Chat

The yellow-breasted chat is found throughout Nevada, although it is more common in the eastern portion of the state. This species is found in cottonwood, willow, riparian, and other woodland habitats with dense understories (Floyd et al. 2007; Neel 1999; Wildlife Action Plan Team 2006). The breeding season for this species is April 15 to July 15. Due to marginal habitat occurring within the study area, the potential for this species to occur within the study area is considered low.

Vesper Sparrow

The vesper sparrow is a summer resident that occurs in various open shrub habitats from high elevation valleys to higher mountain slopes and basins. This species occurs from approximately 5,500 feet in elevation in the foothills of northern Nevada to approximately 9,000 feet in elevation in surrounding mountain ranges. Open areas with a scattered canopy of big sagebrush and a minimum ground cover of 20 percent grasses, forbs, and young shrubs appear to be the preferred nesting habitat for this species. Nests are typically placed on the ground under or near shrubs (Floyd et al. 2007; Neel 1999; Wildlife Action Plan Team 2006). The breeding season for this species is April 15 to July 15. Based on the presence of suitable nesting and foraging habitat within the study area, the potential for this species to occur within the study area is considered high.

3.18.1.3 Amphibians

Columbia Spotted Frog

The Columbia spotted frog occurs primarily in central Nevada (Nye County) and northeast Nevada (Elko and Eureka counties), usually at elevations between 5,600 and 8,700 feet. This species prefers quiet aquatic habitats including perennial streams, ponds, springs, lakes, and marshes. The Columbia spotted frog may travel to uplands during wet weather, expanding localized populations. Females begin laying eggs in late April and May and tadpoles emerge by August (USFWS 2010b). Known populations of Columbia spotted frogs exist in the Independence Range approximately 15 miles east of the study area. This species has not been recorded within the study area; however, marginal habitat occurs within the study area in mapped wetlands (Cedar Creek Associates, Inc. [Cedar Creek] 2009) and along Boulder Creek. Based on the presence of marginal habitat within the study area, the potential for this species to occur within the study area is considered low.

Northern Leopard Frog

The northern leopard frog is broadly distributed in limited and isolated habitats from eastern Nevada to northern and western Nevada. Most Nevada populations are highly localized and isolated from one another (NatureServe 2010; Wildlife Action Plan Team 2006). This species inhabits permanent water with rooted aquatic vegetation such as springs, slow streams, marshes, bogs, ponds, canals, flood plains, reservoirs, and lakes. In summer, it commonly inhabits wet meadows and fields and takes cover underwater, in damp niches, or in caves when inactive. Eggs are laid and larvae develop in shallow, still, permanent water (typically), generally in areas well exposed to sunlight. Eggs are typically attached to vegetation just below the surface of the water. Females begin laying eggs in late April and May and tadpoles emerge by August (NatureServe 2010; Wildlife Action Plan Team 2006). This species has not been recorded within the study area; however, marginal habitat occurs within the study area in mapped wetlands (Cedar Creek 2009) and along Boulder Creek. Based on the presence of marginal habitat, the potential for this species to occur within the study area is considered low.

3.18.2 Environmental Consequences

Primary issues related to special status species would include the loss or alteration of native habitats, increased habitat fragmentation, animal displacement, and direct loss of wildlife. Potential impacts for 35 status species identified as potentially occurring within the study area are discussed below.

3.18.2.1 Proposed Action

Surface Disturbance

The proposed project would result in the long-term reduction of approximately 2,505 acres of wildlife habitat, including approximately 1,960 acres of sagebrush shrubland, 543 acres of grassland, and approximately 2 acres of riparian areas and herbaceous wetland. Woody species such as sagebrush would require up to 25 years to reach maturity. The disturbance associated with the proposed project would be reclaimed following completion of mining activities with the exception of 278 acres associated with the open pit expansion.

Similar to impacts discussed in Section 3.17, Wildlife and Aquatic Biological Resources, impacts to special status species from mine-related surface disturbance would include the short-term (temporary) and long-term reduction or loss of habitat. Habitat loss or alteration would result in direct losses of smaller, less mobile species of wildlife, such as small mammals, and the displacement of more mobile species into adjacent habitats. In areas where habitats are at, or near, carrying capacity, animal displacement could result in some unquantifiable reductions in local wildlife populations. Mine-related surface disturbance also would result in an incremental increase in habitat fragmentation at the mine site until vegetation has been re-established. It is anticipated that the potential mine-related displacement and habitat fragmentation impacts would be highest for special status species that may use the riparian corridors along Boulder Creek.

Mammals

Bats

Of the 13 bat species that could occur in the study area, eight (pallid bat, Townsend's big-eared bat, big brown bat, small-footed myotis, long-eared myotis, long-legged myotis, Yuma myotis, and western pipistrelle bat) have been documented within the project region (BLM 2008b; Bradley et al. 2006). Implementation of the proposed project could result in direct and indirect impacts to local bat species and their habitat. Direct impacts would include the long-term disturbance of foraging habitat, including approximately 1,960 acres of sagebrush shrublands, 543 acres of grassland habitat, and approximately 2 acres of herbaceous wetland from the development of the proposed project. Indirect impacts associated with mine-related noise and human presence currently occur at the site and would increase

under the proposed project. However, due to the lack of roosting habitat within the study area, project construction would not result in population-level impacts to sensitive bat species.

Preble's Shrew

Implementation of the proposed project would result in the long-term reduction of approximately 2,505 acres of potentially suitable habitat for this species, until reclamation was completed and vegetation re-established. This impact would be considered negligible considering the large amount of suitable habitat located in the project region. Indirect impacts associated with mine-related noise and human presence currently occurs at the site and would increase under the proposed project. However, project construction could result in the direct mortalities of individual shrews, if present. The loss of individual Preble's shrews would not result in population-level impacts.

Fletcher Dark Kangaroo Mouse

Implementation of the proposed project would result in the long-term reduction of approximately 2,505 acres of potentially suitable habitat for this species, until reclamation was completed and vegetation re-established. This impact would be considered low, considering the large amount of suitable habitat located in the project region. Indirect impacts associated with mine-related noise and human presence currently occur at the site and would increase under the proposed project. However, project construction could result in the direct mortalities of individual mice, if present. The loss of individual Fletcher dark kangaroo mice would not result in population-level impacts.

Pygmy Rabbit

Implementation of the proposed project would result in the long-term reduction of approximately 1,960 acres of potentially suitable sagebrush habitat (big sagebrush-dominated habitats) for this species, until reclamation was completed and vegetation re-established. Indirect impacts associated with mine-related noise and human presence currently occur at the site and would increase under the proposed project. These impacts would be considered moderate, considering the extent of potentially suitable habitat (mature sagebrush) located in the project region. However, project construction could result in the direct mortalities of individual rabbits, if present. The loss of individual pygmy rabbits (a game species in Nevada) would not result in population-level impacts.

Birds

Based on implementation of applicant-committed environmental protection measures, no adverse impacts to sensitive raptors and migratory bird species have been identified in association with the construction and operation of the proposed project. Other potential species-specific impacts are discussed below.

Bald Eagle

No bald eagle nests occur within the study area. Occurrence by this species would be limited to migrating and dispersing individuals. Direct impacts would include the long-term reduction of approximately 2,505 acres of potential foraging habitat, until reclamation was completed and vegetation re-established. Indirect impacts associated with mine-related noise and human presence currently occur at the site and would increase under the proposed project. Based on implementation of Barrick Dee Mining Venture (BDMV's) committed environmental protection measures, the lack of existing nest sites within the study area, and the existing level of activity at the mine site, potential impacts to this species as a result of the proposed project would be considered low.

Swainson's Hawk

No Swainson's hawk nests have been identified in the study area. In addition, no suitable nesting habitat occurs within the study area. Direct impacts would include the long-term reduction of approximately 2,505 acres of potential foraging habitat, until reclamation was completed and vegetation re-established. However, this impact would be considered negligible based on the overall availability of suitable foraging habitat in the vicinity of the study area. Indirect impacts associated with mine-related noise and human presence currently occur at the site and would increase under the proposed project. Based on implementation of applicant-committed environmental protection measures, the lack of existing nest sites within the project vicinity, and the existing level of activity at the mine site, potential impacts to this species as a result of the proposed project would be considered low.

Ferruginous Hawk

No ferruginous hawk nests have been identified in the study area. Direct impacts would include the long-term reduction of approximately 2,505 acres of potential foraging habitat, until reclamation was completed and vegetation was re-established. However, this impact would be considered negligible based on the overall availability of suitable foraging habitat in the vicinity of the study area. Indirect impacts associated with mine-related noise and human presence currently occur at the site and would increase under the proposed project. Based on implementation of applicant-committed environmental protection measures, the lack of existing nest sites within the project vicinity, and the existing level of activity at the mine site, potential impacts to this species as a result of the proposed project would be considered low.

Golden Eagle

No golden eagle nests have been identified within the study area. Direct impacts would include the long-term reduction of approximately 2,505 acres of potential foraging habitat, until reclamation was completed and vegetation was re-established. Indirect impacts associated with mine-related noise and human presence currently occur at the site and would increase under the proposed project. Based on implementation of applicant-committed environmental protection measures, the lack of active nest sites within the study area, and the existing level of activity at the mine site, potential impacts to this species as a result of the proposed project would be considered low.

Prairie Falcon

The nearest documented prairie falcon nest is approximately 7 miles north of the study area. Direct impacts to prairie falcons would include the long-term reduction of approximately 2,505 acres of potential foraging habitat, until reclamation was completed and vegetation re-established. Indirect impacts associated with mine-related noise and human presence currently occur at the site and would increase under the proposed project. Based on the implementation of applicant-committed environmental protection measures, the lack of active nest sites within the study area, and the existing level of activity at the mine site, potential impacts to this species as a result of the proposed project would be considered low.

Greater Sage-grouse

The nearest active lek site occurs approximately 3.5 miles north of the study area. As a result, no direct impacts to breeding greater sage-grouse (or leks) would be anticipated from the proposed project. Potential impacts are anticipated to occur as a result of disturbance to sagebrush habitat within the study area in association with the development of the proposed project. Potential direct impacts would include the incremental long-term reduction of approximately 2,505 acres of habitat that may potentially be utilized as nesting, early brood, late summer, and winter habitat. In addition, 808 acres of PPH-Important Habitat would be incrementally lost as a result of development of the proposed project. Indirect impacts

associated with mine-related noise and human presence currently occur at the site and would increase under the proposed project. Based on the limited use of sagebrush habitat within the study area by this species, the distance of active leks from existing and proposed facilities, and the existing level of activity at the mine site, potential impacts to this species as a result of the proposed project would be considered low.

Long-billed Curlew

This species has been documented within the study area and limited habitat occurs along Boulder Creek. Direct impacts to this species would result from the long-term reduction of approximately 543 acres of grassland habitat and approximately 2 acres of riparian areas and herbaceous wetland habitat. Indirect impacts associated with mine-related noise and human presence currently occur at the site and would increase under the proposed project. Based on the implementation of applicant-committed environmental protection measures, limited marginal habitat in the vicinity of the study area, and the existing level of activity at the mine site, potential impacts to this species as a result of the proposed project would be considered low.

Western Yellow-billed Cuckoo and Yellow-breasted Chat

These species have not been documented within the study area and limited marginal habitat (e.g., willows) occurs along portions of Boulder Creek. Direct impacts to this species would result from the long-term reduction of approximately 2 acres of riparian areas and herbaceous wetland habitat. Indirect impacts associated with mine-related noise and human presence currently occur at the site and would increase under the proposed project. Based on the implementation of applicant-committed environmental protection measures, limited marginal habitat in the vicinity of the study area, and the existing level of activity at the mine site, potential impacts to this species as a result of the proposed project would be considered low.

Western Burrowing Owl

NDOW documented burrowing owls during the spring of 2011 in Boulder Valley. Suitable nesting habitat also occurs within the study area. Direct impacts to this species would include the long-term reduction of approximately 2,505 acres of breeding and foraging habitat, until reclamation was completed and vegetation re-established. Indirect impacts associated with mine-related noise and human presence currently occur at the site and would increase under the proposed project. Based on implementation of applicant-committed environmental protection measures, and the existing level of activity at the mine site, potential impacts to this species as a result of the proposed project would be considered low.

Long-eared Owl

This species has not been documented breeding within the study area and breeding habitat is limited within the study area. Direct impacts to this species would result from the long-term reduction of approximately 2,505 acres of potential foraging habitat until reclamation was completed and vegetation re-established. Indirect impacts associated with mine-related noise and human presence currently occur at the site and would increase under the proposed project. Based on the implementation of applicant-committed environmental protection measures, limited breeding habitat in the vicinity of the study area, and the existing level of activity at the mine site, potential impacts to this species as a result of the proposed project would be considered low.

Short-eared Owl

This species has not been documented within the study area although suitable nesting habitat is present throughout the study area. Direct impacts to this species would result from the long-term reduction of approximately 2,505 acres of potential foraging habitat until reclamation was completed and vegetation

re-established. These impacts would be considered negligible based on the overall availability of suitable habitat in the vicinity of the study area. Indirect impacts associated with mine-related noise and human presence currently occur at the site and would increase under the proposed project. Based on the implementation of applicant-committed environmental protection measures, the overall availability of suitable habitat in the vicinity of the project, and the existing level of activity at the mine site, potential impacts to this species as a result of the proposed project would be considered low.

Lewis's Woodpecker, Pinyon Jay, Juniper Titmouse

Based on the presence of suitable habitat (e.g., piñon-juniper woodlands) in the study area, direct impacts to these species would result from the long-term reduction of approximately 1,960 acres of sagebrush shrubland habitat. Indirect impacts associated with mine-related noise and human presence currently occur at the site and would increase under the proposed project. Based on the implementation of applicant-committed environmental protection measures, the overall availability of suitable habitat in the vicinity of the project, and the existing level of activity at the mine site, potential impacts to these species as a result of the proposed project would be considered low.

Loggerhead Shrike, Vesper Sparrow

Based on the presence of potentially suitable breeding habitat, direct impacts to this species would include the long-term reduction of approximately 2,505 acres of potential breeding and foraging habitat, until reclamation was completed and vegetation re-established. Indirect impacts associated with mine-related noise and human presence currently occur at the site and would increase under the proposed project. Based on the implementation of applicant-committed environmental protection measures, the overall availability of suitable habitat in the vicinity of the project, and the existing level of activity at the mine site, potential impacts to these species as a result of the proposed project would be considered low.

Amphibians

Columbia Spotted Frog, Northern Leopard Frog

The expansion of the pit would remove three wetlands designated as AR1, AR16, and AR17 in the project study area. Surveys were conducted in July 2010 in these three wetlands, as well as the sediment pond (AR09) (BLM 2010i). No amphibians were observed in any of these waterbodies. The absence of amphibians in these wetlands and pond indicates that potential habitat for the Columbia spotted frog and northern leopard frog is limited. In addition, no previous records exist for these species in the Boulder Creek drainage. Therefore, no impacts are expected for these species as a result of the proposed project.

Human Presence and Noise

Impacts to special status species would parallel those discussed in Section 3.17.2, Environmental Consequences.

Water Management Activities

Impacts to special status species would parallel those discussed in Section 3.17.2, Environmental Consequences.

Hazardous Materials Spill

Impacts to special status species would parallel those discussed in Section 3.17.2, Environmental Consequences.

3.18.2.2 Single Waste Rock Disposal Facility Alternative

Impacts to special status species would be the same as described for the Proposed Action, except that the East WRDF would not be developed and the West WRDF would be expanded by approximately 54 acres. Over all this alternative would result in 128 fewer acres of wildlife habitat. This alternative would extend the disturbance footprint of the West WRDF approximately 0.25 mile farther north compared to the Proposed Action Alternative. All other direct and indirect impacts would be similar to the Proposed Action.

3.18.2.3 Partial Pit Backfill Alternative

Under the Partial Pit Backfill Alternative, impacts for Special Status Species would be the same as described for the Proposed Action, except that an additional 291 acres would be reclaimed in the open pit during final reclamation.

3.18.2.4 No Action Alternative

Under the No Action Alternative, the proposed project would not be developed and impacts to special status species would not occur. Under this alternative, approximately 2,505 acres of wildlife habitat would not be disturbed or lost, as described under the proposed project. Additional habitat fragmentation and animal displacement would not occur, limiting the impacts to wildlife resources to existing conditions. The level of human use would remain the same as the current levels. Completion of closure and reclamation activities associated with existing disturbance, and mineral exploration activities within the study area, would be conducted under existing authorizations.

New disturbance would not occur near Boulder Creek under the No Action Alternative. Therefore, potential sedimentation impacts on aquatic special status species (i.e., Columbia spotted frog and northern leopard frog) and their habitat would not result under the No Action Alternative. In addition, the loss of several wetlands containing aquatic habitat would not occur because the pit would not be expanded. A low level risk of fuel spills on aquatic habitat would exist for the No Action Alternative, although the Spill Prevention, Control, and Countermeasure Plan would be implemented to reduce spill risks.

3.18.3 Cumulative Impacts

The CESA for special status wildlife species is defined in Section 3.18.1, Affected Environment, and is shown in **Figure 3.18-1**; the CESA for greater sage-grouse is presented in **Figures 3.18-2** and **3.18-3**. The CESA for special status aquatic species is defined in Section 3.18.1, Affected Environment, and is shown in **Figure 3.18-4**. The past, present, and reasonably foreseeable future actions (RFFAs) are discussed in Section 3.2, Past, Present, and Reasonably Foreseeable Future Actions. RFFAs from mining activities are identified in **Table 3.2-1**; their locations are shown in **Figures 3.2-1** and **3.2-2**.

3.18.3.1 Proposed Action

Table 3.18-1 presents the disturbance of greater sage-grouse habitat by wildfires (1980 to 2011) and mining operations. Past, present, and RFFAs from utility and energy development (Ruby Pipeline, North Elko Pipeline, TS Power Plant, and Tuscarora Geothermal Power Plant) have resulted, or would result, in up to 3,210 acres of additional disturbance. The CESA for greater sage-grouse encompasses areas that are utilized by greater sage-grouse in relation to past, present, and RFFAs. Several thousand acres of cultivated alfalfa in Boulder Valley and the Humboldt River Valley (area north of Battle Mountain) may potentially provide late summer/brood-rearing habitat for greater sage-grouse (BLM 2008b). These areas provide succulent forbs sought by greater sage-grouse, which include alfalfa and other annual or perennial forbs. The current extent of potential use of these cultivated areas by greater sage-grouse is unknown since cover provided by sagebrush habitats adjacent to these fields has been impacted by wildfires in many areas over the last 20 to 30 years (BLM 2008b).

Table 3.18-1 Cumulative Special Status Species Habitat Disturbance

CESA	Habitat Classification	Total Acres of Habitat	Acres of Habitat Disturbed by Fire	Acres Disturbed by the Proposed Action	Acres of Habitat Disturbed by Mining Operations (Past, Present, and RFFAs[1])	Acres of Habitat Disturbed by Utility and Energy Development (Past, Present, and RFFAs)	Percent of Total Habitat Acres Disturbed
Special Status Species[2]	NA	2,389,947	1,131,690 (47%)	2,505 (<1%)	38,622 (2%)	3,210 (<1%)	1,172,817 (49%)
Greater Sage-grouse (habitat type)[3]	NA	2,272,791	1,051,007 (46%)	2,505 (<1%)	37,142 (2%)	3,210 (<1%)	1,093,864 (48%)
Greater Sage-grouse (habitat classification)[4]	PPH - important	492,240	257,541 (52%)	808 (<1%)	122 (<1%)	223 (<1%)	258,694 (53%)

[1] See **Table 3.1-1** for breakdown of mining projects.

[2] The special status CESA is identical to the wildlife CESA, excluding greater sage-grouse.

[3] Includes NDOW designated nesting, early brood, late summer, and winter habitat.

[4] PPH and PGH are as described in BLM Instruction Memorandum 2012-043.

Sources: BLM 2012; NDOW 2012, 2010a; U.S. Geological Survey 2004.

Studies have shown that development can negatively impact greater sage-grouse populations as a result of habitat loss and increased human disturbance (Holloran 2005; Walker et al. 2007). Greater sage-grouse have been observed to abandon lek sites in areas with increased road development (Braun 1986; Holloran 2005; Walker et al. 2007). Compared to hens in undisturbed leks, greater sage-grouse hens that used breeding leks within approximately 2 miles from the development area moved further away from breeding leks to nesting areas and had lower nest initiation rates (Lyon and Anderson 2003). Furthermore, greater sage-grouse hens that utilized habitats farthest from roads had greater brood survivorship than those hens utilizing habitat near roads (Lyon and Anderson 2003).

Connelly et al. (2000) recommend that facilities be located more than 2 miles from active lek sites under ideal habitat conditions, 3 miles when habitat conditions are not ideal, and 11 miles when greater sage-grouse populations are migratory. It is assumed that habitat conditions within the study area are not ideal, based on fire history and the current level of human disturbance and noise levels from the large amount of mining activity along the Carlin Trend. In addition, the loss of wetland habitat within the study area would contribute to the cumulative loss of available surface water and wetland habitat within the greater sage-grouse CESA. Combined with mine groundwater pumping activities from other mining projects, within the greater sage-grouse CESA, loss of wetland habitat or reduced flows in springs and seeps, may impact important brooding habitat for greater sage-grouse and other special status species (BLM 2010b). Loss of wetlands and reductions or elimination of flows in springs and seeps could impact greater sage-grouse dependent on these sites and may impact the distribution and use of habitat during the spring, summer, and early fall.

Potential cumulative impacts to other special status species would parallel those described in Section 3.17.3, Cumulative Impacts.

3.18.3.2 Single Waste Rock Disposal Facility Alternative

Cumulative effects under the single WRDF Alternative would be similar to cumulative effects associated with the Proposed Action, except that 154 fewer acres of habitat disturbance would occur under this alternative. Implementation of this alternative also would result in a reduction of 154 acres of potential nesting and seasonal sage grouse habitat in the CESA.

3.18.3.3 Partial Pit Backfill Alternative

Cumulative effects under the Partial Pit Backfill Alternative to Special Status Species would be the same as discussed under the Proposed Action, except that an additional 291 acres would be reclaimed in the open pit during final reclamation.

3.18.3.4 No Action Alternative

Cumulative impacts to special status species for the No Action Alternative generally would be the same as described for the proposed project, except that there would be 2,505 fewer acres of habitat disturbance and reduced habitat fragmentation within the CESA.

Under the No Action Alternative conditions, potential sediment and fuel spill risks would continue to exist within the CESA. However, existing sediment-control and spill plans would be used to minimize impacts on the Boulder Creek drainage. These low level impacts would combine with other surface disturbance activities within the CESA.

3.18.4 Potential Monitoring and Mitigation Measures

The following mitigation measure is recommended for greater sage-grouse.

Issue: The proposed project would remove or disturb important greater sage-grouse habitat (PPH). Important greater sage-grouse habitat in the Carlin Trend has been modified by large wildland fires that have converted sagebrush communities to a cheatgrass landscape, and by past and present mining

operations. The implementation of the proposed project would further reduce important habitat for greater sage-grouse in the Carlin Trend.

Mitigation Measure SS-1: In order to reduce project-related impacts that would remove or disturb approximately 808 acres of important greater sage-grouse habitat, Barrick Dee Mining Venture (BDMV) would restore important greater sage-grouse habitat located on Bureau of Land Management (BLM) land immediately north of the proposed project area at a ratio of 2:1, approximately 1,616 acres. The locations of possible restoration areas are shown in **Figure 3.18-7**. Restoration activities that would be used to restore important greater sage-grouse habitat include, but are not limited to:

Seeding Treatments – Possible seeding treatments include broadcast and drag, drill, broadcast/aerial, harrow, disking, and hand.

Mechanical Treatment – To provide for an adequate seedbed, mechanical treatments would include disking (plowing), harrowing and mowing of existing grasses.

Livestock Grazing and Protective Fencing – Rest from livestock grazing.

Herbicide Treatment – A combination of Imazapic and Glyphosate herbicide treatments would be used to suppress non-native annuals and crested wheatgrass in order to introduce shrubs, forbs and grasses into the treatment areas.

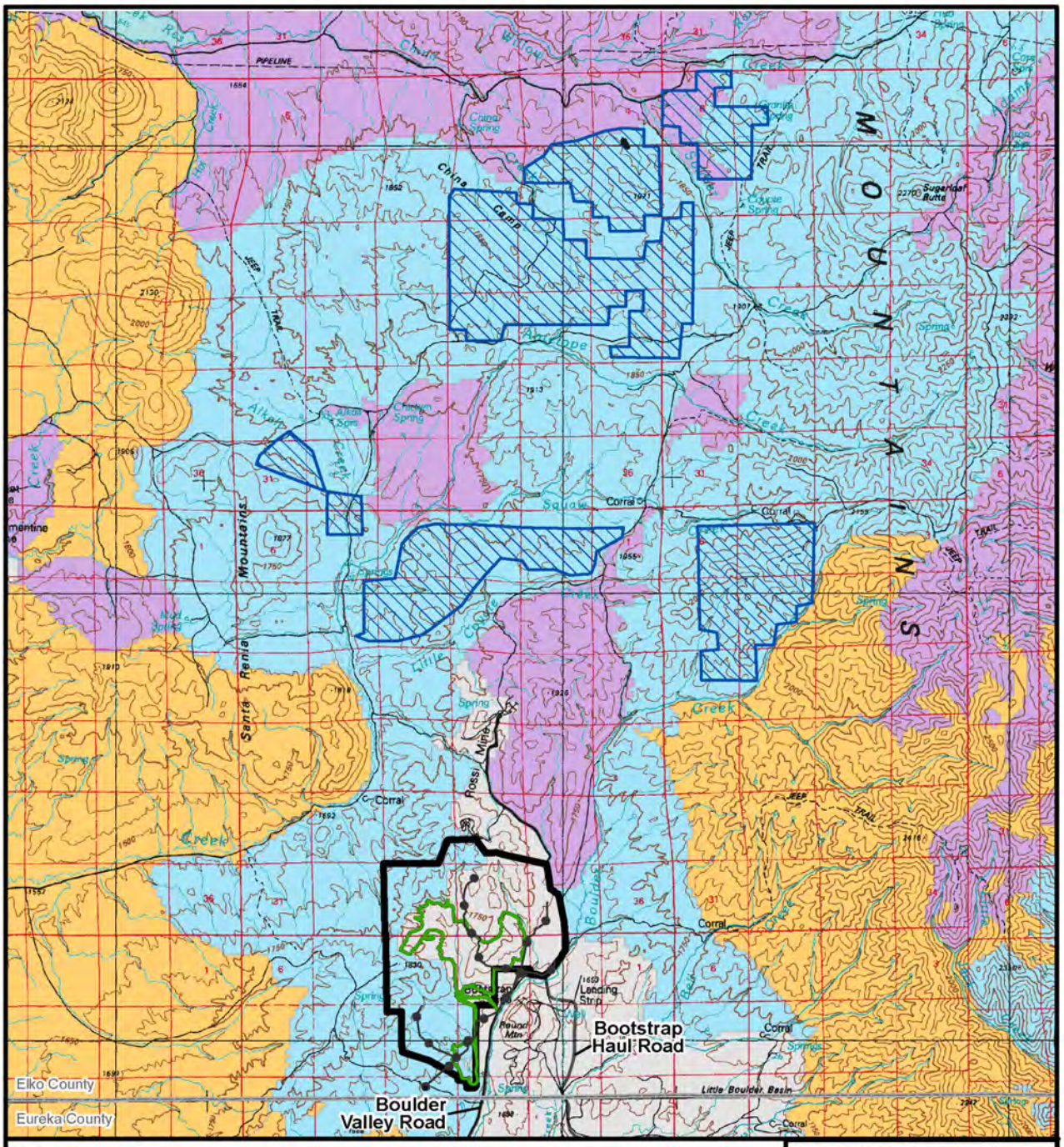
Prescribed Burn Treatments – Controlled burns would be use to reduce fuels, control competing vegetation, and improve wildlife habitat.

Restoration activities would occur within a 10-year period and would commence within one year of the initiation of project approval.

Effectiveness: Implementation of this mitigation measure would reduce project-related impacts to sage-grouse by restoring important greater sage-grouse habitat within the CESA for this species. Monitoring programs would be developed and implemented to gauge the effectiveness of treatments and mitigation measures.

Vegetation rehabilitation treatments would be monitored using techniques outlined by the United States Geological Survey (USGS) in the *Strategy for Monitoring Post-fire Rehabilitation Treatments Handbook*. Treatment goals would be set on a site-by-site basis, taking into consideration site conditions pre-treatment, treatment method and species planted. Invasive species management treatments (including chemical, manual and mechanical treatments) would be considered effective if greater than 80 percent of the targeted weed species are affected by the treatment during the year. Infestation size and density would be measured annually to determine progress and to adapt management plans for treatment areas.

Resource Effects Analysis: Implementation of mitigation measure SS-1 would affect the following elements or resources: water, cultural, air quality, visual, soils, vegetation, noxious weeds and non-native invasive plant species, range, wildlife, and special status species. Affects to these elements or resources would be the same as discussed for mitigation measure WL-2 in Section 3.17.4, Potential Monitoring and Mitigation Measures.



Legend

- Proposed PoO Boundary
- Proposed Power Transmission Line
- Existing Reclaimed Disturbance
- PPH - Essential/Irreplaceable Habitat (NDOW Category 1)
- PPH - Important Habitat (NDOW Category 2)
- PGH - General Habitat (NDOW Categories 3 and 4)
- Non-habitat
- Greater Sage-grouse Habitat Restoration Areas

Source: NDOW 2012.

N

0 0.75 1.5 Miles

Arturo Mine Project EIS

Figure 3.18-7

Greater Sage-grouse Treatment Areas

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3.18.5 Residual Impacts

Residual impacts to special status species under the Proposed Action would include the long-term loss of 1,960 acres of sagebrush shrubland and the permanent loss of 278 acres of sagebrush shrubland and grassland habitat associated with the expansion of the open pit. The loss of shrub-dominated communities would represent a long-term change in wildlife habitat composition (i.e., shrub-dominated communities to grass/forb dominated communities) under the Proposed Action because it would take approximately 25 years for mature shrubs to become established in these communities.

Implementation of applicant-committed measures involving sediment control and the Spill Contingency Plan also would avoid residual impacts to special status aquatic species habitat and species in the Boulder Creek drainage. The elimination of three wetlands associated with the open pit would remove aquatic habitat, which would represent a residual impact on macroinvertebrates and plant communities that occur in waterbodies when water is present. This may indirectly impact special status species that utilize these communities.

3.19 Land Use and Access

3.19.1 Affected Environment

The study area for land use includes the proposed Plan of Operations (PoO) boundary; the Bootstrap Haul Road, power connection yard, secondary access road entrance, and power transmission line corridor that occur outside of the proposed PoO boundary; and an area within approximately 2 miles of the proposed disturbance area. The study area for access includes the proposed PoO boundary; the Bootstrap Haul Road, electrical substation area, secondary access road entrance, and power transmission line corridor that occur outside of the proposed PoO boundary; and the primary access roads approaching the project area including the transportation corridor for hauling ore to the mill site. The Cumulative Effects Study Area (CESA) for both land use and access is the same as the study area (**Figure 3.19-1**).

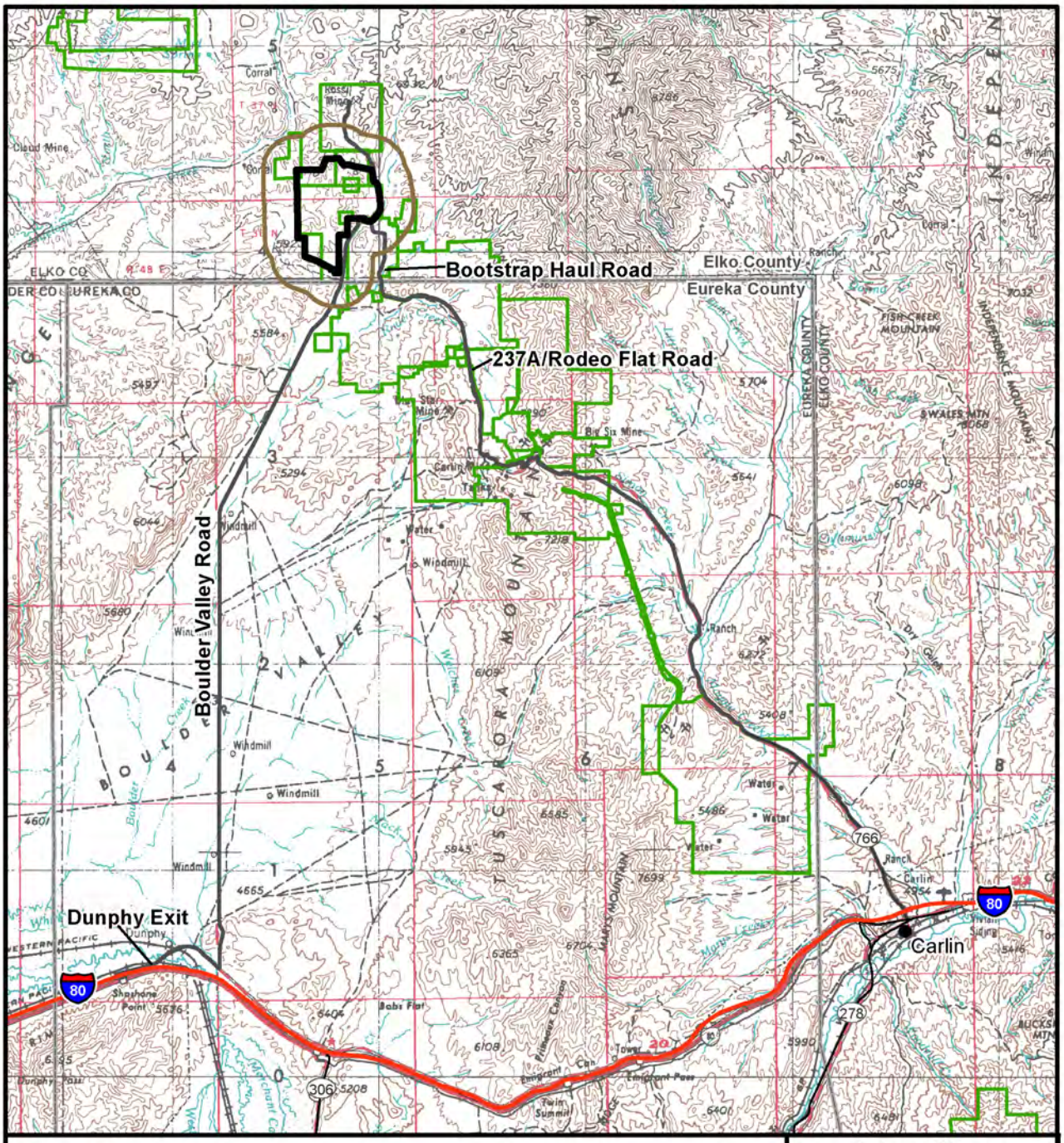
3.19.1.1 Land Use

The proposed project is located in Elko County, Nevada. Elko County is the fourth largest county in the lower 48 states with a land area of 17,181 square miles (Elko County 2010). Approximately 72.7 percent of the county is federal land administered by the Bureau of Land Management (BLM) (62.6 percent), the United States Forest Service (9.8 percent), the United States Fish and Wildlife Service (0.2 percent), and the United States Department of Defense (0.1 percent). Although substantial, the percentage of federally administered lands is less than the 86.5 percent of the state as a whole. Native American tribal lands make up 1.5 percent of Elko County and the state owns approximately 0.1 percent of the county. The remaining 25.7 percent is privately owned or owned by local governments (Elko County 2010).

The area within the proposed PoO boundary consists primarily of BLM land (3,475 acres), with an additional 38 acres of private land. Linear facilities located outside of the proposed PoO boundary include an additional 76 acres of BLM land and 38 acres of private land. Other private lands occur immediately east and south of the proposed PoO boundary, and are scattered throughout the general area, primarily along creek bottoms or on patented mining-related properties (**Figure 1-2**). There are no state- or county-owned lands in the vicinity of the proposed project.

Public lands in the proposed project vicinity are managed by the BLM under the guidance of the BLM Elko District Resource Management Plan (BLM 1986). The Resource Management Plan has designated project area lands "… open for mineral entry for locatable minerals …" (BLM 1987). Elko County does not have a master plan for the project vicinity. However, it has adopted the "Elko County Public Lands Policy Plan" (Elko County 2010). Among other provisions, the policy plan encourages continued mining under Directive 14-1, which states, "Retain existing mining areas and promote the expansion of mining operations and areas not specifically withdrawn" (Elko County 2010). Other relevant minerals policies in the plan include Directive 14-4, which encourages enforcement of reclamation standards to prevent "… undue degradation of the public lands," and Directive 14-6, which encourages that reclamation be "… consistent with the best possible post mine use for each specific area" (Elko County 2010). Elko County does not have zoning jurisdiction over public lands (Pierce-Fitzgerald 2010). Private lands in the proposed project vicinity are mostly, if not entirely, zoned Open Space (Pierce-Fitzgerald 2010).

Livestock grazing is an established historic use of much of the area surrounding the proposed project and is the dominant use of the largest land area in the vicinity (Section 3.16, Range Resources). Lands in the proposed project vicinity are part of the Twenty Five Allotment. There also is some hay production in irrigated private lands in Boulder Valley. Additionally, dispersed outdoor recreation, consisting of hunting, camping, limited off-road vehicle use, sightseeing, photography, hiking, rock climbing, and



Source: BLM 2010c.

Arturo Mine Project EIS

Figure 3.19-1

Land Use and Access Cumulative Effects Study Area

05/17/2012

visiting old mining camps, occurs on a seasonal basis, although not by large numbers of people. There are no developed recreation areas near the proposed project (Section 3.11, Recreation and Wilderness). There are no Indian Reservations in the vicinity of the proposed project. There are a limited number of land use authorizations and rights-of-way (ROWs) on BLM lands in the vicinity of the proposed project. **Table 3.19-1** provides specific information on the authorizations and ROWs based on BLM Master Title Plats and the LR2000 system (BLM 2010g). The road ROW authorization refers to the Bootstrap Haul Road. The power transmission line ROWs host the existing lines that provide power to existing mines southeast of the proposed project, such as the BGMI facility and the North Operations Area of the Carlin Trend. Under the Proposed Action, the existing 69-kilovolt (kV) power transmission line (ROW NVN 038874) would be upgraded to 120-kV to provide power for the proposed project.

Table 3.19-1 Land Use Authorizations and ROWs in the Study Area[1]

Serial Number	Grantee	Use	Township	Range	Section	ROW Width (feet)
NVN 007683	Newont Mining Corp.	Roads (Bootstrap Haul Road)	36N	49E	14	180
NVN 038874	Sierra Pacific Power Co.	Power transmission line	36N	49E	4	25
NVN 053160	Sierra Pacific Power Co.	Power transmission line	36N	49E	9, 14, 15	90
NVN 047775	Sierra Pacific Power Co.	Power transmission line	37N	49E	26	90
Serial Number	**Grantee**	**Use**	**Township**	**Range**	**Section**	**Authorization Size (acres)**
NVN 058227	Newmont Gold Co.	Patent Issued	36N	49E	10, 11, 14, 15	124.0
NVN 063106	Barrick Goldstrike Mines Inc. (BGMI)	Geothermal Lease	36N	49E	14, 15	725.1

[1] Not including mining-related surface operations authorizations.

Source: BLM 2010g.

3.19.1.2 Access

The proposed project would be accessed by a sparse network of roadways typical of rural Nevada. Interstate 80 (I-80) is the primary east-west traffic artery across northern Nevada, connecting Winnemucca, Battle Mountain, and Elko with Reno to the west, and Salt Lake City, Utah, to the east. The proposed area is located approximately 28 road miles north of Dunphy and I-80.

Primary access to the proposed project for employees and vendors would be from the Town of Carlin via State Road (SR) 766 and Rodeo Flat Road (County Road 237a), through the BGMI property, and along the Bootstrap Haul Road for a total of approximately 30 road miles to the proposed PoO boundary. The project also could be accessed by traveling 27 miles west of Carlin on I-80 to the Dunphy Exit, then 28 miles north on the Boulder Valley Road (a county-improved gravel road) to the existing entrance of the Dee Gold Mine. Some vendors would utilize the Boulder Valley Road to access the Arturo Project.

According to the proposed PoO, the portion of the ore that would be processed off-site would be trucked to the BGMI facility via the Bootstrap Haul Road. The haul road is a gravel surface private road, closed to public access.

According to the Nevada Department of Transportation (NDOT), only I-80 and SR 766 are included in the Nevada Federal Aid Highway System. The NDOT classifies I-80 as an Interstate Highway, and SR 766 as a Rural Major Collector (NDOT 2009).

Traffic is considered to be relatively light compared to road capacity on all proposed project access roads. Traffic on the gravel-surfaced county roads is primarily associated with mining and ranching, and is occasionally increased by dispersed recreation-related traffic. Vehicle use of the Boulder Valley Road 1.3 miles north of I-80 averaged 160 vehicles per day (vpd) in 2009. Existing traffic conditions on all paved highways are at level of service "A." Vehicle use along I-80 averaged 11,000 vpd east of Carlin and 6,800 vpd near the Dunphy exit, both of which are well below its capacity. SR 766, 5 miles north of I-80, carried an average of 2,200 vpd in 2009, down from 2,650 vpd in 2006 (all count data were obtained from NDOT [2009]). Traffic counts on area roads generally peaked in 2006 or 2007; 2009 counts tended to be up slightly from 2008.

3.19.2 Environmental Consequences

Primary issues include potential conflicts with existing land uses, ROWs and other land use authorizations; potential impacts to two alternative access routes; and conflicts with land use plans or regulations for both public and private lands.

3.19.2.1 Proposed Action

The proposed project or alternatives could affect land use and access both directly and indirectly. Direct impacts may include the termination or modification of existing land uses or ROWs in the project area. Indirect impacts may result in altered land use patterns to other use areas adjacent to or near the project area. Indirect impacts also would occur if the proposed project or alternatives stimulated or encouraged the development of land uses not presently anticipated, or conversely, precluded other planned or proposed uses.

<u>Land Use</u>

The proposed project encompasses a total of approximately 3,627 acres, of which 3,551 acres (98 percent) are public lands administered by the BLM and approximately 76 acres (2 percent) are private lands. Proposed project activities on private lands include approximately 0.9 mile of rerouted power transmission line corridor, the construction of a new power connection yard, and approximately 106 acres devoted to widening the existing Bootstrap Haul Road, some of which is outside the proposed PoO boundary. As currently planned, total surface disturbance would be approximately 2,774 acres, 2,703 acres of which would be on public land. The proposed project would add approximately 1,962 acres to the existing and reclaimed disturbance of 812 acres – an increase of approximately 240 percent (**Table 2-2**).

Current use of land within the proposed project boundary is a mixture of mining (the Storm Underground Project) and grazing by both domestic animals and wildlife. There also may be a small amount of low density, dispersed recreation activity. As previously noted, there is cattle and horse grazing in the project vicinity under the permit stipulations of the Twenty Five Allotment. Recreation use is likely limited to occasional hunting and, possibly sightseeing by travelers on the Boulder Valley Road, which provides easy access to the area. None of these uses is believed to bring large numbers of the public into the project vicinity.

Approximately 30 percent of the proposed disturbance would occur on land that has been previously disturbed, of which approximately 67 percent was reclaimed subsequent to the prior mining activities

(**Table 2-2**). New project-related disturbance including a new fenced area around the proposed PoO boundary (approximately 3,513 acres) would reduce the amount of land available for livestock grazing and dispersed recreation, although the loss would be small relative to the total public land available for such activities in the project vicinity. The specifics of the loss of access to public lands are addressed in Section 3.16, Range Resources, and Section 3.11, Recreation and Wilderness. Approximately 3,333 acres would not be available for livestock grazing in the Twenty Five Allotment and 24 acres would not be available for livestock grazing in the T Lazy S Allotment until reclamation has been completed and vegetation re-established. Approximately 472 acres, in addition to the 129 acres of existing open pit disturbance, would be lost in the Twenty Five Allotment from the expansion of the open pit. None of the proposed surface disturbance would occur on currently irrigated cropland so there would be no loss of hay production from the proposed project.

The proposed project would not conflict with the few existing ROWs in the project vicinity. New ROW authorizations would be required to upgrade the existing 69-kV power transmission line to a 120-kV power transmission line. The proposed changes to the existing power transmission line would not adversely affect land use or power availability in the area.

Post-reclamation land use of most of the disturbance area would be returned to open space, grazing, dispersed recreation, and wildlife habitat. These uses would be consistent with local and BLM land use plans and guidelines. The proposed mine pit would not be reclaimed and would constitute the main area that would not be returned to prior use after closure and reclamation of the proposed project.

Access

Four categories of traffic would be generated on public roadways by the proposed project including construction traffic, worker commuting traffic, general company and contractor traffic, and material deliveries. Construction traffic would likely be a combination of medium- and heavy-duty trucks for delivery of equipment and materials. Mine workers would mostly commute in company contracted buses. General Barrick Dee Mining Venture (BDMV) and contractor traffic would be predominantly light vehicles, automobiles and pickup trucks. There also would be ore hauling by 320-ton trucks on the Bootstrap Haul Road.

Construction would involve 100 BDMV and contractor workers for approximately 8 months. Traffic could include two to three buses or up to 60 personal and company-owned automobiles and pickup trucks in the morning and evening. Most, if not all, of this traffic would access the project site using the Bootstrap Haul Road via SR 766 and Rodeo Flat Road (County Road 237a). Effects on transportation would be minor and short-term.

Worker commuter traffic would primarily consist of buses operating at shift change times plus a small number of personal vehicles. With a planned 24-hour, 7-day work schedule, it is assumed that fewer than half the 379 person maximum work force would be entering or exiting the site at any one time. This level of commuting could be accommodated by five or fewer buses bringing the incoming workers to the site and carrying departing workers back out. This would generate up to 10 vehicle trips in any 1-hour period, which would travel on SR 766 and Rodeo Flat Road. It is anticipated that this level of traffic would have very little, if any, effect on traffic flows or safety under the proposed project.

Heavy traffic from material deliveries to the proposed project area would consist of occasional tractor-trailer or straight truck deliveries at variable times throughout the day. It is expected that the traffic generation from this type of traffic would rarely, if ever, exceed 15 truckloads per day, or 30 vehicle trips, half in-bound and half out-bound. This type of traffic would likely happen over the course of the day and would add only a maximum of four to six vehicle trips during any given hour, such as a peak commuter shift change hour. At this level, considering the low levels of traffic on SR 766 and Rodeo Flat Road currently, the good condition of the road, and the generally long sight distances along most of the

route, it is expected that the effects of the proposed project on traffic flow and safety along the roadway would be minor.

Transportation safety concerns related to traffic generated by the proposed project would be minimal. Lines of sight at intersections are unobstructed and sight distances are ample. Haul trucks would be segregated from light vehicles by a safety berm along the Bootstrap Haul Road (**Figure 2-9**). Development of the proposed project would have no effect on the physical characteristics of the major intersections or the geometrics of roadways. The increase in traffic would be modest, remaining well within the capacity of the roadways. The occurrence of heavy vehicles in the traffic stream would increase slightly, but not substantively. As such, any increase in the risk of traffic accidents would be minor and proportional to the overall increase in traffic. The combination of heavy and light vehicles would occur mostly on the mine sites or in mining areas, which are closed to the public.

Development of the proposed project would not significantly affect highway traffic in the project region. In summary, the effects of the proposed project on land use and access in the project area would be considered minor.

3.19.2.2 Single Waste Rock Disposal Facility Alternative

The Single Waste Rock Disposal Facility (WRDF) Alternative would be similar to the Proposed Action, except that the East WRDF would not be developed and the West WRDF would be expanded by approximately 54 acres. Overall, this alternative would result in approximately 128 fewer acres of habitat disturbance. With the exception of a 4.6 percent reduction in land disturbance from this alternative, all other direct and indirect impacts associated with this alternative would be the same as the Proposed Action.

3.19.2.3 Partial Pit Backfill Alternative

The Partial Pit Backfill Alternative would have a similar footprint as the Proposed Action. Design height and capacity of the West and East WRDF would be different compared to the Proposed Action. The West WRDF would be 230 feet lower and the East WRDF would be 310 feet higher under this alternative, and the number of pit lakes would be reduced from three to one. Mining would be sequenced differently from the Proposed Acton to allow backfilling portions of the open pit with waste rock during operation. Under this alternative, delays in the schedule to accommodate the backfilling would occur to adjust for transport of waste rock to the East and South Pits. The mining rate would slow by an estimated 22 percent, resulting in a 1-year extension of the mine life.

<u>Land Use</u>

There would be no notable differences in the effects on land use during the life of the mine as the distinguishing differences from the Proposed Action would occur within the same fenced perimeter. There would be approximately a 1-year delay in completing reclamation and returning the reclaimed areas to post-reclamation land use. This would be a minor effect in the context of the life of the Arturo Mine Project and the long-term availability of the area after project completion.

<u>Access</u>

Effects on access would be similar to those from the Proposed Action with the exception that there would be 90 fewer workers employed at the project during peak years. Most workers are expected to commute to the project site by bus so this alternative would result in approximately one fewer buses traveling to and from the mine during peak hours. This would be a very minimal reduction in traffic as compared with the Proposed Action.

3.19.2.4 No Action Alternative

Under the No Action Alternative, the proposed project would not be developed and the related potential impacts to access and land use would not occur. Continuation of mining activities associated with the Storm Underground Mine, completion of closure and reclamation activities associated with existing disturbance, ongoing mineral exploration activities, and reclamation within the study area, would be conducted under existing authorizations. No additional ground-disturbing activities beyond those currently authorized would occur at the mine site.

Land Use

Effects of the existing activities at the Dee Gold Mine were addressed in prior environmental analyses. Under the No Action Alternative, previous approvals have resulted in 543 acres that have been previously disturbed and reclaimed and 269 acres that remain disturbed. This disturbance is ongoing and would continue. Some of the approved disturbance would be reclaimed when the Storm Underground Mine ceases operation in the future. These activities would have minimal, if any, effect on other land uses. The prior approval indicates conflicts with governmental regulations or policies would not be expected from the No Action Alternative.

Access

Most, if not all, of the traffic associated with the No Action Alternative currently occurs along Boulder Valley Road and the local road network. The traffic is being accommodated with no measurable adverse effect on the roads beyond regular maintenance, and all roads are well within their capacities to accommodate traffic. Public access to public lands is not restricted, except for access to the Storm Underground Mine, which is controlled by Barrick-Rossi Mine Venture. The effects of the No Action Alternative on land use and access in the project area would be minor.

3.19.3 Cumulative Impacts

The CESA for access and land use is defined in Section 3.19.1, Affected Environment, and is shown in **Figure 3.19-1**. Past, present, and reasonably foreseeable future actions (RFFAs) are discussed in Section 3.2, Past, Present, and Reasonably Foreseeable Future Actions. RFFAs for mining activities are identified in **Table 3.2-1** and their locations are shown in **Figures 3.2-1** and **3.2-2**.

3.19.3.1 Proposed Action

Land Use

Past, present, and RFFAs within the land use and access CESA have resulted, or would result, in approximately 12,747 acres. Past, present, and RFFAs from utility and energy development (North Elko Pipeline) would result in up to 140 acres of additional disturbance. The proposed project incrementally would add 2,774 acres to the disturbance for a total of 15,661 acres of disturbance in the CESA. The proposed project would represent approximately a 22 percent increase over past, present, and RFFAs. The total cumulative disturbance, which is predominantly related to mineral development, would be consistent with Elko County and BLM plans, policies, and ordinances. The proposed project-related disturbance would be slightly over 3 square miles, which would be a small increment of the vast acreage of public lands in the region, and would have minimal effect on other existing or potential land uses in the CESA. The cumulative unreclaimed disturbance area that would remain after completion of the interrelated actions, including the pit areas of the proposed project, would be a small percentage of the total land area in the CESA, and would have a negligible effect on land uses.

The foreseeable improvements in range and habitat restoration would be expected to improve the economic viability of ranching in the CESA, partially offsetting the losses of grazing land from mineral development.

Access

Traffic generation data from the approved and reasonably foreseeable mineral development activities are unknown. However, most of these actions previously have been approved or are affiliated with existing mining operations. Consequently, it is assumed that most of the traffic that could be anticipated is currently on the road system. Based on this assumption and the substantial unused capacity on CESA roads and highways, it is expected that cumulative effects on traffic flow and safety would be minimal.

3.19.3.2 Single Waste Rock Disposal Facility Alternative

Land Use

Cumulative effects under the Single WRDF Alternative would be similar to cumulative effects associated with the Proposed Action, except that this alternative would reduce the cumulative land disturbance in the CESA by 128 acres, or approximately 1 percent. The reduction, while beneficial, would be negligible in the context of the total CESA.

Access

Traffic generation from the Single WRDF Alternative would be essentially the same as for the proposed project. Consequently, cumulative effects on traffic flow and safety from the Single WRDF Alternative would be the same as for the proposed project.

3.19.3.3 Partial Pit Backfill Alternative

Land Use

Cumulative effects under the Partial Pit Backfill Alternative would be similar to the cumulative effects associated with the Proposed Action, except that reclamation and return of the project area to post-mining land uses would be delayed by approximately 1 year for the Arturo Mine Project. This would be a very minor effect in the context of the entire CESA and the totality of past, present and RFFAs.

Access

Traffic generation from the Partial Pit Backfill Alternative would be slightly less than for the Proposed Action. Cumulative effects on traffic flow and safety from this alternative would be essentially the same as for the proposed project.

3.19.3.4 No Action Alternative

Most of the traffic that could be anticipated under the No Action Alternative is currently on the road system. Traffic from RFFAs would add small increments to the overall traffic load on area roads and highways, but there also would be minor reductions in traffic as existing mines reach the end of their productive lives. There is substantial unused capacity on CESA roads and highways so it is expected that cumulative effects on traffic flow and safety from the No Action Alternative would be minimal.

3.19.4 Potential Monitoring and Mitigation Measures

No additional monitoring or mitigation measures are recommended for land use or access.

3.19.5 Residual Impacts

Residual impacts to land use would include the permanent loss of 472 acres of vegetation in areas associated with the expansion of the open pit, which would not be reclaimed. Consequently, this area would not support grazing by cattle or terrestrial wildlife, or other surface uses common to the surrounding area. Three modest sized pit lakes would support water fowl, which may attract some recreational use, although safety barriers would discourage, if not completely prevent, access by the public. No residual impacts to roadways, traffic flows, or access to the rest of the project site would be expected.

3.20 Noise

The study area for noise effects encompasses an area within a 5-mile radius of the proposed Plan of Operations (PoO) boundary, and Bootstrap Haul Road, power connection yard, secondary road access entrance, and power transmission line corridor, that occurs outside of the proposed PoO boundary. The Cumulative Effects Study Area (CESA) includes an area within approximately 10 miles of the study area (**Figure 3.20-1**). The 5-mile direct noise effects study area is based on the estimation, derived from previous comparable projects, that mine noise would not exceed acceptable levels beyond that distance. The CESA is based on a doubling of the direct noise effects study area, assuming a comparable source, or sources, would have a similar direct effects radius.

3.20.1 Affected Environment

Describing the environment potentially affected by noise from the proposed project involves identifying noise-sensitive receptors and existing noise sources in the project vicinity, characterizing terrain features that may affect noise transmission, and determining existing noise levels.

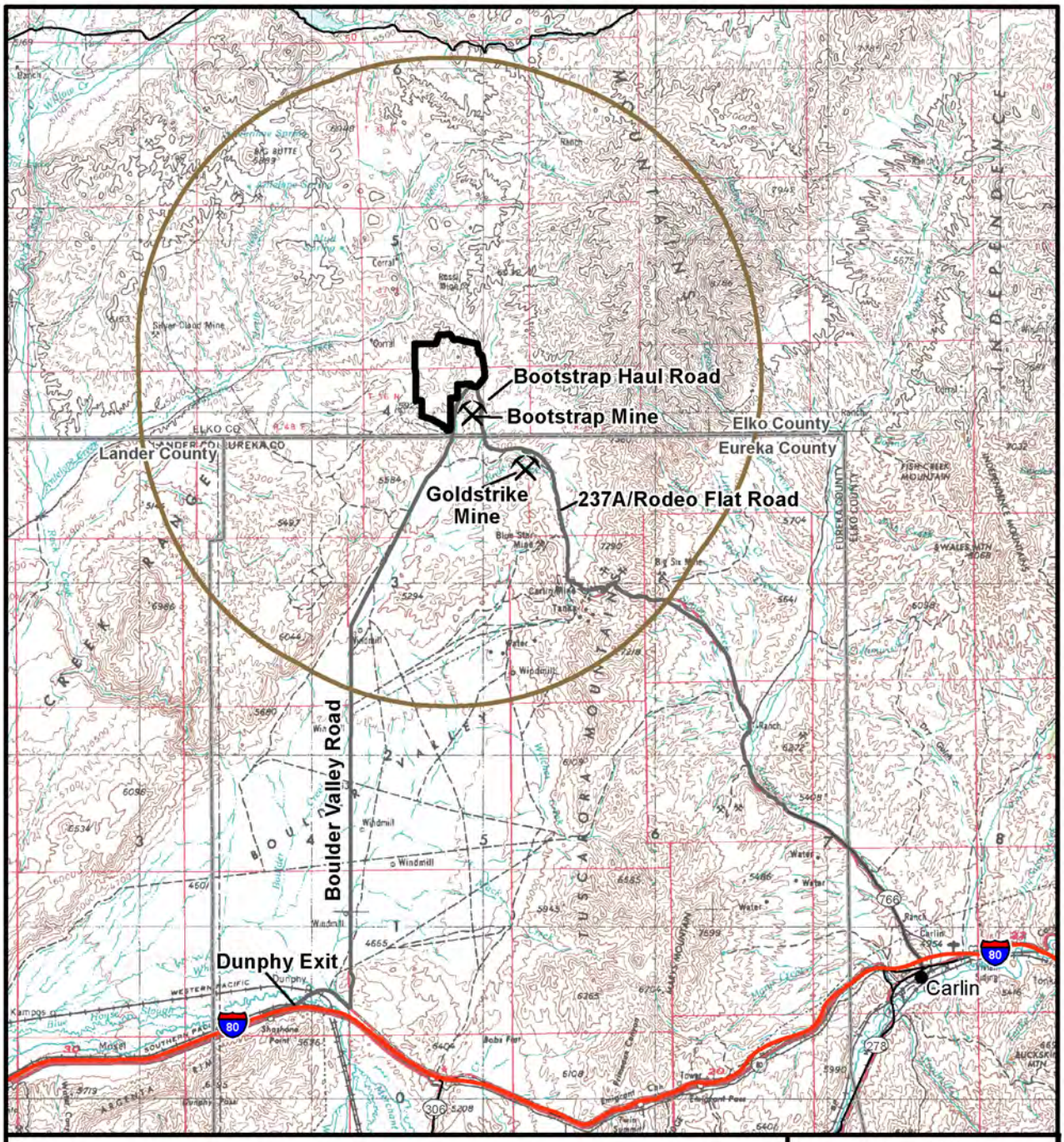
The proposed project is located in a remote area of western Elko County, just north of the Eureka County line, where the only signs of development are existing mines and a few remnants of historic mining projects. There are no occupied ranches within 5 miles of the proposed PoO boundary. The nearest ranches are the St. John's Ranch, nearly 9 miles to the north-northeast and the TS Ranch, approximately 6 miles to the southwest. In effect, no noise sensitive receptors have been identified within the area reasonably expected to be susceptible to project-related noise.

Man-made sources of noise in the study area include: 1) the Bootstrap Mine (inactive), within 1 mile of the proposed PoO boundary to the south, 2) the Rossi Mine (active), within 2 miles of the proposed PoO boundary to the north, and 3) the BGMI facility (active), within 3.5 miles of the proposed PoO boundary to the southeast. Wind, insects, and birds, are the principal natural contributors to ambient noise in the study area. Variations in wind speeds can have a dramatic effect on noise levels in the area. Mine traffic on the Boulder Valley Road, particularly from the Rossi Mine, generates periodic vehicular noise, although the traffic is generally light. There also may be a small amount of dispersed recreation-related traffic in the area on an occasional basis.

Terrain in the study area is very irregular. The existing pit wall tops out at approximately 5,840 feet above mean sea level (amsl), which is 780 feet above the floor of the pit at 5,060 feet amsl. Ridges to the north and northwest rise above 6,100 feet amsl; the terrain flattens out to the south in Boulder Valley where there are fields irrigated with mine water from mines along the Carlin trend.

Field measurements for existing noise levels were not considered to be necessary for the proposed project because of the lack of identified noise sensitive land uses in the study area. Existing noise levels were estimated based on reference materials and field monitoring conducted for other mining projects in northern and central Nevada in recent years. It is estimated that ambient noise levels are low (below 40 decibels on the A-weighted scale (dBA) at night and in the low to mid 40s dBA during the day in the absence of significant wind) in areas 1 mile or greater from active mining projects. Winds above 12 to 15 miles per hour would raise noise levels by 10 dBA, or more, with very strong winds adding even greater increases in ambient noise levels. At certain times of the year, insect activity also may increase noise levels, although generally by smaller increments than wind noise.

Noise levels within 0.25 to 0.5 mile of existing mining activities likely are somewhat higher. In general, noise levels near active mining vary with the particular activity and with proximity of the activity to the observer. Measurements at other mine sites suggest noise levels commonly range between 45 dBA and 55 dBA at project boundaries. These levels typically result from equipment moving waste rock or ore and from drilling equipment. Blasting is likely to be noticeable at distances of 1 mile or more, but it is typically



Legend

- Proposed PoO Boundary
- Cumulative Effects Study Area (Approximately 10 mile radius from Project)

N

0 2.5 5 Miles

Source: BLM 2010c.

Arturo Mine Project EIS

Figure 3.20-1

Noise Cumulative Effects Study Area

05/17/2012

a minor consideration since it generally occurs once per day at the same time every day, because modern blasting techniques employ a series of small charges rather than a single large charge, and because the duration of a blast sequence is very short, on the order of less than 5 seconds. Because of these characteristics, blasting has very little effect on day-night average sound levels (L_{dn}).

For comparison purposes, **Table 3.20-1** illustrates noise levels associated with several common indoor and outdoor activities, which would help to understand noise emission levels from the proposed project.

Table 3.20-1 Typical Values of Sound Level of Common Noise Sources

Sound Pressure Level (dBA)	Common Indoor Noise Levels	Common Outdoor Noise Levels
110	Rock band	--
105	--	Jet flyover at 1,000 feet
100	Inside New York subway train	--
95	--	Gas lawn mower at 3 feet
90	Food blender at 3 feet	--
85	--	Heavy truck at 50 feet
80	Garbage disposal at 3 feet, or shouting at 3 feet	Noisy urban daytime
70	Vacuum cleaner at 10 feet	Gas lawn mower at 100 feet
65	Normal speech at 3 feet	Commercial area, heavy traffic at 300 feet
60	Large business office	--
50	Dishwasher in next room	Quiet urban daytime
45	Small town residence	--
40	Small theater, large conference room	Quiet urban nighttime
35	Soft whisper at 6 feet	Quiet suburban nighttime
33	Library	--
28	Bedroom at night	--
25	Concert hall (background)	Quiet rural nighttime
15	Broadcast and recording studio	--
5	Threshold of hearing	--

Sources: Bureau of Land Management (BLM) 2000d; Harris 1979.

3.20.2 Environmental Consequences

Primary issues include the potential for project-related activities to increase noise levels to the degree that use and enjoyment of noise sensitive receptors would be affected. Noise impacts are commonly judged according to two general criteria: the extent to which a project would exceed federal, state, or local noise regulations, and the estimated degree of disturbance to people. There are no specific federal,

state, or local noise regulations that would govern at the proposed Arturo Mine project. Neither the State of Nevada nor Elko County has noise regulations governing mining operations.

Without legislative guidance, the degree of disturbance becomes the key factor in evaluating noise effects. The concept of human disturbance is known to vary with a number of interrelated factors, including not only changes in noise levels, but the presence of other, non-project related noise sources in the project vicinity; peoples' attitudes toward the proposed project; the number of people exposed; and the type of human activity affected (e.g., sleep, quiet conversation or religious rituals as compared to physical work or active recreation).

In the absence of applicable noise regulations or specific standards, the noise analysis used 65 dBA (L_{dn}) as an absolute level criterion, and a 10 dBA increase above existing levels as a relative criterion, to evaluate projected project-related noise. L_{dn} is the average day sound level for a 24-hour, midnight to midnight period with 10 dBA added to the sound levels from 10:00 p.m. to 7:00 a.m. The 65 dBA L_{dn} criterion is based on the United States Housing and Urban Development noise guidelines, which identify levels in excess of 65 dBA L_{dn} as “normally unacceptable” for exterior noise for residential areas (U.S. Department of Housing and Urban Development 1996). A 10 dBA increase is perceived as a doubling of sound and is considered a likely indicator of community annoyance. The 10 dBA figure is based on United States Environmental Protection Agency (USEPA) studies showing that an increase of 10 dBA over existing background noise levels has commonly caused nearby residents to vigorously complain (USEPA 1974).

The study area has no residences or other gathering places, such as schools or churches, that are commonly identified as noise sensitive areas. Because of this, it was necessary to conduct the noise analysis to identify anticipated distances to the threshold standards rather than potential noise levels at sensitive receptors.

3.20.2.1 Proposed Action

Hard rock mining commonly generates noise from two primary sources: operations of both stationary and mobile heavy equipment, and blasting to loosen waste rock and ore from the bedrock for removal by truck and shovel operations. Major sources of noise from mining and processing operations of the proposed project would include rock drilling, blasting, loading of rock and ore, ore hauling, ore crushing, and crushed ore handling and distribution. Project construction also would include road building associated with the proposed haul road widening. An equipment roster with noise emissions estimates is illustrated in **Table 3.20-2**. Some additional equipment is in use at the Storm Underground Mine, but noise emissions from those sources are included in the existing estimated background noise levels. Noise emissions estimates for the various types of equipment were developed from published USEPA data (USEPA 1971), from the previous Nevada mining EISs (BLM 2002b, 1996a), and from file data for comparable mining projects in Nevada and other western states.

The proposed project would encompass an area of 3,627 acres, or approximately 5.7 square miles. The main noise generating activity centers would include the expanded pit, the West Waste Rock Disposal Facility (WRDF), the East WRDF, the new Heap Leach Pad No. 12, and mine traffic along the Bootstrap Haul Road.

For purposes of the analysis, assumptions were made regarding a roster of equipment that would be operating at each activity center at one time and total noise emission levels were calculated for the combined operations. Project-related noise levels are typically calculated at sensitive receptor locations; however, no sensitive receptors were identified in the study area. Consequently, the approach taken to analyze potential noise effects of the proposed project was to calculate the distance from the project to the two criteria noted above: an L_{dn} of 65 dBA, and a noise level of 10 dBA above existing ambient levels.

Table 3.20-2 Arturo Mine Project Equipment Roster

Equipment				Daily Operation		
Type	hp*	Units	dBA[1,2]	Hours	Utilization (%)	Comments
Rotary Drill	760	5	86	24	85	
Front End Loader (25-cubic-yard)	1,250	1	90	24	90	
Electric Shovel (70- to 115-ton payload)	NA	3	90	24	90	Electric only, no diesel
Mechanical Shovel (50-ton payload)	2,500	1	85	24	90	Diesel/Hydraulic
Haul Truck (320-ton)	2,700	30	90	24	90	
Motor Grader	265	4	85	24	85	
Track Bulldozer	580	4	87	24	80	
Wheel Bulldozer	800	4	85	24	90	
Blasting Truck	300	2	83	12	50	
Blasting Agent Loading Truck	400	3	83	12	90	
Backhoe Excavator	300	2	85	12	25	
Water Truck	1,350	4	83	24	85	
Hole Stemmer	40	3	85	12	50	
Maintenance Truck	250	3	83	24	50	
Welding Truck	250	2	83	24	50	
Tire Truck	300	1	83	24	85	
Service Truck	300	2	83	24	50	
Crane Flatbed	250	2	85	24	50	
Personnel Carrier	300	4	83	24	30	
Pickup Truck	250	10	75	24	30	
Pump	40	4	85	24	20	
Lighting Plant	27	10	78	24	50	
Other Temporary Support Equipment and Vehicles	200	20	70-85	24	25	

[1] Sound pressure levels measured at a reference distance of 50 feet.

[2] Sound pressure level per unit.

* Horsepower.

Sources: Barrick Dee Mining Venture 2010a; BLM 2007d.

The analysis was very conservative, as noise emission levels assumed all equipment at each activity center was operating simultaneously and sound pressure levels were not adjusted for utilization rates. In addition, noise attenuation was calculated only for the spreading of sound waves over distance; no

adjustments were made for additional attenuation from atmospheric absorption, ground effects, or topographic barriers, which would come into play as work in the pit moved deeper below the ground surface level. This approach would ensure a maximum estimation of distance to the identified criteria perimeters. Under actual conditions, distances to criteria noise levels from the proposed project would be lower as a result of atmospheric absorption and ground absorption, and would decrease over time for barrier changes as pit depths increased and waste rock piles and heap leach pads grew.

Based on the equipment distribution scenarios developed for the project activity centers, and the assumptions described above, estimated project-related noise levels would drop to an L_{dn} of 65 dBA at a distance of 9,300 feet, or approximately 1.75 miles, from the activity centers. Project-related noise would drop below 10 dBA over background noise at a distance of just over 25,000 feet, or 4.75 miles, from mine related activity. (As noted above, background noise was assumed to be 40 dBA; therefore, 10 dBA above background noise would be 50 dBA.) These distances are believed to be worst-case, based on the conservative assumptions employed, and there are no identified noise-sensitive receptors within either of these perimeter distances.

Blasting noise is not included in the noise level estimates noted above, mainly because mine blasting is typically an extremely brief event occurring an average of once per day, depending on the operations plan for the pit. With this very brief and consistent type of noise emission, neither of the criteria noted for other mine-related noise is relevant to blasting noise. Although blasts are sometimes perceived by the layman to be a single explosion, mining blasts are actually a series of smaller, single-hole explosions. Each hole is sequentially delayed and detonated independently of the other holes. Less noise and ground vibrations are generated because several small blasts (delays) are detonated in sequence rather than as one large, instantaneous blast. Blasting can be further controlled by varying the amount of explosive, the type of delay, the delay sequence, the type of explosives, and the type of detonator used. Blasting for the proposed project would take place only during daylight hours and would be conducted under strict Mine Safety and Health Administration safety procedures.

Information on noise emissions from blasting is inconsistent. Noise analyses for development proposals at other Nevada mining facilities (BLM 2004c, 2000d) have assumed blasting noise levels of approximately 115 to 125 dBA at 900 feet from the blast source, lasting for up to 15 seconds. In contrast, field measurements taken at the Pipeline/South Pipeline Pit Complex in 2003 recorded a maximum sound level (L_{max}) of 69.8 dBA at approximately 10,000 feet from the source, lasting for less than 5 seconds, which would be equivalent to approximately 91 dBA at 900 feet, a substantially lower level (BLM 2007d). Subjective observations at other mine sites would indicate even lower levels using modern blasting techniques.

Based on these field measurements and observations, this analysis assumes the lower levels are more representative of the actual blasting noise than the assumed levels used for prior Environmental Impact Statements. The blasting noise maximum emission level used in the analysis was 91 dBA at a 900-foot reference distance.

Using the 91 dBA number, the calculated L_{max} noise levels from blasting at the 5-mile study area perimeter would be approximately 62 dBA. L_{max} is the greatest sound level measured on a sound level meter during a designated time interval or vent, using “fast” time averaging on the meter.

The blasting calculations were based on blasting at the surface with no excess attenuation. As with other pit related noise emissions, the noise from blasting would be increasingly reflected upward by the pit walls as the pit depth increased, which would reduce the noise levels outside the pits.

With modern blasting techniques, blast noise would be experienced by people at the nearest ranch as a brief, muted clap and roll of thunder possibly preceded by a faint warning whistle or siren. Public acceptance is generally improved by scheduling blasting at the same time every day to further reduce the “startle factor.”

In summary, with no identified noise-sensitive receptors in the noise effects study area and relatively modest noise level estimates from project-related activities, noise level effects from the proposed project would be negligible.

3.20.2.2 Single Waste Rock Disposal Facility Alternative

The Single WRDF Alternative would be similar to the Proposed Action, except that the East WRDF would not be developed and the West WRDF would be expanded by approximately 54 acres. Overall, this alternative would result in approximately 128 fewer acres of habitat disturbance. Noise emissions from the Single WRDF Alternative would not be measurably different from those anticipated from the proposed project. As a result, all other direct and indirect impacts associated with this alternative would be the same as the Proposed Action.

3.20.2.3 Partial Pit Backfill Alternative

The Partial Pit Backfill Alternative would have a similar footprint as the Proposed Action. Design height and capacity of the West and East WRDF would be significantly different compared to the Proposed Action. The West WRDF would be 230 feet lower and the East WRDF would be 310 feet higher under this alternative and the number of pit lakes would be reduced from three to one. Mining would be sequenced differently from the Proposed Action to allow backfilling portions of the open pit with waste rock during operation. Due to a slower mining rate required to accommodate the sequencing, nine fewer haul trucks and one fewer electric shovel would be used. The slower mining rate would result in a 1-year extension of the mine life.

The Partial Pit Backfill Alternative would result in slightly lower noise emissions than the Proposed Action because of the reduced equipment roster. The distances to the 65 dBA level and to the 10 dBA over background level would be reduced slightly. The effect would likely not be noticeable to the casual observer. The noise would continue for 1 additional year compared with the Proposed Action. There are no identified noise-sensitive receptors in the noise effects study area so the noise level effects of the Partial Backfill Alternative would be negligible.

3.20.2.4 No Action Alternative

Under the No Action Alternative, the proposed project would not be developed and subsequent noise impacts would not occur. Continuation of mining activities associated with the Storm Underground Mine, completion of closure and reclamation activities associated with existing disturbance, and ongoing mineral exploration activities within the study area, would be conducted under existing authorizations. Following these permitted activities, the area would revert to relatively quiet wildlife habitat, agriculture, and dispersed recreation uses, perhaps with some modest influence on noise from other nearby mines.

3.20.3 Cumulative Impacts

The CESA for noise is described in Section 3.20.1, Affected Environment, and is shown in **Figure 3.20-1**. The past, present, and reasonably foreseeable future actions (RFFAs) are discussed in Section 3.2, Past, Present, and Reasonably Foreseeable Future Actions. RFFAs from mining activities are identified in **Table 3.2-1**; their locations are shown in **Figures 3.2-1** and **3.2-2**.

Past actions would have no effect on noise in the study area because noise emissions terminate at the completion of a project or activity. Any potential cumulative noise effects from present actions is included in the estimated background levels for the proposed Arturo Mine Project.

3.20.3.1 Proposed Action

Noise from RFFAs would not be expected to cause cumulative effects with noise from the proposed project because noise tends to be localized to the area within 2 to 5 miles of an activity and there are no

identified noise sensitive receptors within the 5-mile study area perimeter with the potential to be affected by project-generated noise.

3.20.3.2 Single Waste Rock Disposal Facility Alternative

Noise effects from the Single WRDF Alternative would be the same as for the proposed project. No cumulative noise effects would be expected from this alternative.

3.20.3.1 Partial Pit Backfill Alternative

Noise effects under the Partial Pit Backfill Alternative would be slightly less than effects associated with the Proposed Action. No cumulative noise effects would be expected from this alternative.

3.20.3.2 No Action Alternative

Under the No Action Alternative, noise levels from the proposed project area would decline after completion of the Storm Underground Mine, subsequent reclamation activities, and exploration activities. Noise from identified RFFAs also would decline over time as those projects are completed and reclaimed. Any cumulative noise effects in the study area would be minimal.

3.20.4 Potential Monitoring and Mitigation Measures

No additional monitoring or mitigation measures are recommended for mine-related noise effects.

3.20.5 Residual Impacts

Upon completion of the reclamation activities associated with previously approved projects and the proposed project, noise emissions would cease and there would be no residual noise impacts.

3.21 Environmental Justice

The study area and Cumulative Effects Study Area (CESA) for environmental justice includes Elko County and Eureka County (**Figure 3.21-1**). The rationale for the study area is that the mine would be located in Elko County, adjacent to the Eureka County line and the primary access would pass through northern Eureka County. A substantial majority of the workers would be expected to live in west central Elko County because of a combination of proximity, housing availability, and availability of a broad range of public and private services.

3.21.1 Affected Environment

Executive Order (EO) 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" was issued February 11, 1994 (59 Federal Register 7629). EO 12898 "is intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority communities and low-income communities access to public information on, and an opportunity for participation in, matters relating to human health and the environment." It requires each federal agency to achieve environmental justice as part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects, including social and economic effects, of its programs, policies, and activities on minority and low-income populations.

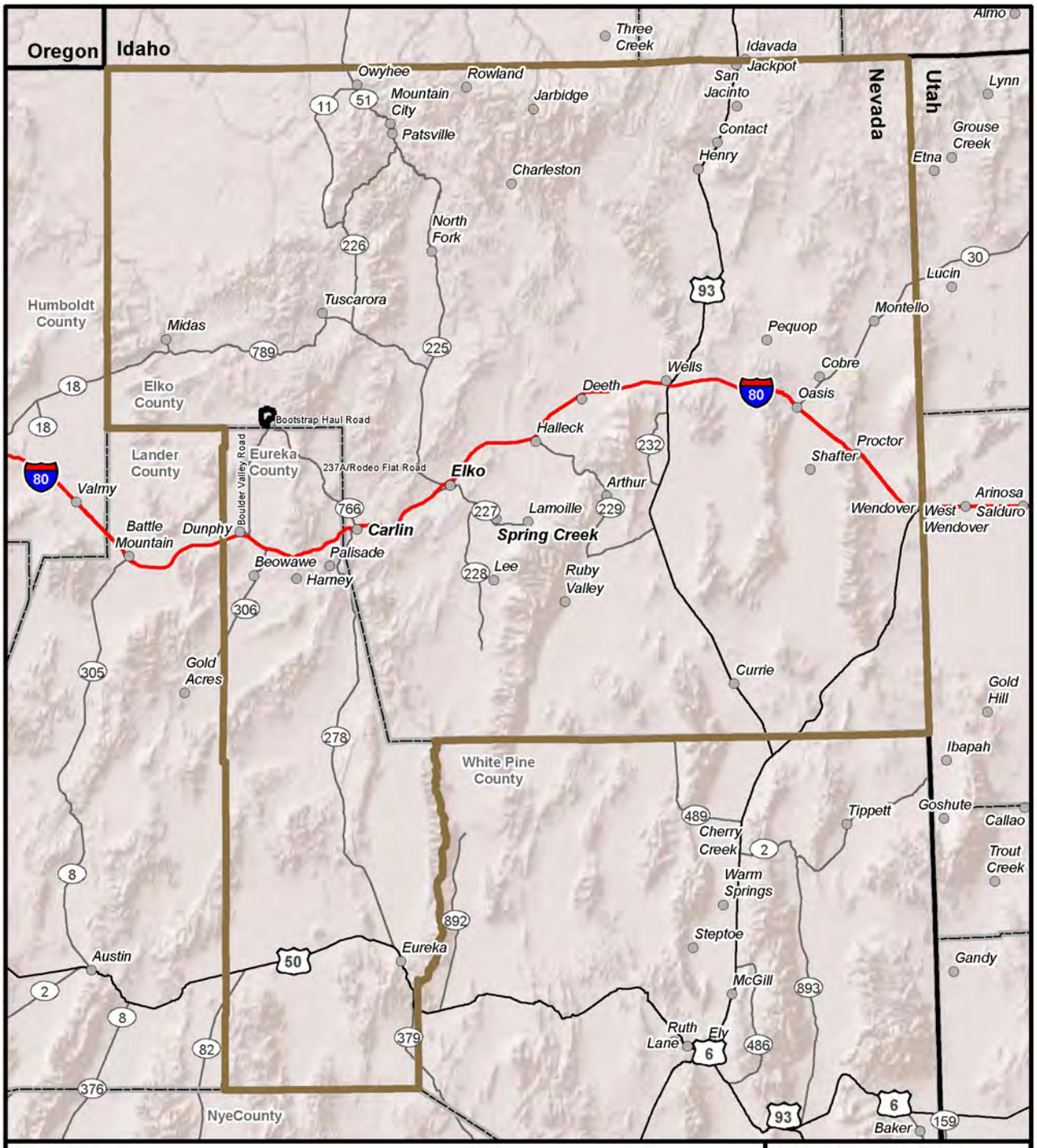
Pursuant to EO 12898, the Council on Environmental Quality (CEQ) prepared "Environmental Justice: Guidance under the Environmental Policy Act" (CEQ 1997) to assist federal agencies with their National Environmental Policy Act (NEPA) procedures "… so that environmental justice concerns are effectively identified and addressed." This analysis was conducted with the assistance of the CEQ "guidance" document.

The CEQ guidance states that population groups defined as minorities include: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic/Latino origin; or Hispanic/Latino. CEQ guidelines for evaluating potential adverse environmental justice effects indicate minority populations should be identified when either: 1) a minority population exceeds 50 percent of the population of the affected area; or 2) a minority population represents a "meaningfully greater increment" of the affected area population than the population of some appropriate larger geographic unit, as a whole.

Low-income populations are those communities or sets of individuals whose median income is below the current poverty level of the general population. According to the guidance, low-income populations in an affected area should be identified using the "annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty." In identifying low-income populations, (federal) agencies may consider as a community either a group of individuals living in geographic proximity to one another or a set of individuals (such as migrant workers or Native Americans) where either type of group experiences common conditions of environmental exposure or effect" (CEQ 1997).

3.21.1.1 Minority Population

Both Elko and Eureka counties are notably less ethnically and racially diverse than the state as a whole. Eureka County, in particular, is over 83 percent white, non-Hispanic, compared with over 69 percent for Elko County and 54 percent for Nevada (**Table 3.21-1**). Both counties have 1 percent or fewer blacks or Asians, compared with over 7 percent for both groups state-wide. Both counties have lower percentages of Hispanics than the state. Elko County does have a higher percentage of American Indian, Eskimo, or Aleut population with 4.7 percent compared with the state's 0.9 percent. This is largely attributable to the presence of the Elko Band Colony, one of four colonies that comprise the Te-Moak Tribe of Western Shoshone with headquarters in Elko.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White Pine County
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Patsville
Jarbidge
Three Creek
Idavada
Jackpot
San Jacinto
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Henry
Charleston
North Fork
Tuscarora
Midas
Bootstrap Haul Road
Boulder Valley Road
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Valmy
Battle Mountain
Dunphy
Carlin
Palisade
Beowawe
Harney
Elko
Deeth
Wells
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Arthur
Lamoille
Spring Creek
Lee
Ruby Valley
Pequop
Cobre
Oasis
Proctor
Shafter
Wendover
West Wendover
Arinosa
Salduro
Montello
Lucin
Etna
Grouse Creek
Lynn
Gold Acres
Currie
Gold Hill
Ibapah
Tippett
Goshute
Callao
Trout Creek
Cherry Creek
Warm Springs
Steptoe
McGill
Ruth
Ely
Lane
Gandy
Baker
Eureka
Austin
Almo
Legend
Proposed PoO Boundary
Cumulative Effects Study Area
N
0 10 20 Miles
Source: BLM 2010c.
Arturo Mine Project EIS
Figure 3.21-1
Environmental Justice Cumulative Effects Study Area

05/21/2012

Table 3.21-1 2010 Race and Ethnicity Percent by County

	Elko County	Eureka County	State of Nevada
White Not of Hispanic Origin	69.1	83.6	54.1
Black Not of Hispanic Origin	0.7	0.1	7.7
American Indian, Eskimo, or Aleut	4.7	2.1	0.9
Asian or Pacific Islander Non-Hispanic	1.0	0.9	7.7
Other and Two or More Races	1.7	1.3	3.1
Hispanic Origin of Any Race	22.9	12.0	26.5

Source: U.S. Census Bureau 2010a.

Census Tract 9517 encompasses much of the rural area of northern Elko County from Humboldt County on the west to the Utah state line on the east. Portions of 13 Census Blocks in Block Group 2 of Census Tract 9517 lie within a 5-mile radius of the project area. All of the proposed surface disturbance would be located in Block 2898. There is no resident population in the census blocks nearest the project area. The total population of Tract 9517 was 2,669 in 2010, scattered among several small communities, ranches, and rural residences. The population was 32.3 percent American Indian and Alaskan Native, and 29.9 percent claimed Hispanic ethnicity. All other minority race categories were very small.

In accordance with the guidance, minority populations should be identified when either:

- The minority population of the affected area exceeds 50 percent; or
- The minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographical analysis.

The population of American Indians does not exceed 50 percent for Elko County. The population percentage of American Indians in Elko County is almost four times greater than for the state as a whole, however, which would be considered “meaningfully greater” than the minority population in the general population. Therefore, for the purpose of identifying environmental justice concerns, a minority population, as defined by the guidance, exists in the study area.

3.21.1.2 Low-Income Population

Although mining is a dominant industry in the study area and mining wages and salaries are typically higher than average, per capita personal income (PCPI) in the study area continues to lag slightly behind the state level. Data from 2000 indicated a state income average of $30,986. Average PCPI for study area counties in 2000 was $25,418 (82.0 percent of the state level) in Elko County and $23,757 (76.7 percent of the state level) in Eureka County (Bureau of Economic Analysis [BEA] 2010). By 2008, the state PCPI had risen to $40,936, an increase of 32 percent. The PCPI for study area counties was $37,300 for Elko County and $40,674 for Eureka County. PCPI in study area counties had grown faster than the state’s PCPI and had risen to 91.1 percent of the state level in Elko County and 99.4 percent of the state level in Eureka County (BEA 2010). In contrast to PCPI, estimated median household incomes tell a slightly different story. The median household income for the state for 2009 was estimated at $53,310, compared with $62,091 for Elko County (116.5 percent of the state level) and $56,815 for Eureka County (106.6 percent of the state level) (U.S. Census Bureau 2010b).

Poverty status is determined by comparing annual income to poverty thresholds, which vary by family size, number of children, and age of the householder, although not geographically. Poverty thresholds

are updated annually based on changes in the Consumer Price Index. Weighted average poverty thresholds for 2009 ranged from $10,289 for a single individual 65 years and over to $44,366 for a household of nine or more people. Census estimates indicated 12.4 percent of the people in Nevada had incomes below the poverty level in 2009 (U.S. Census Bureau 2010b). Both study area counties had lower percentages of people with incomes below the poverty thresholds than the state: Elko County was at 8.2 percent and Eureka County was at 10.4 percent. Estimates of the percent of young people under age 18 in poverty were higher for both jurisdictions, but the percentages for the two study area counties were below the statewide 17.6 percent. Based on this information, neither of the study area counties would be considered to have low-income populations under EO 12898.

3.21.2 Environmental Consequences

Primary issues related to environmental justice are guided by EO 12898 that initiated consideration of environmental justice in federal actions. The basic question is whether any potential adverse human health or environmental effects of the Proposed Action or alternatives would fall disproportionately on minority or low income members of the affected community.

According to the CEQ guidance, “when determining whether human health effects are disproportionately high and adverse, agencies are to consider the following three factors to the extent practicable:

- Whether the health effects, which may be measured in risks and rates, are significant (as employed by NEPA), or above generally accepted norms. Adverse health effects may include bodily impairment, infirmity, illness, or death; and
- Whether the risk or rate of hazard exposure by a minority population, low-income population, or Indian tribe to an environmental hazard is significant (as employed by NEPA) and appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group; and
- Whether health effects occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards”(CEQ 1997).

“When determining whether environmental effects are disproportionately high and adverse, agencies are to consider the following three factors to the extent practicable:

- Whether there is or will be an impact on the natural or physical environment that significantly (as employed by NEPA) and adversely affects a minority population, low-income population, or Indian tribe. Such effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment; and
- Whether environmental effects are significant (as employed by NEPA) and are or may be having an adverse impact on minority populations, low income populations, or Indian tribes that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group; and
- Whether the environmental effects occur or would occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards” (CEQ 1997).

In order to assess the potential for environmental justice impacts, the socioeconomic characteristics of the study area counties and communities are first analyzed for the presence of minority and/or low income populations. Second, if minority and/or low-income populations are identified based on the CEQ Guidance, the proposed project and alternatives are evaluated for potential effects, which may be expected to disproportionately impact any such populations.

3.21.2.1 Proposed Action

The environmental analyses indicate that the potential effects of the proposed project would not be expected to disproportionately affect any particular population. The area in the immediate vicinity of the proposed project has no resident population. The nearest residences are a few remote ranches located several miles from the project area that have not been identified as minority or low-income in nature. The nearest residential area is approximately 30 miles away at Carlin. Beowawe, the nearest community in Eureka County, is approximately 30 miles south of the proposed project. Elko is nearly 50 miles away by road. The community of Owyhee, on the Duck Valley Indian Reservation in Elko County, is over 60 miles north of the proposed project and the Southfork Indian Reservation, also in Elko County, is over 50 miles southeast of the proposed project. The relatively high proportion of Hispanic or Latino population in Census Tract 9517 is assumed to reside a substantial distance from the project area, as well, because of the scarcity of residences in the project vicinity. By the same rationale, there are no concentrations of low-income people near the project area. Environmental effects that may occur at a greater distance from the proposed project area, such as air quality or traffic effects, would affect the study area's population essentially equally without regard to race, ethnicity, or income level.

Regarding whether "communities have been sufficiently involved in the decision making process," the Bureau of Land Management (BLM) has held three public scoping meetings and distributed public notices about the proposed project through mailings and notices in area newspapers in addition to the formal notice in the Federal Register. There also has been an extensive effort to involve the Native American communities in the process through consultation specific to the proposed project (documented in Section 3.6, Native American Traditional Values, and Chapter 4.0, Consultation and Coordination).

3.21.2.2 Single Waste Rock Disposal Facility Alternative

The Single Waste Rock Disposal Facility (WRDF) Alternative would be similar to the Proposed Action, except that the East WRDF would not be developed and the West WRDF would be expanded by approximately 54 acres. Overall, this alternative would result in approximately 128 fewer acres of habitat disturbance. Implementation of this alternative is expected to have the same effects on minority and low income populations as the proposed project. Consequently, this alternative would not be expected to disproportionately affect any particular population.

3.21.2.3 Partial Pit Backfill Alternative

The Partial Pit Backfill Alternative would require the sequencing of mining to allow backfilling portions of the open pit with waste rock during mining. The mining sequence would be less flexible than under the Propose Action. Under this alternative, delays in the schedule would occur to adjust for transport of waste rock to the East and South Pits. The mining rate would slow by an estimated 22 percent, resulting in a 1-year extension of the mine life. The Partial Pit Backfill Alternative would be expected to have the same effects on minority and low-income populations as the proposed project. Consequently, this alternative would not be expected to disproportionately affect any particular population.

3.21.2.4 No Action Alternative

Under the No Action Alternative, BLM would not approve the proposed project. Mining activities associated with the Storm Underground Mine would continue, closure and reclamation activities associated with existing disturbance would be completed, and mineral exploration activities and reclamation would continue in the study area, all under existing authorizations. Any potential adverse environmental justice effects were addressed in the permitting process for the existing activities.

3.21.3 Cumulative Effects

The CESA for environmental justice is defined in Section 3.21.1, Affected Environment, and is shown in **Figure 3.21-1**. The past, present, and reasonably foreseeable future actions (RFFAs) are discussed in

Section 3.2, Past, Present, and Reasonably Foreseeable Future Actions. RFFAs from mining activities are identified in **Table 3.2-1**; their locations are shown in **Figures 3.2-1** and **3.2-2**.

3.21.3.1 Proposed Action

The environmental justice analysis did not identify any disproportionate effects from the proposed project on minority or low-income populations in the study area, and an extensive effort to involve all communities in the decision-making process was documented. Therefore, no disproportionate cumulative effects to these populations would occur as a result of the proposed project.

3.21.3.2 Single Waste Rock Disposal Facility Alternative

No disproportionate adverse effects on minority or low-income populations have been identified for this alternative so there would be no cumulative adverse environmental justice effects from the Single WRDF Alternative.

3.21.3.3 Partial Pit Backfill Alternative

No disproportionate adverse effects on minority or low-income populations have been identified for this alternative, so there would be no cumulative adverse environmental justice effects from the Partial Pit Backfill Alternative.

3.21.3.4 No Action Alternative

No disproportionate cumulative effects to these populations would occur as a result of the No Action Alternative.

3.21.4 Potential Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended for environmental justice.

3.21.5 Residual Impacts

No disproportionate adverse environmental justice effects were identified so there would be no residual impacts.

3.22 Energy Requirements and Climate Change

Energy requirements and greenhouse gas (GHG) emissions associated with the proposed project would be related to the consumption of energy from mining and processing activities over the 20-year project life. Operations that would contribute to GHG emissions would include:

- Fuel consumption (vehicles and machinery); and
- Electricity consumption (machinery and dewatering).

The 2008 national annual emissions of GHGs were approximately 8 billion tons (U.S. Environmental Protection Agency [USEPA] 2008a, reported in carbon dioxide equivalents (CO_2[e])[1]. In Nevada, the total carbon dioxide (CO_2) emissions from all combustion sources (diesel, gasoline, coal, propane, etc.) were approximately 62 million tons (56.3 million metric tons) (Nevada Division of Environmental Protection [NDEP] 2008). A total of 78 percent of Nevada statewide emissions of CO_2 were from electrical power generation and transportation (NDEP 2008). Approximately 3.5 percent of Nevada CO_2 emissions, which is 2.2 million tons, or 2.0 million metric tons of CO_2 per year, were from mining activities along the Carlin Trend (NDEP 2008).

3.22.1 Energy Requirements

Table 3.22-1 presents fuel (primarily diesel), electrical power usage and associated GHG emissions, for the Proposed Action, Single Waste Rock Disposal Facility (WRDF) Alternative, Partial Pit Backfill Alternative, and No Action Alternative. All alternatives have similar energy use and GHG emissions, except for the No Action Alternative.

3.22.2 Climate Change

3.22.2.1 Climate Change Overview

GHGs consist of compounds in the earth's atmosphere that absorb outgoing long-wave radiation emitted from the earth's surface, resulting in a warming of the atmosphere. Naturally occurring GHGs include CO_2, methane (CH_4), nitrous oxide, and ozone. Although many of these gases occur naturally in the atmosphere, man-made sources have substantially increased the emissions of GHGs over the past several decades. Of the man-made GHGs, the greatest contribution currently comes from CO_2 emissions.

Through complex interactions on a regional and global scale, these GHG emissions and net losses of biological carbon sinks (i.e., vegetation) cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia, recent industrialization and burning of fossil carbon sources have caused CO_2(e) concentrations to increase dramatically, and are a possible contributor to overall global climatic changes (Intergovernmental Panel on Climate Change [IPCC] 2007).

Global mean surface temperatures have increased nearly 1.8 degrees Fahrenheit (°F) (1.0 degrees Celsius [°C]) from 1890 to 2006 depending on where measurements are reported (Hansen et al. 2010) ard Institute for Space Studies 2007). Northern latitudes (above 24 degrees North) have exhibited

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[1] CO_2(e) represent the quantity of CO_2 that would be required to produce the same global warming potential (GWP) as any given GHG. Typically, this value is presented over a 100-year period where a given quantity (i.e., 1 pound) of CO_2 has a GWP of 1 and the same quantity of CH_4 has a GWP of 21. Therefore, given the same quantities, CH_4 has an impact 21 times greater than CO_2.

Table 3.22-1 Estimated Fuel and Electrical Power Consumption

Case	Diesel Consumption (gallons)[1]	Power Consumption (kilowatt-hour/year)[1]	Direct GHG (tons per year) CO_2[2]	Indirect GHG (tons CO_2(e) /yr)[2]	Total GHG (tons CO_2(e) /yr)[2]
Proposed Action (stationary sources)	0	60,000	0	25,901	25,901
Proposed Action (mobile sources)	7,227,000	0	80,220	0	80,220
Proposed Action Total	**7,227,000**	**60,000**	**80,220**	**25,901**	**106,121**
Single WRDF Alternative (stationary sources)	0	60,000	0	25,901	25,901
Single WRDF Alternative (mobile sources)	7,727,000	0	85,770	0	85,770
Single WRDF Alternative Total	**7,727,000**	**60,000**	**85,770**	**25,901**	**111,671**
Partial Pit Backfill Alternative (stationary sources)	0	60,000	0	25,901	25,901
Partial Pit Backfill Alternative (mobile sources)	6,814,262	0	75,638	0	75,638
Partial Pit Backfill Alternative Total	**6,814,262**	**60,000**	**0**	**25,901**	**101,539**
No Action Alternative (stationary sources)	0	14,447	0	6,236	6,236
No Action Alternative (mobile sources)	483,719	0	5,369	0	5,369
No Action Alternative Total	**483,719**	**14,447**	**5,369**	**6,236**	**11,606**

[1] BDMV 2011b.

[2] USEPA 2011.

temperature increases of nearly 2.1°F since 1900, with nearly a 1.8°F increase since 1970 alone. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of GHGs are likely to accelerate the rate of climate change.

At present, there is no regulatory program which requires reductions in GHG emissions. However, in response to a Supreme Court decision interpreting the Clean Air Act, on July 30, 2008, the USEPA published an advance notice of proposed rulemaking addressing regulatory mechanisms for regulating GHG emissions for purposes of addressing climate change. Congress also may consider legislation that would impose regulatory controls or incentives for reducing GHG emissions.

As with any field of scientific study, there are uncertainties associated with the science of climate change. This does not imply that scientists do not have confidence in many aspects of climate change science. Some aspects of the science are known with virtual certainty, because they are based on well-known physical laws and documented trends (USEPA 2008b). It should be noted however, that while many in the scientific community assert that increases in global mean surface temperature are undoubtedly caused by increases in global GHG concentrations, others continue to debate this theory for varying reasons, including uncertainty in the empirical evidence and theoretical models (Waugh 2011) and neither side may ever be swayed from their beliefs and theories.

A recent study provides further evidence that the earth is getting warmer. The Berkeley Earth Surface Temperature study (Berkeley 2011) found reliable evidence of a rise in the average world land temperature of approximately 1.8°F (1°C) since the mid-1950s (Science Daily 2011). Analyzing temperature data from 15 sources, in some cases going as far back as 1800, the Berkeley Earth Surface Temperature study directly addressed scientific concerns raised by climate change skeptics, including the urban heat island effect, poor station quality, and the risk of data selection bias.

Specifically, the Berkeley Earth Surface Temperature study concluded that:

- The urban heat island effect is locally large and real, but does not contribute significantly to the average land temperature rise. That is because the urban regions of Earth amount to less than 1 percent of the land area.
- About one-third of temperature sites around the world reported global cooling over the past 70 years (including much of the United States and northern Europe). But two-thirds of the sites show warming. Individual temperature histories reported from a single location are frequently noisy and/or unreliable, and it is always necessary to compare and combine many records to understand the true pattern of global warming.

The large number of sites reporting cooling might help explain some of the skepticism of global warming. In fact, it is very hard to measure weather consistently over decades and centuries, and the presence of sites reporting cooling is a symptom of the noise and local variations that can creep in. A good determination of the rise in global land temperatures cannot be done with just a few stations: it takes hundreds – or better, thousands – of stations to detect and measure the average warming. Only when many nearby thermometers reproduce the same patterns can we know that the measurements were reliably made.

Stations ranked as "poor" in a survey by Anthony Watts and his team of the most important temperature recording stations in the United States, (the United States Historical Climatology Network -- known as the USHCN), showed the same pattern of global warming as stations ranked as “OK.” Absolute temperatures of poor stations may be higher and less accurate, but the overall global warming trend is the same, and the Berkeley Earth Surface Temperature analysis concluded that there is not any undue bias from including poor stations in the survey.

Another recent study titled The Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation concluded that climate change would likely lead to global increases in extreme weather, along with heightened risks to livelihoods, human health, and infrastructure, both today and in the future (IPCC 2011). This report also describes the costs -- in terms of lives lost and economic damages -- that have already occurred, plus those that would likely result from this phenomenon, and the societal implications of a warmer world, in which yesterday's extreme conditions become the new norm.

Climate change analyses are comprised of several factors including, but not limited to, GHGs, land use management practices, and the albedo effect (the fraction of solar radiation reflected by a surface or object). While emissions from mining activities may contribute to the effects of climate change to some

extent, it is currently not possible to associate any particular actions with the creation of any specific climate-related environmental effects. The tools necessary to quantify climatic impacts presently are unavailable. As a consequence, impact assessments of specific effects of man-made activities cannot be determined. Therefore, climate change analysis for the purpose of this document is limited to accounting and disclosing of GHG emissions that may contribute to climate change.

3.22.2.2 Proposed Project and Climate Change

Historically, the climate in the project area (the Great Basin Desert) has been highly variable due to its location in respect to atmospheric circulation patterns and the surrounding complex topography. However, it is highly probable that temperatures in North America will rise over the next 100 years with temperatures in the western United States increasing between 2.5 and 6°C relative to pre-1900 levels (Christensen et al. 2007). These increased temperatures will have numerous impacts, including diminished water resources related to longer periods of drought, snowpack dissipation due to warmer temperatures (snow will occur later in the year and melt sooner) (Bureau of Reclamation 2011), and a direct effect on ozone which has been shown to have increased ground level concentrations due to increasing temperature (USEPA 1998b).

The proposed project would emit CO_2(e) that would incrementally add to the GHGs in the region from other sources including power plants, mining activities, industrial operations, vehicle traffic, wildfires, and other activities as identified in Section 3.2, Past, Present, and Reasonably Foreseeable Future Actions. The proposed project, including the Proposed Action, Single WRDF Alternative, and the Partial Pit Backfill Alternative, represents approximately 1 percent of the GHG emissions from all sources in the region, approximately 0.04 percent of the emissions in Nevada, and a tiny fraction of the emissions on a global basis. As a result, the proposed project would be expected to have a negligible effect on climate.

3.23 Relationship between Short-term Uses of the Human Environment and the Maintenance and Enhancement of Long-term Productivity

As described in the introduction to Chapter 3.0, short-term is defined as the 8-year mine life of the project and a 4-year reclamation period; long-term is defined as the future following reclamation (i.e., beyond 12 years). This section identifies the tradeoffs between the short-term impacts to environmental resources during operation and reclamation versus the long-term impacts to resource productivity that would extend beyond the end of reclamation.

The short-term use of resources during the expansion, operation, and reclamation of the proposed project would result in beneficial impacts in the form of an extension of local employment and the generation of revenue.

The proposed project would result in various short-term impacts, such as the temporary loss of soil and vegetation productivity and the associated loss of wildlife habitat, possible wildlife avoidance and displacement, a reduction in dispersed recreation opportunities, temporary increases in fugitive dust, and increased noise levels. These impacts are expected to end upon completion of operations and would be minimized through implementation of applicant-committed environmental protection measures.

The short-term visual impacts would last a few years beyond mine closure and gradually would be reduced as vegetation becomes more established. The scale and extent of the facilities would continue to alter the local landscape and views in the long term.

Impacts to long-term productivity (i.e., following project reclamation) primarily would depend on the effectiveness of the proposed reclamation of the disturbance areas. Successful reclamation would provide for post-mining wildlife and self-sustaining plant communities. Revegetation also is expected to stabilize disturbed surfaces and control erosion.

There would be a long-term loss in soil and vegetation productivity and associated terrestrial wildlife habitat, a reduction in livestock grazing areas, and public lands used for dispersed recreation that would not be reclaimed.

3.24 Irreversible and Irretrievable Commitment of Resources

The proposed project could result in the irreversible commitment of resources (e.g., the loss of future options for resource development or management, especially of nonrenewable resources such as minerals or cultural resources) or the irretrievable commitment of resources (e.g., the lost production or use of renewable natural resources during the life of the operations). Irreversible and irretrievable impacts of the proposed project are summarized for each resource in **Table 3.24-1**.

Table 3.24-1 Irreversible and Irretrievable Commitment of Resources by the Proposed Action

Resource	Irreversible Impacts	Irretrievable Impacts	Explanation
Geology and Minerals	Yes	Yes	Approximately 64 million tons of gold ore would be mined during operations. This would result in the irreversible and irretrievable commitment of this resource.
Water Quality and Quantity (Surface and Ground) and Water Use	Yes	Yes	Evaporation from the pit lake would result in an irreversible and irretrievable impact to surface water quality within the pit lake.
Cultural Resources	Yes	Yes	Although data recovery would be completed at 29 historic properties, irreversible and irretrievable impacts to these sites would occur because the sites ultimately would be destroyed by project construction and some of their data would be lost. Irreversible and irretrievable indirect and cumulative impacts to sites not undergoing data recovery would occur.
Native American Traditional Values	No	No	Adverse effects to religious, spiritual, or sacred values cannot be monitored or mitigated.
Hazardous Materials and Solid Waste	No	No	No irreversible or irretrievable commitment of resources or impact is anticipated. However, if a spill were to affect a sensitive resource, an irretrievable impact could occur pending the recovery of the resource.
Air Quality	No	No	Project emissions would not exceed federal or state Ambient Air Quality Standards. Air quality would return to existing conditions after completion of the project.
Paleontological Resources	Yes	Yes	There would be an irretrievable and irreversible loss of any paleontological resources in Carlin Formation areas buried by the waste rock disposal facilities.
Social and Economic Values	No	Yes	Labor and some capital resources, once committed and expended, would not be retrievable.
Recreation and Wilderness	Yes	Yes	There would be an irretrievable loss of public land available for dispersed recreational opportunities during operations and reclamation. An irreversible loss would occur on approximately 472 acres of public land previously reclaimed or newly disturbed associated with the expansion of the existing open pit, which would not be reclaimed. No irreversible or irretrievable commitment or impact of wilderness resources is anticipated.
Visual Resources	Yes	No	Impacts to visual resources would be reduced through successful reclamation procedures and implementation of the environmental protection measures. However, permanent changes would result.

Table 3.24-1 Irreversible and Irretrievable Commitment of Resources by the Proposed Action

Resource	Irreversible Impacts	Irretrievable Impacts	Explanation
Soils	Yes	Yes	Suitable growth media would be salvaged from the mine disturbance areas for use in reclamation. There would be a loss of soil productivity during operations on approximately 1,962 previously undisturbed acres and 543 previously disturbed but reclaimed acres, resulting in an irretrievable commitment of 2,505 acres of this resource. There would be an additional irreversible commitment of the resource on approximately 472 acres previously reclaimed or undisturbed associated with the expansion of the open pit, which would not be reclaimed.
Vegetation, including Riparian Zones and Wetlands	Yes	Yes	There would be an irretrievable commitment of vegetation resources on approximately 1,962 previously undisturbed acres and 543 previously disturbed but reclaimed acres during operations. There would be an additional irreversible commitment of the resource on approximately 472 acres (previously reclaimed or undisturbed) associated with the expansion of the open pit, which would not be reclaimed. An irreversible and irretrievable impact to riparian zones and wetland resources is anticipated, which would be mitigated by the offsite enhancement of wetlands.
Noxious Weeds and Invasive Species	No	No	Disturbance areas within the proposed project area would be monitored to identify any noxious weeds and invasive species. If populations were observed within the proposed project area during operations, they would be removed. Successful reclamation of disturbance areas also would minimize the potential for establishment of noxious weeds and invasive species within the proposed disturbance area.
Range Resources	Yes	Yes	There would be an irretrievable commitment of range resources on approximately 3,357 acres with a suspension of approximately 687 animal unit months (AUMs) during operations. An irretrievable loss of 95 AUMs would occur within the Twenty Five Allotment from the expansion of the open pit, which would not be reclaimed.
Wildlife and Aquatic Biological Resources	Yes	Yes	There would be an irretrievable commitment of sagebrush shrubland, grassland, and riparian zone and wetland area wildlife habitat on approximately 2,505 acres during operations. There would be an additional irreversible commitment of the resource on approximately 472 acres of sagebrush shrubland, and grassland associated with the expansion of the existing open pit, which would not be reclaimed.
Special Status Species	Yes	Yes	Same as described above for Wildlife and Aquatic Biological Resources.

Table 3.24-1 Irreversible and Irretrievable Commitment of Resources by the Proposed Action

Resource	Irreversible Impacts	Irretrievable Impacts	Explanation
Access and Land Use	Yes	No	There would be no irreversible or irretrievable impacts to access; public access patterns would be maintained. An irreversible loss would occur on approximately 472 acres of public land associated with the expansion of the existing open pit, which would not be reclaimed.
Noise	No	No	Noise is not considered irreversible because it would cease following the completion of mine operations.
Environmental Justice	No	No	The proposed project would not disproportionately affect minority or low-income populations.
Energy Requirements and Climate Change	No	Yes	There would be irretrievable energy consumption during the operations and reclamation. The proposed project would be expected to have a negligible effect on climate.