Livestock Grazing

Introduction

A large portion of the project area is classified by the Forest Service as being capable of supporting livestock grazing, and the majority of the land is currently under grazing permits held by Rosemont Copper. The project area is located within portions of the Rosemont, DeBaud, Thurber, Greaterville, Helvetia, and Stone Springs grazing allotments on the Nogales Ranger District (figure 78).

The terms "grazing capability" and "grazing suitability" are used throughout this section. The following discussion of these terms is offered to provide the reader with a clearer understanding of their meaning in this context.

Capability is the potential of an area of land to produce resources, supply goods and services, or allow resource uses under an assumed set of management practices at a given level of management intensity. Capable grazing lands are the sum of all lands classified as having full or potential grazing capability for domestic livestock. A large portion of the capability determination is based on factors such as landform, geology, slope, and climate.

Suitability is the appropriateness of applying certain resource management practices to a particular area of land as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices. Land suitable for grazing is accessible to livestock or wildlife, can be grazed on a sustained yield basis without damage to long-term productivity, and is compatible with desired conditions.

It is important to note that decisions regarding grazing capability and suitability are not being made with the Rosemont Copper Project decision. While potential changes in capability and suitability from the project are described in this section, subsequent analysis and NEPA decisions would be required to determine both capability and suitability for grazing based on postmine conditions.

Changes from the Draft Environmental Impact Statement

Public comments asked that the livestock grazing section be improved to address impacts to allotments, livestock health, and livestock water supply, the effectiveness of reclamation measures related to grazing, and cumulative impacts to livestock. Each of these items is addressed either in this section or in the response to public comments (see appendix G).

The analysis for livestock grazing in the DEIS assumed that livestock grazing would be excluded from all areas within the perimeter fence. However, it was subsequently determined that livestock grazing could possibly continue to be allowed in the area between the perimeter fence and the security fence during the active mining phase. While allowing grazing between the perimeter and security fence is a possibility, until the fences are constructed and range conditions assessed, it is not possible to determine the suitability of this area for grazing. Therefore, the calculation of reduction in AUMs remains based on the perimeter fence, not the security fence, and is similar to that used in the DEIS.

The term "potentially capable" has been replaced with the term "partially capable." NFS lands are classified in terms of relative capability of supporting grazing activities and as being fully capable, partially capable, or not capable. Partially capable is not a typical term used in Forest Service grazing management, but in this situation it applies to reclaimed areas that would likely meet slope

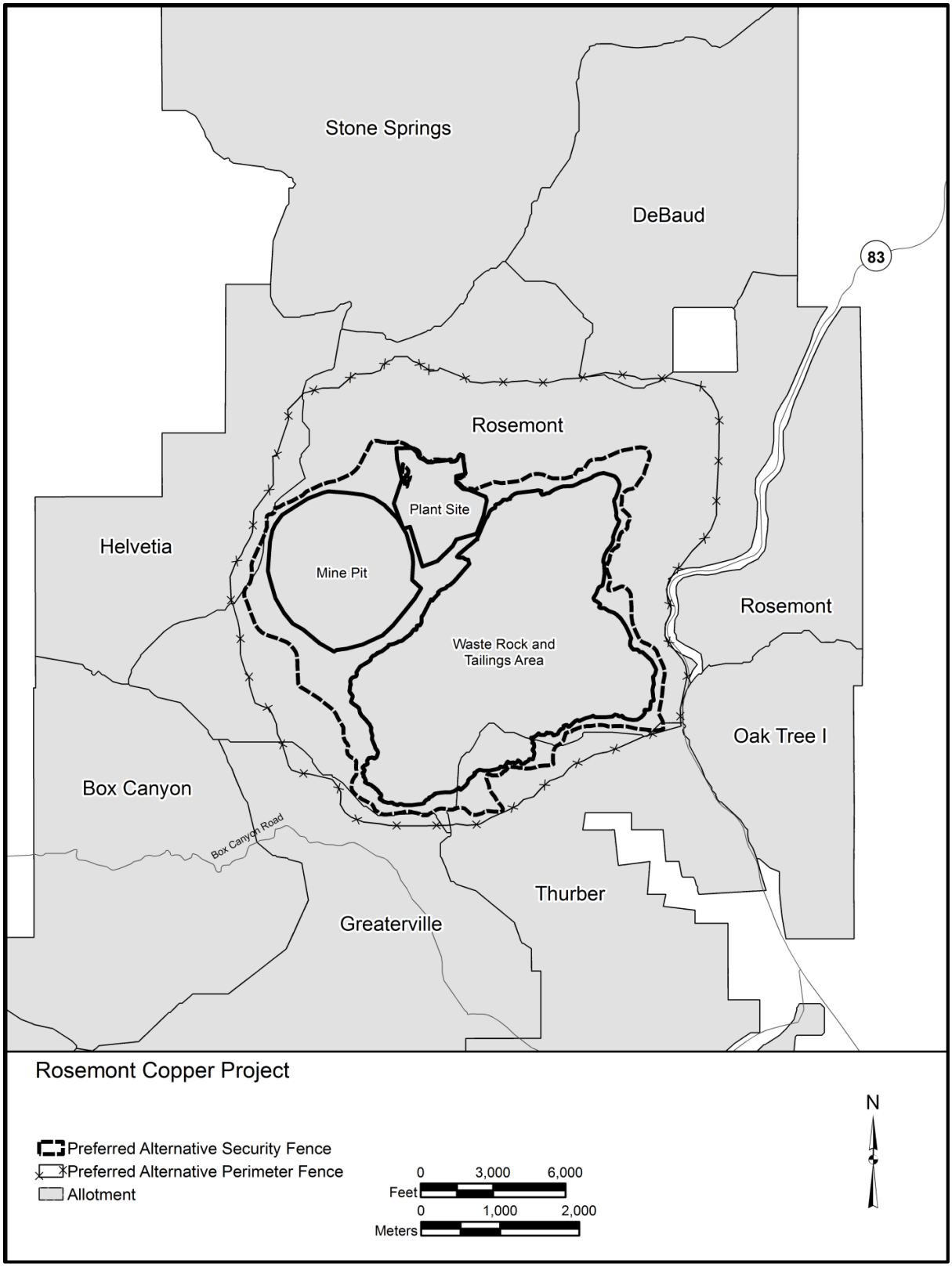

Figure 78. Grazing allotments and the Barrel Alternative

considerations but not the production of forage until proven. Areas permanently removed from grazing are considered not capable.

Table 132, which summarizes current grazing activities within project area, has been updated with more current information to reflect changes since the publication of the DEIS.

Tables 133 and 135 through 139 have been updated to reflect changes in acres and reductions in AUMs associated with continued livestock grazing between the security and perimeter fences.

Issues, Cause and Effect Relationships of Concern

Although effects on livestock grazing were not identified as a significant issue through the scoping process, all action alternatives would cause impacts to the grazing allotments within the project area by removing lands suitable for livestock grazing, impacting water sources, and altering grazing patterns. The following section addresses the alternatives' impacts to livestock grazing in order to provide a full impact analysis as well as to provide the background information that is used in the analysis of impacts to other resources. Other issues not identified during public and agency scoping that are analyzed in this section include the following:

- Acres of change in classification of capability of each grazing allotment from fully capable to partially capable or not capable
- Stock tanks lost
- Seeps and springs impacted
- Reduction in animal unit months

Analysis Methodology, Assumptions, Uncertain and Unknown Information

The temporal bounds of analysis includes the premining, active mining, final reclamation and closure, and postmining phases. Grazing would still take place where it does not conflict with mine activities during all of these phases, but the level of grazing would be reduced because grazing would be excluded from areas within the security fence. Postclosure, grazing limitations may continue in order to allow reclamation to proceed.

The analysis area for livestock grazing represents the total area in which grazing could be restricted as a result of mine activities (excluded within the security fence, restricted between the security fence and the perimeter fence) and the areas in which stock tanks and seeps and springs could be impacted, as shown in figure 78. The electric transmission line, water line, primary access road, and sections of reconstruction on the utility maintenance road would all remove or disturb existing vegetation, which would reduce forage availability in those specific areas. However, on the basis of the grazing allotments as a whole, the loss of this vegetation would be minimal and would not affect livestock grazing management on NFS lands.

Security fence locations are shown in figures 9, 13, 17, 21, and 23 in chapter 2. The locations of seeps and springs potentially impacted are shown in figure 69 in the "Seeps, Springs, and Riparian Areas" resource section of chapter 3. Figure 78 shows the security fence and perimeter fence of the Barrel Alternative in relation to the grazing allotments in the vicinity of the project area. Perimeter and security fence locations vary by alternative (see figures 9, 13, 17, 21, and 23 in chapter 2). Grazing would continue on all allotments during all mine phases, although some grazing allotments would be

reduced in capacity primarily because of the areas within the security fence that would be excluded from grazing.

The analysis methodology for determining the existing conditions of grazing allotments and impacts to grazing allotments includes obtaining Forest Service geospatial data for the existing allotments and overlaying the data with the total fenced areas within the security fence for the action alternatives. Acreages of impacted grazing allotments are calculated where the areas within the security fence overlap the locations of the grazing allotments.

The potential reductions in AUMs were determined using GIS data and a mathematical equation. This is basically a desktop analysis to determine the possible reduction in AUMs. In order to conduct a more precise analysis, several years of studies would be needed for the allotments once the perimeter and security fences have been constructed and the mine is operational. Information on conditions at that time would be needed to determine livestock use once the fences have been installed and the mine is operational. Additional information regarding the availability of water in the area where livestock could graze would be needed, among other data. It is anticipated that these studies would be conducted as part of an update to allotment management plans or other planning efforts for the affected allotments once the mine is constructed and operating.

While it is the Coronado's intent to allow grazing within the perimeter fence during all mine phases, the number of livestock that would be allowed to graze cannot be determined until the security and perimeter fences are constructed and range conditions determined. Therefore, the calculations of reductions in AUMs assume no grazing within the perimeter fence. This represents a worst-case scenario in which range condition inspections determine that the area between the security and perimeter fence is not suitable for grazing during mine operations. The most likely outcome would be AUM numbers that are somewhere between those that are currently allowed and those reflected in the analysis.

Grazing may be reintroduced in areas within the security fence once reclamation is completed and the land has been determined to be suitable for grazing. This could be during the active mining phase in some areas where concurrent reclamation has occurred or is occurring and livestock grazing has been determined to be suitable for specific areas. It is not known when revegetation would be established enough to reinstate grazing, but assessment of the acreage of suitable grazing habitat returned to productivity during reclamation is estimated based on ongoing research conducted by the University of Arizona and funded by Rosemont Copper.

Adequate information was found to analyze livestock grazing impacts in terms of capability for the purposes of this analysis and the final decision to be made. Uncertain and unknown information pertaining to impacts to stock tanks, seeps, and springs is addressed in the "Seeps, Springs, and Riparian Areas" resource section of chapter 3.

Summary of Effects by Issue Factor by Alternative

Table 132 presents the summary comparison of impacts from each alternative.

Table 132. Summary of effects

Issue Factor	No Action	Proposed Action	Phased Tailings	Barrel	Barrel Trail	Scholefield-McCleary
Other Effects Considered						
Issues Analyzed: Impact to Allotments						
Acres of change from fully to partially capable within Rosemont allotment	0	4,156	4,085	4,040	4,454	3,835
Acres of change from fully to partially capable within Thurber allotment	0	204	204	178	230	0
Acres of change from fully to partially capable within Greaterville allotment	0	19	19	<1	1	0
Acres of change from fully to partially capable within DeBaud allotment	0	8	0	0	0	1,031
Acres of change from fully to partially capable within Helvetia allotment	0	<1	<1	9	<1	0
Acres of change from fully to partially capable within Stone Springs allotment	0	0	0	0	0	77
Acres of change from fully to not capable within Rosemont allotment	0	950	950	950	950	950
Stock ponds lost	0	11	11	15	15	5
Springs impacted	0	76	76	76	76	79
Potential reduction in AUMs each year over 25-year mine life	0	900 to 919	900 to 919	862 to 919	975 to 1,001	1,009 to 1,045

Affected Environment

Relevant Laws, Regulations, Policies, and Plans

Major legislation, guidance, and mandates directing the administration of livestock grazing on public lands are as follows (from FSM 2200, "Range Management," (U.S. Forest Service 2005)):

- Organic Administration Act of June 4, 1897 (Chapter 2, 30 Statute 34, as amended; 16 U.S.C. 551).
- Bankhead-Jones Farm Tenant Act, Title III, of July 22, 1937, Sections 31–33 (Chapter 517, 50 Statute 525, as amended; 7 U.S.C. 1010–1012).
- Granger-Thye Act of April 24, 1950, Sections 1, 5, 7, 11, 12, 18, 19 (Chapter 97, 64 Statute 82; 16 U.S.C. 571c, 572, 580d, 580g, 580h, 580k, 580).
- Multiple-Use Sustained-Yield Act of June 12, 1960 (Public Law 86-517, 74 Statute 215; 16 U.S.C. 528–531).
- National Environmental Policy Act of January 1, 1970 (Public Law 91-190, 83 Statute 852; 42 U.S.C. 4321 (note), 4321, 4331–4335, 4341–4347).
- Forest and Rangeland Renewable Resources Planning Act of August 17, 1974 (Public Law 93-378, 88 Statute 476, as amended; 16 U.S.C. 1601 (note), 1600–1614).
- National Forest Management Act of October 22, 1976 (Public Law 94-588, 90 Statute 2949, as amended; 16 U.S.C. 472a, 476, 500, 513–516, 518, 521b, 528 (note), 576b, 594-2 (note), 1600 (note), 1601 (note), 1600–1602, 1604, 1606, 1608–1614).
- Federal Land Policy and Management Act of October 21, 1976, Sections 206, 310, 401–404 (Public Law 94-579, 90 Statute 2743, as amended; 43 U.S.C. 1716, 1740, 1751–1753).

- Public Rangelands Improvement Act of October 25, 1978 (92 Statute 1803; 43 U.S.C. 1752–1753, 1901–1908).

General Management Direction for Grazing on the Coronado National Forest

Objectives of the Range Management Program for the national forests and national grasslands are as follows (from FSM 2200, "Range Management" (U.S. Forest Service 2005:4)):

- To manage range vegetation in order to protect basic soil and water resources, provide for ecological diversity, improve or maintain environmental quality, and meet public needs for interrelated resource uses;
- To integrate management of range vegetation with other resource programs to achieve multiple-use objectives contained in forest land and resource management plans;
- To provide for livestock forage, wildlife food and habitat, outdoor recreation, and other resource values dependent on range vegetation;
- To contribute to the economic and social well-being of people by providing opportunities for economic diversity and by promoting stability for communities that depend on range resources for their livelihood; and
- To provide expertise on range ecology, botany, and management of grazing animals.

In general, the goal of the Coronado for every allotment is to manage livestock in a manner that allows for the attainment of sustainable multiple-use resource objectives that are compatible with the standards and guidelines in the forest plan and the principles of ecosystem management. In doing so, the Coronado ensures the following: (1) the proper use of water resources; (2) compliance with the ESA; (3) compliance with the National Historic Preservation Act; (4) compliance with the forest plan (U.S. Forest Service 1986); (5) overall satisfactory watershed condition; and (6) sustainable vegetation (or range) conditions.

To accomplish the above objectives, the Coronado would do the following: (1) establish maximum utilization levels annually for each pasture (within each allotment or management unit) based on current management objectives and depending on the season of use; (2) adjust livestock movement patterns based on water and forage availability, typically through the use of salt blocks (placed away from water areas) to help control movement; (3) make necessary range improvements, such as repairing fencing and routine maintenance of existing improvements; and (4) implement a monitoring system. This monitoring system includes the establishment of key areas, monitoring of utilization levels, and inspections to ensure that desired management goals and objectives are met.

Existing Rangeland Management and Conditions

Rosemont Copper holds the grazing permits for the allotments within the project area. Rosemont Copper plans to continue all permitted grazing activities (see table 133) as permitted throughout the course of the project. Currently, Rosemont Copper holds term grazing permits on four allotments: Rosemont, Thurber, Greaterville, and DeBaud. Each year, 325 head of cattle are permitted to graze the Rosemont allotment between March 1 and 31; 325 head between September 1 and October 31; and 150 head between November 1 and February 28 (U.S. Forest Service 2002). For the Greaterville allotment, 325 head of cattle are permitted to graze between April 1 and August 31 each year (U.S. Forest Service 2002); 150 head are permitted to graze the DeBaud allotment between November 1 and February 28 each year (U.S. Forest Service 2002); and 221 head of cattle are permitted to graze

the Thurber allotment each year (U.S. Forest Service 2008). Actual use can vary from permitted use, depending on what is determined in the Annual Operating Instruction meeting between the Coronado and the permittee. The Helvetia and Stone Springs allotments would be impacted only slightly by proposed mine activities; these term grazing permits are held by other parties.

Table 133. Summary of current grazing activities within project area

Allotment	Permitted Numbers	Permitted AUMs	Permitted Period of Use	Authorized Use (2012)	Authorized AUMs (2012)	Proposed Season of Use (2012)
Greaterville*	325	1,635	4/01–08/31	250	708	4/01/12–8/31/12
Rosemont*	325 325 150	331 652 592	3/01–8/31 9/01–10/31 11/01–2/28	125 150	625 444	8/1/12–5/1/12 12/1/12–2/28/13
DeBaud*	150	592	11/01–2/28	Rested	0	11/01/12–2/28/12
Thurber*	221	2,652	3/01–2/28	125 250	505 535	8/1/12–12/1/12 7/15/12–10/15/12
Helvetia†	60	950	3/01–2/28	595	826	9/1/12–10/1/12 8/1/12–7/15/13
Stone Springs‡	245	1,474	10/31–3/31	Rested	0	10/01/12–3/31/13

* Rosemont, Thurber, Greaterville, and DeBaud grazing permits held by Rosemont Copper.

† Helvetia grazing permit held by Santa Rita Ranch.

‡ Stone Springs grazing permit held by ANAM, Inc.

The four allotments permitted to Rosemont Copper contain a mixture of Federal, State, and private lands totaling approximately 22,190 acres, with 19,370 acres of land suitable for livestock grazing. Rosemont Copper (or parent company) is permitted to graze cattle on all four allotments, and approximately 6,454 AUMs of grazing are currently authorized each year. An “animal unit month” refers to the amount of forage necessary to feed 1 animal unit for a period of 1 month. An “animal unit” is defined as 1 mature cow of approximately 1,000 pounds and a calf up to weaning age, usually 6 months, or their equivalent of other animals.

Rangeland within the project area encompasses two major vegetation types: semidesert grassland and Madrean evergreen woodland (Brown 1994). There are also a few areas that contain riparian woodland vegetation and xeroriparian vegetation. Madrean evergreen woodland covers the higher elevations of the project area, generally in the western and southern areas. This community is characterized by open woodlands or savanna composed of trees interspersed with grasses and forbs. Semidesert grassland, characterized by open grasslands with widely scattered shrubs and cacti, covers the lower elevations of the project area. Vegetation types are described more fully in the “Biological Resources” resource section.

Current rangeland conditions on the Coronado National Forest have been partially hampered as a result of recent drought conditions; the conditions also reflect a history of intense grazing pressure that resulted in erosion. The Coronado currently employs a rotational grazing system on all of its allotments in order to allow the development of an adaptive management strategy intended to rest pastures when necessary. A combination of rest and use, or even complete deferral for at least one full growing season, is commonly and regularly employed across the Coronado National Forest on all allotments when necessary to ensure that range conditions do not deteriorate (Brown 2009).

The majority of the capable rangeland in the project area appears to be in satisfactory condition (a Forest Service measure of the health of the vegetation and soil relative to their combined potential to produce a sound and stable biotic community) based on range vegetation transect studies conducted on the Rosemont, Greaterville, and DeBaud allotments in fall 2009 (Biedenbender 2010a, 2010b; Lockwood 2010a) and as evidenced by pace, cluster, and line vegetation transects conducted in a variety of locations on the Thurber allotment in November 2006 (U.S. Forest Service 2008).

Vegetation and soil conditions on the Greaterville, Rosemont, and DeBaud allotments are stable or have improved since monitoring transects were initially established in the 1960s (Biedenbender 2010a, 2010b; Lockwood 2010a). In spite of the more than 10-year drought, vegetation on the Greaterville, Rosemont, and DeBaud allotments is currently in fair to excellent condition, and the soil condition on all the monitoring sites is satisfactory, the highest category in the Natural Resources Conservation Service Soil Condition Rating Guide (Biedenbender 2010a, 2010b; Lockwood 2010a). This indicates that hydrologic function, soil and site stability, and nutrient cycling are intact on these sites (Biedenbender 2010a, 2010b; Lockwood 2010a). Rangeland monitoring analysis results are shown in table 134 for the Rosemont, Greaterville, and DeBaud allotments.

Table 134. Rangeland conditions from the 1950s through 2010

Allotment	1950s Vegetation	1950s Soils	1967 to 1969 Vegetation	1967 to 1969 Soils	1995 Vegetation	1995 Soils	2005 to 2010 Vegetation	2005 to 2010 Soils
Rosemont	–	–	Fair to good	High fair to excellent	Fair to excellent	–	Good to excellent	Satisfactory
Greaterville	–	–	Good	High fair to excellent	Fair to excellent	–	Fair to excellent	Satisfactory
DeBaud	–	–	Fair to high fair	Fair to good	Fair to good	–	High fair to good	Satisfactory
Thurber	Fair to good	Fair to good	–	–	Good to excellent	–	Fair to good	Good to excellent
Helvetia	–	–	Fair to good	Fair to good	–	–	Fair	Good
Stone Springs	–	–	Fair	Fair	–	–	Poor to excellent	Satisfactory

Sources: Biedenbender (2010a; 2010b); Brown (2007); Lockwood (2007; 2010a; 2010b).

Notes:

– = No soils or vegetation conditions were reported for this time period.

The rating system used to characterize soils in rangeland condition assessments has changed over time. By 2005, the Forest Service had adopted soil ratings as described below. Prior to this, ratings were given on a rating scale of "poor" to "excellent."

The most recent soil rating system is based on the Natural Resources Conservation Service Soil Condition Rating Guide. These ratings are defined as follows (U.S. Forest Service 1999:4–5):
Satisfactory – Indicators signify that soil function is being sustained and soil is functioning properly and normally. The ability of soil to maintain resource values and sustain outputs is high.
Impaired – Indicators signify a reduction in soil function. The ability of soil to function properly has been reduced and/or there exists an increased vulnerability to degradation.
Unsatisfactory – Indicators signify that loss of soil function has occurred. Degradation of vital soil functions results in the inability of soil to maintain resource values, sustain outputs, and recover from impacts.

The purpose of any monitoring program is to be able to determine whether management actions are being properly implemented and are effective at achieving the desired conditions (U.S. Forest Service 2005). The Coronado employs a combination of effectiveness and implementation monitoring in an attempt to achieve a successful monitoring program. Effectiveness monitoring is used to track

conditions and trends in upland and riparian vegetation, soils, and watersheds and follows the procedures outlined in Cooperative Extension Service (1999) and Forest Service (1996). Effectiveness monitoring occurs at least once over the 10-year term of the grazing permit, or more frequently if necessary (U.S. Forest Service 2008). Implementation monitoring includes inspection reports, forage utilization measurements, livestock counts, and facilities inspections (U.S. Forest Service 2008). Utilization measurements are conducted in accordance with the principles and procedures outlined in Cooperative Extension Service (1999) and Smith et al. (2007). Utilization is monitored for key forage species, i.e., native perennial grasses palatable to livestock. As livestock use patterns change, new key areas may be established and existing key areas may be modified or discontinued.

Environmental Consequences

Direct and Indirect Effects of Each Alternative

No Action Alternative

Under the no action alternative, there would be no loss of grazing access from any of the allotments and no loss of seeps, springs, or stock tanks. Site conditions would remain satisfactory. Climate change is expected to result in continued drought, which could stress vegetation and result in changes in grazing management in the future.

Impacts Common to All Action Alternatives

The electric transmission line, water line, primary access road, and sections of reconstruction on the utility maintenance road would all remove or disturb existing vegetation, which would reduce forage availability in those specific areas. However, taking into account the grazing allotments as a whole, the loss of this vegetation would be minimal and would not result in reductions in AUMs.

For all action alternatives, grazing as currently permitted would be allowed in the area between the perimeter fence and security fence. Grazing would be excluded from the area within the security fence until such time that the Forest Service determines conditions to be appropriate for reinstituting grazing. Range fencing outside the security fence would not be impacted. While grazing between the perimeter and security fences would be allowed to continue in accordance with current permit requirements, it is possible that changed conditions resulting from fence installation and mine operations could result in future grazing restrictions or changes in permitted AUMs. Monitoring would occur as deemed necessary by the Coronado to determine range conditions; any changes to grazing within the perimeter fence would be based on the monitoring results.

Clearing of vegetation for construction of the mine and ancillary facilities would result in long-term impacts to livestock grazing on NFS allotments for all action alternatives. The impacts are largely a matter of acres directly impacted, which correlate to acres within the perimeter fence and differ by alternative, as described below.

Approximately 955 acres of the Rosemont allotment would change from fully capable to not capable (i.e., the area of the mine pit). The remaining disturbance acres could be converted to suitable grazing habitat once monitoring of reclamation indicates the success of vegetation establishment, including vegetation density and diversity.

Proposed Action

As a result of the proposed action, there would be a change from fully capable to partially capable on the Rosemont, DeBaud, Thurber, Greaterville, and Helvetia allotments, as shown in table 135.

During the premining and active mining phases, some limitation of grazing would occur, as summarized in table 135. Reductions in the suitable acreage for the Helvetia, DeBaud, and Greaterville allotments are minor enough that no reductions in AUMs would be necessary. However, a reduction of 900 to 919 AUMs could occur under the proposed action from the Rosemont and Thurber allotments. Overall, there would be no impact to the ability of the Forest Service to manage grazing allotments (i.e., rest and rotation).

Table 135. Potential loss of grazing during premining and active mining phases under proposed action

Allotment	Suitable Acres	Restricted Acres (within perimeter fence)	Percentage of Allotment Impacted	Permitted AUMs	Reduction in AUMs
Rosemont	8,410	5,634	67	1,575	779 to 787 AUMS
Greaterville	4,120	88	2	1,635	No reduction
DeBaud	2,360	19	<1	592	No reduction
Thurber	4,480	280	6	2,652	121 to 132 AUMS
Helvetia	1,231	155	13	950	No reduction
Stone Springs	3,013	0	0	1,474	No reduction

In addition, 15 stock ponds and 76 springs are expected to be lost to direct disturbance or to potential lowering of the groundwater table (table 136). Note that not all springs have been located in the field or, if located, they do not have actual presence of water. Therefore, they may not provide water for livestock; see the "Seeps, Springs, and Riparian Areas" resource section of chapter 3 for more detail.

Table 136. Stock ponds and springs lost under proposed action

Spring or Stock Tank	Spring ID or Stock Tank Cadastral Location	Spring Name	Possible Alternate Name (from forest allotment maps)*	Type of Impact	Forest Grazing Allotment or Other Landownership
Spring	48	Paja Verde Spring	–	Indirect; possible	Apache Springs Allotment
Spring	12	Chavez Spring	–	Indirect; possible	BLM
Spring	63	Shamrod Spring	–	Indirect; possible	BLM
Spring	93	Upper Empire Gulch Spring	–	Indirect; possible	BLM
Spring	95	Zackendorf Spring	–	Indirect; possible	BLM
Spring	2	Basin Spring	–	Indirect; possible	Box Canyon allotment
Spring	51	Proctor Box Spring	–	Indirect; possible	Box Canyon allotment
Spring	74	Unnamed Spring (in Box Canyon)	–	Indirect; possible	Box Canyon allotment
Spring	15	Crucero Spring No. 1	–	Indirect; possible	DeBaud allotment
Spring	29	HQ Water Spring	–	Indirect; possible	DeBaud allotment
Spring	34	Lower Mulberry Spring	–	Indirect; high	DeBaud allotment
Spring	43	Mulberry Canyon	–	Indirect; high	DeBaud allotment

Spring or Stock Tank	Spring ID or Stock Tank Cadastral Location	Spring Name	Possible Alternate Name (from forest allotment maps)*	Type of Impact	Forest Grazing Allotment or Other Landownership
Spring	44	Mulberry Spring	–	Indirect; possible	DeBaud allotment
Spring	62	Scholefield No. 3 Spring	–	Indirect; possible	DeBaud allotment
Spring	80	Unnamed Spring No. 14	–	Indirect; possible	DeBaud allotment
Spring	94	Water Develop Spring	–	Indirect; possible	DeBaud allotment
Spring	8	Bowman Spring	–	Indirect; possible	Greaterville allotment
Spring	9	Box Canyon Spring – Stock Drinker No. 1	–	Indirect; possible	Greaterville allotment
Spring	10	Box Canyon Spring – Stock Drinker No. 2	–	Indirect; possible	Greaterville allotment
Spring	19	Deering Spring	–	Indirect; high	Greaterville allotment
Spring	40	Mine Water Spring	–	Indirect; possible	Greaterville allotment
Spring	47	Ophir Gulch Well	–	Indirect; possible	Greaterville allotment
Spring	73	Unnamed Spring (South of Deering Spring)	–	Indirect; possible	Greaterville allotment
Spring	76	Unnamed Spring (in South Sycamore Canyon)	Box Canyon Water	Indirect; possible	Greaterville allotment
Stock Tank	D-19-16 06ab	Stock Tank	–	Direct	Greaterville allotment
Spring	20	Diesler Spring	–	Indirect; possible	Helvetia allotment
Spring	22	Feliz Spring	–	Indirect; possible	Helvetia allotment
Spring	56	Ruelas Spring	Ruelas Spring 2–3	Indirect; high	Helvetia allotment
Spring	57	Ruelas Spring Nos. 2 and 3	–	Indirect; possible	Helvetia allotment
Spring	65	Soldier Spring	–	Indirect; possible	Helvetia allotment
Spring	79	Unnamed Spring No. 13	Ruelas Spring	Indirect; possible	Helvetia allotment
Spring	11	California Mine Spring	–	Indirect; possible	Private land
Spring	23	Fence Spring	–	Indirect; possible	Private land
Spring	26	Helvetia Spring	–	Indirect; high	Private land
Spring	28	Horse Pasture Spring	–	Indirect; possible	Private land
Spring	77	Unnamed Spring No. 1	–	Indirect; possible	Private land
Spring	78	Unnamed Spring No. 12	–	Indirect; possible	Private land
Spring	4	Bee Spring	–	Direct	Rosemont allotment
Spring	35	McCleary Dam	North Dam	Direct	Rosemont allotment
Spring	37	McCleary No. 2	Tub Spring	Indirect; high	Rosemont allotment
Spring	42	Mueller Spring	–	Direct	Rosemont allotment
Spring	52	Questa Spring	–	Indirect; high	Rosemont allotment

Spring or Stock Tank	Spring ID or Stock Tank Cadastral Location	Spring Name	Possible Alternate Name (from forest allotment maps)*	Type of Impact	Forest Grazing Allotment or Other Landownership
Spring	55	Rosemont Spring	Lower Vespa Spring	Direct	Rosemont allotment
Spring	67	SW	–	Indirect; high	Rosemont allotment
Spring	84	Unnamed Spring No. 2	–	Direct	Rosemont allotment
Spring	89	Unnamed Spring No. 3	–	Direct	Rosemont allotment
Spring	91	Unnamed Spring No. 5	–	Direct	Rosemont allotment
Stock Tank	D-18-15 25dc	Upper Barrel Tank	–	Direct	Rosemont allotment
Stock Tank	D-18-15 25dd	Section 25	–	Direct	Rosemont allotment
Stock Tank	D-18-16 29ac	East Dam Header Tank	–	Direct	Rosemont allotment
Stock Tank	D-18-16 29ac	North Dam Header Tank	–	Direct	Rosemont allotment
Stock Tank	D-18-16 32c	Unnamed Stock Tank	–	Direct	Rosemont allotment
Spring	14	Cow Spring	–	Indirect; possible	State Trust land
Spring	27	Hilton Spring	–	Indirect; possible	State Trust land
Spring	90	Unnamed Spring No. 4	–	Indirect; possible	State Trust land
Spring	3	Batamout Spring	Batamouta Spring	Indirect; possible	Stone Springs allotment
Spring	5	Big Spring	Mud Spring	Indirect; possible	Stone Springs allotment
Spring	17	Dam Spring	–	Indirect; possible	Stone Springs allotment
Spring	24	Fig Tree Spring	–	Indirect; high	Stone Springs allotment
Spring	25	Heiter Spring	Cottonwood Spring	Indirect; possible	Stone Springs allotment
Spring	30	Indian Spring	–	Indirect; possible	Stone Springs allotment
Spring	31	La Cholla Spring	–	Indirect; possible	Stone Springs allotment
Spring	32	Little Indian Spring	–	Indirect; possible	Stone Springs allotment
Spring	39	Mesquite Flat Spring	Casita Spring	Indirect; possible	Stone Springs allotment
Spring	41	Mudhole Spring	Lazy Boy Spring	Indirect; possible	Stone Springs allotment
Spring	45	Oak Spring	–	Indirect; possible	Stone Springs allotment
Spring	46	Ojo Blanco Spring	–	Indirect; possible	Stone Springs allotment
Spring	53	Rock Spring	–	Indirect; possible	Stone Springs allotment
Spring	58	Rust Spring	–	Indirect; possible	Stone Springs allotment

Spring or Stock Tank	Spring ID or Stock Tank Cadastral Location	Spring Name	Possible Alternate Name (from forest allotment maps)*	Type of Impact	Forest Grazing Allotment or Other Landownership
Spring	64	Siphon Spring	Spring	Indirect; possible	Stone Springs allotment
Spring	68	Sycamore Spring	Stone Spring	Indirect; high	Stone Springs allotment
Spring	69	Tree Spring	–	Indirect; possible	Stone Springs allotment
Spring	70	Tub Spring	–	Indirect; possible	Stone Springs allotment
Spring	71	Tunnel Spring	–	Indirect; possible	Stone Springs allotment
Spring	72	Tunnel Spring No. 2	–	Indirect; possible	Stone Springs allotment
Spring	81	Unnamed Spring No. 16	–	Indirect; possible	Stone Springs allotment
Spring	82	Unnamed Spring No. 17	–	Indirect; possible	Stone Springs allotment
Spring	83	Unnamed Spring No. 18	–	Indirect; possible	Stone Springs allotment
Spring	85	Unnamed Spring No. 20	–	Indirect; possible	Stone Springs allotment
Spring	86	Unnamed Spring No. 21	–	Indirect; possible	Stone Springs allotment
Spring	87	Unnamed Spring No. 22	–	Indirect; possible	Stone Springs allotment
Spring	88	Unnamed Spring No. 24	–	Indirect; possible	Stone Springs allotment
Stock Tank	D-19-16 05bc	Unnamed Stock Tank	–	Direct	Thurber allotment
Stock Tank	D-19-16 05bc	North Basin Tank 2	–	Direct	Thurber allotment
Stock Tank	D-19-16 05bc	North Basin Tank	–	Direct	Thurber allotment
Stock Tank	D-19-16 06dd	Barrel Tank	–	Direct	Thurber allotment
Stock Tank	D-19-16 06dd	South Basin 4 Tank	–	Direct	Thurber allotment

Note:

– = No alternate name.

* SWCA Environmental Consultants (2012).

Phased Tailings Alternative

Under the Phased Tailings Alternative, there would be a change from fully capable to partially capable on the Rosemont, Thurber, Greaterville, and Helvetia allotments.

During the premining and active mining phases, some limitation of grazing would occur, as summarized in table 137. Reductions in the suitable acreage for the Greaterville and Helvetia allotments are minor enough that no reductions in AUMs are necessary. However, a reduction of 900 to 919 AUMs could occur under the Phased Tailings Alternative from the Rosemont and Thurber

allotments. Overall, there would be no impact to the ability of the Forest Service to manage grazing allotments (i.e., rest and rotation).

Impacts to stock ponds and springs are expected to be the same as for the proposed action, although some springs would be impacted directly rather than indirectly.

Table 137. Potential loss of grazing during premining and active mining phases under Phased Tailings Alternative

Allotment	Suitable Acres	Restricted Acres (within perimeter fence)	Percentage of Allotment Impacted	Permitted AUMs	Reduction in AUMs
Rosemont	8,410	5,542	66	1,575	779 to 787 AUMs
Greaterville	4,120	88	2	1,635	No reduction
DeBaud	2,360	8	<1	592	No reduction
Thurber	4,480	280	6	2,652	121 to 132 AUMs
Helvetia	1,231	155	13	950	No reduction
Stone Springs	3,013	0	0	1,474	No reduction

Barrel Alternative

Under the Barrel Alternative, there would be a change from fully capable to partially capable on the Rosemont, Thurber, Greaterville, and Helvetia allotments.

During the premining and active mining phases, some limitation of grazing would occur, as summarized in table 138. Reductions in the suitable acreage for the Greaterville and Helvetia allotments are minor enough that no reductions in AUMs are necessary. However, a reduction of 862 to 919 AUMs could occur under the Barrel Alternative from the Rosemont and Thurber allotments. Overall, there would be no impact to the ability of the Forest Service to manage grazing allotments (i.e., rest and rotation).

Impacts to springs are expected to be the same as under the proposed action, although some springs would be impacted indirectly rather than directly. The Barrel Alternative would impact four additional stock tanks, compared with the proposed action, as shown in table 139.

Table 138. Potential loss of grazing during premining and active mining phases under Barrel Alternative

Allotment	Suitable Acres	Restricted Acres (within perimeter fence)	Percentage of Allotment Impacted	Permitted AUMs	Reduction in AUMs
Rosemont	8,410	6,379	76	1,575	757 to 787 AUMs
Greaterville	4,120	86	2	1,635	No reduction
DeBaud	2,360	17	<1	592	No reduction
Thurber	4,480	350	8	2,652	105 to 132 AUMs
Helvetia	1,231	158	13	950	No reduction
Stone Springs	3,013	0	0	1,474	No reduction

Table 139. Additional stock ponds lost under Barrel Alternative

Name of Water Source	Cadastral Location	Allotment
Stock Tanks		
Section 33 Tank	D-18-16 33cc	Rosemont
Section 33 Tank	D-18-16 33cc	Rosemont
Dirt Tank	D-18-16 33cc	Rosemont
McCleary Tank	D-18-16 30bb	Rosemont

Barrel Trail Alternative

Under the Barrel Trail Alternative, there would be a change from fully capable to partially capable on the Rosemont, Thurber, Greaterville, and Helvetia allotments. During the premining and active mining phases, some limitation of grazing would occur, as summarized in table 140. Reductions in the suitable acreage for the Greaterville and Helvetia allotments are minor enough that no reductions in AUMs are necessary. However, a reduction of 975 to 1,001 AUMs could occur under the Barrel Trail Alternative from the Rosemont and Helvetia allotments. Overall, there would be no impact to the ability of the Forest Service to manage grazing allotments (i.e., rest and rotation).

Impacts to springs are expected to be the same as under the Barrel Alternative. With respect to stock tanks, the same tanks would be impacted as under the Barrel Alternative, except that McCleary Tank would not be impacted and East Dam Tank (D-18-16 28ac) would be impacted, which is still within the Rosemont allotment.

Table 140. Potential loss of grazing during premining and active mining phases under Barrel Trail Alternative

Allotment	Suitable Acres	Restricted Acres (within perimeter fence)	Percentage of Allotment Impacted	Permitted AUMs	Reduction in AUMs
Rosemont	8,410	6,379	76	1,575	835 to 840 AUMs
Greaterville	4,120	86	2	1,635	No reduction
DeBaud	2,360	17	<1	592	No reduction
Thurber	4,480	350	8	2,652	140 to 161 AUMs
Helvetia	1,231	158	13	950	No reduction
Stone Springs	3,013	0	0	1,474	No reduction

Scholefield-McCleary Alternative

Under the Scholefield-McCleary Alternative, there would be a change from fully capable to partially capable on the Rosemont, DeBaud, and Stone Springs allotments.

During the premining and active mining phases, some limitation of grazing would occur, as summarized in table 141. A reduction of 1,009 to 1,045 AUMs could occur under the Scholefield-McCleary Alternative from the Rosemont, Stone Springs, and DeBaud allotments. Overall, there would be no impact to the ability of the Forest Service to manage grazing allotments (i.e., rest and rotation).

Table 141. Potential loss of grazing during premining and active mining phases under Scholefield-McCleary Alternative

Allotment	Suitable Acres	Restricted Acres (within perimeter fence)	Percentage of Allotment Impacted	Permitted AUMs	Reduction in AUMs
Rosemont	8,410	5,918	70	1,575	721 to 741 AUMs
Greaterville	4,120	0	0	1,635	No reduction
DeBaud	2,360	1,324	56	592	250 to 260 AUMs
Thurber	4,480	0	0	2,652	No reduction
Helvetia	1,231	355	29	950	No reduction
Stone Springs	3,013	1,126	37	1,474	38 to 44 AUMs

Impacts to stock tanks are expected to be the same as under the proposed action, with the exception that six stock tanks would not be impacted under the Scholefield-McCleary Alternative: South Basin 4 Tank, North Basin Tank, North Basin Tank 2, Barrel Tank, and two unnamed tanks. The Scholefield-McCleary Alternative would impact two additional springs, compared with the proposed action, as shown in table 142.

Table 142. Additional springs lost under Scholefield-McCleary Alternative

Spring ID	Spring Name	Possible Alternate Name (from forest allotment maps)*	Type of Impact	Forest Grazing Allotment
60	Scholefield No. 1	–	Direct	DeBaud allotment
61	Scholefield No. 2	–	Direct	DeBaud allotment

Note:

– = No alternate name.

* SWCA Environmental Consultants (2012).

Cumulative Effects

As outlined in the introduction to chapter 3, cumulative impacts of past and present actions are identified and analyzed in the "Affected Environment" part of each resource section, including for "Livestock Grazing." This cumulative effects discussion addresses the cumulative impacts of the action alternatives and any applicable reasonably foreseeable actions as identified on the Coronado ID team's list of reasonably foreseeable future actions, provided in the introduction to chapter 3. The list was reviewed, and no reasonably foreseeable future actions are expected to have a cumulative effect on livestock grazing within the analysis area.

Climate Change

It is likely that the increased temperatures and reduced precipitation will increase the vulnerability of springs and riparian systems relying on the groundwater system. The cumulative impact to these riparian systems from prolonged droughts, along with the impacts from the Rosemont Copper Project, is more fully detailed in the "Seeps, Springs, and Riparian Areas" resource section of this chapter.

Expected climate change conditions would have an effect on the vegetation that provides forage for livestock. Changes could include reduction in cover or density and a longer time for overall

successful establishment in areas of disturbance. Climate related impacts to vegetation and water supply, in and of themselves, and when combined with the reduced acres of capable grazing land resulting from the mine pit, could result in changes in grazing management on NFS allotments in the future, such as changes in grazing systems or reduction in grazing intensity.

Mitigation Effectiveness

Mitigation and Monitoring – Forest Service

- **Growth media salvage and application.** In order to support reclamation activities, soil and other growth media would be salvaged, stored, and applied to the surface of the perimeter waste rock buttress, and waste rock and tailings facilities in order to facilitate revegetation.
- **Revegetate disturbed areas with native species.** Reclamation efforts would include revegetating with native grasses, forbs, shrubs, and trees on areas disturbed by mining and mine related activities. Revegetation would include detecting and treating invasive weed species.
- **Concurrent placement of perimeter buttress.** Placement of the perimeter buttress would allow for reclamation activities to take place earlier, concurrent with mine operations.
- **Construction, management, and maintenance of features to reduce potential impacts to wildlife and livestock from reduced flow in seeps, springs, surface water, and groundwater.** Seven water features would be managed for sustainability of surface water, which includes availability for livestock. Up to 23 additional water features would be managed or constructed if needed for threatened and endangered species, but this water would also be available for livestock use.
- **Future modification of allotment management plans.** Rosemont Copper would prepare and submit to the Coronado a request to modify the allotment management plans for the Thurber, DeBaud, Greaterville, and Rosemont grazing allotments. These modifications are intended to improve watershed condition and protect threatened and endangered species but would also necessarily affect livestock use as well.
- **Removal of unneeded facilities during closure.** Mining facilities not needed for future management of the land would be removed, including buildings, the plant site, some roads, the perimeter and security fences, power supply line, piping systems, and water supply pipeline. The plant site would be recontoured and revegetated with native vegetation, while building foundations would either be removed or broken up and buried.

Conclusion of Mitigation Effectiveness

Revegetation activities are described in chapter 2 and in the “Soils and Revegetation” section in chapter 3. With respect to grazing, the most pertinent measure of revegetation potential is the expected productive capacity of the reclaimed areas. Soil productivity for the project area ranges from roughly 450 to 2,400 pounds per acre (Fehmi et al. 2008; Natural Resources Conservation Service 2010). The University of Arizona has conducted greenhouse studies using three material types from the project area that represent the soil substrates provided by waste rock and tailings. Two of the three materials tested in the greenhouse with Rosemont Copper’s recommended seed mixture resulted in soil productivity ranging from 1,010 to 1,080 pounds per acre—well within the natural range for the site. The third material tested showed limited productivity (290 pounds per acre) and may have limited revegetation potential. To better address real-world conditions, Rosemont Copper also conducted experiments with onsite reclamation test plots. Soil productivity or biomass when

measured in the cool season ranged from 713 to 2,856 pounds per acre; when measured in the warm season, it ranged from 17 to 1,438 pounds per acre. The greenhouse studies and onsite test plots demonstrate that desired conditions can be reached, but they also show that care must be taken during revegetation to select the appropriate surface preparation and treatment to provide the greatest potential for revegetation success.

Overall, these mitigation measures would help to maintain grazing practices on current allotments, with the exception of the mine pit, where loss of grazing capability would be permanent. The remainder of the allotments would be expected to provide suitable grazing conditions; however, that determination would depend on the success of reclamation efforts to create stable slopes and revegetation efforts to successfully establish plant communities that are conducive to grazing and grazing management.

Future modification of allotment management plans may potentially reduce livestock grazing on the allotments and in that case would not mitigate for any losses to livestock grazing capacity that result from the presence of the mine.