ENVIRONMENTAL ASSESSMENT

INTERAGENCY LAND EXCHANGE
Between the
U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT
And the
COLORADO STATE BOARD OF LAND COMMISSIONERS
Fremont, Saguache, Conejos, and Alamosa Counties, Colorado
Number CO-500-08-0008-EA

To support
CONSOLIDATION OF LANDS within GREAT SAND DUNES NATIONAL PARK AND PRESERVE and within THE BACA NATIONAL WILDLIFE REFUGE

July 2009

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Prepared for

Bureau of Land Management
Colorado State Office
Branch of Lands and Realty
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Lakewood, CO 80215

With Contributions by

Colorado State Board of Land Commissioners

U.S. Fish and Wildlife Service

National Park Service

EXECUTIVE SUMMARY

A land exchange between the Bureau of Land Management (BLM) and the Colorado State Board of Land Commissioners (State Land Board [SLB]) is evaluated in this environmental assessment (EA) under the provisions of the National Environmental Policy Act (NEPA) of 1969, as amended. Involved in the proposed exchange are 28 parcels of Federal land in Fremont, Saguache, and Conejos counties in south-central Colorado, and 20 parcels of state land in Alamosa and Saguache counties in the San Luis Valley. This land exchange supports the provisions of the Great Sand Dunes National Park and Preserve Act of 2000 (Public Law 106-530 or PPA-2000). Within the Act are provisions for the establishment of the approximately 150,000-acre Great Sand Dunes National Park and Preserve (expanded from the 38,659-acre Great Sand Dunes National Monument established in 1932) and the new 92,617-acre Baca National Wildlife Refuge.

Both the park and refuge units are within the San Luis Valley, a large intermontane basin north of the Colorado-New Mexico border. The underlying intent of the Act is to protect and preserve the spectacular and unique sand dunes, the surface water and groundwater systems that replenish the sand mass, and the remarkable biodiversity of the surrounding landscape for the benefit and enjoyment of present and future generations of Americans and visitors.

Following appraisal to determine equalization of land values, the proposed Federal exchange parcels total 20,870.03 acres (18,190.03 surface acres and 2,680 acres of mineral estate only) and the proposed state exchange parcels total 57,056.11 acres (51,245.61 surface acres and 5,810.50 acres of mineral estate only). Following the exchange, as proposed herein, 25,765.69 acres of former Colorado SLB land would be managed by the National Park Service (NPS), 30,910.62 acres would be managed by the U.S. Fish and Wildlife Service (USFWS), and a 380-acre parcel would be managed by the BLM.

A summary of the impacts of the Proposed Action and the No Action Alternative is presented in Table ES-1. Each of the impacts is described in terms of duration (short- or long-term), significance (insignificant, low, moderate, or high), and type of impact (beneficial or adverse). Under the No Action Alternative, impacts are described for Federal and state lands. Under the Proposed Action, impacts are described for the land exchange from Federal to state and from state to Federal. Each of the analyzed topics is also described by project region in the affected environment section.

TABLE ES-1. SUMMARY COMPARISON OF ALTERNATIVES

Topic	Impact Summary
Cultural Resources	**No Action:** *Federal and State:* • No effect – historic and prehistoric cultural resources would continue to be managed under applicable state and Federal laws and regulations. **Proposed Action:** *Federal to State:* • Adverse affect – NRHP eligible and potentially eligible cultural resources would no longer be on Federal lands and would therefore not be managed under applicable Federal laws and regulations. Mitigation measures, documented in a treatment plan (Bevilacqua 2009) and agreed to in a Memorandum of Agreement to Treat Adverse Effects to the Historic Properties, consist of listing NRHP-eligible sites and districts in the Colorado State Register of Historic Properties and inclusion of these state-listed resources in the SLB Stewardship Trust Program. *State to Federal:* • No effect – due to enactment of Federal laws, inventory, and mitigation should any ground-disturbing activity take place, and will be managed under applicable Federal laws and regulations
Floodplains	**No Action:** *Federal:* • Short and long-term, insignificant effects – adherence to Federal laws relating to floodplains would continue. *State:* • Long-term, insignificant to low, beneficial effect – diversion of flows to irrigate hay crops in floodplains would continue to contribute to floodplain stability. **Proposed Action:** *Federal to State:* • Long-term, insignificant effect – SLB would assume management of intermittent drainages at Table Mountain and Gribbles Park, which would not result in a change in land use. • Long-term, insignificant, adverse effect – due to livestock grazing of narrow floodplains at Biedell Creek and La Jara Reservoir. *State to Federal:* • Long-term, insignificant to low, beneficial effect – diversion of flows to irrigate hay crops in floodplains would continue to contribute to floodplain stability. • Long-term, insignificant to low, adverse effect – continued livestock and American elk grazing would affect wildlife habitat structure and quality. • Long-term, insignificant to low, beneficial effect – all management actions would be evaluated under NEPA and stipulated in approved CCPs and GMPs, resulting in preservation of floodplain values.
Wetlands and Riparian Zones	**No Action:** *Federal:* • Short- and long-term, insignificant to low, beneficial effects – due to adherence to EOs 11988 and 11990; approved RMPs, GMP, and CCPs; and Colorado PLH Standard 2. *State:* • Short- and long-term, insignificant to low, beneficial effects – due to adherence to EOs 11988 and 11990.

TABLE ES-1. SUMMARY COMPARISON OF ALTERNATIVES

Topic	Impact Summary
	• Long-term, negligible to low, adverse effect – due to continued diversion of San Luis Valley stream flows to irrigate hay crops. **Proposed Action:** *Federal to State:* • Long-term, insignificant, adverse effect – the SLB would assume management of limited wetland and riparian resources, continue livestock grazing, and adhere to EOs 11988 and 11990, and the wetlands provisions of the CWA, as amended. *State to Federal:* • Short- and long-term, insignificant to moderate, beneficial effects – due to evaluation of the continuation or elimination of livestock grazing and irrigation practices; baseline and monitoring research; and habitat management for quality and biodiversity under an approved BNWR CCP and GRSA GMP, EOs 11988 and 11990, and NPS-DO 77-1. • Long-term, negligible to low, adverse effect –continued diversion of San Luis Valley stream flows to irrigate hay crops on USFWS parcels. • Short- and long-term, low to moderate, adverse effects – due to American elk grazing in wetland and riparian habitats on BNWR lands.
Migratory Birds	**No Action:** *Federal:* • Long-term, insignificant to low beneficial effect – no change in land management or leasing practices; • Long-term, insignificant to low, adverse effect – continued quarry operations at the Table Mountain parcels would result in effects on migratory bird habitat due to noise, dust generation, and human presence. *State:* • Long-term, insignificant to low, beneficial effect – due to no change in land management or leasing practices. **Proposed Action:** *Federal to State:* • Long-term, insignificant to low, adverse effect – due to merging Table Mountain and Gribbles Park parcels into existing SLB grazing leases; management that generally includes leases for grazing; mineral extraction; and minor harvesting of forest products, and noise, dust, and human presence near Table Mountain quarry operations. *State to Federal:* • Long-term, insignificant effect – due to BLM management of parcel 31 under the approved RMP. • Long-term, insignificant to moderate, beneficial effect – due to USFWS habitat evaluation, improvement, monitoring, research, and public education under the BNWR CCP. • Long-term, insignificant to moderate, beneficial effect – due to NPS management under EO 13186 providing quality habitat for migratory birds, scientific research, and public education. • Long-term, insignificant to low, adverse effect – due to reduction in wet meadow habitat from irrigation system removal.

TABLE ES-1. SUMMARY COMPARISON OF ALTERNATIVES

Topic	Impact Summary
Federal Threatened, Endangered, Candidate, and Colorado BLM Sensitive Species	**No Action:** *Federal:* • Long-term, insignificant, beneficial effect – listed and sensitive species habitat management would continue within the framework of the existing RMPs. State: • Long-term, insignificant to low, adverse effect – listed and sensitive species habitat management would continue under the ESA and the guidance of the CDOW. Habitat would experience ongoing grazing by American elk and would likely be irrigated for grass hay crops. Ongoing leasing for grazing and other activities would create economic benefits to the school trust under lease agreement contract language. **Proposed Action:** *Federal to State:* • Long-term, insignificant to low, adverse effect – the SLB would honor existing BLM grazing leases and would seek to lease vacant lands for livestock grazing, woodland and forest products, mineral resources, and recreation. • Long-term, insignificant to low, adverse effect – due to ongoing leasing for grazing and other activities creating economic benefits to the school trust under lease agreement contract language, grazing by American elk, and with guidance from CDOW (refer also to the attached Biological Assessment). *State to Federal:* • Long-term, insignificant effect – due to BLM management of parcel 31 under Colorado PLH Standard 4 for livestock grazing. • Long-term, insignificant to moderate, beneficial effect – due to USFWS and NPS land evaluation, management, and monitoring of listed and sensitive species, habitat, and biodiversity under the BNWR CCP and the GRSA GMP with guidance from the ESA. Mitigation by USFWS includes collecting riparian habitat use data for the southwestern willow flycatcher and yellow-billed cuckoo for inclusion into future management plans.
Invasive Nonnative Species	**No Action:** *Federal:* • Long-term, insignificant to low, beneficial effect – due to invasive species monitoring and control under RMPs and the Colorado Noxious Weed Management Act. *State:* • Long-term, insignificant to moderate, beneficial effect – due to invasive species monitoring and control under the Colorado Noxious Weed Management Act and with cooperation of lessees and the CDOT maintenance staff. **Proposed Action:** *Federal to State:* • Long-term, insignificant to low, adverse effect – due to presence of mapped invasive species and agricultural land requiring nonnative plant species inventory, control, and management. • Long-term, insignificant to low, beneficial effect – due to nonnative species monitoring and control by lessees with assistance from the Colorado Department of Agriculture.

TABLE ES-1. SUMMARY COMPARISON OF ALTERNATIVES

Topic	Impact Summary
	State to Federal: • Long-term, insignificant, beneficial effect – due to BLM parcel evaluation and implementation of nonnative species controls under the RMP. • Short- and long-term, low to moderate, beneficial effects – due to USFWS and NPS invasive species mapping and monitoring programs and nonnative species management and control. Mitigation by the USFWS and NPS in the form of invasive species identification, mapping, and control would be enacted to establish a native species composition and wildlife habitat quality.
Prime and Unique Farmlands	**No Action:** *Federal:* • No effect – no prime and unique farmland designations for soils on proposed exchange parcels. *State:* • Long-term, insignificant, beneficial effect – due to re-leasing proposed exchange parcels for hay production using irrigation, thus preserving the properties of designated prime and unique farmland soils. **Proposed Action:** *Federal to State:* • No effect – there are no prime and unique farmland designations for soils on proposed exchange parcels. *State to Federal:* • No effect – there are no prime and unique farmland designations for soils of proposed exchange parcels going to BLM and NPS management. • Long-term, insignificant to high, adverse or beneficial effect – due to decisions in the BNWR CCP process to either terminate all or part of crop production or to continue irrigation and cropping of soils designated as farmland of unique importance, prime farmland if irrigated, and prime farmland if irrigated and reclaimed of excess salts and sodium.
Surface Water and Groundwater Quality	**No Action:** *Federal:* • Short- and long-term, insignificant, adverse effects – water resources would be managed by the BLM under RMPs and Colorado PLH Standard 5. Adverse effects on water quality would occur from continued livestock and American elk grazing and from runoff from quarry sites and access roads. *State:* • Short- and long-term, insignificant to low, adverse effects – due to reinstatement and continuation of irrigation on some parcels and application of fertilizer that leaches into surface water and groundwater systems. **Proposed Action:** *Federal to State:* • Long-term, insignificant, adverse effect – due to livestock waste and habitat disturbance affecting water quality. *State to Federal:* • Long-term, insignificant to low, beneficial effect – due to BLM management under Colorado PLH Standard 5 and USFWS management of San Luis, Saguache, and San Isabel creeks for wildlife habitat under an approved BNWR CCP.

TABLE ES-1. SUMMARY COMPARISON OF ALTERNATIVES

Topic	Impact Summary
	• Long-term, low, adverse effect – due to use of fertilizer to produce crops on BNWR lands under an approved CCP. • Long-term, insignificant to moderate, beneficial effect – due to NPS restoration of natural flows and elimination of fertilizer and livestock wastes from reaches of Sand, Little Spring, Big Spring, and Arena creeks under the GRSA GMP.
Air Quality	**No Action:** *Federal and State:* • Insignificant effect – existing year round air quality is good and no effects on sensitive receptors would be expected. **Proposed Action:** *Federal to State:* • Insignificant effect – no changes in land use practices would occur that would influence local or regional air quality. *State to Federal:* • Insignificant effect – no changes in land use practices would occur that would influence local or regional air quality. • Long-term, insignificant and short-term, low to moderate, adverse effects – USFWS habitat management practices would generally have little effect on local and regional air quality, except when using prescribed fire as a management tool. • Long-term, insignificant and short-term, low to moderate, adverse effects – NPS habitat management practices would generally create no changes in land use practices that would influence good local and regional air quality except when using prescribed fire as a management tool. As a form of air quality mitigation, both BNWR and GRSA are partners in the Greater Sand Dunes Interagency Fire Management Plan.
Areas of Critical Environmental Concern, Colorado Natural Areas, and Potential Conservation Areas	**No Action:** *Federal:* • No effect – no ACECs occur on proposed exchange parcels. *State:* • Long-term, insignificant to low, adverse effect – due to continued livestock and American elk grazing, fires, irrigation, and mowing within portions of Indian Springs CAN, Great Sand Dunes PCA, San Luis Lakes PCA, and Weisman Lakes PCA. **Proposed Action:** *Federal to State:* • Long-term, insignificant to low, adverse effect – due to water diversion, livestock and American elk grazing, motorized recreation, and potential development within the Carnero Creek PCA of the Biedell Creek parcels. *State to Federal:* • No effect – no designated areas within parcel 31 would be exchanged to the BLM. • Long-term, insignificant to low, beneficial effect – due to USFWS management of the Weisman Lakes PCA and NPS management of the Great Sand Dunes and San Luis Lakes PCAs using resource monitoring, habitat maintenance and management, environmental education programs, research, and habitat protection techniques under an approved BNWR CCP and GRSA GMP.

TABLE ES-1. SUMMARY COMPARISON OF ALTERNATIVES

Topic	Impact Summary
Wild and Scenic Rivers	**No Action:** *Federal:* • No effect – no change in eligible wild and scenic river visitation or human encroachment. State: • Long-term, negligible to moderate, beneficial effect – due to negotiations between SLB and NPS to designate eligible Sand Creek and Big Spring Creek corridors as wild and scenic rivers. **Proposed Action:** *Federal to State:* • Insignificant effects – no change in eligible wild and scenic river visitation or human encroachment. *State to Federal:* • Long-term, insignificant effect – SLB parcel exchanged to BLM does not have surface drainages; SLB parcels exchanged to the USFWS do not have stream segments eligible to become wild and scenic rivers. • Long-term, negligible to moderate, beneficial effect – due to negotiations between SLB and NPS to designate eligible Sand Creek and Big Spring Creek corridors as wild and scenic rivers.
Wilderness	**No Action:** *Federal and State:* • Long-term, insignificant effect – due to continued management by the SLB under tenant leases and the BLM under RMPs. • Long-term, insignificant to low, beneficial effect – due to consideration of selected SLB parcels for inclusion into the GRSA Wilderness Study Area. **Proposed Action:** *Federal to State:* • Insignificant effect – due to SLB management as trust lands. *State to Federal:* • Long-term, negligible to moderate, beneficial effect – due to potential NPS expansion of the GRSA Wilderness Study Area onto former SLB-managed parcels.
Hazardous or Solid Wastes	**No Action:** *Federal:* • Short- and long-term, insignificant effects – due to no RECs being identified on Table Mountain, Gribbles Park, and La Jara Reservoir parcels. State: • Short- and long-term, insignificant effects – due to no RECs being identified on SLB parcels. **Proposed Action:** *Federal to State:* • Short- and long-term, insignificant effects – due to no RECs being identified on Table Mountain, Gribbles Park, and La Jara Reservoir parcels.

TABLE ES-1. SUMMARY COMPARISON OF ALTERNATIVES

Topic	Impact Summary
	State to Federal: • Short- and long-term, insignificant effects – six potential RECs observed in a 2005 Phase I Environmental Site Assessment were investigated in a 2007 Phase II Environmental Site Assessment. The Phase II investigation and a second Phase I Environmental Site Assessment in 2009 concluded that there were no RECs or other environmental liabilities associated with the SLB parcels.
Environmental Justice	**No Action:** *Federal and State:* • No effect – land would remain in public management under the SLB and BLM RMPs. **Proposed Action:** *Federal to State:* • No effect – Executive Order thresholds would not be met, lands would be expected to remain undeveloped, and grazing would continue under SLB management. *State to Federal:* • No effect – Executive Order thresholds would not be met, lands would be expected to remain undeveloped, hunting and grazing would be discontinued by NPS under the GRSA GMP, and hunting and grazing would likely continue under the USFWS BNWR CCP.
Native American Consultation and Religious Concerns	**No Action:** *Federal and State:* • No effect – Section 106 of the NHPA requires Native American consultation to determine if NRHP eligible properties significant to tribal peoples are present. However, with no action being taken there would be no Section 106 undertaking that requires tribal consultation. **Proposed Action:** *Federal to State:* • Effect listed under the Cultural Resources section – The following tribes requested consultation: Cheyenne River Sioux Tribe, Comanche Nation of Oklahoma, Hopi Tribe, Jicarilla Apache Nation, Ogallala Lakota Tribe, Pueblo of Laguna, and the Sandia Pueblo. • Adverse effect – 38 tribes were identified that might attribute historic and cultural significance to the exchange lands and were consulted (See Appendix C.3, Executive Summary of Tribal Consultation). The Hopi Tribe and the Jicarilla Apache Nation requested consultation on the Treatment Plan. The Jicarilla Apache Nation requested concurring party signatory status on the Memorandum of Agreement. *State to Federal:* • No effect – These lands will be managed under applicable Federal laws and regulations.
Soils	**No Action:** *Federal:* • No effect – due to soils management by BLM under RMPs provisions and Colorado PLH Standard 1. State: • Long-term, insignificant to low, adverse effect – due to alteration of soils characteristics under irrigation (soil chemistry and type).

TABLE ES-1. SUMMARY COMPARISON OF ALTERNATIVES

Topic	Impact Summary
	Proposed Action: *Federal to State:* • No effect – no change in soil structure or type classification. • State to Federal: • No effect – No changes in soils structure or type classification on lands exchanged to the BLM. • Long-term, insignificant to low, adverse effect – USFWS management under the BNWR CCP would apply irrigation and alter soils structure or type classification. • Long-term, insignificant, adverse effect – NPS management under the GRSA GMP would result in wind erosion of soils surfaces.
Vegetation	**No Action:** *Federal:* • Long-term, insignificant, beneficial effect – due to BLM management under RMPs and Colorado PLH Standard 3, range monitoring, grazing management, and invasive plant species control; • Long-term, low to moderate, adverse effect – due to woodland and shrubland loss to quarry expansion on Table Mountain parcels. *State:* • Long-term, insignificant effect – due to lessee responsibility for range monitoring, grazing management, irrigation, and invasive species control. **Proposed Action:** *Federal to State:* • Long-term, negligible, adverse and beneficial effect – due to range monitoring, grazing management, and invasive plant species control under provisions of the STP. • Long-term, low to moderate, adverse effect – due to woodland and shrubland loss to quarry expansion on Table Mountain parcels. • Long-term, insignificant to moderate, adverse effect – due to timber harvest on Biedell Creek and La Jara Reservoir parcels under CSFS management provisions. • Long-term, insignificant to low, adverse effect – due to mitigation ensuring use of appropriate timber harvest practices by CSFS. *State to Federal:* • Long-term, insignificant to low, beneficial effect – due to BLM management under the RMP and Colorado PLH Standard 3. • Long-term, insignificant to moderate, beneficial effect – due to USFWS management of wildlife habitat, native plant species and communities, surface and groundwater management to maintain the health of riparian and wetland communities, and nonnative species control under an approved BNWR CCP. • Long-term, insignificant to moderate, beneficial effect – NPS management would reduce nonnative species populations, preserve native communities or habitats, cease irrigation, and achieve regional biodiversity under the GRSA GMP. • Long-term, insignificant to moderate, adverse effect – NPS would cease irrigation to encourage establishment of native plant communities under natural hydrologic regimes, resulting in unknown loss of wetland acreage.
Terrestrial Wildlife	**No Action:** *Federal and State:* • Long-term, insignificant, beneficial effect – due to CDOW management of wildlife on all parcels.

TABLE ES-1. SUMMARY COMPARISON OF ALTERNATIVES

Topic	Impact Summary
	• Long-term, insignificant, adverse effect – due to livestock grazing and irrigation supporting hay crops. **Proposed Action:** *Federal to State:* • Long-term, insignificant to low, adverse effect – due to livestock grazing, forest product and mineral extraction and hunting recreation. *State to Federal:* • Long-term, insignificant, beneficial effect – due to BLM management of livestock grazing under Colorado PLH Standard 3. • Long-term, low to moderate, beneficial effect –USFWS management under the BNWR CCP would improve habitat for migratory and resident species. • Long-term, low to moderate, beneficial effect – NPS management under the GRSA GMP would remove livestock grazing and manage habitat for migratory and resident species. • Short- and long-term, insignificant to low, beneficial effects – due to CDOW and USFWS management of hunting recreation and population of American elk on lands to be managed under the BNWR CCP.
Aquatic Wildlife	**No Action:** *Federal:* • Long-term, insignificant to low, adverse effect – due to livestock use of riparian and wetland forage and water. *State:* • Long-term, insignificant to low, adverse effect – due to seasonal irrigation use of water and natural water fluctuations. • Long-term, insignificant to moderate, adverse effect – due to livestock and American elk grazing of riparian and wetland forage and use of water. **Proposed Action:** *Federal to State:* • Long-term, insignificant to low, adverse effect – due to livestock use of riparian and wetland forage and water. *State to Federal:* • Long-term, insignificant to low, beneficial effect – due to USFWS enhancement of aquatic and wetland habitats and aquatic habitat management under EO 11990 and within the BNWR CCP process. • Long-term, low to moderate, adverse effect – due to livestock use of riparian and wetland forage and water on USFWS parcels. • Long-term, low, adverse effect – NPS would cease irrigation reducing size of some aquatic habitats. • Long-term, low to moderate, adverse effect – due to grazing of aquatic habitat by American elk on NPS parcels. • Long-term, low to moderate, beneficial effect – due to return of natural hydrology on NPS parcels.
Geology and Minerals	**No Action:** *Federal:* • Long-term, low to moderate, adverse effect – mining of Dakota Formation sandstone would result in effects on site geologic formations. • Long-term, insignificant to low, adverse effect – due to the loss of resources from the sale of boulders and moss-rock for landscaping. • Low to moderate, beneficial effect – due to loss of resources from the sale of riprap, boulders, moss-rock, and rock products.

TABLE ES-1. SUMMARY COMPARISON OF ALTERNATIVES

Topic	Impact Summary
	State: • Beneficial effect – due to potential lease of parcels for sand and gravel extraction. **Proposed Action:** *Federal to State:* • Long-term, insignificant to low, adverse effect – due to removal and sale of boulders and moss-rock for landscaping; • Short- and long-term, insignificant to moderate, beneficial effects – due to sale of sandstone riprap, aggregate, and boulders and sale of surface boulders and moss-rock. *State to Federal:* • Long-term, insignificant, adverse effect – due to natural erosion, limited sand and gravel extraction, and infrastructure construction.
Paleontology	**No Action:** *Federal:* • Long-term, negligible, adverse effect – due to continued management of paleo resources by including ongoing appropriate paleo survey, monitoring, and other mitigation as needed. • Long-term, negligible to low, beneficial effect – due to reconnaissance survey and determination of fossil potential for Table Mountain. *State:* • No effect – due to little likelihood of parcels providing fossils of use. **Proposed Action:** *Federal to State:* • Long-term, negligible, adverse effect – due to continued management of paleo resources by including ongoing appropriate paleo survey, monitoring, and other mitigation as needed. *State to Federal:* • Long-term, negligible, beneficial effect – due to Federal protection of fossils of use if determined to be present.
Socioeconomics	**No Action:** *Federal:* • Long-term, insignificant, beneficial effect – due to BLM-managed parcels being used for recreation and the remaining part of the base on entitlement acres in the respective counties under the PILT program. *State:* • Long-term, insignificant, beneficial effect – SLB-managed parcels would be used for public recreation and would generate revenues for the school trust and public education. **Proposed Action:** *Federal to State:* • Short- and long-term, low, adverse and beneficial effects – due to SLB maintenance of grazing leases, honoring BLM grazing permits, offering new grazing permits with higher fees, harvesting or recovering timber or minerals, continuing public access for hunting and other outdoor recreation, and a decline in PILT entitlement acres for counties. *State to Federal:* • Short-term, low, adverse effect – due to loss of grazing and hunting.

TABLE ES-1. SUMMARY COMPARISON OF ALTERNATIVES

Topic	Impact Summary
	• Long-term, insignificant to low, beneficial effect – due to increased visitor use, outdoor recreation, wildlife viewing, and other nonconsumptive uses. • Long-term, insignificant to low, beneficial effect – due to increase in acres eligible for inclusion into the PILT program and Refuge Revenue Sharing payments (USFWS).
Range Management	**No Action:** *Federal and State:* • Long-term, insignificant, beneficial effect – due to income derived from grazing leases. **Proposed Action:** *Federal to State:* • Long-term, insignificant, beneficial effect –Table Mountain and Gribbles Park parcels would be merged into existing SLB grazing leases. • Short-term, insignificant, beneficial effect – SLB would honor BLM grazing permits for Biedell Creek and La Jara Reservoir parcels. • Long-term, insignificant to low, beneficial effect – due to new SLB grazing permits as BLM permits expire providing school trust income. *State to Federal:* • Long-term, insignificant, beneficial effect – due to BLM grazing lease and management under the RMP using land health monitoring program protocols. • Long-term, insignificant to low, beneficial effect – due to USFWS management of grazing under the BNWR CCP where livestock grazing and fire are considered management tools. • Long-term, insignificant to low, adverse effect – USFWS would reduce livestock grazing over time thereby reducing rangeland area under the BNWR CCP. • Long-term, insignificant to low, adverse effect – due to NPS elimination of livestock grazing under the GRSA GMP. • Long-term, insignificant to low, beneficial effect – due to management for native range values and wildlife habitat values under the GRSA GMP.
Forest Management	**No Action:** *Federal and State:* • Long-term, insignificant, beneficial effect – due to management of SLB woodland parcels under the CSFS. • Long-term, insignificant to low, beneficial effect – due to management of woodland and forest stands under BLM-RMPs. **Proposed Action:** *Federal to State:* • Long-term, insignificant to low, beneficial effect – due to CSFS evaluation of woodland and forest stands for fuelwood, transplant trees, Christmas trees, and lumber production and general forest management practices. *State to Federal:* • Long-term, insignificant, beneficial effect – due to BLM management of woodland stands under the RMP directives for fuelwood and transplant tree production. • Long-term, insignificant effect – due to USFWS and NPS management of riparian woodland stands under their respective BNWR CCP and GRSA GMP.

TABLE ES-1. SUMMARY COMPARISON OF ALTERNATIVES

Topic	Impact Summary
Hydrology and Water Rights	**No Action:** *Federal and State:* • Long-term, beneficial effect – Water rights would be available for a variety of uses under BLM-RMP management directives. • Long-term, insignificant effect – Water rights would be available for a variety of uses under SLB management directives. **Proposed Action:** *Federal to State:* • Long-term, insignificant effect – due to active water rights listed by SLB on Agricultural Lease of state trust lands on form AG 01/202. *State to Federal:* • No effect – due to lack of water rights on parcel to BLM. • Long-term, low to moderate, beneficial effect – due to BNWR development of a water management plan. • Long-term, insignificant to low, beneficial effect – due to NPS management under the GRSA GMP.
Visual Resources	**No Action:** *Federal and State:* • Long-term, insignificant effect – due to continued land use practices under present management plans, leases, and agreements. **Proposed Action:** *Federal to State:* • Long-term, insignificant effect – due to continued livestock grazing on native range. • Short-term, negligible to low, adverse effect – due to forest management activities by the CSFS. *State to Federal:* • Long-term, insignificant effect – due to Federal use of VRM tools. • Short-term, insignificant, adverse effect – due to changes in irrigation affecting vegetation pattern, texture, and color.
Noise	**No Action:** *Federal and State:* • Long-term, insignificant, adverse effect – due to normal ranching and recreational pursuits. • Short-term, low to moderate, adverse effect – due to case-by-case increases in sound levels during normal ranching and recreational activities or external sources such as aircraft overflight. • Long-term, low to moderate, adverse effect – due to mining activities at the Table Mountain Quarry sites. • Long-term, low, adverse effect – due to traffic noise from nearby highways and roads. **Proposed Action:** *Federal to State:* • Long-term, insignificant, adverse effect – due to normal ranching activities. • Long-term, low to moderate adverse effect – due to mining activities at the Table Mountain Quarry sites.

TABLE ES-1. SUMMARY COMPARISON OF ALTERNATIVES

Topic	Impact Summary
	State to Federal: • Long-term, low, adverse effect – due to traffic noise from nearby highways and roads. • Short-term, insignificant to low, adverse effect – due to USFWS hay production and seasonal hunting under the BNWR-CCP. • Long-term, low, adverse effect – due to traffic noise from nearby highways and roads to GRSA visitors.
Recreation	**No Action:** *Federal and State:* • Long-term, insignificant effect – due to recreation type and intensity management under the RMPs and the PAP. **Proposed Action:** *Federal to State:* • Long-term, insignificant to low, adverse effect – due to recreation type and intensity under CDOW hunting leases within the PAP process. *State to Federal:* • Long-term, insignificant effect – due to BLM management of recreation type and intensity under the SLVCPL-RMP. • Short and long-term, insignificant to low, beneficial effects – USFWS would manage hunting recreation under a CCP. • Long-term, low to moderate, beneficial effect – USFWS would manage non-consumptive wildlife recreation, environmental education, and interpretation programs under a CCP. • Long-term, insignificant to moderate, beneficial effect–NPS would manage diverse, passive recreation under the GMP. • Long-term, insignificant to low, adverse effect – due to loss of hunting recreation under NPS-GMP provisions, mitigated to long-term, insignificant to low, beneficial effects of more diverse SLV outdoor recreation opportunities.
Access	**No Action:** *Federal and State:* • Long-term, insignificant, beneficial effect – due to normal maintenance of roads and trails. **Proposed Action:** *Federal to State:* • Long-term, insignificant, beneficial effect – due to continued parcel access and normal maintenance of roads and trails. • Long-term, insignificant to low, adverse effect – due to loss of public access. Mitigation would include seasonal access to selected parcels for hunting under the CDOW/SLB PAP. *State to Federal:* • Long-term, insignificant, beneficial effect –BLM would manage the small parcel under the SLVCPL-RMP, resulting in gain of public access and normal maintenance of roads and trails. • Long-term, low to moderate, beneficial effect – due to USFWS road and trail location, normal maintenance, and managed public use under the BNWR CCP. • Long-term, insignificant to low, adverse effect – due to NPS access closures and native vegetation restoration activities under the GRSA GMP.

TABLE ES-1. SUMMARY COMPARISON OF ALTERNATIVES

Topic	Impact Summary
Transportation	**No Action:** *Federal and State:* • Long-term, insignificant, beneficial effect – due to continued maintenance of access for transport of commodities and access for noncommercial uses. **Proposed Action:** *Federal to State:* • Short- and long-term, insignificant, beneficial effects – due to continued maintenance of transportation corridors. • Short- and long-term, insignificant to low, beneficial effect – ingress/egress lanes already constructed and maintained by CDOT would continue to ensure safety for the traveling public. *State to Federal:* • Long-term, insignificant, beneficial effect – siting and design of access to BNWR would consider closure of ranch road access to SH 17, roadway safety upgrades, and ingress/egress lanes for safety. • Long-term, insignificant effect – development of the Comprehensive Conservation Plan would define long-term access needs and transportation planning. • Long-term, insignificant, adverse effect – future actions affecting transportation within GRSA would be assessed under NEPA and NPS guidelines and could affect traffic volume on SHs 150 and 17 and US 160. • Long-term, insignificant to low, adverse effect -- due to congestion from traffic volume increase for BNWR and GRSA.

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ACRONYMS AND ABBREVIATIONS

ACEC	Area of Critical Environmental Concern
ACHP	Advisory Committee for Historic Preservation
ANWR	Alamosa National Wildlife Refuge
AOU	American Ornithologists Union
ARPA	Archeological Resources Protection Act
As	Arsenic
AUM	Animal unit month
BNWR	Baca National Wildlife Refuge
BLM	Bureau of Land Management
^{o}C	degrees centigrade
CAA	Federal Clean Air Act of 1970
CAQCC	Colorado Air Quality Control Commission
CCP	Comprehensive Conservation Planning
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and the Environment
CEQ	Council on Environmental Quality
CFO	Colorado Field Ornithologists
CFR	Code of Federal Regulations
CFRRPC	Central Front Range Regional Planning Commission
CFS	cubic feet per second
CMT	Culturally Modified Trees
CNAA	Colorado Natural Areas Act
CNAP	Colorado Natural Areas Program
CNHP	Colorado Natural Heritage Program
CODMG	Colorado Division of Minerals & Geology
CR	County Road
CRS	Colorado Revised Statutes
CSFS	Colorado State Forest Service
CSP	Colorado State Parks
CSU	Colorado State University
CTO	Colorado Tourism Office
CWA	Clean Water Act
dBA	A-weighted Decibels
DBH	Diameter at Breast Height (4.5 feet)
DPA	Doctrine of Prior Appropriation
E	East
e^2M	engineering-environmental Management, Inc.
EA	Environmental Assessment
EDR	Environmental Data Resources, Inc.
EIS	Environmental Impact Statement
EQUIP	Environmental Quality Incentives Program
ESA	Endangered Species Act
^{o}F	degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
GIS	Geographic Information System
GMP	General Management Plan
GPS	Global Positioning System
GRSA	Great Sand Dunes National Park and Preserve
Hg	Mercury
IMPROVE	Interagency Monitoring of Protected Visual Environment

km	kilometers
m	meters
mi	miles
m^2	square meters
MBI	Michael Baker, Inc.
mg/kg	milligrams per kilogram
mg/m^3	milligrams per Cubic Meter
mi^2	square miles
ml	milliliter
MOA	Memorandum of Agreement
mph	miles per hour
MVNWR	Monte Vista National Wildlife Refuge
N	North
NA	Not applicable
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NASS	National Agricultural Statistics Service
NEPA	National Environmental Policy Act of 1969, as amended
NF	National Forest
NH_3	Ammonia
NHPA	National Historic Preservation Act
NO_x	Nitric oxides
NO_2	Nitrous oxide
NPS	National Park Service
NRCS	National Resources Conservation Service
NRHP	National Register of Historic Places
NWRS	National Wildlife Refuge System
O_3	Ozone
OAHP	Office of Archeology and Historic Preservation
PAP	Public Access Program
Pb	Lead
PCA	Proposed Conservation Area; Potential Conservation Area
PCB	Polychlorinated biphenyls
PFYC	Potenital Fossil Yield Classification
pH	1 divided by the hydrogen ion concentration
PILT	Payment in Lieu of Taxes
PL	Public Law
PLH	Public Land Health
$PM_{2.5}$	Particulate matter less than 2.5 microns
PM_{10}	Particulate matter less than 10 microns
PPA-2000	Great Sand Dunes National Park and Preserve Act of 2000
ppm	parts per million
REC	Recognized Environmental Condition
RGRA	Royal Gorge Resource Area
RMP	Resource Management Plan
RRS	Refuge Revenue Sharing
S	South
SAIPE	Small Area Income and Poverty Estimates
SCS	Soil Conservation Service
Se	Selenium
SH	State Highway
SHPO	State Historic Preservation Officer
SLB	State Land Board (Colorado)
SLRA	San Luis Resource Area
SLV	San Luis Valley
SLVCPL	San Luis Valley Center for Public Lands

SLVRPC	San Luis Valley Regional Planning Commission
SO_2	Sulfur dioxide
sp.	Species
spp.	Two or more species of the same genus
SW ReGAP	Southwest Regional Gap Analysis Program Project
TDS	Total dissolved solids
THPO	Tribal Historic Preservation Officer
TNC	The Nature Conservancy
$\mu g/m^3$	micrograms per cubic meter
U.S.	United States
USACE	U.S. Army Corps of Engineers
USBEA	U.S. Bureau of Economic Analysis
USBR	U.S. Bureau of Reclamation
USC	United States Code
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	Volatile Organic Compounds
VRM	Visual Resource Management
W	West
WRCC	Western Regional Climate Center
WWL	Western Water and Land

1.0 PURPOSE AND NEED

The Bureau of Land Management (BLM) is authorized to complete land exchanges under Section 206 of the Federal Land Policy and Management Act, following a determination that the public interest would be well served (BLM 2006). Further, when considering the public interest, the authorized BLM officer would apply full consideration to (1) the opportunity to achieve better management of Federal lands; (2) the needs of the state and local residents and their economics; and (3) securing important resource management objectives including but not limited to protection of fish and wildlife habitat, riparian habitat, cultural resources, recreation opportunities, and watersheds (BLM 2006).

The need for the proposed exchange is driven by the legislative objective of the Great Sand Dunes National Park and Preserve Act of 2000 (Public Law 106-530 or PPA-2000) (see Appendix A) for the Federal government to acquire state-owned lands within the proposed boundaries of Great Sand Dunes National Park and Preserve, referred to herein as GRSA, and Baca National Wildlife Refuge (BNWR) (BLM 2004a). It would result in acquisition by the U.S. government of state-owned land valued for wildlife habitat, scenic qualities, cultural resources, scientific qualities, and recreational resources. The non-Federal land represents an important component of the diverse ecosystem surrounding and adjacent to the GRSA, and its acquisition would protect the hydrologic features necessary to keep the dunes intact and geologically functioning. The acquisition of non Federal land would also protect the adjoining and surrounding Federal land from future land uses that could conflict with Federal land management activities in the area. Acquisition of this land would reduce potential conflicts and improve the management potential of both the public and private land. The costs to the Federal government to process the exchange as proposed are outweighed by the long-term public use benefits to be derived from the natural resources values received.

The purpose of this environmental assessment (EA) is to determine the potential adverse and beneficial impacts associated with the proposed exchange of Federal and state lands. An EA is prepared when a proposed action is anticipated to have potentially significant environmental impacts, or a proposed action is environmentally controversial. The following elements must be accomplished when preparing an EA: (1) briefly provide evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI); (2) aid in an agency's compliance with the National Environmental Policy Act (NEPA) when an EIS is unnecessary; and (3) facilitate preparation of an EIS when one is necessary. This EA provides a comprehensive environmental description and analysis of the effects of exchanging state and Federal lands in fulfillment of the legislative objective of PPA-2000, the administrative direction in the GRSA General Management Plan (GMP) (NPS 2007), and the administrative direction of the BNWR Comprehensive Conservation Planning (CCP) process (USFWS 2005). The EA ensures that the Colorado State Board of Land Commissioners (State Land Board [SLB]), BLM, U.S. Fish and Wildlife Service (USFWS), and National Park Service (NPS) administrators and managers and the public understand the scope of the proposed exchange, the values of selected lands, and the implications related to Federal and state management of proposed exchange lands.

1.1 CONSOLIDATE PUBLIC LAND OWNERSHIP PATTERNS

The Proposed Action, acquiring identified non-Federal lands, would consolidate Federal land holdings by bringing into NPS (GRSA) and USFWS (BNWR) ownership and management presently managed SLB lands in the San Luis Valley that lie adjacent to the GRSA and have special and unique resource values.. These non-Federal lands would contribute to a large contiguous block of Federal land that would result in more efficient management and increased public access for dispersed recreation, including hunting. Consolidated management of these lands would serve to provide greater long-term protection of the geologic, hydrologic, paleontologic, scenic, scientific, educational, wildlife, and recreational resources of the San Luis Valley, including the sand sheet associated with the dune mass (and responsible, in part, for dune replenishment and functional stability) and the ground and surface water system on which the sand dunes and associated wetlands systems depend. This land exchange would help to provide permanent protection of the entire Great Sand Dunes system, rather than only the active dune mass.

1.1.1 Proposed Royal Gorge Resource Area Exchange Parcels

BLM lands proposed for exchange in Fremont County include parcels on Table Mountain near Penrose, Colorado, and in Gribbles Park adjacent to the Fremont and Park county line that are surrounded by state and private land. The Table Mountain parcels lay approximately 5 miles west of Penrose and the Gribbles Park parcels are approximately 13 miles northeast of Salida, Colorado (see Figure 1-1).

Exchange of the Federal lands and minerals proposed in the Table Mountain and Gribbles Park units (see Figures 1-2 and 1-3) is consistent with the Record of Decision and approved Resource Management Plan (RMP) for the Royal Gorge Resource Area (RGRA) (see Section 1.7.1). Federal lands included in the Table Mountain site are designated as Category I lands that are suitable for sale because they are difficult and uneconomic to manage and have no significant resource values that would warrant retention in Federal ownership (BLM 1996). Category I lands are available for exchange if the result is clearly in the best interest of the public and management will be improved. These parcels remain unfenced from adjoining SLB parcels and historically have been managed as a unit for grazing leases.

There are no Federal lands in the Table Mountain and Gribbles Park units that are identified as Category II, suitable for retention, nor are they included in wilderness study areas, developed recreation sites, National Register of Historic Places (NRHP) eligible cultural and historic sites, or special-status plant and animal habitats. Federal lands included in the Gribbles Park site are designated as Category III lands that are suitable for disposal by land exchange if the result is in the public interest and management will be improved (BLM 1996).

1.1.2 Proposed San Luis Valley Center for Public Lands Exchange Parcels

BLM lands proposed for exchange in Saguache and Conejos counties include parcels on Biedell Creek near La Garita, Colorado (see Figure 1-4), and near La Jara Reservoir near Antonito, Colorado (see Figure 1-5), which are surrounded by state and private land. The Biedell Creek parcels lie about 10 miles northwest of La Garita and the La Jara Reservoir parcels are between 12 and 34 miles northwest of Antonito (see Figure 1-1).

Proposed exchange of the Federal lands and minerals of the Biedell Creek and La Jara Reservoir sites is consistent with the Record of Decision and approved RMP for the San Luis Resource Area (see Section 1.7.1). These Federal lands are designated Category II and are available for exchange on a case-by-case basis to enhance public resource values if it serves the national interest. The RMP and Final EIS state that exchanges are the preferred method for ownership adjustment and would be considered if (1) the exchange results in a consolidated land ownership pattern or improved manageability of natural resources, or (2) would otherwise be in the public interest (BLM 1991).

1.2 INCREASE PUBLIC RECREATIONAL OPPORTUNITIES

Acquisition of non-Federal land in the San Luis Valley would increase public access for participation in recreational opportunities. In particular, there would be increased opportunities for wildlife viewing, photography, natural resources and history education, and hiking in both the BNWR and GRSA, and horseback riding and camping within the GRSA. Within BNWR there continues to be increased opportunity for waterfowl, upland game, and big game hunting if so determined in the refuge comprehensive conservation planning document that would be prepared beginning in 2011.

1.3 ACQUIRE AND PROTECT WILDLIFE HABITAT

Much of the non-Federal land that would be acquired in this exchange lies within the playa lakes region and adjacent to the extensively vegetated sand sheet region of the San Luis Valley, and, as such, is valuable habitat for waterfowl, shorebirds, other migratory birds, and a variety of other wildlife species, including rare and endemic species. Management by the NPS and USFWS would be directed, in part, to maintain and enhance wildlife habitat values of these lands and to protect and monitor habitats of rare wildlife and plant species. Managing playa habitat for wildlife is consistent with the management objectives of the nearby BLM-Blanca Wetlands Management Unit, Colorado State Parks land at San Luis Lakes State Park, and The Nature Conservancy (TNC) lands. It would enhance area wide management of the playa lakes system and its hydrology.

The SLB parcels proposed for exchange include USFWS priority 1 (parcels 32, 33, 34, and 43), priority 2 (parcels 26, 39, 40, and 42), and priority 3 (parcels 26 and 41) acquisition lands (USFWS 2005). These parcels were prioritized based on the presence of wetland and riparian

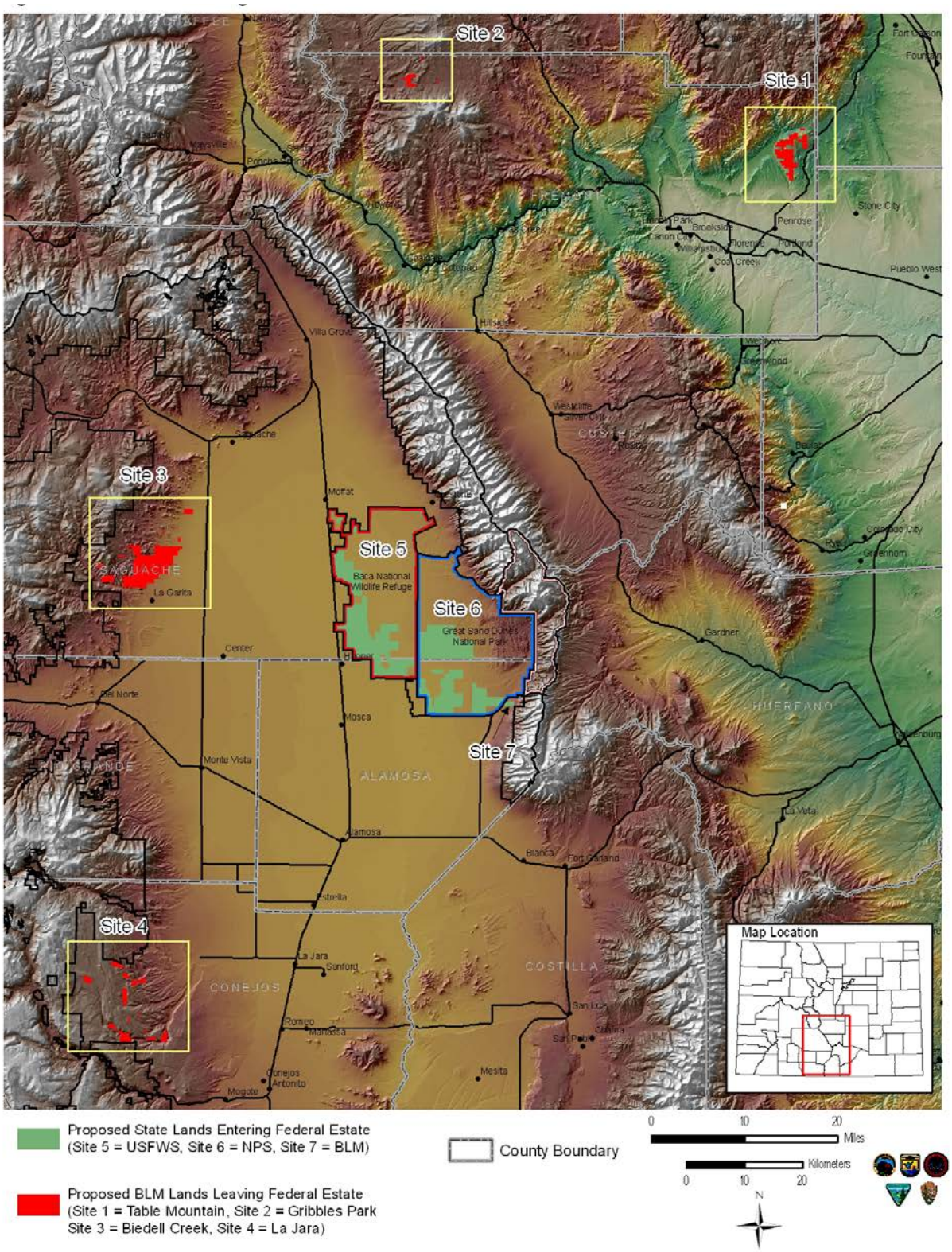

FIGURE 1-1. LOCATION MAP OF LANDS CONSIDERED FOR EXCHANGE BY THE SLB AND THE BLM

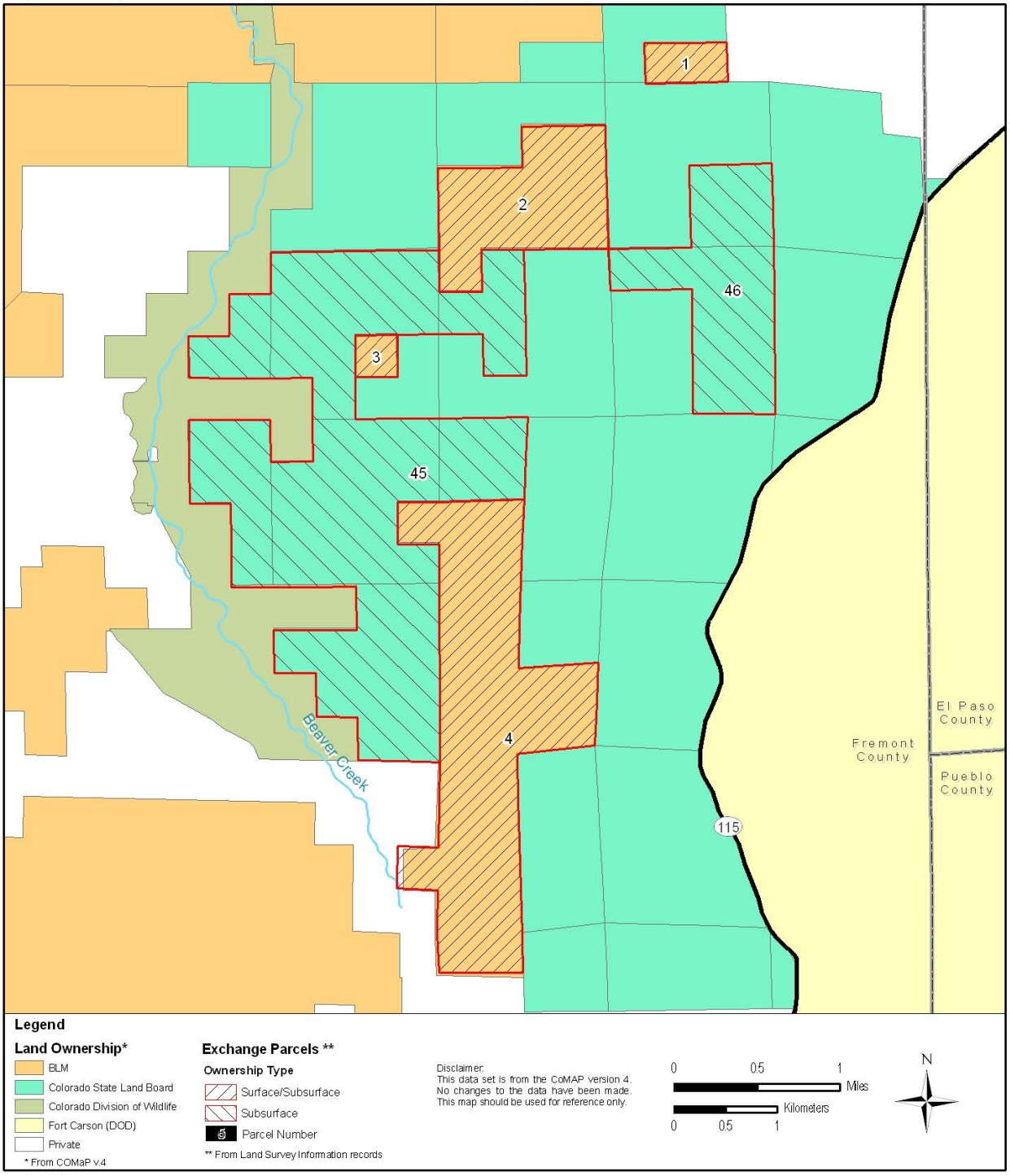

FIGURE 1-2. LOCATION AND PARCEL NUMBERS FOR LANDS PROPOSED FOR EXCHANGE BY THE BLM AT THE TABLE MOUNTAIN SITE

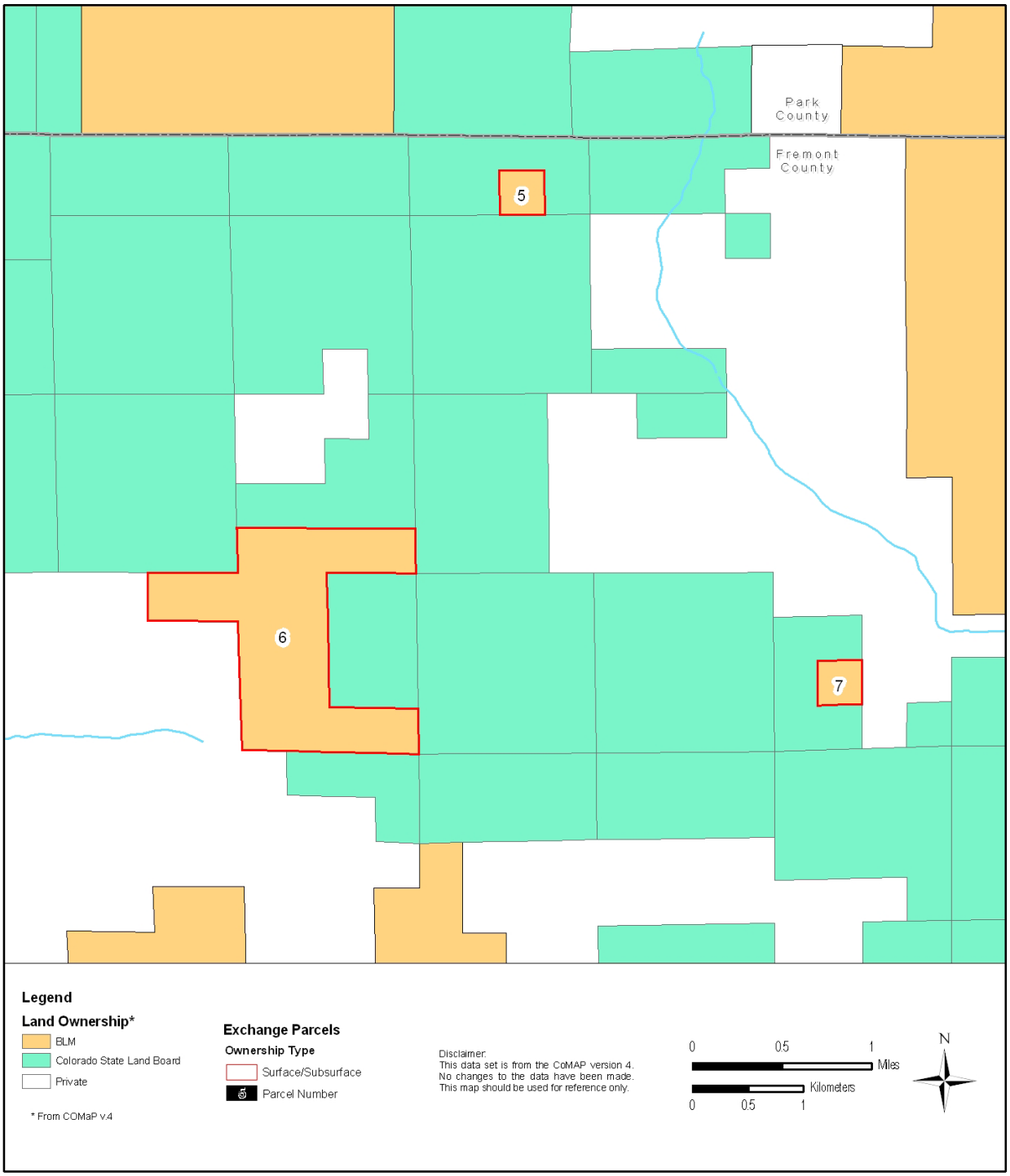

FIGURE 1-3. LOCATION AND PARCEL NUMBERS FOR LANDS PROPOSED FOR EXCHANGE BY THE BLM AT THE GRIBBLES PARK SITE

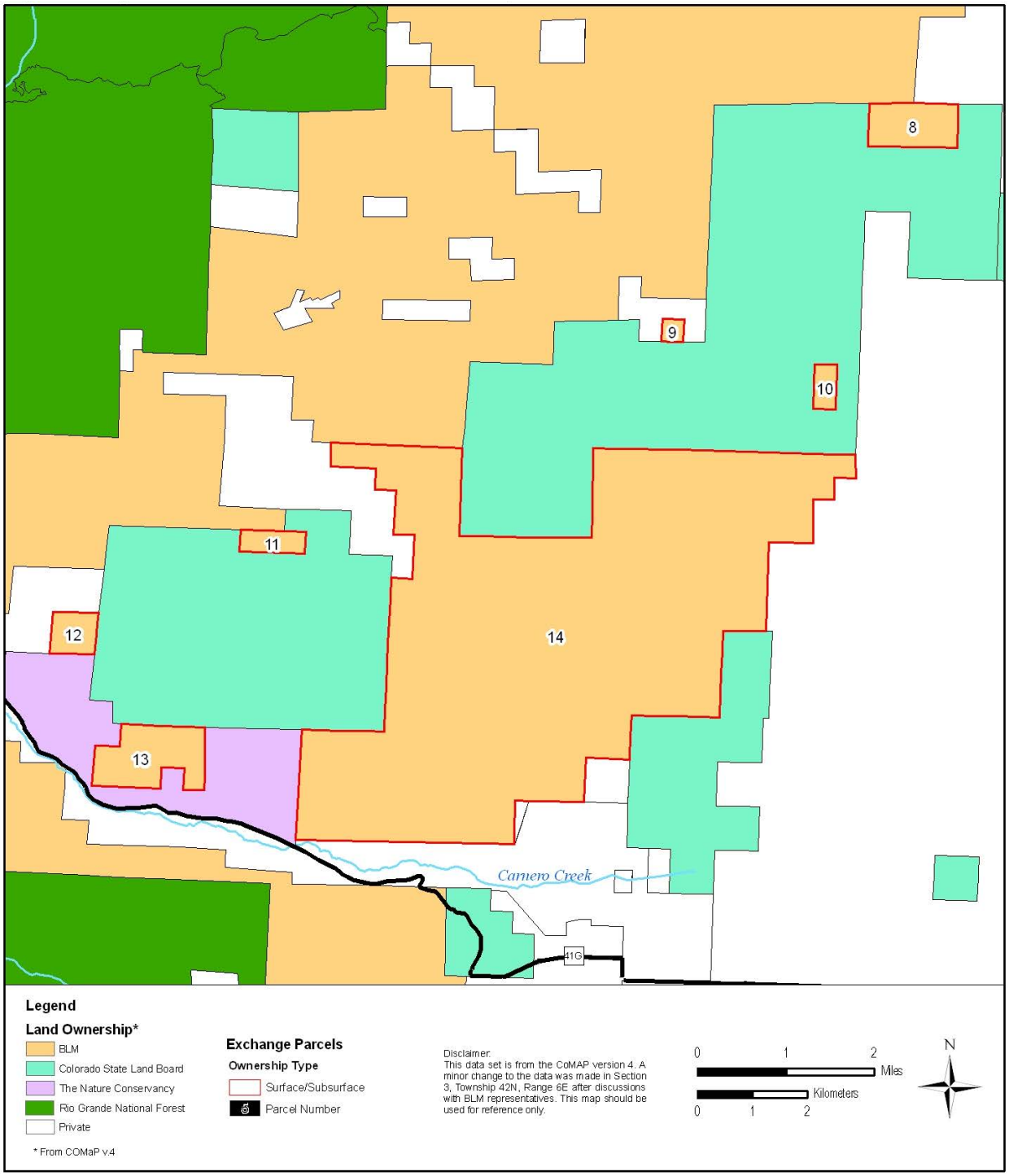

FIGURE 1-4. LOCATION AND PARCEL NUMBERS FOR LANDS PROPOSED FOR EXCHANGE BY THE BLM AT THE BIEDELL CREEK SITE

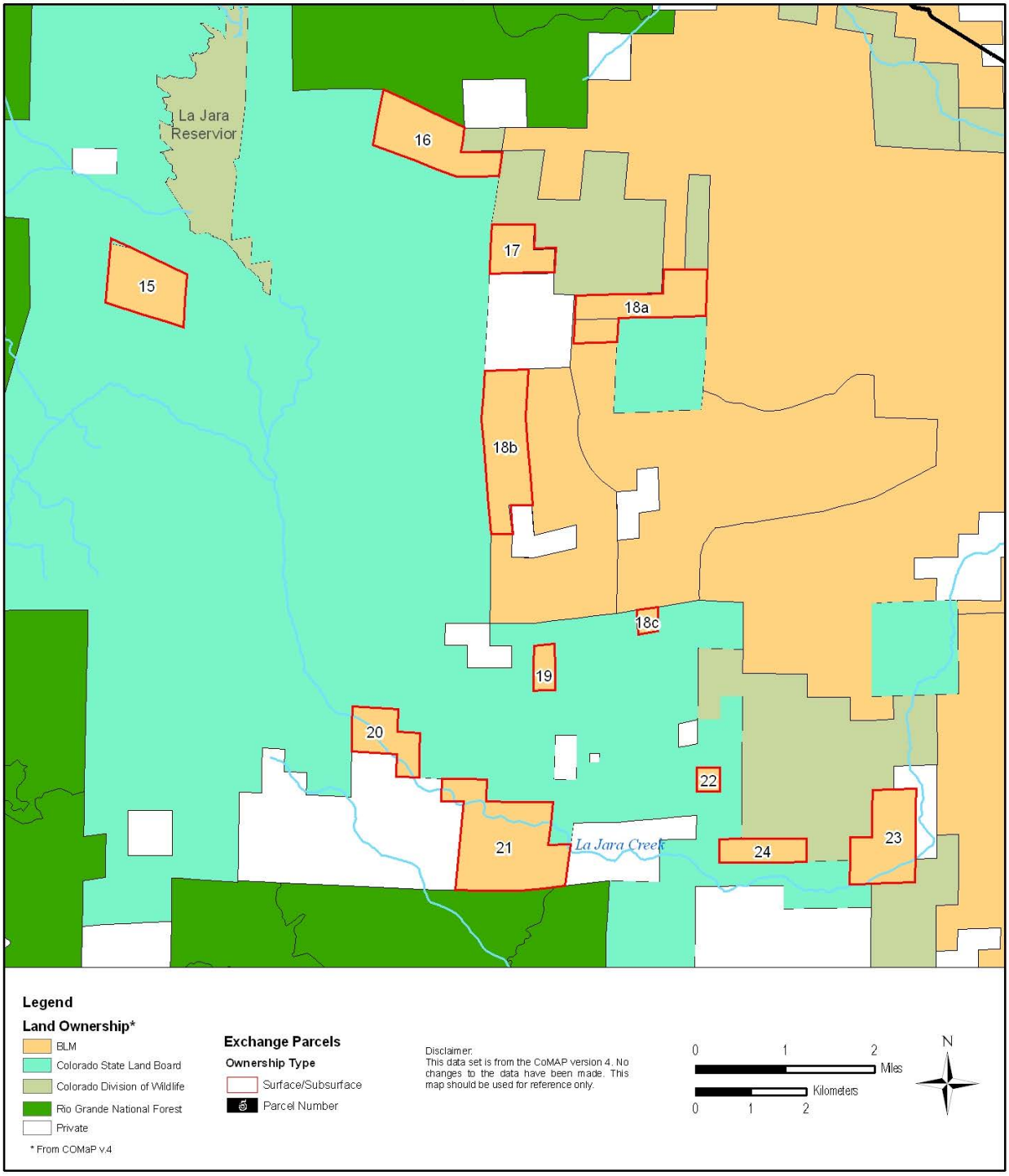

FIGURE 1-5. LOCATION AND PARCEL NUMBERS FOR LANDS PROPOSED FOR EXCHANGE BY THE BLM AT THE LA JARA RESERVOIR SITE

wildlife habitats, which are regarded as the most important habitats requiring protection and preservation within BNWR. Specific management actions by BNWR staff are discussed in the appropriate resource sections of this EA. A second parcel prioritization criterion was to not intentionally divide ownership of parcels resulting in uneconomic remnants for a landowner.

The SLB would evaluate proposed Federal exchange lands for enrollment into its Stewardship Trust Program, established by amendment to the Colorado Constitution in 1996 (Colorado SLB 2001). Lands held under the Stewardship Trust Program are managed by the SLB to maximize options for long-term public use and to protect and enhance the beauty, natural values, open space, and wildlife habitat. The SLB would manage these lands to conserve identified natural values.

The Stewardship Trust Program is required to designate up to 300,000 acres and the lands proposed for exchange are already enrolled in the program (approximately 25,000 acres) or are nominated for acceptance into the program (approximately 28,000 acres). Therefore, some or all of the BLM lands proposed for exchange could be nominated and enrolled into the Stewardship Trust Program and benefit from SLB attention to the natural values of the land.

1.4 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

A potential alternative using a series of phased exchanges was dismissed as unreasonable because of concerns related to the costs, timing, and value equalization of multiple appraisals and funding concerns related to cultural resources documentation and mitigation. The extent of the proposed exchange relative to the ultimate number of acres of Federal lands involved is directly related to the land values and does not present a distinct alternative. Appraisals conducted by the Department of the Interior's Appraisal Services Directorate initially estimated the value of properties on both sides of the proposed land exchange transaction as ranging from $15.3 to $17.5 million. No other reasonable alternatives were identified as a result of public scoping or internal technical reviews.

1.5 PUBLIC NOTIFICATION

The BLM held public information meetings in Alamosa, Colorado (May 23, 2005) and in Canon City, Colorado (May 26, 2005). The proposed land exchange was summarized in a handout that provided background information, the exchange proposal, resource value information, public benefit descriptions, and land value (BLM 2005b). The potential public benefits outlined in the handout presented in each public meeting (BLM 2005b) are as follows:

- Federal and state-owned lands would be consolidated for more logical and improved management and development.
- The exchange would result in more practical management of Federal lands and protection of fish and wildlife habitats, watersheds, and cultural resources.
- The exchange would not result in split estate mineral ownership between the SLB and the Federal government.

- Existing grazing, mineral, and other land uses on both the Federal and non-Federal lands would be recognized and protected.
- The exchange would contribute to meeting the needs of state and local residents and their economies.
- Impacts and loss of revenue to Federal, state, and local governments would be minimized as much as possible. The counties where the Federal lands are located would retain their eligibility to receive payment in lieu of taxes (PILT) after title passes to the state, as long as the SLB does not subsequently transfer title to nonstate ownership.

Three citizens attended the Alamosa meeting and no one attended the Canon City meeting. There were no written responses received for presentation at the meetings or for evaluation/response following the meetings.

Discussion of the proposed land exchange was presented by the Colorado State Board of Land Commissioners during a public meeting on February 17, 2006.

Media releases were prepared by the SLB and placed on their "News Releases" Web site at <*http://trustlands.state.co.us*> (Page 2006). Additionally, Notices of Pending Land-for-Land Exchanges were placed in the *Valley Courier* and *Canon City Daily Record* newspapers, published March 29, April 5, April 12, and April 19, 2006 (see Appendix B) (Page 2006).

Two comprehensive planning efforts resulting from Great Sand Dunes National Park and Preserve Act of 2000 offered opportunities for the public, government agencies, and American Indian Tribes to learn about the land exchange authority and how to participate in that effort, and to discuss and plan the future management intentions for these lands.

The NPS began preparation of the GRSA GMP/Wilderness Study/EIS in 2002, and completed it in 2007. It was prepared with extensive public involvement, participation of an advisory council appointed by the Secretary of the Interior, and cooperation from other Federal and state management agencies throughout the process. This effort included the following:

- One preliminary community-based workshop (about 40 participants)
- Twelve public meetings in five communities (total attendance about 222)
- Four wilderness hearings in four communities (testimony by about 50 individuals)
- Five newsletters (334 comments received)
- A sixty-day public review of the draft GMP (3,394 comments received)
- Quarterly (or more frequent) Great Sand Dunes Advisory Council public meetings held since January 2003
- Numerous informal and formal meetings in communities by the advisory council, park superintendent, and park staff.

American Indian tribes that might attach religious or cultural significance to historic properties were invited to be consulting parties in both the land exchange and the general management plan on February 8, 2005, and participated in their first meeting on March 3, 2005. There was

also Section 106 consultation with the SHPO throughout the general management planning process (see also Chapter 4, Consultation and Coordination).

The USFWS began comprehensive planning for the BNWR in February 2004, and completed the planning process in 2005. It was prepared in cooperation with other Federal and state management agencies. This effort included the following:

- A news release in local and regional newspapers and other venues
- Two public meetings
- BNWR staff participation in meetings of the Great Sand Dunes Advisory Council, local water conservation district meetings, and San Luis Valley Focus Area Committee meetings.

1.6 PUBLIC ISSUES AND MANAGEMENT CONCERNS

The Council on Environmental Quality *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* encourages agencies to limit the issues to be addressed in EAs to those significant issues identified as a result of the public notification and scoping process. The BLM received comments during the public information meeting held in Alamosa, Colorado on May 23, 2005, which included the following:

- Effect of land exchange on travel management (please refer to the “Access” and “Transportation” sections)
- Access closures resulting from exchange of BLM lands to SLB management and assurance of access (please refer to the “Access” and “Transportation” sections)
- Leased lands transferred from BLM to SLB management, their eligibility for PILT, and whether an increase in revenues from PILT would occur (please refer to the “Socioeconomics” section)
- Difference in grazing lease rates for an animal unit month under BLM and SLB management. Would the SLB honor BLM grazing permits? (please refer to the “Socioeconomics” section)
- Clarification of which parcels are under consideration for exchange to determine if personal leases are affected (please refer to the “Overview” and “Introduction” sections and Appendix A)
- Camping recreation and its status when BLM parcels are transferred to the SLB for management, particularly in the La Jara Reservoir area (please refer to the “Recreation” section)
- Land sale should be considered versus land exchange (please refer to the “Overview” and “Introduction” sections and Appendix A)
- There is confusion among citizens about the scope of the Proposed Action (please refer to the “Overview” and “Introduction” sections and Appendix A)

The public comments for the GRSA GMP primarily addressed public access to new Federal lands, management of natural resources (including elk and noxious weeds), management of

cultural resources (including the Medano Ranch), and a proposal for additional wilderness. During the public meetings regarding the BNWR comprehensive planning process, the issues and management concerns expressed by citizens, SLB, and BLM generally included management of threatened and endangered species, issues surrounding elk populations and their conflicts with agriculture, and control of invasive plants and noxious weeds.

1.7 LAND-USE PLAN CONFORMANCE REVIEW

The Proposed Action is subject to and has been reviewed for conformance with the following plans:

1. Royal Gorge Resource Area (RGRA); Record of Decision and Approved Resource Management Plan, approved May 13, 1996

2. San Luis Resource Area (SLRA); Proposed Resource Management Plan and Final Environmental Impact Statement, approved December 18, 1991.

1.7.1 Decision Numbers/Pages

1. RGRA (BLM RMP-EIS 1996): Decisions fall under one of three categories: Resource Condition Type, Land-Use Allocation Type, and Management Action Type (p 2-1). Decisions for resource management levels, methods, and multiple uses are based on policy and regulations (p 2-1). Lands and resources will continue to be managed to provide for needed commodities and uses including livestock grazing, and mineral materials sales to assist in the support of local and regional economies (p 2-1). A tabular decision matrix for resource objective, allocation, and action decisions by values managed is presented (pp 2-5-1 through 2-5-17). Decisions are made by eco-subregion, an area somewhat similar in land, vegetation, and management goals, and could have particular issues or management concerns in common. For Table Mountain and Gribbles Park, the resource condition objective, land use allocation, and management action decisions are described on the basis of the Gold Belt eco-subregion.

2. SLRA (BLM RMP-FEIS 1991): Decisions fall under one of three categories: Resource Condition Objective, Land-Use Allocation, and Management Action (p 7). Management decisions are based on current policies, regulations, and the specific resource conditions, allocations, and management actions described (p 7). Lands and resources will continue to be managed to provide for needed commodities and uses including livestock grazing, and mineral materials sales to assist in the support of local and regional economies (p 7). A decision narrative for resource objective, allocation, and action decisions by values managed is presented (pp 3-6 through 3-22). Decisions are made for areas of land named for geographic references. For Biedell Creek and La Jara Reservoir the resource condition objective, land-use allocation, and the management action decisions are described on the basis of the San Luis Area 1 and Ra Jadero Canyon geographic reference areas.

1.7.2 Decision Language

In terms of land ownership adjustments, RGRA decision guidance includes the following:

- Parcels considered difficult and uneconomical to manage with no significant resource values will be identified for sale.
- Exchange could be used when the result is clearly in the best interest of the public and management will be improved.
- Identified parcels for acquisition or retention will provide values for public use and have access.
- All uses will be equally considered in analyzing proposals.
- Land ownership adjustments in the Gold Belt eco-subregion include 18,076 acres for exchange; 5,664 acres for disposal through exchange, lease, or transfer; and 108,661 acres for retention or exchange (BLM 1996).

However, the Record of Decision continues with the statement: "retain high potential mineral resources even if the estate is split" (BLM 1996). This statement is very clear that the decision to dispose of the mineral estate within this EA is inconsistent with the RMP. The decision in the RMP refers only to the disposal of the surface estate providing discussion that split estate and surface estate should remain together. However, the Record of Decision then clearly discusses that high potential mineral estate should be retained. The mineral report for this proposed exchange (BLM 2005c) documents that the mineral estate in the Table Mountain area is of high potential. The mineral potential of Table Mountain parcels was addressed in the appraisal process.

In terms of lands and realty management, SLRA decision guidance includes:

- Establish a priority for access using listed criteria.
- Promote maximum utilization of existing rights-of-way, including joint use when possible.
- Emphasize retention and management of the majority of BLM-administered lands in the planning area.
- Priority criteria for acquisitions of new lands are riparian, habitat for special-status animal species, and areas with special-status plant species.
- Recreation use sites adjacent to water, wildlife habitat, access, and lands to improve overall manageability.
- Land disposal of some scattered parcels to other agencies or entities with an interest in the maintenance or enhancement of the potential riparian/values (BLM 1991).

1.7.3 Relationship to Statutes, Regulations, or Other Plans

Statutory authority for Federal land exchanges is presented in section 206 of the Federal Land Policy and Management Act (43 United States Code [U.S.C.] 1716) and the implementing regulations are presented in 43 Code of Federal Regulations (CFR) 2200. Land exchanges are further recognized in the PPA-2000, which expands the boundaries of GRSA and also creates the BNWR. PPA-2000 grants the authority to acquire lands within the GRSA and BNWR boundaries through purchase, donation, transfer from another Federal agency, or by exchange. The mandates of the NPS Organic Act of 1916 (16 U.S.C. §§ 1 et seq.) are furthered as the land exchange "conserves the scenery and the natural and historic objects and wild life therein" and also "provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (16 U.S.C. 1).

The GRSA GMP (NPS 2007) was prepared with extensive cooperation from other Federal and state management agencies and outlines the relationship of NPS planning to other planning efforts as follows:

- Resource Management Strategy, Great Sand Dunes National Monument (1994), a management strategy based on (1) defining the Great Sand Dunes ecosystem, (2) understanding the system, (3) monitoring the system, (4) managing the system, and (5) evaluating actions.
- Conceptual Management Plan, CCP process, BNWR (2005).
- Planning for Lands Added to Rio Grande National Forest (NF) in the year 2000, "Zone B" lands of PPA-2000.
- Interagency Land Exchange EA, GRSA, BNWR, BLM, and Colorado SLB (2007).
- Greater Sand Dunes Interagency Fire Management Plan (2005), cooperatively prepared by GRSA, BNWR, and TNC Medano-Zapata Ranch.

The BNWR Conceptual Management Plan, CCP process (2005) was prepared with extensive cooperation from other Federal and state management agencies and presents the relationship of USFWS planning to other planning efforts as follows:

- General Agreement among the NPS, TNC, USFWS, and the U.S. Forest Service (USFS) (USFWS 2005), establishing a framework for management of the 93,210-acres Baca Ranch.
- Interim Compatibility Determination, Colorado Division of Wildlife (CDOW) Dispersal Hunt Activities (becomes effective when SLB lands are transferred to the Federal government), use is an American elk hunting program conducted under the guidelines and authorities of CDOW, Section 271 "Big Game Animals Causing Damage and Big Game Populations Over Objective," part of Article XII of the Colorado Wildlife Commission Regulations under "Special Hunting Seasons for Big Game Ungulates."
- General Management Plan/Wilderness Study/Environmental Impact Statement for GRSA (NPS 2007).

The USFS, Rio Grande NF will be amending their forest plan to designate management prescriptions for the newly acquired lands (“Zone B” lands of PPA-2000). The planning process is underway and will include public and other agency involvement. Through the NEPA process, the USFS would analyze the type and kinds of uses and access that would be permissible and compatible with resource management objectives for the lands in question. The newly acquired lands include Kit Carson Peak, which is attractive to many people for its outdoor quality because it exceeds 14,000 feet in elevation.

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2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 BACKGROUND

This EA addresses a proposed exchange of 20 land parcels totaling 57,056.11 acres of state land managed by the SLB (for future management by the BLM, NPS, and USFWS) for 28 parcels totaling 20,870.03 acres of Federal government land administered by the BLM (for future management by the SLB). This EA describes the proposed land exchange in context with enabling legislation and agency management plans, documents the purpose of and need for the Proposed Action, provides location maps and legal descriptions, describes notification of the public and opportunities for public comment, and identifies public issues and management concerns. This EA also describes the alternatives considered, portrays the relevant aspects of the affected environment for the Federal and state land exchange parcels, and evaluates the environmental consequences of the proposal and its consistency with the BLM Royal Gorge Field Office Resource Management Plan and Record of Decision (BLM 1996) and the San Luis Valley Center for Public Lands Resource Management Plan and Record of Decision (BLM 1991).

This EA complies with the requirements of NEPA and the Office of the President's Council on Environmental Quality (CEQ) regulations for implementing NEPA. This EA analyzes the potential environmental effects of an exchange of lands managed by the BLM, Royal Gorge Field Office in Fremont County, and San Luis Valley Center for Public Lands in Saguache and Conejos counties for land managed by the SLB in Saguache and Alamosa counties. Federal exchange land would be managed by the SLB and state exchange land would be managed by the USFWS, NPS, or the BLM under this proposal.

2.2 INTRODUCTION

The proposed land exchange addressed in this EA would support the Great Sand Dunes National Park and Preserve Act of 2000 (Public Law [P.L,] 106-530: PPA-2000) (see Appendix A). Specifically, PPA-2000 provides for the establishment of the approximately 150,000-acre GRSA and the approximately 92,617-acre BNWR in the San Luis Valley of south-central Colorado. PPA-2000 expanded the GRSA boundary nearly fourfold and authorized conversion of the existing national monument (38,659 acres established in 1932) to national park status. Additionally, it established the Great Sand Dunes National Preserve, which is also managed by the NPS and encompasses approximately 40,000 acres. The boundary expansion included the SLB surface lands and mineral rights under evaluation in this EA.

The Great Sand Dunes are the tallest sand dunes in North America and are among the most fragile and complex dune systems in the world. The sand dune system is composed of the dunes watershed and three sand deposits: the sabkha, sand sheet, and dune field. Sabkhas are flat saline areas of sand or silt lying just above the water table; the sand sheet represents thick areas of sand and silt that are undulating, but have not formed into dunes; and the dune field is

the area of active sand deposits reaching elevations of several hundred feet. To ensure the natural cycle of sand movement into and from the dunes, the geologic, hydrologic, and ecologic processes within the sand deposits and watershed must occur unimpeded. Disruptions or changes in the natural processes could have significant, permanent effects on dune resources that would conflict with the NPS mission of preservation and protection.

The underlying intent of PPA-2000 is to protect and preserve the spectacular and unique sand dunes, the surface and groundwater system that replenishes the sand mass, and the remarkable biodiversity of the surrounding landscape for the benefit and enjoyment of present and future generations. The PPA-2000 states in part, under Section 4:

> *When the Secretary determines that sufficient land having a sufficient diversity of resources has been acquired to warrant designation of the land as a national park, the Secretary shall establish the Great Sand Dunes National Park in the State of Colorado…as a unit of the National Park System.*

The values identified by Congress for GRSA and associated Federal, state, and private lands are presented in Section 2 of the PPA-2000 and include the following:

> *(1) the Great Sand Dunes National Monument in the State of Colorado was established by presidential proclamation in 1932 to preserve Federal land containing spectacular and unique sand dunes and additional features of scenic, scientific, and educational interest for the benefit and enjoyment of future generations;*
> *(2) the Great Sand Dunes, together with the associated sand sheet and adjacent wetland and upland, contain a variety of rare ecological, geological, paleontological, archaeological, scenic, historical, and wildlife components, which:*
> > *(A) include the unique pulse flow characteristics of Sand Creek and Medano Creek that are integral to the existence of the dunes system;*
> > *(B) interact to sustain the unique Great Sand Dunes system beyond the boundaries of the existing National Monument;*
> > *(C) are enhanced by the serenity and rural western setting of the area; and*
> > *(D) comprise a setting of irreplaceable national significance;*
> *(3) the Great Sand Dunes and adjacent land within the Great Sand Dunes National Monument;*
> > *(A) provide extensive opportunities for educational activities, ecological research, and recreational activities; and*
> > *(B) are publicly used for hiking, camping, and fishing, and for wilderness value (including solitude);*
> *(4) other public and private land adjacent to the Great Sand Dunes National Monument;*
> > *(A) offers additional unique geological, hydrological, paleontological, scenic, scientific, educational, wildlife, and recreational resources; and*
> > *(B) contributes to the protection of:*
> > > *(i) the sand sheet associated with the dune mass;*
> > > *(ii) the surface and groundwater systems that are necessary to the preservation of the dunes and adjacent wetland; and*

(iii) the wildlife, viewshed, and scenic qualities of the Great Sand Dunes National Monument;

(5) some of the private land described in paragraph (4) contains important portions of the sand dune mass, the associated sand sheet, and unique alpine environments, which would be threatened by future development pressures;

(6) the designation of a Great Sand Dunes National Park, which would encompass the existing Great Sand Dunes National Monument and additional land, would provide:

(A) greater long-term protection of the geological, hydrological, paleontological, scenic, scientific, educational, wildlife, and recreational resources of the area including the sand sheet associated with the dune mass and the groundwater system on which the sand dune and wetland systems depend; and

(B) expanded visitor use opportunities;

(7) land in and adjacent to the Great Sand Dunes National Monument is:

(A) recognized for the culturally diverse nature of the historical settlement of the area;

(B) recognized for offering natural, ecological, wildlife, cultural, scenic, paleontological, wilderness, and recreational resources; and

(C) recognized as being a fragile and irreplaceable ecological system that could be destroyed if not carefully protected; and

(8) preservation of this diversity of resources would ensure the perpetuation of the entire ecosystem for the enjoyment of future generations.

PPA-2000 states that GRSA would be managed in accordance with its language and all laws generally applicable to units of the national park system. A GMP and wilderness study has been prepared for GRSA and alternative management approaches evaluated per NEPA in an EIS (NPS 2007). The GMP describes the general management path the NPS intends to follow for the next 15 to 20 years, and provides a framework for proactive decisionmaking related to visitor use, natural and cultural resources management, and GRSA facilities. Management issues addressed by the GMP relate to protection of fundamental GRSA resources and values, management of newly acquired lands, public access, crowding and overuse, wilderness, wild and scenic rivers, and development and land uses in and around GRSA boundaries.

The BNWR, managed by the USFWS, is the third area so designated by Congress in the San Luis Valley. The others include Alamosa National Wildlife Refuge (ANWR) and Monte Vista National Wildlife Refuge (MVNWR). The ANWR and MVNWR were established under the Migratory Bird Conservation Act: "… for use as inviolate sanctuaries, or for any other management purpose, for migratory birds." It is the mission of the National Wildlife Refuge System ". . . to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (NWRS Improvement Act of 1997). Goals to further the National Wildlife Refuge System mission include the following:

1. Fulfill our statutory duty to achieve refuge purpose(s) and further the system mission.

2. Conserve, restore where appropriate, and enhance all species of fish, wildlife, and plants that are endangered or threatened with becoming endangered.
3. Perpetuate migratory bird, interjurisdictional fish, and marine mammal populations.
4. Conserve a diversity of fish, wildlife, and plants.
5. Conserve and restore, where appropriate, representative ecosystems of the United States, including the ecological processes characteristic of those ecosystems.
6. Foster understanding and instill appreciation of fish, wildlife, and plants, and their conservation by providing the public with safe, high-quality, and compatible wildlife-dependent public use. Such use includes hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

Specifically, the purpose of BNWR (USFWS 2005) is

> *. . . to restore, enhance and maintain wetland, upland, riparian and other habitats for wildlife, plants and fish species that are native to the San Luis Valley, Colorado. Management of the refuge will emphasize migratory bird conservation and will consider the refuge's role in broader landscape conservation efforts.*

A conceptual management plan has been prepared to provide management direction for BNWR until a CCP process is undertaken in 2011 to guide management for the subsequent 15 or so years (USFWS 2005). The CCP provides local landowners, neighboring government agencies, and interested citizens with an overview of anticipated management approaches by providing a broad overview of the USFWS proposed management approach for wildlife and habitats, public uses, facilities, interagency coordination, and other operational needs.

BNWR will be managed as part of the refuge system in accordance with the National Wildlife Refuge System Administration Act of 1966, as amended, with the National Wildlife Refuge Improvement Act of 1997 (Executive Order 12996), the Refuge Recreation Act (16 U.S.C. 460k et seq. 1962), and other applicable USFWS and Federal land management policies (USFWS 2005). The interim goals for BNWR management were prepared to protect and foster better understanding of the ecological processes that have and continue to shape the landscape (USFWS 2005). These goals include the following:

1. Evaluate pre-acquisition management strategies in relation to wetland, upland, and riparian habitats.
2. Assemble resource information including wildlife and biological, hydrological, and cultural resources.
3. Assemble visitor services information and needs for the development of the visitor services program.
4. Assemble operational and funding needs including staff requirements and inventorying real property assets such as fences, windmills, buildings, water control structures, and roads.
5. Maintain and evaluate pre-acquisition irrigation strategies.

6. Ensure law enforcement protection including but not limited to facilities, boundaries, cultural resources, and refuge-specific regulations.
7. Respond to public concerns and provide information in a timely manner.

PPA-2000 further grants the authority to acquire lands within both the GRSA and BNWR through purchase, donation, transfer from another Federal agency, or exchange as addressed in this EA. Section 8 of the PPA-2000 stipulates that lands or interests (e.g., mineral estate) that are within the legislative boundaries of BNWR and GRSA and are owned by the State of Colorado and managed by the SLB (51,245.61 surface acres and 5,810.50 acres of mineral estate only) may be acquired by donation or exchange. The PPA-2000 does not allow the sale of Federal lands to acquire state-owned lands under the authority of the Federal Land Transaction Facilitation Act, commonly known as the Baca Act (FLTFA 2000). Therefore, a land exchange represents the only viable mechanism for the Federal government to acquire the total 57,056.11 acres of state-owned surface lands and other interests located within the boundaries of the GRSA and BNWR.

A companion action that supports PPA-2000 is a cooperative effort by the Federal government and TNC to purchase approximately 86,000 acres of the privately owned Baca Ranch (i.e. Cabeza de Vaca Land and Cattle Company, LLC). The purchase and eventual transfer to the Federal government involved the use of Land and Water Conservation Fund (1964) funds and special congressional appropriations. The Baca Ranch includes most of the land within the Luis Maria Baca Grant No, 4, for which the Federal government issued a confirmatory patent on February 20, 1900. The Land and Water Conservation Fund purchase was a critical first step in acquiring enough land to warrant formal designation of the GRSA and BNWR. Following purchase, approximately 29,000 acres of the Baca Ranch are being managed by the NPS, thus allowing formal designation of the park and preserve. Of the remaining land purchase, approximately 12,000 acres are managed by the USFS and approximately 45,000 acres became part of the BNWR, managed by the USFWS.

In January 2004, representatives from the NPS and USFWS met with the Colorado BLM director to discuss the merits of pursuing this proposed land exchange with the SLB. The NPS, BLM, USFWS, and SLB subsequently agreed to cooperate to complete the proposed exchange, which was identified as a high priority by the office of the Secretary of the Interior. BLM resource management planning provides the basis for evaluating and communicating public land uses, including this proposed exchange. Using the principles of multiple use and sustained yield, the BLM seeks to maximize resource values for present and future generations of Americans (BLM 2004b).

The SLB manages approximately 3,000,000 surface acres of Colorado trust lands. One management objective is to gain a reasonable and consistent income from those lands for the benefit of public schools and other designated state institutions. Additionally, the SLB holds approximately 1,500,000 acres of mineral rights without surface rights. As trustees for state land, the SLB is authorized to manage these lands for beneficiaries presently and into the future. Land exchanges represent one tool available to manage trust lands, as is designation of lands in the Stewardship Trust Program. The Stewardship Trust Program was approved by Colorado voters in 1996, protecting some trust lands from potential near-term sale, preserving

it for future SLB use. Presently, that trust encompasses approximately 300,000 acres of SLB land with special resource values. Nearly 97 percent of SLB lands proposed for exchange under PPL-2000 have been designated or are nominated to be placed in the Stewardship Trust Program.

SLB-managed lands are commonly leased for various uses including livestock grazing, farming, mineral exploration and development, timber harvesting, and public access for wildlife-related recreation. An individual parcel could have several lease activities occurring simultaneously. The Board of Land Commissioners, during its February 20, 2004, regular meeting, tabled its consideration of Saguache County land tracts for oil and gas lease auction approval. This decision was tabled to allow staff to provide additional information to the board concerning options on Saguache County land tracts, and specifically identified research and progress toward the potential land exchange of all SLB tracts within the proposed boundary of GRSA and BNWR. The formal notice for the pending land-for-land exchange was published by the SLB in March and April 2006 (see Appendix B).

Federal (BLM) lands specifically identified for exchange to the SLB (see Figure 1-1) include public lands totaling 20,870.03 acres in four geographic areas in Fremont, Saguache, and Conejos counties, and include the following:

- Table Mountain (1,692.62 surface acres and 2,680 mineral estate acres = 4,372.62 acres)
- Gribbles Park (approximately 480 acres) in Fremont County
- Biedell Creek (11,479.58 acres) in Saguache County
- La Jara Reservoir (4,537.83 acres) in Conejos County.

The Table Mountain and Gribbles Park parcels are administered by the BLM Royal Gorge Field Office, and the Biedell Creek and La Jara Reservoir parcels are administered by the BLM San Luis Valley Public Lands Center.

The proposed land exchange is located in the SLB South District that administers state-owned lands consisting of school Sections 16 and 36, in satisfaction of quantity or special grants allowed by the Federal government in the Colorado Statehood Act of 1876, and additional lands that have been acquired by past land exchanges or purchase. SLB lands proposed for exchange are located in Alamosa and Saguache counties (see Figure 1-1). The SLB established the priority for the order in which Federal parcels would be acquired under the proposed exchange as follows: (1) Table Mountain, (2) Gribbles Park, (3) Biedell Creek, and (4) La Jara Reservoir. The actual amount of BLM land to be exchanged was based on the appraised land value versus the assessed land values of SLB parcels. Table 2-1 summarizes the land exchange and proposed future management addressed in this EA.

TABLE 2-1. SUMMARY OF LAND EXCHANGE SITES AND ACREAGES

Site Name	County	Land Exchange Intent	Total Surface Acreage / (minerals acreage)
1. Table Mountain	Fremont	From BLM to State	1,692.62 / (2,680.00)
2. Gribbles Park	Fremont	From BLM to State	480.00 / (0.00)
3. Biedell Creek	Saguache	From BLM to State	11,479.58 / (0.00)
4. La Jara Reservoir	Conejos	From BLM to State	4,537.83 / (0.00)
		Total to State	**18,190.03 / (2,680.00)**
5. BNWR	Saguache/Alamosa	From State to USFWS	30,912.62 / (3,531.00)
6. GRSA	Saguache/Alamosa	From State to NPS	25,765.69 / (2,279.50)
7. BLM	Alamosa	From State to BLM	379.70 / (0.00)
Total to Federal			**51,245.61 / (5,810.50)**

Kit Page, SLB South District manager, addressed potential SLB land exchange by identifying three long-term goals to better provide for lands and their administration in the South District: (1) increase the value of SLB holdings, (2) increase annual revenue from SLB holdings, and (3) achieve efficient and effective management of SLB holdings. He also identified repositioning tools to implement long-term goals of which exchange of lands with the BLM is integral (Page 2001). The land exchange, as proposed, allows the South District to accomplish land ownership changes to improve management and increase value and revenue to the state trust.

2.3 PROPOSED ACTION

An exchange of land presently managed by the Colorado BLM (Royal Gorge Field Office and San Luis Valley Center for Public Lands) and the SLB (South District) is proposed to support the Great Sand Dunes National Park and Preserve Act of 2000. Specifically, PPA-2000 provides for the establishment of the GRSA and the BNWR in the San Luis Valley of south-central Colorado (see Figure 1-1). Section 8 of PPA-2000 stipulates that lands or interests (e.g., mineral estate) that are within the legislative boundaries of GRSA and owned and managed by the State of Colorado may only be acquired via donation or exchange. The PPA-2000 does not permit the sale of Federal lands to acquire state-owned lands under the authority of the Federal Land Transaction Facilitation Act of 2000.

The proposed land exchange involves Federal acquisition of SLB surface and mineral estate, and mineral estate only, located in Alamosa and Saguache counties (see Figure 1-1). The SLB lands are proposed for exchange for land surface and mineral estate only (Table Mountain site) administered by the BLM in Fremont, Saguache, and Conejos counties (see Figure 1-1).

The Department of the Interior Federal agency partners (BLM, NPS, and USFWS) are the proponents for the proposed land exchange to be processed under Section 206 of the Federal Land Policy and Management Act of 1976 and implementing regulations (43 CFR 2200). BLM land assets would be proposed to be exchanged for properties managed by the SLB. Therefore,

the Colorado BLM office has assumed the lead for processing the proposed land exchange under its existing policy and procedural guidance, including preparation of this EA. Under Section 206 (c) of the act:

> *Lands acquired by the Secretary by exchange under this section which are within the boundaries of any unit of the National Forest System, National Park System, National Wildlife Refuge System, . . . upon acceptance of title by the United States shall immediately be reserved for and become part of the unit or area within which they are located, without further action by the Secretary, and shall thereafter be managed in accordance with all laws, rules, and regulations applicable to such unit or area (PL 100-409 §3, 8-20-88).*

This proposed land exchange provides public benefits by reducing BLM commitment of public resources for isolated, difficult to manage parcels that provide low to moderate public benefit or contain limited special resource values, while acquiring new Federal lands that have exceptional resource values of high public benefit as part of the GRSA and BNWR.

The land exchange is driven by PPA-2000, which expanded the area and boundaries of GRSA from 38,659 acres, protecting only the main dune field under national monument status, by adding an additional 111,341 acres (totaling 150,000 acres) that protects the functioning dune system and added the national preserve (see Figure 1-1). PPA-2000 also created the 92,617-acre BNWR (see Figure 1-1) and added 13,599 acres that include Kit Carson Peak into the Rio Grande NF.

The entire proposed exchange addressed herein involves the acquisition of SLB land surface and mineral estate. The SLB exchange land is nearly all located in the congressionally authorized boundaries of GRSA and BNWR in Alamosa and Saguache counties. Table 2-2 provides the legal description of individual SLB parcels or management units depicted on Figure 2-1. These lands include parcels 26 through 47, as identified on Figure 2-1. Parcels 26, 39, 40, 41, 42, 43, and 47 are proposed to be managed by the USFWS as a portion of the BNWR; parcels 27, 28, 29, 30, 35, 36, 37, 38, and 44 are proposed to be managed by the NPS as GRSA land; and parcel 31 is proposed to be managed by the BLM.

The SLB lands are proposed for exchange for Federal land surface and mineral estate (Table Mountain site) administered by the BLM in Fremont, Saguache, and Conejos counties (see Figures 1-2, 1-3, 1-4, and 1-5). Table 2-2 provides the legal description of individual BLM parcels depicted on Figures 1-2, 1-3, 1-4, and 1-5. These lands include parcels 1 through 25 and parcels 45 and 46.

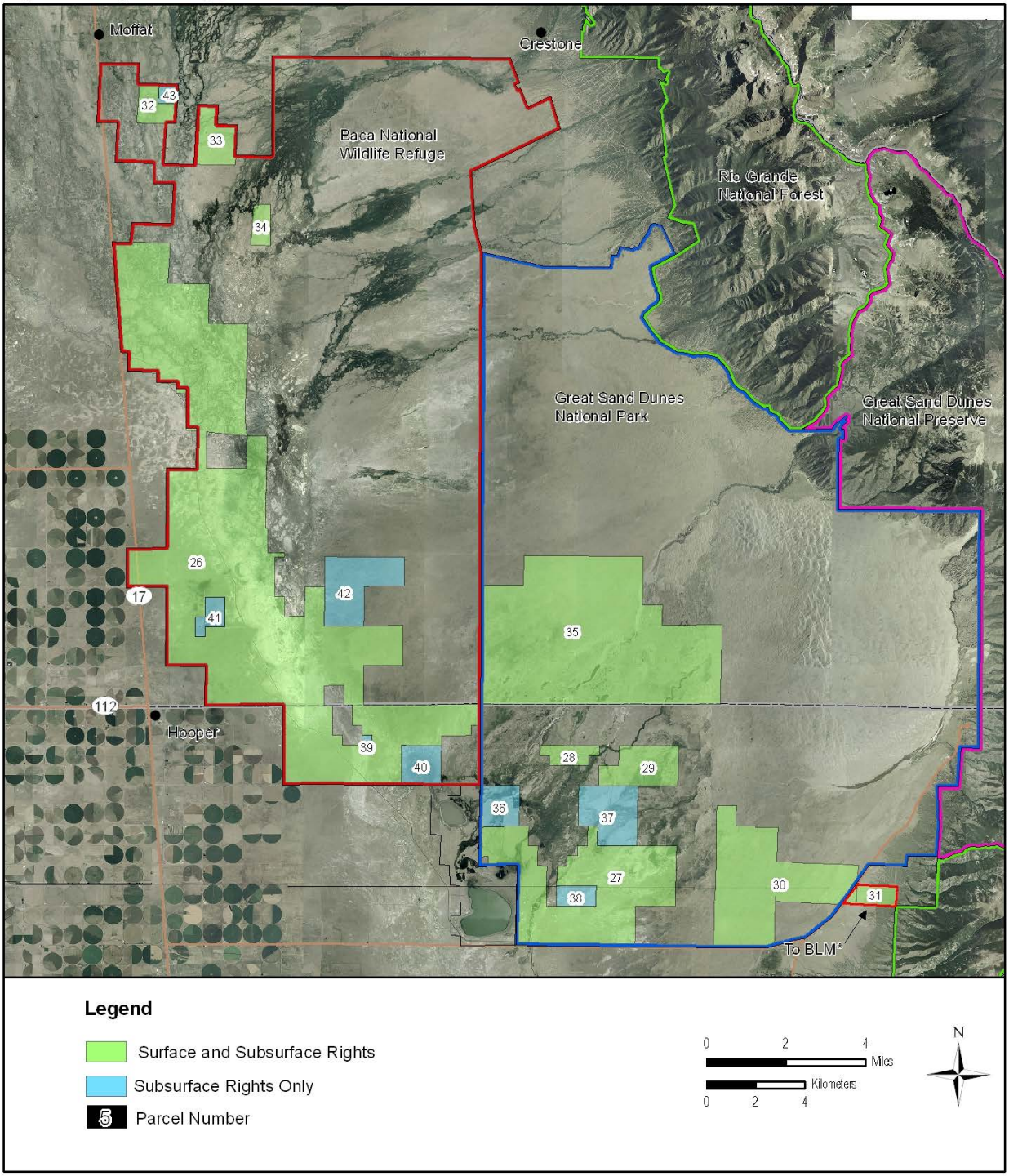

FIGURE 2-1. LOCATION AND PARCEL NUMBERS FOR LANDS PROPOSED FOR EXCHANGE BY THE SLB

TABLE 2-2. LEGAL DESCRIPTIONS OF SLB LAND TO BE EXCHANGED TO THE BLM

Parcel No.	Legal description		Acres	County	Current owner	Target owner
26	T. 40 N., R. 11 E.	Sec. 2, lots 1, 2, 3, 4, S1/2N1/2, N1/2SW1/4, and NW1/4SE1/4	456.52	Alamosa	State	Baca NWR
	T. 40 N., R. 11 E.	Sec. 3, lots 1, 2, 3, 4, S1/2N1/2, and S1/2	654.02	Alamosa	State	Baca NWR
	T. 40 N., R. 11 E.	Sec. 4, lots 1, 2, 3, 4, S1/2N1/2, N1/2S1/2, SE1/4SW1/4, and S1/2SE1/4	610.40	Alamosa	State	Baca NWR
	T. 40 N., R. 11 E.	Sec. 5, lots 1, 4, SE1/4NE1/4, SW1/4NW1/4, W1/2SW1/4, and SE1/4SW1/4	283.01	Alamosa	State	Baca NWR
	T. 40 N., R. 11 E.	Sec. 6, lots 1, 2, 3, 4, 5, 6, 7, S1/2NE1/4, SE1/4NW1/4, E1/2SW1/4, and SE1/4	643.61	Alamosa	State	Baca NWR
	T. 40 N., R. 11 E.	Sec. 7, lots 1, 2, 3, 4, E1/2, and E1/2W1/2	644.42	Alamosa	State	Baca NWR
	T. 40 N., R. 11 E.	Sec. 8, all	640.00	Alamosa	State	Baca NWR
	T. 40 N., R. 11 E.	Sec. 9, E1/2, E1/2NW1/4, SW1/4NW1/4, and SW1/4	600.00	Alamosa	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 1, lots 1, 2, 3 and 4, and S1/2NW1/4 and SW1/4	353.52	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 2, lots 1, 2, 3, 4, S1/2N1/2, and S1/2	637.98	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 3, lots 1, 2, 3, 4, S1/2N1/2, and S1/2	637.60	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 10, all	640.00	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 11, all	640.00	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 12, lot 2 and W1/2	340.11	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 13, fractional N1/2NE1/4, S1/2NE1/4, W1/2, and SE1/4	479.90	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 14, all	640.00	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 15, all	640.00	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 16, all	640.00	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 22, N1/2, SW1/4, W1/2SE1/4, and NE1/4SE1/4	600.00	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 23, E1/2 and N1/2NW1/4	400.00	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 24, W1/2NE1/4, SE1/4NE1/4, W1/2, and SE1/4	600.00	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 25, all	640.00	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 26, all	640.00	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 27, W1/2NE1/4, SE1/4NE1/4, W1/2, and SE1/4	600.00	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 35, all	640.00	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 36, all	640.00	Saguache	State	Baca NWR
	T. 41 N., R. 11 E.	Sec. 19, lot 4, E1/2, and SE1/4 SW1/4	400.30	Saguache	State	Baca NWR
	T. 41 N., R. 11 E.	Sec. 28, all	640.00	Saguache	State	Baca NWR
	T. 41 N., R. 11 E.	Sec. 29, all	640.00	Saguache	State	Baca NWR
	T. 41 N., R. 11 E.	Sec. 30, lots 1, 2, 3, 4, E1/2, and E1/2W1/2	641.98	Saguache	State	Baca NWR

TABLE 2-2. LEGAL DESCRIPTIONS OF SLB LAND TO BE EXCHANGED TO THE BLM

Parcel No.	Legal description		Acres	County	Current owner	Target owner
26, cont'd.	T. 41 N., R. 11 E.	Sec. 31, lots 1, 2, 3, 4, E1/2, and E1/2W1/2	641.60	Saguache	State	Baca NWR
	T. 41 N., R. 11 E.	Sec. 32, N1/2 and SE1/4	480.00	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 9, all	640.00	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 10, all	640.00	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 14, all	640.00	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 15, all	640.00	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 16, all	640.00	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 17, Fractional portion east of railroad right-of-way	115.00	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 21, N1/2 and NE1/4SE1/4	360.00	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 22, E/12, NW1/4, N1/2SW1/4, and SE1/4SW1/4	600.00	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 23, all	640.00	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 26, all	640.00	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 27, E1/2	320.00	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 34, E1/2E1/2	160.00	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 36, lots 1, 2, and W1/2	370.60	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 4, lots 1, 2, 3, 4, S1/2N1/2, and S1/2	642.19	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 5, Fractional portion east of railroad right-of-way	207.40	Saguache	State	Baca NWR
	T. 42 N., R. 10 E.	Sec. 8, Fractional portion east of railroad right-of-way	167.22	Saguache	State	Baca NWR
			25807.38			
32	T. 43 N., R. 10 E.	Sec. 16, W1/2, and SE1/4	480.00	Saguache	State	Baca NWR
			480.00			
33	T. 43 N., R. 10 E.	Sec. 15, SE1/4	160.00	Saguache	State	Baca NWR
	T. 43 N., R. 10 E.	Sec. 22, E1/2	320.00	Saguache	State	Baca NWR
	T. 43 N., R. 10 E.	Sec. 23, W1/2	320.00	Saguache	State	Baca NWR
			800.00			
34	T. 43 N., R. 10 E.	Sec. 36, lots 1, 2, 3, 4, and W1/2W1/2	292.24	Saguache	State	Baca NWR
			292.24			
39	T. 40 N., R. 11 E.	Sec. 4, SW1/4SW1/4	40.00	Alamosa	State	Baca NWR
	T. 40 N., R. 11 E.	Sec. 9, NW1/4NW1/4	40.00	Alamosa	State	Baca NWR
			80.00			
40	T. 40 N., R. 11 E.	Sec. 10, all	640.00	Alamosa	State	Baca NWR
			640.00			
41	T. 41 N., R. 10 E.	Sec. 22, SE1/4SE1/4	40.00	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 23, S1/2NW1/4 and SW1/4	240.00	Saguache	State	Baca NWR
	T. 41 N., R. 10 E.	Sec. 27, NE1/4NE1/4	40.00	Saguache	State	Baca NWR
			320.00			
42	T. 41 N., R. 11 E.	Sec. 17, fractional	531.00	Saguache	State	Baca NWR
	T. 41 N., R. 11 E.	Sec. 20, all	640.00	Saguache	State	Baca NWR
	T. 41 N., R. 11 E.	Sec.16, fractional	520.00	Saguache	State	Baca NWR
			1691.00			

TABLE 2-2. LEGAL DESCRIPTIONS OF SLB LAND TO BE EXCHANGED TO THE BLM

Parcel No.	Legal description		Acres	County	Current owner	Target owner
43	T. 43 N., R. 10 E.	Sec. 16, NE1/4	160.00	Saguache	State	Baca NWR
			160.00			
47	T. 41 N., R. 11 E.	Sec. 33, All	640.00	Saguache	State	Baca NWR
			640.00			
		Baca NWR Site Subtotal	30,910.62			
27	T. 40 N., R. 12 E.	Sec. 19, lots 1, 2, 3, 4, and E1/2SW1/4	238.98	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 20, E1/2NE1/4, SE1/4SW1/4, and SE1/4	280.00	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 21, S1/2	320.00	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 22, S1/2	320.00	Alamosa	State	GRSA
	T. 40 N., R. 11 E.	Sec. 24, E1/2, NW1/4, N1/2SW1/4, and SE1/4SW1/4	600.00	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 27, all	640.00	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 28, all	640.00	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 29, N1/2	320.00	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 30, lots 1, 2, 3, 4, E1/2E1/2 and E1/2 W1/2	477.88	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 31, lots 1, 2, 3, 4, E1/2, and E1/2W1/2	645.48	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 32, all	640.00	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 33, all	640.00	Alamosa	State	GRSA
			5762.34			
28	T. 40 N., R. 12 E.	Sec. 7, E1/2NE1/4 and NW1/4NE1/4	120.00	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 8, N1/2NE1/4, SW1/4NE1/4, and NW1/4	280.00	Alamosa	State	GRSA
			400.00			
29	T. 40 N., R. 12 E.	Sec. 9, E1/2 and SW1/4	480.00	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 10, all	640.00	Alamosa	State	GRSA
			1120.00			
30	T. 40 N., R. 12 E.	Sec. 13, SW1/4	160.00	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 24, all	633.23	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 25, all	635.08	Alamosa	State	GRSA
	T. 27 S., R. 73 W.	Sec. 20, all; (computed from resurvey plat)	591.21	Alamosa	State	GRSA
	T. 27 S., R. 73 W.	W.Sec. 19, lots 1, 2, 3, 4, E1/2 and E1/2W1/2; (computed from resurvey plat)	666.93	Alamosa	State	GRSA
	T. 40 N., R. 13 E.	Sec. 31, all	347.30	Alamosa	State	GRSA
	T. 40 N., R. 13 E.	Sec. 19, all	357.93	Alamosa	State	GRSA
	T. 40 N., R. 13 E.	Sec. 30, all	351.70	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Section 36	640.00	Alamosa	State	GRSA
			4383.38			
35	T. 41 N., R. 11 E.	Sec. 24, all	640.00	Saguache	State	GRSA
	T. 41 N., R. 11 E.	Sec. 25, all	640.00	Saguache	State	GRSA

TABLE 2-2. LEGAL DESCRIPTIONS OF SLB LAND TO BE EXCHANGED TO THE BLM

Parcel No.	Legal description		Acres	County	Current owner	Target owner
35 cont'd.	T. 41 N., R. 11 E.	Sec. 36, all	640.00	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 16, all	465.03	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 17, all	472.36	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 18, lots 2, 3, 4, and fractional S1/2NE1/4, SE1/4NW1/4, and E1/2SW1/4 and SE1/4	479.14	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 19, lots 1, 2, 3, 4, E1/2, and E1/2W1/2	642.40	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 20, all	640.00	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 21, all	640.00	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 22, SW1/4	160.00	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 26, all	640.00	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 27, all	640.00	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 28, all	640.00	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 29, all	640.00	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 30, lots 1, 2, 3, 4, E1/2, and E1/2W1/2	641.22	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec, 31, lots 1, 2, 3, 4, E1/2, and E1/2W1/2	640.42	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 32, all	640.00	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 33, all	640.00	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 34, all	640.00	Saguache	State	GRSA
	T. 41 N., R. 12 E.	Sec. 35, all	640.00	Saguache	State	GRSA
			11820.57			
36	T. 40 N., R. 11 E.	Sec. 13, all	640.00	Alamosa	State	GRSA
			640.00			
37	T. 40 N., R. 12 E.	Sec. 16, all	640.00	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 17, E1/2	320.00	Alamosa	State	GRSA
	T. 40 N., R. 12 E.	Sec. 21, N1/2	320.00	Alamosa	State	GRSA
			1280.00			
38	T. 40 N., R. 12 E.	Sec. 29, S1/2	320.00	Alamosa	State	GRSA
			320.00			
44	T. 27 S., R 73 W	Sec. 21, portion lying west of road	39.50	Alamosa	State	GRSA
			39.50			
		GRSA Site Subtotal	25,765.79			
31	T. 27 S., R. 73 W.	Sec. 20, portion	59.70	Alamosa	State	BLM
	T. 27 S., R. 73 W.	Sec. 21, S1/2; (outside Monument boundary)	320.00	Alamosa	State	BLM
		GRSA Site Subtotal	379.70			
		Total State acreage	57,056.11			
		State minerals-only acreage	5,810.50			
		Exhibit A surface acreage	51,245.61			

TABLE 2-3. LEGAL DESCRIPTIONS OF BLM LAND TO BE DISPOSED TO THE SLB

Parcel No.	Legal Description		Acres	Site Name	County
1	T. 17 S., R. 68 W.,	Sec. 11, SE1/4SW1/4 and SW1/4SE1/4	80.00	Table Mtn.	Fremont
			80.00		
2	T. 17 S., R. 68 W.,	Sec. 15, S1/2NE1/4 and S1/2	400.00	Table Mtn.	Fremont
	T. 17 S., R. 68 W.,	Sec. 22, NW1/4NW1/4	40.00	Table Mtn.	Fremont
			440.00		
3	T. 17 S., R. 68 W.,	Sec. 21, NW1/4SE1/4	40.00	Table Mtn.	Fremont
			40.00		
4	T. 17 S., R. 68 W.,	Sec. 27, SW1/4	160.00	Table Mtn.	Fremont
	T. 17 S., R. 68 W.,	Sec. 28, NE1/4SE1/4	40.00	Table Mtn.	Fremont
	T. 17 S., R. 68 W.,	Sec. 34, W1/2 and SE1/4	480.00	Table Mtn.	Fremont
	T. 18 S., R. 68 W.,	Sec. 3, lots 3, 4, 5, 6, 7, S1/2NW1/4, and NW1/4SW1/4	332.62	Table Mtn.	Fremont
	T. 18 S., R. 68 W.,	Sec. 4, NE1/4SE1/4	40.00	Table Mtn.	Fremont
	T. 18 S., R. 68 W.,	Sec. 10, N1/2NW1/4	80.00	Table Mtn.	Fremont
			1,132.62		
		Table Mountain subtotal	1,692.62		
5	T. 51 N., R. 11 E.,	Sec. 2, SW1/4SE1/4	40.00	Gribbles Park	Fremont
			40.00		
6	T. 51 N., R. 11 E.,	Sec. 15, S1/2S1/2	160.00	Gribbles Park	Fremont
	T. 51 N., R. 11 E.,	Sec. 21, N1/2NE1/4	80.00	Gribbles Park	Fremont
	T. 51 N., R. 11 E.,	Sec. 22, NW1/4	160.00	Gribbles Park	Fremont
			400.00		
7	T. 51 N., R. 12 E.;	Sec. 19, NE1/4SW1/4	40.00	Gribbles Park	Fremont
			40.00		
		Gribbles Park subtotal	480.00		
8	T. 43 N., R. 7 E.;	Sec. 14, NW1/4	160.00	Biedell Creek	Saguache
	T. 43 N., R. 7 E.;	Sec. 15, NE1/4	160.00	Biedell Creek	Saguache
			320.00		
9	T. 43 N., R. 7 E.;	Sec. 29, NE1/4SW1/4	40.00	Biedell Creek	Saguache
			40.00		
10	T. 43 N., R. 7 E.;	Sec. 34, W1/2NW1/4	80.00	Biedell Creek	Saguache
			80.00		
11	T. 42 N., R. 6 E.	Sec. 9, N1/2NE1/4	80.00	Biedell Creek	Saguache
	T. 42 N., R. 6 E.	Sec. 10, NW1/4NW1/4	40.00	Biedell Creek	Saguache
			120.00		
12	T. 42 N., R. 6 E.	Sec. 18, NE1/4	160.00	Biedell Creek	Saguache
			160.00		

TABLE 2-3. LEGAL DESCRIPTIONS OF BLM LAND TO BE DISPOSED TO THE SLB

Parcel No.	Legal Description		Acres	Site Name	County
13	T. 42 N., R. 6 E.	Sec. 21, SW1/4NW1/4 and W1/2SW1/4	120.00	Biedell Creek	Saguache
	T. 42 N., R. 6 E.	Sec. 20, S1/2NE/14, SE1/4NW/14, SW1/4, N1/2SE1/4, and SW1/4SE1/4	400.00	Biedell Creek	Saguache
			520.00		
14	T. 42 N., R. 6 E.	Sec. 2, lots 1, 2, 3, 4, S1/2NE1/4, SE1/4NW1/4, E1/2SW1/4,and SE1/4	514.80	Biedell Creek	Saguache
	T. 42 N., R. 6 E.	Sec. 3, lots 1 and 2	77.50	Biedell Creek	Saguache
	T. 42 N., R. 6 E.	Sec. 11, E1/2 and E1/2SW1/4	400.00	Biedell Creek	Saguache
	T. 42 N., R. 6 E.	Sec. 12, all	640.00	Biedell Creek	Saguache
	T. 42 N., R. 6 E.	Sec. 13, all	640.00	Biedell Creek	Saguache
	T. 42 N., R. 6 E.	Sec. 14, E1/2 and E1/2W1/2	480.00	Biedell Creek	Saguache
	T. 42 N., R. 6 E.	Sec. 22, S1/2NE1/4, SE1/4NW1/4, E1/2SW1/4, and SE1/4	360	Biedell Creek	Saguache
	T. 42 N., R. 6 E.	Sec. 23, E1/2, E/12NW/14, SW1/4NW1/4, and SW1/4	600.00	Biedell Creek	Saguache
	T. 42 N., R. 6 E.	Sec. 24, all	640.00	Biedell Creek	Saguache
	T. 42 N., R. 6 E.	Sec. 25, W1/2NE1/4 and NW1/4	240.00	Biedell Creek	Saguache
	T. 42 N., R. 6 E.	Sec. 26, N1/2	320.00	Biedell Creek	Saguache
	T. 42 N., R. 6 E.	Sec. 27, NE1/4 and E1/2NW1/4	240.00	Biedell Creek	Saguache
	T. 42 N., R. 7 E.	Sec. 3, lots 3, 4, and SW1/4NW1/4	119.76	Biedell Creek	Saguache
	T. 42 N., R. 7 E.	Sec. 4, lots 1, 2, 3, 4, S1/2N1/2, and S1/2;	637.47	Biedell Creek	Saguache
	T. 42 N., R. 7 E.	Sec. 5, lots 1, 2, 3, 4, S1/2N1/2, and S1/2	635.41	Biedell Creek	Saguache
	T. 42 N., R. 7 E.	Sec. 6, lots 1, 2, S1/2NE1/4, and SE1/4	319.05	Biedell Creek	Saguache
	T. 42 N., R. 7 E.	Sec. 7, lots 1, 2, 3, 4, E1/2, and E1/2W1/2	645.20	Biedell Creek	Saguache
	T. 42 N., R. 7 E.	Sec. 8, all	640.00	Biedell Creek	Saguache
	T. 42 N., R. 7 E.	Sec. 9, W1/2	320.00	Biedell Creek	Saguache
	T. 42 N., R. 7 E.	Sec. 17, all	640.00	Biedell Creek	Saguache
	T. 42 N., R. 7 E.	Sec. 18, lots 1, 2, 3, 4, E1/2, and E1/2W1/2	645.20	Biedell Creek	Saguache
	T. 42 N., R. 7 E.	Sec. 19, lots 1, 2, 3, 4, NE1/4, and E1/2W1/2	485.19	Biedell Creek	Saguache
			10,239.58		
		Biedell Creek subtotal	11,479.58		
15	T. 35 N., R. 5 E.,	Sec. 25, lots 1, 2, 3, 4, 5, 6, 7, and 8	374.17	La Jara Reservoir	Conejos
			374.17		

TABLE 2-3. LEGAL DESCRIPTIONS OF BLM LAND TO BE DISPOSED TO THE SLB

Parcel No.	Legal Description		Acres	Site Name	County
16	T. 35 N., R. 6 E.,	Sec. 21, lots 1, 2, 3, 4, 5, 6, 7, and 8	374.74	La Jara Reservoir	Conejos
	T. 35 N., R. 6 E.,	Sec. 22, S1/2NW1/4	80.00	La Jara Reservoir	Conejos
			454.74		
17	T. 35 N., R. 6 E.,	Sec. 26, lot 1	42.20	La Jara Reservoir	Conejos
	T. 35 N., R. 6 E.,	Sec. 27, lots 1, 2, 3, and 4	169.06	La Jara Reservoir	Conejos
			211.26		
18a	T. 35 N., R. 6 E.,	Sec. 25, S1/2SW1/4, and SE1/4	240.00	La Jara Reservoir	Conejos
	T. 35 N., R. 6 E.,	Sec. 26, lots 5 and 6	84.24	La Jara Reservoir	Conejos
			324.24		
18b	T. 35 N., R. 6 E.,	Sec. 34, lots 5, 6, 7, and 8	170.89	La Jara Reservoir	Conejos
	T. 34 N., R. 6 E.,	Sec. 3, lots 5, 6, 7, 8, 9, 10, and 11	360.44	La Jara Reservoir	Conejos
	T. 34 N., R. 6 E.,	Sec. 10, SE1/4, and S1/2NE1/4, and NW1/4NE1/4	280.00	La Jara Reservoir	Conejos
	T. 34 N., R. 6 E.,	Sec. 11, E1/2, and E1/2SW1/4, and SE1/4 NW 1/4 and Lots 1, 2, and 3	552.98	La Jara Reservoir	Conejos
	T. 34 N., R. 6 E.,	Sec 2 Lot 8	51.25	La Jara Reservoir	Conejos
			1,415.56		
18c	T. 34 N., R. 6 E.,	Sec. 13, NE1/4NW1/4	40.00	La Jara Reservoir	Conejos
			40.00		
19	T. 34 N., R. 6 E.,	Sec. 14, SW1/4NW/14 and NW1/4SW1/4	80.00	La Jara Reservoir	Conejos
			80.00		
20	T. 34 N., R. 6 E.,	Sec. 21, SW1/4NE1/4, NW1/4, and NW1/4SE1/4	240.00	La Jara Reservoir	Conejos
			240.00		
21	T. 34 N., R. 6 E.,	Sec. 22, S1/2SW1/4	80.00	La Jara Reservoir	Conejos
	T. 34 N., R. 6 E.,	Sec. 26, lots 1, 2, and W1/2W1/2	234.70	La Jara Reservoir	Conejos
	T. 34 N., R. 6 E.,	Sec. 27, E1/2 and E1/2W1/2	480.00	La Jara Reservoir	Conejos
			794.70		
22	T. 34 N., R. 7 E.,	Sec. 19, lot 4	43.16	La Jara Reservoir	Conejos
			43.16		
23	T. 34 N., R. 7 E.,	Sec. 28, W1/2	320.00	La Jara Reservoir	Conejos
	T. 34 N., R. 7 E.,	Sec. 29, E1/2SE1/4	80.00	La Jara Reservoir	Conejos

TABLE 2-3. LEGAL DESCRIPTIONS OF BLM LAND TO BE DISPOSED TO THE SLB

Parcel No.	Legal Description		Acres	Site Name	County
			400.00		
24	T. 34 N., R. 7 E.,	Sec. 29, NW1/4SW1/4	40.00	La Jara Reservoir	Conejos
	T. 34 N., R. 7 E.,	Sec. 30, NE1/4SW1/4 and N1/2SE1/4	120.00	La Jara Reservoir	Conejos
			160.00		
		La Jara Reservoir subtotal	4,537.83		
Subsurface Mineral Parcels*					
45	T. 17 S., R. 68 W.,	Sec. 20, SE1/4NE1/4 and N1/2SE1/4	120.00	Table Mtn.	Fremont
	T. 17 S., R. 68 W.,	Sec. 21, N1/2, N1/2SW1/4, and SE1/4SW1/4	440.00	Table Mtn.	Fremont
	T. 17 S., R. 68 W.,	Sec. 22, E1/2NW1/4, SW1/4NW1/4, and NE1/4SW1/4	160.00	Table Mtn.	Fremont
	T. 17 S., R. 68 W.,	Sec. 27, NW1/4	160.00	Table Mtn.	Fremont
	T. 17 S., R. 68 W.,	Sec. 28, NE1/4, E1/2NW1/4, SW1/4NW1/4, SW1/4, NW1/4SE1/4, and S1/2SE1/4	560.00	Table Mtn.	Fremont
	T. 17 S., R. 68 W.,	Sec. 29, NE1/4 and E1/2SE1/4	240.00	Table Mtn.	Fremont
	T. 17 S., R. 68 W.,	Sec. 33, E1/2, S1/2NW/14, and NE1/4 SW1/4	440.00	Table Mtn.	Fremont
			2,120.00		
46	T. 17 S., R. 68 W.,	Sec. 14. SE1/4	160.00	Table Mtn.	Fremont
	T. 17 S., R. 68 W.,	Sec. 23, E1/2 and N1/2NW1/4	400.00	Table Mtn.	Fremont
			560.00		
			2,680.00		
	Total Federal Acreage		18,190.03		
	Federal Minerals-only Acreage		2,680.00		
	Federal Surface and Subsurface Acreage		20,870.03		

2.4 NO ACTION ALTERNATIVE

This alternative assumes that the land exchange, as proposed, would not occur, and that ownership and management of the selected BLM parcels would continue under the current RMPs and any subsequent amendments. In the future, BLM lands identified for exchange in the RMPs could continue to be considered for exchange.

The BLM would be unable to support Federal acquisition of all lands within the congressionally authorized GRSA boundary. GRSA lands identified in PPA-2000 would be managed under existing agreements between the NPS and SLB. The BLM would not exchange public lands to acquire further Federal ownership within BNWR. BNWR lands identified in PPA-2000 would be managed under existing agreements between the USFWS and SLB. Although the No Action Alternative is a requirement for consideration under NEPA, it is inconsistent with the intent of the legislation.

Offered SLB parcels would continue to be used to support the school trust and other programs through leasing for livestock grazing, public hunting, wildlife habitat, forest products, rural open space, and mineral exploration. Some SLB lands could be made available for sale to the public, for example, to facilitate new residential development. The SLB would not have the opportunity to acquire isolated Federal parcels and increase the efficiency of school trust land management in the South District. For the purpose of this EA, effects of the No Action Alternative are based on leasing arrangements prior to 2004.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 DESCRIPTION OF THE AFFECTED ENVIRONMENT

This section describes the affected environment for the Federal and state land parcels proposed for exchange. It describes the general setting of the four affected counties (i.e., Fremont, Alamosa, Saguache, and Conejos) and the San Luis Valley physiographic area. Also presented are descriptions of climate and the natural and economic resources, in addition to selected landscape photographs. The existing environment discussions are presented in the same level of detail for proposed Federal and state parcels, when available data allow, so that evaluations of potential effects presented in the "Environmental Consequences" sections are made with parity.

3.1.1 General Setting

This EA addresses proposed exchange parcels located in two geographic areas: Fremont County on the Front Range of the Rocky Mountains; and Alamosa, Saguache, and Conejos counties in the San Luis Valley of south-central Colorado (see Figure 1-1). For reader clarity, these geographic areas are discussed separately by county in the following subsections.

3.1.2 Fremont County

Fremont County lies on the southern edge of Colorado's Front Range, including a portion of the southern Rocky Mountains. The western two-thirds and the northern one-half of the county consists of mountain and valley topography, and the southeastern portion encompasses the foothills and plains. Two physiographic provinces are encompassed—the southern Rocky Mountains and the upper Great Plains (NRCS 1996). Between the two provinces lies a narrow zone of prominent hogbacks with sharply folded and thrust-faulted strata. Occupying an elevation range from 4,900 feet to 11,700 feet, Fremont County is generally flanked by the Wet Mountains and Great Plains to the east, the Mosquito Range to the northwest, the Sangre de Cristo Range to the west, and the southern extremity of South Park to the north (Taylor 1999).

South Park, the third of four major north-south-oriented high-elevation intermontane basins in the southern Rocky Mountains, occupies a portion of Fremont County (Wallace et al. 1999). South Park is approximately 50 miles long (north to south) and 35 miles wide (east to west) with the major drainage being the South Platte River, which exits from the southern extension of the Tarryall Mountains in the southeastern portion of Park County. This area of Fremont County is characterized by mountains, mesas, and intermontane parks, along with volcanic exposures and soils (NRCS 1996).

Several groups of humans have lived in or explored the Fremont County area over several thousand years. It was claimed for Spanish rule by Francisco Vasquez de Coronado in 1540

(Fremont County 2005). The region was more recently occupied by the Ute Tribe among other tribes who remained until the late 1800s. Early American explorers included Lieutenant Zebulon Pike who visited the Royal Gorge area during 1806 and Captain John Fremont who arrived in the area during 1843 on a largely scientific expedition. As early as 1872, oil was sold from the Oil Creek area and large coal reserves were being mined to support the railroad.

The principal cities in the area of the proposed land exchange include Canon City, Florence, and Penrose. The total population of Fremont County is approximately 48,000, with about half residing in Canon City. Canon City was settled in 1859 and soon became a trade center and gateway to gold and silver mines and camps to the west. Three events—the discovery of oil, cattle ranching, and construction of the territorial prison—later defined the character of Canon City and Fremont County. In the early 1900s, irrigation was provided for fruit and vegetable crops resulting in the settling of Penrose. A suspension bridge was constructed across the Royal Gorge of the Arkansas River in 1929, bringing tourists and making tourism a long-term economic force.

Table Mountain is west of State Highway (SH) 115, southwest of Colorado Springs, Colorado, and northeast of Penrose; it is flanked on the northeast by Mount Pittsburg and on the southeast by Wild Mountain. It generally occupies the hogback formation that lies between the principal physiographic provinces (see Figure 3-1). Parcels encompass rugged drainages including Patton Canyon and its tributaries and Banta Gulch and its tributaries. All are tributary to the larger Beaver Creek, which flows to the Arkansas River. There is an approximately 1,761-foot elevational range within the Table Mountain site, from Beaver Creek (5,658 feet) in parcel 4 to the summit of Table Mountain (7,419 feet) in parcel 2.

Gribbles Park is on the southern extremity of South Park and is situated between Black Mountain to the north and Waugh Mountain and Stoney Face Mountain to the south; they are portions of the Arkansas Hills (Wallace et al. 1999). The parcels are characterized by the South Park Basin physiography (see Figure 3-2), and are drained by Badger and Cottonwood creeks, which are both tributary to the Arkansas River. There is an approximately 964-foot elevational range within the Gribbles Park site, from the vicinity of Cottonwood Creek (8,928 feet) in parcel 6 to the highest slopes (9,892 feet) in parcel 5.

From the Great Plains to the summit of Waugh Mountain, a variety of life zones support distinct communities of plant and animal life within Fremont County. Mixed grasslands and badlands exposures are common at lower elevations merging into piñon pine – juniper woodland in the foothills and on lower slopes. With increasing elevation, the piñon pine – juniper woodland transitions into sparse to dense montane woodlands and forests of ponderosa pine, Douglas-fir, fir, and quaking aspen. Interspersed are rugged talus slopes and mixed grass mesa tops. Each life zone supports specially adapted animal and insect life.

Source: BLM 2005

FIGURE 3-1. EAST AND WEST FLANKS OF THE PROPOSED TABLE MOUNTAIN BLM EXCHANGE PARCELS ILLUSTRATING TOPOGRAPHY AND VEGETATION

Source: BLM 2005

FIGURE 3-2. GRIBBLES PARK PROPOSED BLM EXCHANGE PARCEL ILLUSTRATING TOPOGRAPHY AND VEGETATION

3.1.3 Alamosa, Saguache, and Conejos Counties and the San Luis Valley

3.1.3.1 Alamosa County

Alamosa County is on a central to east-central direction within the San Luis Valley with the Great Sand Dunes situated on the eastern boundary and relatively level sand sheets and alkaline playas composing the remaining area. The county is relatively level, averaging approximately 7,500 feet elevation, and the highest points of the Great Sand Dunes are approximately 1,100 feet higher. A small portion of the Sangre de Cristo Mountains occur in the county and provide topographic relief to about 11,000 feet in elevation.

For the most part, Alamosa County lies in a closed basin with a high water table, alkaline soils, and little external drainage (NRCS 1973). The principal drainage of the southwestern portion of the county is the Rio Grande and its major tributaries, the Alamosa River and Rock and La Jara creeks. Internal drainage into San Luis Lake occurs via San Luis and Arena creeks while Big Spring Creek drains internally nearby. Reservoirs include San Luis and Head lakes, which are managed for recreation and wildlife habitat, and Adams Lake. Several irrigation canals are present including the San Luis, Excelsior, and Empire.

Historically, the region was occupied by the Apache and Ute tribes, among the tribes who remained until the late 1800s. During the late 1600s, Europeans from Spain, mostly searching for precious metals, visited and explored the San Luis Valley through the 1880s and established the foundation of the Rio Grande culture, elements of which remain today. Alamosa is the Spanish word for cottonwood, the species of large trees that line perennial drainages and grow near seeps and springs. The City of Alamosa was established in 1878 where the railroad crossed the Rio Grande and was considered the rail hub for the entire San Luis Valley. This distinction led to it becoming the largest city in the San Luis Valley with a population of nearly 9,000. Alamosa County was the last of the original counties to become established in Colorado (in 1913; Broomfield County became established in 2001). It was formally the northern portion of Costilla and Conejos counties. Approximately 15,000 people live within the county. In addition to Alamosa, towns in the county include Mosca, Hooper, and Estrella.

Agriculture, including irrigated farming and livestock (cattle and sheep) production, plays a vital role in the regional economy. Irrigated crops include alfalfa and grass hay, potatoes, barley, oats, and lettuce. Retirees and tourism are becoming more important within the county and Alamosa has a strong base of retail, education, state, and Federal employment.

The proposed land exchange area includes SLB parcels in the northeastern portion of Alamosa County and adjacent to the southern boundaries of BNWR and GRSA. Generally, the lands encompass a portion of the sand dune mass, sand sheet, and alkaline playas and are nearly flat (see Figure 3-3). There is an approximately 50 foot elevation range within the SLB site, from the vicinity of parcels along Sand Creek (7,550 feet) to the dune top parcels (7,600 feet) on the western edge.

Source: BLM 2005

FIGURE 3-3. PROPOSED SLB EXCHANGE PARCELS ILLUSTRATING TOPOGRAPHY AND VEGETATION

Sparse grasslands occupy active dunes while the sand sheet typically supports rabbitbrush and mixed grass communities. Alkaline flats are characterized by greasewood shrublands with a mixed salt-tolerant grass understory. Some nearly pure stands of grasses tolerant of alkaline soils, particularly saltgrass, are present.

3.1.3.2 Saguache County

Saguache County encompasses the northern portion of the San Luis Valley and is flanked by the Sangre de Cristo Mountains to the east and the San Juan Mountains to the west (see Figure 3-4). The southeastern portion of Saguache County includes the northern extremities of BNWR and GRSA and much of the adjoining sand sheet. The elevations encompassed range from 7,600 feet on the San Luis Valley floor up to 14,000 feet in the Sangre de Cristo Range and 10,000 feet in the San Juan Range (NRCS 1984).

FIGURE 3-4. SAGUACHE COUNTY REPRESENTATIVE LANDSCAPE

The principal drainage from the west is via Saguache, Carnero, and La Garita creeks and from the north by San Luis Creek. There are many small creeks that have headwaters formed in the Sangre de Cristo Mountains that flow into San Luis Creek from the eastern portion of the county, including Deadman Creek.

The name Saguache originated in part from the Ute phrase for “land of blue water” (NRCS 1984). During the 1600s, the area was explored and ultimately settled by the Spanish and later became part of Mexico. The war between Mexico and the United States resulted in the area becoming part of the United States; it was subsequently settled by prospectors, miners, and homesteaders following the Civil War. Several towns, including Crestone, Duncan, and

Liberty, formed due to mining interests, but all but Crestone were abandoned shortly following the mining boom. These towns were located within a 99,000-acre land grant (the Baca Grant), which was set aside in 1821 for the heirs of Don Luis Maria Cabeza de Vaca (NRCS 1984). Lead and silver were mined here through the early 20th century.

During the 1880s, Hereford cattle were imported from England and used to establish one of the largest Hereford ranches in the state on the Baca Grant lands. Presently, cattle grazing is practiced on private, SLB, BLM, and USFS managed rangeland throughout the county during the spring and summer using forage produced on irrigated private land to sustain cattle and sheep through the winter. Principal crops include alfalfa and grass hay, barley, potatoes, oats, spring wheat, and lettuce. There is some logging of forest products at middle and higher elevations.

The principal towns in Saguache County include Center, Saguache, Moffat, Crestone, and Baca Grande, with a combined population of 3,200. About half of the county's population of 7,000 lives in the unincorporated rural areas. The economy is centered on irrigated agriculture and livestock production, particularly cattle and sheep; however, retirees and tourism are also important.

The proposed land exchange includes the area of Biedell Creek in the western portion of the county adjacent to Rio Grande NF and the area near the southern boundary of BNWR and GRSA. The nearest towns are Moffat and Center. Biedell Creek generally occupies the east-facing slope of the La Garita Mountains (see Figure 3-5). There is an approximately 2,152 foot elevational range within the Biedell Creek site, from the San Luis Valley floor (7,649 feet) in parcel 8 to the highest slopes (9,801 feet) in parcel 12.

Source: BLM 2005

FIGURE 3-5. PROPOSED BIEDELL CREEK BLM EXCHANGE PARCEL ILLUSTRATING TOPOGRAPHY AND VEGETATION

Mixed grasslands and dwarf-shrublands are common at lower elevations, merging into piñon pine – juniper woodlands in the foothills and on lower slopes. With increasing elevation, the piñon pine – juniper woodland transitions into sparse to dense montane woodlands and forests of ponderosa pine, Douglas-fir, and quaking aspen. The sand sheet of southeastern Saguache County supports sparse dwarf-shrublands, shrublands, and grasslands.

3.1.3.3 Conejos County

Conejos County lies within the southern portion of the San Luis Valley, with approximately one-half of the county's eastern area in the San Luis Valley and the western half composed of the bordering foothills and ridges of the San Juan Mountains (NRCS 1980). Occupying an elevation range from 7,700 feet to 10,500 feet, Conejos County is generally flanked by the San Luis Valley to the east, north, and south, and the San Juan Range to the northwest (Taylor 1999).

The Rio Grande forms the eastern border of Conejos County, flowing generally north to south into New Mexico. La Jara, Hot, and Tosido creeks and the Alamosa River are the principal tributaries that drain the northwestern portion of the county. Fox and San Antonio creeks and the Conejos River drain the southwestern portion, and the Rio Grande drains the eastern side (NRCS 1980). Several water storage reservoirs are present along the drainages including La Jara, Platoro, Alto Lake, and Cove Lake.

The region was occupied historically by the Apache and Ute tribes, among the tribes who remained until the late 1800s. During the late 1600s, Europeans from Spain explored the southern San Luis Valley. Eventually Major LaFayette Head and Selendonio Valdez settled there in 1854 creating the colony of Servilleta. The Town of Conejos (Spanish for rabbits) was established to the west of Servilleta at about the same time, and became the largest community in the region as part of the Spanish-influenced Rio Grande culture. Conejos and the community of Antonito are two of the oldest towns established by Europeans in the United States.

Manassa, La Jara, Antonito, and Sanford are the principal towns in the county, with a combined population of 3,600. More than half of the county's 8,400 residents live in rural areas. The economy has experienced periodic growth, occasionally thriving, beginning with gold and silver mining in the western mountains, sheep and cattle ranching, irrigated agriculture in general, and the fresh pea industry, specifically. Prior to frozen food packaging and shipping, Conejos County produced a major portion of fresh English peas for eastern markets. Presently, efforts are being made to stabilize the economy around revitalized agriculture, retiree migration, development of some mineral deposits, and tourism.

The proposed land exchange includes the area around La Jara Reservoir in the western portion of the county adjacent to the Rio Grande NF. The nearest town is Capulin, Colorado. Parcels generally occupy the foothills to middle slopes of the San Juan Mountains (see Figure 3-6). There is an approximately 1,641-foot elevational range within the La Jara Reservoir site, from the San Luis Valley floor (8,330 feet) in parcel 23 to the highest slopes (9,971 feet) in parcel 15.

Source: BLM 2005

FIGURE 3-6. PROPOSED LA JARA RESERVOIR BLM EXCHANGE PARCELS ILLUSTRATING TOPOGRAPHY AND VEGETATION

Mixed grasslands and dwarf-shrublands are common at lower elevations, merging into piñon pine – juniper woodlands in the foothills and on lower slopes. With increasing elevation, the piñon pine – juniper woodland transitions into sparse to dense montane woodlands and forests of ponderosa pine, Douglas-fir, and quaking aspen.

3.1.3.4 San Luis Valley

The San Luis Valley, southernmost of four high-elevation intermountain parks in Colorado, lies between the San Juan Mountains to the west and the Sangre de Cristo Mountains to the east (Taylor 1999). The valley is approximately 40 miles wide and 105 miles long, extending north to Poncha Pass and south into New Mexico. Poncha Pass represents the divide between the Rio Grande drainage basin of the San Luis Valley and the Arkansas River drainage basin to the north and east. The Sangre de Cristo Mountain Range contains several peaks in excess of 14,000 feet. Medano Pass, the area below which most sand collects, is relatively low (10,150 feet) (Taylor 1999). The Great Sand Dunes and the deposition system contributing to them cover an area of approximately 500 square miles (mi^2) (CNHP 1999b).

The San Luis Valley is considered by historians to be a discrete cultural region rich in Hispanic culture and place names. Cattle ranching and irrigated agriculture (particularly potatoes, alfalfa, and barley) represent the two main land uses and occupations. Blanca Peak (14,345 feet) is the fourth-highest mountain in Colorado, is sacred to the Navajo people, and towers over the San Luis Valley, a few miles southeast of GRSA.

The Great Sand Dunes are the result of and an element in a fragile, dynamic system that both influences and sustains dune formation. The dune mass is a huge deposit of wind-blown (eolian) sand against the Sangre de Cristo Mountain Range. An extensive vegetated sand sheet surrounds the dune mass, consists of mostly flat-bedded sand deposits with scattered groups of parabolic dunes, and is stabilized by species of grasses and shrubs. The sabkha is an alkaline plain west of and adjoining the sand sheet. It is more crusted, cemented together by minerals deposited by seasonal wetlands. In a study of 1936 and 1990 aerial photography, the dune mass and associated sand sheet did not show any obvious shifts; rather, they displayed remarkable stability over that 54-year time period (McArthur and Sanderson 1990).

Streams that drain the Sangre de Cristo mountain range deliver wind-blown sand back to and around the active dune system, a form of “recycling” the sand particles. Sand thus carried downstream by Medano and Sand creeks, in particular, is deposited on the sand dune mass by southwesterly winds. Over time, sand, wind, and water function to shape and reshape the polymorphic dune field. At the foot of the dunes, the surging water in Medano Creek provides an interesting and delightful contrast to the barren or lightly vegetated sand surfaces. During the spring season, storms generate high winds that can blow for several days and transport millions of sand grains abrasive enough to scour the landscape prior to deposition on the sabkha, sand sheet, great dunes, or mountains.

From valley floor to the crest of the Sangre de Cristo Mountains, a variety of life zones support distinct communities of plant and animal life. At a slightly higher elevation than the dune field, on the base of the mountains, short shrubs merge into sparse piñon pine – juniper woodland.

With increasing elevation, the piñon pine – juniper woodland transitions into dense montane forests of fir, pine (ponderosa and lodgepole), and quaking aspen. At the highest elevations, the subalpine life zone supports stands of spruce and fir that are interspersed with rocky talus slopes. At and below the crest of the mountains is the rocky, snowy alpine zone. Here, lichens, mosses, and cushion plants survive, using their low growth form to lessen the effect of incessant winds. Each life zone supports specially adapted animal and insect life.

Climate

Fremont County is the location of the Table Mountain and Gribbles Park sites. The topography of the county is a combination of rugged mountains, canyons, valleys, and plains. It is semiarid with average annual precipitation of 12.8 inches recorded over a 56-year period in Canon City (WRCC 2005). Thunderstorms occur on about 60 days annually mostly between May-to-August (NRCS 1996). An annual average of 36 inches of snowfall is also recorded. The climate of Fremont County is typical of conditions found along the southern Front Range and southern portion of South Park. The average annual temperature recorded in Canon City ranges from minimums of 39.6 degrees Fahrenheit (ºF) to maximums of 67.9 ºF (WRCC 2005). The coldest temperatures are recorded during January (minimum monthly temperatures range from 21.5 ºF (January) to 60.8 ºF [July]) and the warmest temperatures are recorded during July (maximum monthly temperatures range from 49.6 ºF (January) to 89.1 ºF [July]) (WRCC 2005).

The growing season for Fremont County is between April and September (NRCS 1996). The sun shines about 80percent of the time during the summer and 75percent of the time during the winter. Prevailing winds are from the northwest and the average wind speed peaks in the spring (12 miles per hour [mph]) (NRCS 1996).

The San Luis Valley is the location of the Biedell Creek and La Jara Reservoir sites. A high montane basin at an average elevation of 8,175 feet, it maintains a pleasant climate, partially due to averaging nearly 300 days of sunshine per year. The San Luis Valley is an arid environment with average annual precipitation of 7.1 inches recorded in Alamosa and 8.4 inches recorded in Saguache over a 56-year time period (WRCC 2005). Annual snowfall averages 31.7 inches and 26.4 inches, respectively, at these two locations. GRSA has higher precipitation, averaging 10.5 inches (NPS 1995), and the Ra Jadero allotment on the opposite side of the San Luis Valley ranges from 14 in at lower elevations to 20 in at higher elevations (CSU 2007).

The climate of the San Luis Valley is typical for high mountain parks of southern Colorado. The average annual temperature recorded in Alamosa/Saguache ranges from minimums of 23.6 ºF/26.2 ºF to maximums of 59.2 ºF/59.1 ºF (WRCC 2005). The coldest temperatures are recorded during January (minimum monthly temperatures range from -1.9 ºF/4.4 ºF (January) to 47.4 ºF/47.5 ºF [July]) and the warmest temperatures are recorded during July (maximum monthly temperatures range from 34.5 ºF/35.8 ºF (January) to 82.1 ºF/81.0 ºF [July]) (WRCC 2005). Climate records are also kept at GRSA headquarters, where cold winters and cool summers characterize the Great Sand Dunes area, with July temperatures averaging 18.3 degrees Centigrade (ºC) (65 ºF) and January temperatures averaging –7 ºC (19 ºF) (Fryberger

et al. 1990). The growing season is brief, with approximately 60 frost-free days per year on the mountain slopes and up to 100 days in the agricultural areas (CNHP 1999a).
Winds are variable, but the highest velocities occur during the spring and summer, with winds up to 70 mph in GRSA (Valdez 1997). Wind direction is nearly equally split between northeast and southwest in the area of the Great Sand Dunes. Strong winds blow from the southeast throughout the year and can result in dust storms (sometimes the dust clouds are lifted beyond the Sangre de Cristo Mountains). The winds often include gusts of 55 to 75 mph. A reversal of wind patterns can result in the winter, where high-velocity cold winds blow from the northeast for short periods of time.

3.1.4 Federal Parcels Identified for Exchange

The order in which parcels are to be discussed for each resource within this section are Federal parcels of Fremont County (Table Mountain and Gribbles Park) and Federal parcels of Saguache and Conejos counties (Biedell Creek and La Jara Reservoir) (see Figure 1-1).

3.1.5 State Parcels Identified for Acquisition by Exchange

All state parcels are located in Alamosa and Saguache counties within the San Luis Valley, on the southern and western borders of the GRSA and BNWR (see Figure 1-1).

3.1.6 Standards for Public Land Health

In January 1997, Colorado BLM approved the Standards for Public Land Health. These standards apply to upland soils, riparian systems, plant and animal communities, threatened and endangered species, and water quality. Standards describe conditions needed to sustain public land health and relate to all uses of public lands. Because a standard exists for these five categories, a finding must be made for each of them in this environmental analysis. These findings are located in the respective resource discussions of this EA.

3.2 CRITICAL ELEMENTS, ASSESSMENT OF EFFECTS, AND PROPOSED MITIGATION

This section of the EA identifies and describes the natural, environmental, and economic resources and values that are affected by the Proposed Action or alternatives. Proposed Federal and state exchange lands are discussed at the same level of detail where data allow. This EA includes an assessment of public benefits.

3.2.1 Cultural Resources

NEPA requires analysis of the impacts of a Federal action on the human environment. The human environment includes the natural and physical environment and the relationship of

people with that environment (40 CFR 1508.14). It is concerned with social and cultural aspects of the environment, those that are more "natural," and the relationships between natural and cultural. Culturally valued aspects of the environment are referred to as cultural resources and can include historic properties, other culturally valued pieces of real property, cultural use of the biophysical environment, and such "intangible" sociocultural attributes as social cohesion, social institutions, lifeways, religious practices, traditional cultural properties, and other cultural institutions.

The BLM is required, under Section 106 of the National Historic Preservation Act (NHPA), to take into account the effect of this land exchange undertaking on historic properties. Historic properties, a subset of cultural resources, are sites, buildings, structures, districts, and objects included in or eligible for inclusion in the NRHP. Regulations governing Section 106 (36 CFR Part 800) specifically cite as an adverse effect "the transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance" (36 CFR 800.5(a)(2)(vii)). Properties coming into Federal ownership via the land exchange will be afforded Federal protection and managed consistent with Federal law, regulation, and policy.

Compliance with Section 106 requires the identification of cultural resources, evaluation of their eligibility for inclusion in the NRHP, a determination of effect of the undertaking on historic properties, and an assessment of adverse effects and alternatives or modifications to the undertaking that could avoid, minimize or mitigate adverse effects to historic properties. A Memorandum of Agreement (MOA) was used for this undertaking to identify the appropriate treatments to mitigate adverse effects on historic properties. The MOA signatories all must concur with the MOA which identifies and presents a course of treatment of historic properties. Thus, historic properties located on the parcels being transferred out of Federal ownership are of primary concern.

The cultural resources identification process began with a Class I overview of exchange lands to provide a summary of known cultural resources, the regional history and prehistory, a history of land use, and management options and research guidance. Because very few cultural resource projects have been conducted within the parcels identified for exchange, this overview used a broad approach and considered the cultural resources of areas adjacent to each of the proposed exchange parcels. An assumption was made that nearby areas with similar geographic traits would contain similar quality and quantity of cultural resources as those of the proposed exchange parcels.

Following the Class I cultural resources overview (Bevilacqua and Slaughter 2005), the NPS, BLM, and USFWS conducted Class III intensive cultural resources inventories and NRHP evaluations for the Table Mountain, Gribbles Park, Biedell Creek, and La Jara Reservoir parcels proposed for exchange. The investigations of these areas are detailed below. There were a total of 895 cultural resources identified: 296 sites and 599 isolated finds. The Federal agency partners completed consultation with the Colorado SHPO regarding eligibility of the cultural resources for listing in the NRHP. The Table Mountain Unit contains only one site (5FN2094), a homestead, which is eligible for the NRHP. The significant portion of this site is on private land outside the unit. Two sites in the Gribbles Park Unit were determined to be

eligible for the NRHP under Criterion D, an extensive quarry/open camp (5FN883) and an open camp (5FN2134). While both the Biedell Creek (32 individually eligible sites) and La Jara Reservoir (51 individually eligible sites) Units contain a number of sites that have been individually determined eligible for the NRHP, the resources collectively have been determined eligible for listing as historic districts.

The historic properties include both prehistoric and historic-period resources (including multi-component sites). The historic-period resources date from the late 19th and early 20th century and consist of structures, including remains identified as a stage stop; campsites, such as sheep herding camps; arborglyphs; artifact scatters; trash piles/dumps; cairns; and culturally modified trees (CMTs). The prehistoric resources date from Paleoindian to the late prehistoric/protohistoric periods and include rock art, open camps, sherd and lithic scatters, rock shelters, structures, cairns, game drive lines, open architecture camp sites, quarries, and CMTs. No traditional cultural properties were identified during inventory or during tribal consultation. Isolated finds are generally determined *not eligible* for the NRHP by the Colorado Office of Archeology and Historic Preservation (OAHP) because of the limited range of information they provide.

The final Class III intensive cultural resource inventory of the proposed Table Mountain exchange parcels was submitted in April 2007 (Bevilacqua and Slaughter 2006), and is on file at the BLM office in the Royal Gorge Field Office and Colorado OAHP in Denver. Background research and survey identified six previously recorded sites, 13 newly recorded sites, and 7 isolated finds. One site is eligible for listing in the NRHP (Contiguglia 2006a).

The Class III intensive cultural resources inventory of the proposed Gribbles Park exchange parcels was completed in 2006. The final report is on file at the BLM office in the Royal Gorge Field Office. Results of background research and survey include identification of 4 previously recorded archeological sites, 3 previously recorded isolates, 15 newly recorded isolates, and 23 newly recorded archeological sites (Bevilacqua and Wunderlich 2006). Two sites, one previously recorded site and one newly recorded site, are eligible for listing in the NRHP (Contiguglia 2006b).

The Class III intensive cultural resources inventory of the proposed Biedell Creek exchange parcels was completed in March 2007, and is on file in the BLM La Jara Field Office in the San Luis Valley Public Lands Center (Bevilacqua et al. 2007). Cultural resources include 1 previously recorded site, 120 newly recorded archeological sites, and 355 isolated finds. Thirty-five of the sites are eligible for individual listing in the NRHP, 63 are contributing to a district, and 1 eligible district is present. The Colorado SHPO identified the need for these resources to be evaluated as an archeological district, which could result in additional eligible sites (Contiguglia 2007).

The Class III intensive cultural resources inventory of the proposed La Jara Reservoir exchange parcels was completed in 2006. This report was reviewed by the Colorado State Historic Preservation Officer (SHPO) who concurred with the findings. Fifty-one individual sites and 84 contributing sites have been determined eligible for listing in a proposed La Jara Archeological District (5CN1418). This district includes all La Jara lands inventoried, both

those that will be exchanged with the Colorado State Land Board and those that will remain under BLM management. Only 5 of the individually NRHP-eligible sites and 19 sites potentially contributing to the La Jara Archeological District will be exchanged with the Colorado SLB; the remaining sites will continue to be managed by the BLM (Wells et al. 2008).

TABLE 3-1. CULTURAL RESOURCES SUMMARY TABLE

BLM project area	Individually Eligible Sites	District Contributing Sites	Eligible Districts	Comments
Table Mountain	1	0	0	One eligible site falls on both private and BLM land. However, the eligible section of the site is on private land and will not be affected (Contiguglia 2006a).
Gribbles Park	2	0	0	—
Biedell Creek	35 (32-see comments)	63	1	Only 32 of the 35 eligible sites will be in the proposed district. The Rio Grande Canal is listed in the NRHP, but is not contributing to the potential district. Two other individually eligible sites are also not contributing to the district. All sites will be protected and put into the Land Stewardship Trust. At least one archeological district will be recommended (Anderson 2007).
La Jara Reservoir	51	84	1	—
Total:	**38**	**147**	**2**	

3.2.1.1 Affected Environment

Proposed Table Mountain BLM Exchange Parcels

The Table Mountain BLM parcels proposed for exchange lie in the upper Arkansas River and South Platte River basins of Fremont County. In general, the proposed Table Mountain exchange parcels cover approximately 1,693 surface acres and contain approximately 923 acres requiring cultural resources survey. Of the proposed Table Mountain exchange parcels, 93 acres were considered high sensitivity (expected to include significant sites), 833 acres were of lower sensitivity, and 770 acres of low sensitivity (slopes > 30 percent) or areas of ground disturbance negating the presence of cultural resources) were not surveyed (Bevilacqua and Slaughter 2006).

Site types generally found in the vicinity of the Table Mountain parcels are lithic scatters and open camps, and less commonly, quarries and rock shelters (Bevilacqua and Slaughter 2006).

The predominant material types for lithic artifacts include quartzite and chert. Historic homestead and transportation-related sites are common in the area, as are historic habitation sites and features (cabin foundations and animal control [corral, fencing features]). Previously recorded sites in the Table Mountain vicinity occupy a variety of locations, and most frequently occur near or adjacent to water sources (Bevilacqua and Slaughter 2006).

The proposed Table Mountain exchange parcels contain 6 previously recorded sites, 13 newly recorded sites, and 7 isolated finds identified as a result of a class III survey conducted during 2005 (Bevilacqua and Slaughter 2006). Consultation with the SHPO (Contiguglia 2006a) determined one site (5FN2094) is eligible for inclusion in the NRHP. This multicomponent site is located on BLM and private land. It is 17,609 square meters (m^2) in size and consists of the historic Patton homestead and a prehistoric open camp at the confluence of Patton Canyon and Beaver Creek (Bevilacqua and Slaughter 2006). The Patton homestead is recommended eligible for the NRHP, but the prehistoric component lacks significance; the BLM portion of the site does not support its eligibility (Contiguglia 2006a, Bevilacqua and Slaughter 2006). Significant site features are located on adjacent private land and include two stone structural foundations, masonry well or cistern, stone retaining wall, road or trail, and two areas of soil staining and associated glass (Bevilacqua and Slaughter 2006).

Proposed Gribbles Park BLM Exchange Parcels

Gribbles Park parcels proposed for exchange lie in the uplands of the northern reaches of the Arkansas River Valley in Fremont County. The parcels comprise approximately 480 acres of which 152 acres (21 percent) are considered high sensitivity (expected to include significant sites), 508 acres (71 percent) are medium density, and approximately 59 acres (8 percent) of low sensitivity (slopes >30 percent or areas of ground disturbance negating the presence of cultural resources) (Bevilacqua and Wunderlich 2006).

Previously recorded site types generally found outside the project area (but in the Gribbles Park vicinity) predominantly include open lithic scatters and quarries, and to a lesser extent, sheltered prehistoric sites and historic-era sites (Bevilacqua and Wunderlich 2006). The predominant material types for lithic artifacts include quartzite and chert, but jasper, chalcedony, and petrified wood were also present. Sites dating to Archaic and Late Prehistoric time periods are identified in the archeological record by projectile point comparisons and architecture. No Paleo-Indian sites have been identified. Sites generally occupied a variety of locations, but they most frequently occurred on open ridges, benches, and slopes near or adjacent to creeks (Bevilacqua and Wunderlich 2006).

Within the proposed parcels, four previously recorded archeological sites and three previously recorded isolates are present. One previously recorded site, 23 new sites, and 15 new isolated finds were documented during the 2005 level III survey (Bevilacqua and Wunderlich 2006). Of the new and previously recorded sites, two sites have been determined eligible for listing in the NRHP, including one previously recorded site and one newly recorded site.

Proposed Biedell Creek BLM Exchange Parcels

The Biedell Creek exchange parcels are in the Rio Grande drainage basin north of the Rio Grande River in Saguache County. The parcels cover 11,480 acres north of Del Norte, Colorado. In general, the proposed Biedell Creek exchange parcels contain 8,674 acres (74 percent) of land considered high sensitivity (expected to include significant sites) and 3,059 acres (26 percent) of land considered of low sensitivity (slopes >30 percent or areas of ground disturbance negating the presence of cultural resources) (Bevilacqua et al. 2007). The Biedell Creek area contains nearly half of the sites and isolated finds documented for all potential exchange parcels (Anderson 2006). Site types documented in or near the Biedell Creek parcels span at least 10,000 years of human occupation and include culturally modified trees, game drive features, lithic quarries, cairns, and prehistoric architectural sites or stone structures (Bevilacqua et al. 2007). Common artifact types are lithic biface blades and retouched flakes of chalcedony, chert, and jasper, and historic glass bottles. Located within the exchange parcels are rock shelters, the La Garita Wagon Road, and the Torrez Trading Post (Bevilacqua and Slaughter 2005). Previously recorded sites in the Biedell Creek vicinity occupy vegetated areas along the western parcel boundaries and near permanent water sources east of the parcels.

Historical water conveyance, transportation-related, and early commerce sites also are present in the Biedell Creek area, including the Rio Grande Canal (Bevilacqua et al. 2007). Determined to be NRHP eligible in 2001, the Rio Grande Canal falls under the aegis of the 1866 Mining Act (43 U.S.C. 661, *Appropriation of Waters on Public Lands; Rights-of-Way for Canals and Ditches*) and is operated by the Rio Grande Canal Water Users Association. Canal operation would remain unchanged under SLB management.

There have been minimal cultural resources investigations in this area prior to the 2005 class III survey. Survey methods included pedestrian survey using transects at 30-meter (m) intervals on the San Luis Valley floor and 20-m survey transect intervals on the remaining landscape (Bevilacqua et al. 2007). In accordance with BLM class III survey guidelines (2003), some areas were exempted from surveys, including slopes greater than 30 percent, scree fields, talus slopes, and areas with extremely dense vegetation. These landforms and landscape types were field-verified by archeologists (Bevilacqua et al. 2007).

One previously recorded site, 120 newly recorded archeological sites, and 355 isolated finds are located within the Biedell Creek parcels (Bevilacqua et al. 2007). Thirty-two eligible sites occur in the Biedell Creek parcels (excluding the officially eligible Rio Grande Canal). Isolated finds from this survey are numerous and although they are no longer categorically ineligible for the NRHP, none had enough information potential to be recommended eligible for listing on the NRHP. In addition to individual resources, a Biedell Creek Archaeological District has been determined eligible by the Colorado SHPO for listing on the NRHP. The district includes the aforementioned 32 individually eligible sites as well as 63 other contributing archeological sites (Bevilacqua et al. 2007, Bevilacqua 2007).

Proposed La Jara Reservoir BLM Exchange Parcels

In general, the proposed La Jara Reservoir exchange parcels contain approximately 25,080 acres that required survey, of which 10,213 acres (41 percent) are considered high sensitivity (expected to include significant sites) and 14,799 acres (59 percent) of low sensitivity (slopes >30 percent or areas of ground disturbance negating the presence of cultural resources) (Bevilacqua and Slaughter 2005). The La Jara Reservoir area had received little previous survey and was considered moderate in terms of the number of previously recorded archeological sites. It contains 46 percent of the sites and 36 percent of the isolated finds documented for all potential exchange parcels (Anderson 2006). Site types most common in or near the La Jara Reservoir exchange parcels are lithic scatters and open camps (Bevilacqua and Slaughter 2005). The predominant material type is chert, but obsidian could occur. Archaic resources are most common, but sites range from Paleo-Indian through the Historic era. Possible Puebloan sites with architectural features and burials were documented. Historic sites include a town site, habitation structures, and herding camps. Previously recorded sites in the La Jara Reservoir vicinity (not necessarily in the project area parcels) occupy a variety of locations, but they most frequently occur on open, less heavily vegetated benches and slopes near or adjacent to creeks (Bevilacqua and Slaughter 2005).

As a result of this survey, 135 newly recorded archeological sites and 216 isolated finds were recorded and 108 sites and 1 district have been recommended as eligible for listing in the NRHP. Of the sites recorded in the project area, 28 percent are Archaic period sites, 13 percent are Late Prehistoric or Ceramic period sites, 4 percent are Protohistoric sites, 2 percent are arborglyph sites, and 22 percent are historic sites. The remaining percentage is attributed to a variety of periods (Charles 2007). One site (5CN1151) contained evidence of Paleo-Indian occupation.

Proposed San Luis Valley SLB Exchange Parcels

The SLB is not legally required to inventory cultural resources, so does not have a program for cultural resources management. As a result, no comprehensive surveys or other data are available describing cultural resources present on SLB lands. American Indian sites could include stone structures, campsites, wickiups, and culturally modified trees; several wickiups are known within GRSA. Related artifacts and features could include stone tools, ground stone, hearths, middens, and quarries (Mehls 1984 in Bevilacqua and Slaughter 2005).

Prior to European settlement, the San Luis Valley was inhabited as long ago as 12,000 years by Paleoindians. The San Luis Valley, including the SLB parcels, was also used by American Indians during the Archaic, late Prehistoric/Ceramic, and Protohistoric periods. The valley was settled by Spanish and European immigrants who used both locally available and imported materials to construct settlements, camps, homesteads, ranches, Spanish plazas, religious structures, graves, and cemeteries. These sites contain structural types and features such as cabin remains, farmhouses, barns, out-buildings, corrals, fences, animal enclosures, irrigation ditches, modified springs, wells, and water holes (Martorano et al. 2005). Remains of farm implements and domestic items could be found. Battle sites, forts, and encampments could also

occur along with the expected complement of military artifacts and features. Animal trapping sites and artifacts could also occur due to the practice of this activity in the area.

Trails and toll roads are common within the San Luis Valley, as are transportation-related artifacts (wagon parts, train-related parts, and early automobile parts). These trails and roads often access mining camps, mine and mill sites, ranches, and homesteads that may contain cabins, adits, mines, long toms, sluice boxes, mills, and milling equipment (Martorano et al. 2005).

These types of resources on SLB parcels being acquired by the Federal government would be afforded additional levels of protection under Federal laws and regulations such as Sections 106 and 110 of the NHPA and the Archaeological Resources Protection Act (ARPA) and other applicable laws compared with the current level of protection. As a result, any undertakings involving these lands in the future would require comprehensive cultural resources survey to Federal and Colorado SHPO standards to ensure any NRHP-eligible buildings, structures, objects, sites, or districts that might be present are identified; evaluated for NRHP eligibility; and managed consistent with Federal law, regulation, and policy.

3.2.1.2 Environmental Consequences/Mitigation

To meet Federal historic preservation requirements, the participating Federal agencies must consider the potential impact of the proposed land exchanges to cultural resources. As previously mentioned, by regulation, historic properties leaving Federal control result in an adverse effect as follows: “transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property’s historic significance” (36 CFR 800.5(a)(2)(vii)).

No Action Alternative

Under the No Action Alternative there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. Cultural resources on these parcels would also continue to be managed using applicable state and Federal laws and regulations.

Proposed Action

Under the Proposed Action, the SLB would acquire approximately 20,870 acres of Federal land in exchange for 57,056 acres of SLB land surrounding the Great Sand Dunes. The proposed land exchange would result in two individually NRHP eligible archeological sites, the Biedell Creek Archeological District, and part of the La Jara Archeological District leaving Federal ownership. This constitutes an adverse effect according to the Advisory Council on Historic Preservation’s (ACHP) regulations under 36 CFR Part 800, Protection of Historic Properties. These specify that, “Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property’s historic significance,” is an Adverse Effect [36 CFR 800.5 (2) (vii)].

While comprehensive surveys have not been completed on the incoming SLB parcels, it can be inferred that numerous archeological sites of varying types and in varying condition likely occur, including some that might be eligible for listing in the NRHP. Resources on SLB parcels being transferred to Federal management would be afforded additional levels of protection under Federal laws and regulations such as Sections 106 and 110 of the NHPA, and ARPA and other applicable laws. If any ground-disturbing activity were to take place on these lands in the future, comprehensive archeology survey to Federal and Colorado SHPO standards would be required to ensure any NRHP eligible sites are not disturbed or destroyed.

A cultural resources inventory of the proposed Table Mountain exchange parcels resulted in the identification of one multicomponent archeological site (historic Patton Ranch with prehistoric element [5FN2094]) that was determined to be eligible for listing in the NRHP. The site straddles BLM and private land. The features and elements making the site eligible for the NRHP lie on adjacent private land and not BLM land, so as a result, no NRHP-eligible site(s) will be exchanged, which means the land exchange will result in *no adverse effects* on any NRHP-eligible cultural resources found in the Table Mountain parcels (Contiguglia 2006a, Bevilacqua and Slaughter 2006).

A cultural resources inventory of the proposed Gribbles Park exchange parcels resulted in two sites (5FN883 and 5FN2134) being recommended as eligible for listing in the NRHP. These two sites will be individually listed in the State Register of Historic Properties as mitigation treatment which is detailed in the Treatment Plan (Bevilacqua 2009) and further addressed in the MOA.

A cultural resource inventory of the proposed Biedell Creek exchange parcels resulted in a Biedell Creek Archeological District being determined eligible for listing in the NRHP. This district includes 32 individually eligible sites and 63 sites that contribute to the significance of the archeological district. Transfer of the archeological district out of Federal ownership constitutes an adverse effect according to the ACHP's regulations under 36 CFR Part 800, Protection of Historic Properties. The previously determined NRHP-eligible Rio Grande Canal (5SH1033/5RN63) will not be affected by the land exchange.

As mitigation for the adverse effect, the Biedell Creek Archeological District will be listed in the State Register of Historic Properties and as a protective measure added to the Colorado State Land Stewardship Trust. The Archeological Treatment Plan (Bevilacqua 2009) for the exchange project documents the significance of the eligible resources, details the research questions they can potentially address, and describes the process for listing the district in the State Register of Historic Properties. This approach is further addressed in the MOA for the exchange project.

As a result, the land exchange would constitute an *adverse effect* on current NRHP-eligible cultural resources, as well as to any sites potentially eligible on a district basis. Discussions regarding mitigation have centered on the development of a treatment plan and MOA. Mitigation measures would be presented in a treatment plan and implemented though a MOA. Mitigation measures are under discussion to ensure no NRHP-eligible resources would be adversely affected. Mitigation measures being discussed include listing the NRHP sites and

districts in the Colorado State Register of Historic Places and address long-term preservation by including NRHP and state-listed resources in the SLB Stewardship Trust program (Anderson 2007). Other possible mitigation measures that have been suggested include exclusion of these sites/districts from the land exchange (Bevilacqua et al. 2007).

The Class III Cultural resources inventory of the proposed La Jara Reservoir exchange parcels resulted in a La Jara Archeological District being determined eligible for listing in the NRHP (Wells et al. 2008). This district includes 51 individually eligible sites and 84 sites that contribute to the significance of the archeological district. Transfer of the archeological district out of Federal ownership constitutes an adverse effect according to the ACHP's regulations under 36 CFR Part 800, Protection of Historic Properties. However, only part of the archeological district will be transferred out of Federal ownership; the remaining portion will continue to be managed by the BLM as an archeological district listed in the State Register of Historic Properties.

3.2.2 Floodplains

Floodplains are land areas adjacent to rivers and streams formed by deposition of sediments that are subject to recurring inundation. Floodplains with their high groundwater tables, associated riparian habitat, and often wetlands habitat represent and support some of the most ecologically important and rare vegetation communities and wildlife habitats on the landscape. These floodplains provide keystone habitat for a wide array of animal and plant species including resident and migrating birds, amphibian and fish species, and mammals. Vegetation production and diversity are usually high in and adjacent to floodplains with many plant species adapted only to these unique environments. In addition, floodplains provide a variety of hydrologic functions vital to ecosystem integrity. These include flood abatement in the form of reservoir storage, water filtration of sediment, groundwater recharge, and nutrient/chemical capture (USFS 1995). Development and conversion of floodplains poses a major threat to wildlife diversity, carrying capacity, and hydrologic regime. Changes to floodplains can cause effects that are proportionally greater than elsewhere in an ecosystem (Graber 1996).

Executive Order 11988 (*Floodplain Management*) requires Federal agencies to avoid to the extent possible the short- and long-term adverse impacts associated with occupancy and modification of floodplains, and to avoid direct and indirect support of floodplain development whenever a practicable alternative exists (Federal Register 1977). Prior to taking an action, each Federal agency must determine whether the proposed action would occur within a floodplain and, if so, take action to reduce the risk of flood loss; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. Included in the executive order for floodplain management are actions related to acquiring, managing, and disposing of Federal lands and facilities (Federal Register 1977).

3.2.2.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

Floodplains on the Fremont County Federal parcels identified for exchange occupy a small area. The Table Mountain site supports lower montane riparian habitat on less than 1 percent (1.6 acres) of its surface area and the Gribbles Park site supports montane wet meadow habitat on 1.2 percent (8.7 acres) of its surface area (see Figure 3-7).

Two Table Mountain parcels (2 and 3), the northernmost and southernmost parcels, are bisected by Banta Gulch and Patton Canyon, respectively. Both drainages are subject to large volume, short-duration flows from thunderstorm runoff. Patton Canyon also contains a dry wash/gulch with pockets of near-to-surface groundwater that is also subject to flash flooding.

The small Gribbles Park parcel 7 contains a short reach of an upland swale tributary to Cottonwood Creek that carries runoff during intense precipitation events. Intermittent flows are typical of this tributary drainage; however, saturated conditions exist within it for short periods following large, late spring snowfall and snowmelt. Parcel 6 within the Gribbles Park site contains a short reach of perennial headwater stream tributary to Badger Creek. This stream reach is characterized by a 0.25 mile (mi) long length and an average width of approximately 1.0 foot. The drainage is incised and the channel is positioned between two erosion-control ponds constructed to rehabilitate downcutting and address resource degradation.

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Biedell Creek and La Jara Reservoir site drainages are narrow and contain little alluvium until they reach the San Luis Valley where they widen and meander. Floodplains of the Biedell Creek parcels proposed for exchange support montane riparian woodland and shrubland habitat, occurring as narrow bands of vegetation along streambanks, and covering approximately 13.3 acres of parcels 13 (6.4 acres) and 14 (6.9 acres). These communities are tolerant of periodic flooding and also of high water tables and can be associated with beaver (*Castor canadensis*) activity, which controls local site hydrology. The Colorado Natural Heritage Program (CNHP) (1999b) sampled one riparian shrubland stand in the floodplain of Sheep Creek during a riparian classification study of the San Luis Valley. The drainages and associated floodplains within the Biedell Creek site include Red Rock Canyon; Sanderson Gulch; and San Juan, Little Cottonwood, Cottonwood, Lime, Biedell, and Carnero creeks.

Most of the exchange parcels within the La Jara Reservoir site support riparian plant communities within narrow floodplains, except for parcels 19, 22, 23, and 24. Overall, the La Jara Reservoir site supports riparian woodland, shrubland, and herbaceous habitat covering 26.3 acres, which occupy <1 percent of the site land area.

Montane riparian woodland and shrubland habitats, occurring as narrow bands of vegetation along streambanks, occupy 20.7 acres of the floodplains in the La Jara Reservoir site and are distributed among parcels 15 (1.6 acres), 16 (2.3 acres), 18 (4.4 acres), 20 (4.9 acres), and 21 (0.4 acres). These communities are tolerant of periodic flooding and also of high water tables

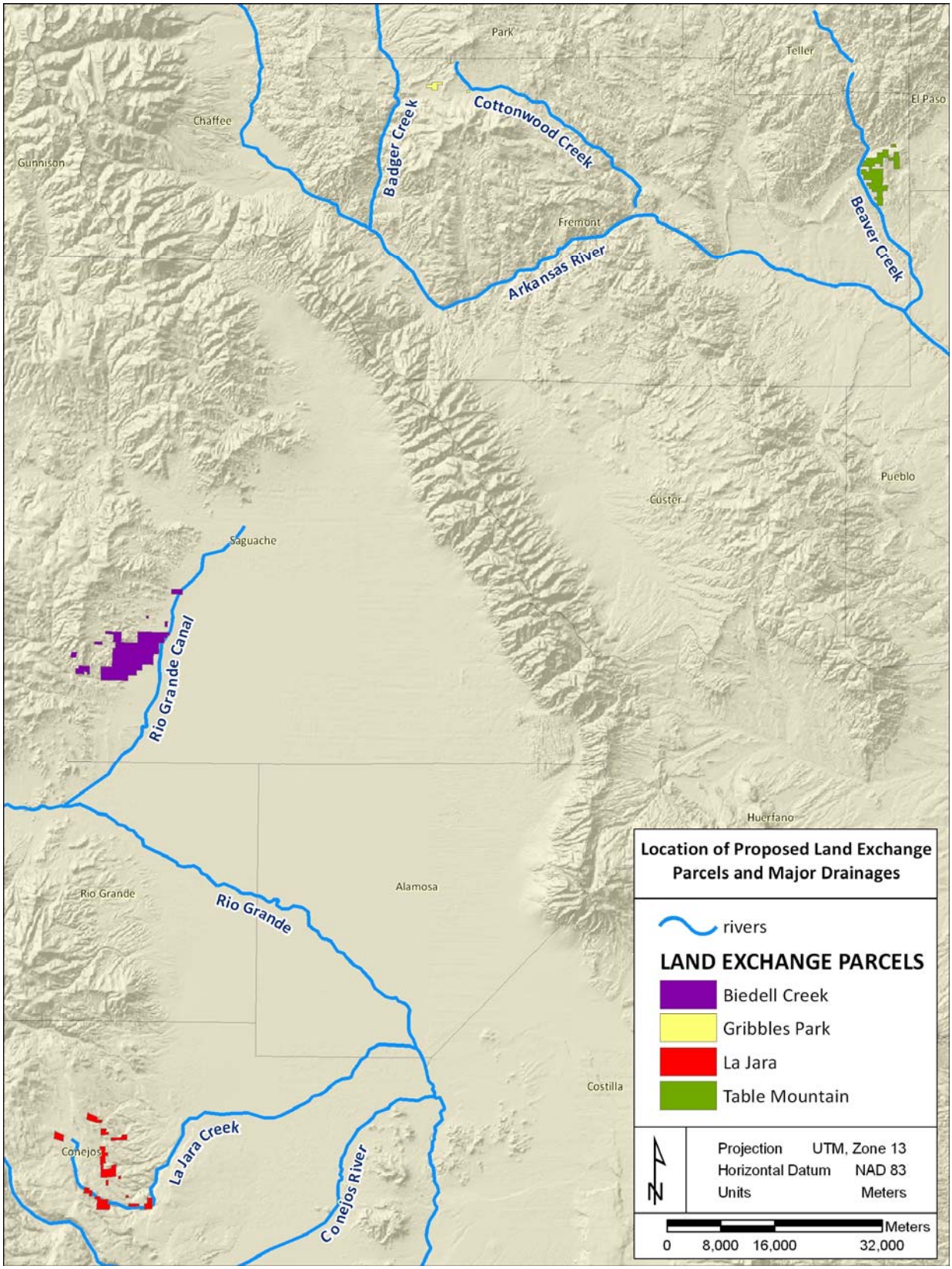

FIGURE 3-7. LOCATION OF PROPOSED LAND EXCHANGE PARCELS AND MAJOR DRAINAGES

and can be associated with beaver activity, which controls local site hydrology. The drainages are tributary to La Jara Creek. Within the La Jara Reservoir site are the floodplains of La Jara, Hot, Poso, Posito, Ojito, Torsito, Jim, and Fox creeks; Fredd Gulch; and Trujillo, Ra Jadero, La Jara, Romero, Leandro, Vicente, Trujillo, Jadero, Garambuyo, and Dry canyons.

La Jara Creek riparian vegetation occurring on floodplains of BLM lands is considered to be in good condition and is improving in terms of riparian vegetation stability. The Alamosa River floodplain riparian condition on BLM lands is considered to be good and the riparian vegetation condition is stable.

Proposed San Luis Valley SLB Exchange Parcels

Riparian woodlands and shrublands have become established on floodplains within SLB proposed exchange parcels 27 (11.8 acres), 29 (11.3 acres), 35 (22.0 acres), 36 (6.7 acres), and 37 (2.0 acres). At higher elevations woody riparian stands occupy the banks and floodplains of small streams as narrow vegetation bands, while on gently sloped land of lower elevations they occur in the floodplain of creeks and typically form wider stands. Lower elevation floodplains are typically irrigated to produce hay crops. Within and near the SLB parcels proposed for exchange are floodplains associated with San Luis, San Isabel, Sand, Little Spring, Big Spring, and Arena creeks.

3.2.2.2 Environmental Consequences/Mitigation

Floodplains with their associated riparian and wetland habitats represent important and rare vegetation communities on the semiarid project landscape. Executive Order 11988 (*Floodplain Management*) requires Federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development whenever there is a practicable alternative. An effect on floodplains would be considered (1) insignificant if there is no construction planned or undertaken and natural processes are allowed to occur, (2) low if construction planned or undertaken is permitted and minimal, (3) moderate if construction planned or undertaken temporarily or permanently alters flows and sediment deposition for short floodplain reaches, and (4) high if construction planned or undertaken permanently alters flows and sediment deposition for short-to-long floodplain reaches.

No Action Alternative

Under the No Action Alternative there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. Floodplains on Federal lands would be addressed according to the RMP management directives and Executive Order 11988 (*Floodplain Management*), resulting in short- and long-term, insignificant effects on floodplains because the Federal Emergency Management Agency (FEMA) requirements for construction in floodplains would be followed by leaseholders.

The SLB would continue management of proposed exchange parcels within the San Luis Valley, e.g., the entire San Luis Valley is an alluvial valley. Floodplains on state land would be addressed with consultation between the SLB and CDOW and under Executive Order 11988. Continued diversion of flows to irrigate hay crops in floodplains by lessees would result in long-term, insignificant to low beneficial effects on floodplain stability.

Proposed Action

Under the Proposed Action, the SLB would assume management of narrow floodplains in the Table Mountain and Gribbles Park parcels proposed for exchange with no change in land use resulting in long-term, insignificant effects on these intermittent drainages. The SLB would also assume management of narrow floodplains in the Biedell Creek parcels proposed for exchange resulting in long-term, insignificant adverse effects due to livestock grazing under grazing plans prepared by the Natural Resources Conservation Service (NRCS). Additionally, the SLB would assume management of narrow floodplains in the La Jara Reservoir parcels proposed for exchange resulting in long-term, insignificant adverse effects due to livestock grazing under grazing plans prepared by the NRCS. In the short-term, BLM grazing permits, animal unit months (AUMs), and season of use would be honored by the SLB resulting in insignificant adverse effects due to livestock grazing in floodplains.

Under the Proposed Action, the SLB parcels proposed for exchange would be managed by the BLM, USFWS, and the NPS. There are no floodplains within the parcel to be managed by the BLM.

The BNWR would manage portions of the floodplains of San Luis, Saguache, and San Isabel creeks where irrigation and mowing floodplains for hay crops and livestock grazing could continue relative to management decisions of the CCP, to be developed beginning in 2011. The large herd of American elk would also continue to graze these floodplain habitats. Continued hay production would result in long-term, insignificant to low, beneficial effects on floodplain stability. Continued livestock and American elk grazing would result in long-term, insignificant adverse effects on floodplain management for wildlife habitat structure and quality. The GRSA would manage portions of the floodplains of Sand, Little Spring, Big Spring, and Arena creeks where livestock grazing would be eliminated. The large herd of American elk would continue to graze these floodplain habitats resulting in long-term, insignificant to low, adverse effects on floodplain management for wildlife habitat structure and quality.

BNWR and GRSA would manage floodplain resources under FEMA regulations, Executive Order 11988, Section 404 of the Clean Water Act (CWA), and other applicable Federal laws and regulations. Management actions would be stipulated in approved CCPs and GMPs and all proposed management actions would be evaluated under the NEPA process resulting in long-term, insignificant to low, beneficial effects for the preservation of floodplain values.

3.2.3 Wetlands and Riparian Zones

Wetlands and riparian habitats represent some of the most ecologically important and rare vegetation communities on semiarid landscapes. They provide keystone habitat for a wide array

of animal and plant species including resident and migrating birds, amphibian and fish species, and mammals. Vegetation production and diversity are usually very high in and around these mesic to aquatic sites, with many plant species adapted only to these unique environments. In addition, wetlands and riparian zones provide a variety of hydrologic functions vital to ecosystem integrity. These include flood abatement in the form of reservoir storage, water filtration of sediment, groundwater recharge, and nutrient/chemical capture (USFS 1995). Development and conversion of wetlands and riparian zones poses a major threat to wildlife diversity, carrying capacity, and hydrologic regime. Changes to and removal of wetlands can cause effects that are proportionally greater than elsewhere in an ecosystem (Graber 1996).

Wetlands are a protected resource under Executive Order 11990, issued in 1977 "to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative." Wetlands have been defined by agencies responsible for their management. The term "wetlands" used herein, is defined using U.S. Army Corps of Engineers (USACE) conventions. The USACE has jurisdiction to protect wetlands under Section 404 of the CWA using the following definition:

> *. . . areas that are inundated or saturated by surface 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 (33 CFR 328.3[b]). Wetlands generally include swamps, marshes, bogs, and similar areas.*

Wetlands have three diagnostic characteristics: (1) more than 50 percent of the dominant species present must be classified as obligate, facultative wetland, or facultative; (2) the soils must be classified as hydric; and (3) the area is either permanently or seasonally inundated (USACE 1987).

The NPS and USFWS classifies/delineates and maps wetlands using the USFWS's Cowardin classification system. This system is based on the more inclusive definition, e.g., "lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water." Under this classification, wetlands must have one or more of the following characteristics: (1) the land supports, at least periodically, predominantly hydrophytes (i.e., plants adapted to growing in water or in saturated soils that are oxygen deficient); (2) the substrate is composed of predominantly undrained hydric (anaerobic) soils; and (3) the substrate is saturated with water or covered by shallow water at some time during the growing season of each year (Cowardin et al. 1979).

Both the USACE and USFWS wetlands definition and classification systems recognize three parameters: hydrophytic vegetation, hydric soil, and wetlands hydrology, but differ from one another in how much habitat is considered wetlands. The Cowardin system defines more habitat types as wetlands and also recognizes many unvegetated sites or areas without soil such as mudflats, rocky or sandy banks, beaches, stream shallows, saline lakeshores, playas, and deepwater or sites lacking soil as wetlands habitats with important wildlife habitat values (please refer to Cowardin et al. 1979).

3.2.3.1 Wetlands Functions and Values

Wetlands in general, and those within the project area, perform several beneficial functions (biological and physical processes) in addition to providing habitat for animals and plants (Adamus et al. 1991). The functions and values (societal perceptions) listed below pertain to water quality, water quantity, landscape health, and human recreation:

1. Groundwater recharge. When wetland surface water levels are higher than those of adjacent water tables, usually following snowmelt, flooding, and floodwater retention, downward or lateral percolation occurs to the adjoining aquifer. If there is no or little exchange of surface water to the groundwater table, then water is lost from wetlands via evaporation to the atmosphere or transpiration by vegetation (evapotranspiration).

2. Groundwater discharge. Stored water in wetlands can move laterally or upward to the surface, emerging, for example, as springs, seeps, or artesian wells. At the point of discharge, additional wetlands usually occur. These wetlands might differ in composition from the source wetlands.

3. Flood flow alteration. Wetlands can hold floodwaters in temporary storage and also slow the velocity of flood flows due to the sinuosity of the drainage feature and roughness provided by vegetation. Stored water is fed slowly to the groundwater table as sediments and detritus are removed and provide forage in aquatic habitats.

4. Sediment stabilization and shoreline anchoring. Wetlands vegetation provides root systems and stems that protect streambanks and shorelines from the erosive action of water (flowing and wind-generated waves) and to a lesser extent wind erosion. Herbaceous wetland vegetation and some shrubs provide considerable root mass, but also lay down over sediments under the weight of water to further protect them from scouring during flood events.

5. Sediment and toxicant retention. Wetlands slow water velocity providing removal by gravity of suspended soil particles and toxic chemicals attached to soil particles or dissolved in the water supply. Sediment deposition can bury toxicants, provide conditions for chemical breakdown, or make them available for assimilation into plant tissues.

6. Nutrient removal and transformation. Wetlands are capable of nitrogen fixation, via bacteria and blue-green algae, thereby producing organic forms of nitrogen usable by animals and plants in the system. In general, however, most wetlands use more nitrogen than is fixed, so de-nitrification occurs. Wetlands do act as sinks for both nitrogen and phosphorus under nutrient-enriched and natural conditions.

7. Production export. Organic material is captured and flushed downstream of wetlands to supply carbon to other habitats or within the greater wetlands or riparian system. Organic material, including dead leaves and insect carcasses, are passed to the food chain and used by bacteria, microorganisms, aquatic invertebrates, and other organisms

prior to being ultimately ingested by fish and wildlife species. This action is commonly termed food chain support and is carried out by wetlands with outlets, productive vegetation that is dense and diverse, and with aquatic animals that use the released nutrients either directly or indirectly.

8. Aquatic diversity and abundance. Wetlands support fisheries and their food sources, which include algae, microorganisms, and invertebrates. These food sources are in turn used by wildlife species that forage on the fishery and also consume smaller animals.

9. Wildlife diversity and abundance. As fish and wildlife habitat, wetlands have the physical and chemical make-up that affect metabolism, attachment, and predator avoidance of the adult or larval forms of fish and the food and cover needs of wildlife. Good fish habitat typically includes deep-to-shallow, open, nonacidic water, no barriers to migration, high oxygen content water, and high vegetation cover. Good wildlife habitat typically includes the presence of islands, high plant diversity of varying heights, and a sinuous, irregular shoreline with good edge to area ratio.

10. Recreation. Active recreation can occur on or in wetlands, including hunting, fishing, swimming, boating, canoeing, and kayaking. Passive recreation includes aesthetic enjoyment, nature study, picnicking, research, or open space.

11. Uniqueness or heritage value. These terms refer to the biological significance of wetlands that often support diverse species, and rare and unique plants, animals, and plant communities.

Riparian zones and habitats are defined as land directly influenced by permanent water, which has visible vegetation or physical characteristics that reflect this permanent water influence. Included are lands adjacent to perennial and intermittent streams, ponds, reservoirs, and springs that typically support the most diverse plant communities (in terms of species composition and vegetation structure) and are the most productive of any vegetation type (BLM 1998). The BLM classifies riparian communities, as follows:

- Excellent: Diversity and abundance of typical riparian plants and animals good. Good age distribution, reproduction evident. Soil mostly covered by vegetation, bank erosion generally lacking. Cover for animals abundant. Vegetation shades water most of the day.

- Good: Most groups of typically riparian plants and animals present at or near stream border, but numbers might be reduced. Age diversity fair, reproduction evident. Some bare soil areas noticeable, but erosion at low levels. Riparian animals somewhat reduced or typical species missing because of cover loss.

- Fair: Many of the typically riparian plants and animals rare or missing from stream border. Age diversity lacking, little sign of reproduction. Bare soil might be common. Animal populations greatly reduced from lack of cover. Vegetative shade on stream lacking or occurs only during morning and evening hours.

- Poor: Typically riparian plants and animals scanty or lacking in both numbers and diversity. Little age variation, no sign of reproduction. Range plants abundant down to water edge. Erosion of bare soil normally high, but could be reduced in grass communities that provide good ground cover, but little diversity or animal cover. No shade on water from vegetation.

The CNHP (1999b) sampled and prepared a classification of riparian plant associations of the Rio Grande and Closed Basin watersheds that includes the area of the San Luis Valley evaluated in this EA. Seventy riparian plant associations were classified from more than 200 streams sampled during this study, ranging from alpine meadows to alkaline playas. This classification likely captures most of the riparian vegetation types within the San Luis Valley portion of this land exchange project. A key to the 70 classified riparian communities of the San Luis Valley is presented in the CNHP (1999b).

3.2.3.2 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

Wetlands and riparian resources on the Fremont County parcels proposed for exchange to the SLB occupy a small area. The Table Mountain site supports lower montane riparian habitat on approximately 1 percent (6.6 acres) of its surface area, and the Gribbles Park site supports montane wet meadow habitat on 1.2 percent (8.7 acres) of its surface area.

Two Table Mountain parcels (2 and 3), the northernmost and southernmost parcels, are bisected by Banta Gulch and Patton Canyon, respectively. Short reaches of Banta Gulch have a relatively shallow water table and support montane riparian woodland vegetation characterized by narrowleaf cottonwood (*Populus angustifolia*). Field inventory of these small vegetation stands did not identify perennial wetlands as defined by the USACE (BLM 2005a). Patton Canyon has not yet been field evaluated, but is thought to be similar to Banta Gulch in terms of sparse riparian woodland support. Patton Canyon contains a dry wash/gulch with pockets of near-to-surface groundwater supporting patches or stands of narrowleaf cottonwood-dominated riparian vegetation. Parcel 45 at Table Mountain supports lower montane riparian woodland (3.3 acres) and shrubland (2.0 acres) and western Great Plains riparian woodland and shrubland (1.3 acres) habitats. These vegetation communities are typically characterized by narrowleaf and plains cottonwood (*Populus deltoides*) trees and species of willow shrubs (*Salix* spp.).

Gribbles Park parcel 7 contains a short reach of an upland swale tributary to Cottonwood Creek. Intermittent flows are typical of this tributary drainage; however, saturated conditions exist within it for short periods following large, late spring snowfall and snowmelt. Parcel 6 within the Gribbles Park site contains a short reach of perennial headwater stream tributary to Badger Creek. It supports wet meadow vegetation, likely species of rush (*Juncus* spp.), sedge (*Carex* spp.), grasses such as tufted hairgrass (*Deschampsia caespitosa*), and wetlands forbs including marsh marigold (*Caltha leptosepala*).

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Biedell Creek supports montane riparian woodland and shrubland habitat covering 13.3 acres of parcels 13 (6.4 acres) and 14 (6.9 acres), which occupy <1 percent of the site land area. Tree species common to these montane riparian stands include narrowleaf cottonwood, blue spruce (*Picea pungens*), quaking aspen (*Populus tremuloides*), Rocky Mountain juniper (*Juniperus scopulorum*), and Douglas-fir (*Pseudotsuga menziesii*). Commonly associated riparian shrubs include thinleaf alder (*Alnus incana*), mountain birch (*Betula occidentalis*), red-osier dogwood (*Cornus stolonifera*), and several species of willows (NatureServe 2009a). These communities are tolerant of periodic flooding and also of high water tables and can be associated with beaver activity, which controls local site hydrology. They tend to occur as narrow bands of vegetation along streambanks.

The CNHP (1999b) sampled one riparian shrubland stand on Sheep Creek during a riparian classification study of the San Luis Valley. The sampled site supported a Geyer willow (*Salix geyeri*) / beaked sedge (*Carex utriculata*) shrubland. With the exception of parcels 19, 22, 23, and 24, the parcels within the La Jara Reservoir site support wetlands or riparian plant communities. The La Jara Reservoir site supports riparian and wetlands woodland, shrubland, and herbaceous habitat covering 26.3 acres, which occupies <1 percent of the site land area. Montane wet meadow habitat occupy 5.5 acres in parcels 16 (1.1 acres) and 17 (4.4 acres), which are characterized by species of grasses, including tufted hairgrass, sedges, spike-rush (*Eleocharis* spp.), and marsh marigold that occur on saturated sites with very low velocity surface and subsurface flows (NatureServe 2009b).

Montane riparian woodland and shrubland habitats occupy 13.6 acres of the La Jara Reservoir site, distributed among parcels 15 (1.6 acres), 16 (2.3 acres), 18 (4.4 acres), 20 (4.9 acres), and 21 (0.4 acres). These riparian and wetland habitats line streams draining the mountain slopes and are characterized by narrowleaf cottonwood, blue spruce, Rocky Mountain juniper, and Douglas-fir trees and species of willow, thinleaf alder, western birch, and red-osier dogwood shrubs (NatureServe 2009a). The communities are tolerant of periodic flooding and also of high water tables and can be associated with beaver activity, which controls local site hydrology. They tend to occur as narrow bands of vegetation along streambanks.

La Jara Creek riparian vegetation of BLM parcels is considered to be in good condition and is improving in terms of riparian vegetation stability. The Alamosa River riparian condition on BLM lands is considered to be good and the riparian vegetation condition is stable.

Proposed San Luis Valley SLB Exchange Parcels

Wetlands across the San Luis Valley cover approximately 230,000 acres (USFWS 2003). Only a small percentage is managed to support dense stands of vegetation preferred by ground-nesting water birds because the majority is harvested annually for hay. A comparative study of aerial photography acquired during 1936 and 1990 determined there was much more surface water and emergent wetlands in 1936 than was present in 1990 (McArthur and Sanderson 1990). During 1990, these wetlands were expressed as the residual woody vegetation, both living and dead, occupying predominantly desiccated potholes. The affected wetlands were not

fed by surface flows in streams and were dependent on near-to-surface groundwater or perched water tables (McArthur and Sanderson 1990). Approximately 14 percent of the BNWR surface area supports wetlands considered to be conservation sites by CNHP because they provide significant to very significant contributions to global biological diversity (Rondeau et al. 1998 in USFWS 2005).

SLB parcels 30, 31, 32, 38, 41, 42, and 43 do not support wetlands, wet meadow, playa, riparian, marsh, or aquatic habitats. Wetlands and riparian habitats that occupy SLB land cover approximately 351.9 acres (< 1 percent of the total area) and have been described for those lands becoming a portion of the BNWR. An additional 58.7 acres (< 1 percent of the total area) are present as open water, and likely support aquatic and emergent wetlands vegetation. Generally, wetlands and riparian habitats include wet meadows, emergent marshes, aquatic, playa, and woody and herbaceous riparian vegetation types (USFWS 2005). Hydrology is the major driving variable in the permanence of wetland types, ranging from open water to saturated soils to surface inflows that might occur once every few years. Playas, which rely on surface water inflow, cover 5,392 acres (12 percent) of the SLB parcels area; however, not all playas are considered wetlands under the USACE definition so they must be examined on an individual basis if necessary to delineate jurisdictional boundaries.

3.2.3.3 Wet Meadows and Emergent Marshes

Meadows and marshes are associated with creek, stream, and pond margins and with landscape depressions where the water table is at or near the ground surface or the soils are inundated by water for short to long periods of time. Wet meadows occur in SLB parcels 26 (41.3 acres), 27 (41.3 acres), 28 (2.4 acres), 29 (73.1 acres), 33 (1.8 acres), 35 (18.5 acres), 36 (1.3 acres), 37 (55.6 acres), and 40 (38.0 acres) (see Figure 3-8). Wet meadows typically occupy saturated soils that occasionally become dry and are often supported by irrigation in the San Luis Valley. San Luis Creek vegetation was sampled on SLB land during a riparian classification study conducted by the CNHP (1999b). A Baltic rush (*Juncus balticus*) wet meadow association was described from the site data.

Ranchers using irrigation for hay production have created and maintained many acres of wet meadow using diversion structures, ditches, and wells to redistribute creek and streamflow and distribute pumped groundwater. Irrigation generally begins in late spring and continues through the summer growing season; the irrigated wet meadows are allowed to dry in late summer to harvest vegetation for livestock forage. In general, wet meadows support species of sedge, Baltic rush, and tufted hairgrass, in addition to nonnative hay grasses such as orchardgrass (*Dactylis glomerata*) and timothy (*Phleum pratense*).

Inundated sites support emergent marsh vegetation, these occur in SLB parcels 27 (7.8 acres), 35 (6.2 acres), and 36 (10.7 acres) (see Figure 3-8). Emergent marshes are frequently or continuously inundated with water and support species of bulrush (*Scirpus* spp.), cattail (*Typha* spp.), rush, spike-rush, and sedge. Along slow-moving creeks and streams marshes are sometimes referred to as sloughs. Emergent marshes also become established in shallow open water and can also be mapped into that unit.

3.2.3.4 Open Water

Open water may support aquatic wetlands and areas of emergent marsh and has been identified on SLB parcels 26 (11.6 acres), 27 (42.2 acres), 35 (1.3 acres), 36 (1.1 acres), and 41 (2.4 acres). Vegetation commonly associated with the open water of streams, canals, ponds, and reservoirs include the aquatic species water milfoil (*Myriophyllum* spp.), water smartweed (*Persicaria* spp.), and pondweed (*Potamogeton* spp.); and floating-leaved plants including duckweed (*Lemna* spp.) and hornwort (*Ceratophyllum* spp.). In shallow water, up to 6 feet deep, the emergent marsh species of bulrush, cattail, rush, and spike-rush typically become established.

3.2.3.5 Playas

Playas have formed in SLB parcels 26 (5,232.1 acres), 27 (35.6 acres), 34 (29.8 acres), 39 (25.6 acres), and 40 (68.9 acres) (see Figure 3-9). Most playas within BNWR occur west of Saguache and San Luis creeks, where they formed due to an intermittent or ephemeral water regime. When sufficient spring runoff from nearby mountain ranges and thunderstorm activity occurs, playas fill with water and then slowly dry through the summer. During dry years, many or all of the playas remain dry, adding to their uniqueness and high productivity when water does return (USFWS 2005). The drying and wetting cycle provides nutrients at high levels that are valuable for invertebrates and the larger wildlife that feed on them, particularly shorebirds. Playas typically support saltgrass (*Distichlis spicata*), iodinebush (*Allenrolfea occidentalis*), greasewood (*Sarcobatus vermiculatus*), and saltbush species (*Atriplex* spp.) and are often surrounded by greasewood shrublands with an understory of saltgrass and western wheatgrass (*Pascopyrum smithii*) (NatureServe 2009c). Barren salt flats also occur and are valuable habitats for foraging and nesting shorebirds.

3.2.3.6 Riparian Woodlands and Shrublands

Riparian woodlands and shrublands have become established within SLB parcels 27 (11.8 acres), 29 (11.3 acres), 35 (22.0 acres), 36 (6.7 acres), and 37 (2.0 acres) (see Figure 3-10). At higher elevations woody riparian stands occupy the banks of small streams as narrow vegetation bands, while on gently sloped land of lower elevations they are found within the floodplains of creeks and typically form wider stands. These woody riparian vegetation types often support narrowleaf or Rio Grande (*Populus wislizenii*) cottonwood, blue spruce, Rocky Mountain juniper, or Douglas-fir trees; and the shrub species of willow, thinleaf alder, western birch, chokecherry (*Prunus virginiana*), red-osier dogwood, and greasewood represent the typical woody riparian plant species. The remaining riparian vegetation is herbaceous and usually characterized by species of sedge and grasses, including tufted hairgrass. The nonnative trees or tall shrubs Russian-olive (*Elaeagnus angustifolia*) and salt-cedar (*Tamarix chinensis*) are common in some lower elevation stands. SLB lands proposed for exchange were sampled during the CNHP (1999b) riparian vegetation classification study that included the San Luis Valley. San Luis Creek supported a greasewood/saltgrass shrubland.

FIGURE 3-8. REPRESENTATIVE SAN LUIS VALLEY EMERGENT MARSH AND WET MEADOW HABITAT

FIGURE 3-9. REPRESENTATIVE SAN LUIS VALLEY PLAYA HABITAT

FIGURE 3-10. REPRESENTATIVE SAN LUIS VALLEY RIPARIAN HABITAT

3.2.3.7 Environmental Consequences/Mitigation

Wetlands and riparian habitats represent important and rare vegetation communities on the semiarid landscape of the parcels proposed for exchange. Executive Order 11990 (*Protection of Wetlands*) requires Federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with occupancy and modification of wetlands habitat and to avoid direct and indirect support of development in wetlands whenever there is a practicable alternative. An effect on wetlands or riparian habitat would be considered (1) insignificant if there are no activities undertaken and natural hydrology and vegetation processes occur; (2) low if activities undertaken result in minor and temporary affects on site hydrology and short-term effects on the wetland and riparian vegetation; (3) moderate if activities undertaken result in minor to low, permanent, and measurable effects on site hydrology and short- and long-term measurable effects on the wetland and riparian vegetation; and (4) high if activities planned or undertaken permanently alter site hydrology and eliminate wetland and riparian vegetation stands as wildlife habitat.

No Action Alternative

Under the No Action Alternative there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. Wetlands and riparian habitats on Federal and state lands would be addressed according to Executive Orders 11988 and 11990 in addition to the RMP management directives and PLH Standard 2 or CDOW and Colorado State Forest Service (CSFS) management guidance resulting in short- and long-term, insignificant to low beneficial effects on wetlands and riparian habitat. Livestock and American elk grazing in wetlands and riparian habitats would continue to occur and would have greater adverse effects on wetlands and riparian resources in the San Luis Valley where the approximately 6,000-head American elk herd occurs. Continued diversion of flows to irrigate hay crops on SLB parcels would result in long-term, negligible to low, adverse effects on down-drainage wetlands. For all lands, any proposed actions that would affect wetlands and riparian resources would require consultation with the USACE under the wetlands protection provisions of the CWA, as amended.

Proposed Action

Under the Proposed Action, the SLB would assume management of limited wetlands and riparian habitat occupying narrow drainages in the Table Mountain (6.6 acres) and Gribbles Park (8.7 acres) BLM parcels proposed for exchange, and streambank wetlands and riparian habitat in the Biedell Creek (13.3 acres) and La Jara Reservoir (20.7 acres) proposed exchange parcels resulting in long-term, insignificant adverse effects due to livestock grazing. Existing BLM grazing permits would be honored where they are in force, and the NRCS would assist the SLB with preparation of grazing plans. The wetlands and riparian resources would be managed by CDOW and CSFS under Executive Orders 11990 and 11988, and the lessee would comply with wetlands protection laws under an agricultural lease agreement with the SLB. Any proposed actions that could affect wetlands and riparian resources would require consultation with the USACE under the wetlands protection provisions of the CWA, as amended.

Under the Proposed Action, the SLB parcels proposed for exchange would be managed by the BLM, USFWS, and the NPS. There is no wetland or riparian habitat within parcel 31 to be managed by the BLM and thus, no application of Executive Order 11990 or PLH Standard 2.

The BNWR would assume management of aquatic habitat (14 acres), wet meadows and emergent marshes (81.8 acres) and playas (5,356.4 acres) on SLB parcels proposed for exchange, and management would be informed by the CCP to be prepared beginning in 2011. Management planning would consider hay production, livestock grazing (livestock grazing ceased on these parcels in 2004), prescribed burning, invasive species controls, and other tools resulting in short- and long-term, insignificant to moderate beneficial effects on wetlands and riparian resource habitat quality and diversity. Continued diversion of surface flows and groundwater pumping to irrigate hay crops on former SLB parcels would result in long-term, negligible to low, adverse effects on down-drainage wetlands establishment and habitat quality. American elk grazing by up to 6,000 head in wetlands and riparian habitats on BNWR lands would result in short- and long-term, low to moderate, adverse effects on wetlands and riparian habitat quality.

Mitigation in the form of BNWR management actions would include the following:

- Assess habitat conditions
- Continue and evaluate current irrigation practices
- Evaluate grazing and haying activities to improve vegetation health and wildlife habitat
- Evaluate prescribed fire to improve habitat for wildlife
- Assess wildlife use
- Assemble existing hydrology data, develop research needs
- Evaluate water management options (USFWS 2005).

The USFWS would develop partnerships with the research community, NPS, and TNC to inventory and monitor wetlands and riparian habitats using ecosystem-wide monitoring protocols. Riparian habitat management would include vegetation condition analysis, identification of areas of degradation, and designing corrective actions related to restoration or grazing patterns. Developing wetlands and riparian management actions on baseline and monitoring data would result in long-term, low to moderate, beneficial effects on these resources as wildlife habitat.

The GRSA would assume management of aquatic habitat (44.6 acres), wet meadows and emergent marshes (216.9 acres), playas (35.6 acres), and riparian woodlands and shrublands (53.8 acres) on SLB parcels proposed for exchange, and management would be informed by the GMP and more detailed plans. Management planning would continue cessation of livestock grazing that occurred in 2004 on these parcels, and consider cessation of irrigation of lands up drainage from these parcels, prescribed burning, invasive species controls, and other tools resulting in short- and long-term, insignificant to moderate beneficial effects on wetlands and riparian resource habitat quality, diversity, and natural hydrologic function.

Federal management actions in general would be stipulated in CCPs and GMPs, adherence to Executive Orders 11988 and 11990, and the NPS Director's Order 77-1: Wetland Protection would be enforced, and all proposed management actions would be evaluated under the NEPA process resulting in long-term, negligible to moderate beneficial effects on wetlands and riparian habitats due to focused and proactive management. For Federal lands, any actions that would affect wetlands and riparian resources would require consultation with the USACE under the wetlands protection provisions of the CWA, as amended. PLH Standard 2 will be discussed subjectively below, but the land exchanged to the BLM (parcel 31) does not contain wetlands or riparian habitat, and the standard does not apply to other federally-managed lands.

Standards for Public Land Health

The Finding on the Public Land Health Standard 2 states:

> *Riparian systems associated with both running and standing water function properly and have the ability to recover from major disturbance such as fire, severe grazing, or 100-year floods. Riparian vegetation captures sediment, and provides forage, habitat, and biodiversity. Water quality is improved or maintained. Stable soils store and release water slowly.*

Standards for public land health (BLM 1997) describe conditions needed to sustain public land health and relate to all uses of the public lands. Standards are applied on a landscape scale and relate to the potential of the landscape. Indicators for Standard 2 are as follows:

- Vegetation is dominated by an appropriate mix of native or desirable introduced species.
- Vigorous, desirable plants are present.
- There is vegetation with diverse age class structure, appropriate vertical structure; and adequate composition, cover, and density.
- Streambank vegetation is present and is composed of species and communities that have root systems capable of withstanding high stream flow events.
- Plant species present indicate maintenance of riparian moisture characteristics.
- Stream is in balance with the water and sediment being supplied by the watershed (e.g., no headcutting, no excessive erosion or deposition).
- Vegetation and free water indicate high water tables.
- Vegetation colonizes point bars with a range of age classes and successional stages.
- An active floodplain is present.
- Residual floodplain vegetation is available to capture and retain sediment and dissipate flood energies.
- Stream channels with size and meander pattern appropriate for the stream's position in the landscape, and parent materials.
- Woody debris contributes to the character of the stream channel morphology.

The Federal parcels selected for exchange contain slightly less riparian woodland and shrubland habitat (40.6 acres) than do the proposed SLB exchange parcels (53.8 acres). Riparian habitat on the Federal parcels occurs generally in narrow bands along small foothill streams of steep topography and on SLB parcels occurs along low-velocity streams on nearly flat topography. It is likely that all of the individual stream systems with riparian habitat are functioning properly.

Following the land exchange, the future condition of the riparian resources of selected Federal parcels would remain unchanged and could improve due to more focused monitoring by BNWR and GRSA staff under Federal floodplain management and protection of wetlands executive orders. For BLM exchange parcels to be managed by the SLB, CDOW, and CSFS would provide riparian resource management over the long term and lessees would be required to adhere to floodplain management, protection of wetlands, and USACE jurisdictional wetlands regulations under the terms of agricultural leasing contracts.

The land exchange as proposed would result in a small gain in Federal ownership and management of riparian habitat, but would result in a net loss of riparian habitat managed by the BLM under PLH Standard 2.

The No Action Alternative would meet PLH Standard 2 for healthy public lands. The BLM would remain responsible for identifying, evaluating, and monitoring all riparian systems on the proposed Federal exchange parcels. Direct impacts on riparian systems would be avoided or minimized when processing land use authorizations. Riparian systems that are functioning at risk would be evaluated further to determine if management changes could positively affect the riparian soils, vegetation, or the site hydrology.

3.2.4 Migratory Birds

More than 800 species of birds spend all or part of their lives in the United States as they migrate from summer breeding grounds in the north to winter in warmer climates of the south, including Latin America (USFWS 2003). Because migratory birds depend on habitats across many political boundaries, a coordinated conservation effort has been established internationally, with the USFWS being the principal Federal authority in the United States Large numbers of birds migrate seasonally through Colorado using natural, managed, and agricultural habitats for forage, roosting, and cover during their flights. The mountain ranges, rivers, and other prominent topographic features can serve as leading lines to guide raptors and other birds during migration, and wetlands and open water provide needed resting and foraging habitat for shorebirds and waterfowl. Many raptor, shorebird, waterfowl, and passerine bird species also migrate to Colorado to breed, nest, and rear broods, then overwinter in warmer climates.

Migratory birds are also economically important, e.g., birders recreate in many areas to identify migrant species, the City of Monte Vista hosts a Crane Festival (estimated 10,000 visitors in 1999) during the spring migration of sandhill cranes (*Grus canadensis*), and some hunters focus on migrating waterfowl, including species of ducks and geese. Organizations such as Ducks Unlimited use donations to protect and restore wetlands and associated riparian and upland

systems used by migrating waterfowl and shorebirds, primarily. These very important San Luis Valley wetlands resources are a priority for conservation and management organizations and agencies, including CDOW (waterfowl program and wetlands initiative), USFWS (partnership programs and wildlife refuges), NRCS (Wetlands Reserve and Environmental Quality Incentives [EQUIP] programs), and private and nonprofit land managers.

In general, shorebirds migrate through Colorado between February and May and between July and November (USFWS 2003). Nesting shorebird activity occurs between March and July. Sandhill cranes migrate between February and April and again during September and October numbering up to 20,000 to 28,000 in the San Luis Valley.

The establishment of BNWR and other wildlife refuges and enlargement of GRSA is important to migratory bird management. The primary function of lands managed under the National Wildlife Refuge System is to provide habitat for waterfowl and shorebirds in addition to other wildlife-related benefits. Federal agencies in general are responsible to protect migratory birds under Executive Order 13186 (Federal Register 2001). This executive order states that migratory birds are of great ecological and economical value to the United States and to other countries. They contribute to biological diversity and bring tremendous enjoyment to those who study, watch, feed, or hunt them and the critical importance of this shared resource has been recognized through ratification of international, bilateral conventions for migratory bird conservation. A list of all migratory birds included under this executive order is available under 50 CFR 10.13; a focused list for species occurring in the proposed land exchange areas is presented in Appendix D.

Several migratory bird species associated with the proposed land exchange region are of conservation concern and a few have status under the ESA and under the Migratory Bird Treaty Act (USFWS 2002). They are (1) northern harrier (*Circus cyaneus*), (2) Swainson's hawk (*Buteo swainsoni*), (3) ferruginous hawk (*Buteo regalis*), (4) golden eagle (*Aquila chrysaetos*), (5) peregrine falcon (*Falco peregrinus*) [ESA delisted], (6) prairie falcon (*Falco mexicanus*), (7) Gunnison sage-grouse (*Centrocercus urophasianus gunnisonii*) [non-Migratory Bird Treaty Act and ESA candidate], (8) snowy plover (*Charadrius alexandrinus*), (9) mountain plover (*Charadrius montanus*) [ESA candidate], (10) solitary sandpiper (*Tringa solitaria*), (11) marbled godwit (*Limosa fedoa*), (12) Wilson's phalarope (*Steganopus tricolor*), (13) yellow-billed cuckoo (*Coccyzus americanus*) [ESA candidate], (14) flammulated owl (*Otus flammeolus*), (15) burrowing owl (*Speotyto cunicularia*), (16) short-eared owl (*Asio flammeus*), (17) black swift (*Cypseloides niger*), (18) Lewis's woodpecker (*Asyndesmus lewis*), (19) Williamson's sapsucker (*Sphyrapicus thyroideus*), (20) gray vireo (*Vireo vicinior*), (21) pinyon jay (*Gymnorhinus cyanocephalus*), (22) Bendire's thrasher (*Toxostoma bendirei*), (23) crissal thrasher (*Toxostoma dorsale*), (24) Sprague's pipit (*Anthus spragueii*), (25) Virginia's warbler (*Vermivora virginiae*), (26) black-throated gray warbler (*Dendroica nigrescens*), (27) Grace's warbler (*Dendroica graciae*), (28) sage sparrow (*Amphispiza belli*), and (29) chestnut-collared longspur (*Calcarius ornatus*).

In general, the San Luis Valley, which includes all of the SLB parcels proposed for exchange and the proposed BLM exchange tracts of Biedell Creek and La Jara Reservoir, represents outstanding habitat for migrant bird species, largely a result of diverse habitats, protected lands,

and minimal human population. The range of open water, marsh, wetlands, meadow, riparian, playa, grassland, shrub-steppe, shrubland, and agricultural land provide habitats for migrating birds. Migratory birds known to use San Luis Valley habitats are discussed below by major group, which include waterfowl and sandhill cranes, shorebirds and marshbirds, colonial water birds, water birds, raptors, songbirds, and corvids. Appendix D (see Table D-1) provides a list of all known sightings for migratory birds in the San Luis Valley.

3.2.4.1 Rare Avian Migrants

Five migrant bird species known to use the San Luis Valley are of management concern for the USFWS; they include the shorebirds American bittern, black tern, and white-faced ibis, and the raptors burrowing owl and ferruginous hawk (USFWS 2003). All five species are known to use ANWR and MVNWR—the three shorebird species also use San Luis Lakes State Park, and are likely to use GRSA and BNWR, including SLB parcels proposed for exchange and having appropriate habitat. Another rare migrant, the southwestern willow flycatcher is discussed in detail in the "Federal Threatened, Endangered, Candidate and Colorado BLM Sensitive Species" section and in the attached Biological Assessment (BA) (see Appendix E).

American bitterns (*Botaurus lentiginosus*) are relatively common nesting birds, preferring tall emergent wetlands habitat (USFWS 2003). The white-faced ibis (*Plegadis chihi*) is a colonial nesting species that uses stands of tall and short emergent wetlands vegetation and shallow water habitat. Known nesting colonies occur on Bowen Pond (in 2001 approximately 500 nesting pairs were present), Parker Pond (MVNWR), Russell Lakes State Wildlife Management Area, and a private lake south of Alamosa (USFWS 2003). During 2000, approximately 300 white-faced ibis nests occurred in MVNWR. Black tern pairs occur on ANWR and MVNWR and they typically nest in tall emergent wetlands vegetation, including bulrush (USFWS 2003). To date, black tern nests have not been documented on the refuges, although nesting was reported at San Luis Lakes State Park (CSP 1996). Burrowing owls are rare because their preferred habitats of shortgrass prairie with prairie dog (*Cynomys* spp.) burrows are not common, and are only known for a small portion of ANWR (USFWS 2003). The last documented sighting of burrowing owls at ANWR occurred in 1999. Ferruginous hawks are fall and winter migrants to the San Luis Valley, using wetlands and salt desert shrub habitats for foraging (USFWS 2003).

3.2.4.2 Waterfowl and Sandhill Cranes

Species of ducks are common in the San Luis Valley during the spring, summer, and fall—their numbers typically peaking in March at approximately 20,000 individuals (USFWS 2003). Eighteen species of ducks regularly use the ANWR and MVNWR as resting and foraging habitats during migration and 10 duck species breed and nest. An average of approximately 20,000 ducks are produced-to-flight annually on the two refuges, including mallard (*Anas platyrhynchos*), gadwall (*Anas strepera*), cinnamon teal (*Anas cyanoptera*), green-winged teal (*Anas carolinensis*), blue-winged teal (*Anas discors*), northern pintail (*Anas acuta*), northern shoveler (*Spatula clypeata*), American widgeon (*Anas americana*), redhead (*Aythya americana*), and ruddy duck (*Oxyura jamaicensis*) (USFWS 2003).

Numbers of wintering waterfowl in the San Luis Valley vary depending on the weather and subsequent availability of unfrozen water and waste grain (USFWS 2003). Waterfowl winter use has shifted from artesian well-dependent wetlands in the early part of the 20th century (now declining due to drought and center-pivot irrigation) at least partially to the MVNWR since the 1980s (USFWS 2003). There is a heavy dependency on artesian water once other sources freeze, including within existing refuge boundaries. The number of ducks using San Luis Valley habitats during the winter waterfowl surveys (1952–2002) peaked during 1971, with approximately 65,000 individuals counted (USFWS 2003). Duck population numbers were from 15,000 to 20,000 individuals during the early 2000s (USFWS 2003).

Following a decline in the 1960s, Canada geese (*Branta canadensis*) populations have become somewhat problematic in the San Luis Valley and statewide, particularly in urban areas (USFWS 2003). Canada geese nest in thick cattail habitat, in and along wetlands margins and on vegetated dikes. Lesser Canada geese migrate through the San Luis Valley during the spring and fall, as do small numbers of white-fronted geese (*Anser albifrons*) and tundra swans (*Cygnus columbianus*). These species use ANWR and MVNWR sites and habitats for resting and foraging (USFWS 2003). The number of geese using San Luis Valley habitats during the winter waterfowl surveys peaked during 2000, with 10,000 to 15,000 individuals counted (USFWS 2003).

Up to 28,000 sandhill cranes migrate through the San Luis Valley annually during the spring and fall seasons, stopping over for several weeks to rest and feed (USFWS 2003). These include the Rocky Mountain population (approximately 22,000 individuals) of the greater sandhill crane (nests in Wyoming and Idaho and winters in the lower and middle Rio Grande Valley of New Mexico) and lesser sandhill cranes and Canadian sandhill cranes (approximately 3,000 to 5,000 individuals) (USFWS 2003). Peak fall and spring migration months are October and March. Most sandhill crane use in the San Luis Valley occurs around MVNWR due to the presence of loafing and resting habitat in the refuge and feeding habitat (small grain fields) surrounding the refuge. Up to 15,000 sandhill cranes roost within MVNWR nightly during the spring, using shallow water wetlands habitat and occasionally feeding on the invertebrates, amphibians, and small mammals (USFWS 2003). Few sandhill cranes use the refuges during the fall migration. The citizens of Monte Vista hold an annual Crane Festival during March.

3.2.4.3 Shorebirds and Marsh Birds

The San Luis Valley is not on a major migratory path for shorebirds, but at least 24 species migrate through in small- to medium-sized flocks (USFWS 2003). Nesting shorebirds include American avocet (*Recurvirostra americana*), common snipe (*Capella galinago*), black-necked stilt (*Hymantopus mexicanus*), killdeer (*Charadrius vociferus*), Wilson's phalarope, snowy plover, piping plover (*Charadrius melodus*), and spotted sandpiper (*Actitis macularia*) that use a variety of habitats from unvegetated flats and gravel roads to flooded, short, emergent vegetation (CSP 1996, USFWS 2003). Common migrant shorebirds, in addition to breeding species, include greater and lesser yellowlegs (*Totanus melanoleucus* and *T. flavipes*), dowitchers (*Limnodromus* spp.), long-billed curlews (*Numenius americanus*), Baird's

sandpipers (*Erolia bairdii*), least sandpipers (*Erolia minutilla*), semipalmated sandpipers (*Ereunetes pusillus*), and other species of sandpiper (USFWS 2003).

As is typical of these secretive marsh species, little is known of habitat use and nesting for rails, soras, and the American bittern in the San Luis Valley (USFWS 2003). Virginia and sora rails (*Rallus limicola* and *Porzana carolina*) nest on ANWR and MVNWR and adults and young are commonly observed during the spring, summer, and fall in wet meadow and marsh habitats. American bitterns occupy dense cattail stands and are discussed above in more detail.

3.2.4.4 Colonial Water Birds and Water Birds

Colonial water birds include the white-faced ibis, discussed above in more detail, and also black-crowned night herons (*Nycticorax nycticorax*), snowy egrets (*Egretta thula*), and cattle egrets (*Bubulcus ibis*). These species often nest together on the same bulrush islands of ANWR and MVNWR, and forage in wet meadows and marshes, and open water including shallow pools and canals. The largest nesting colonies of white-faced ibis and snowy egrets in Colorado occur in the MVNWR (USFWS 2003). Great blue herons (*Ardea herodias*) occur in the San Luis Valley as migrants and some individual birds overwinter, although they are not known to nest within the San Luis Valley (USFWS 2003). The great egret was reported as nesting at San Luis Lakes State Park (CSP 1996). Double-crested cormorants (*Phalacrocorax auritus*) are occasional migrants, but are not known to nest in the San Luis Valley.
Water birds typically include pied-billed, western, eared, and Clark's grebes (*Podilymbus podiceps, Aechmophorus occidentalis, Podiceps caspicus*, and *Aechmophorus clarkii*), which all nest on open water bodies in the San Luis Valley (CSP 1996, USFWS 2003). Pied-billed grebes use shallow and deep water bodies and are, therefore, the most common nesting grebe species. Grebes are known to nest in San Luis Lakes State Park, ANWR, and MVNWR (CSP 1996, USFWS 2003).

3.2.4.5 Raptors and Corvids

The San Luis Valley provides habitat for raptors year-round, including species of eagles, hawks, falcons, owls, and vultures. Bald eagles (*Haliaeetus leucocephalus*) roost and rest in cottonwood trees along the Rio Grande and feed on carrion and sick or weak waterfowl during the winter (USFWS 2003). ANWR is an important staging area for spring migrating bald eagles. Golden eagles are common winter residents in the San Luis Valley, foraging on small mammals in a variety of habitats. Hawks commonly present as winter residents include ferruginous, rough-legged (*Buteo lagopus*), and northern harriers. During the spring through fall seasons, red-tailed (*Buteo jamaicensis*) and Swainson's hawks are common throughout the San Luis Valley.

Both peregrine and prairie falcons migrate through the San Luis Valley during spring and fall seasons (USFWS 2003). They feed on shorebirds and other small birds and also use habitats for resting. Peregrine falcons might nest in the mountains 5 miles west of MVNWR, and fledglings have been observed in the southern portion of the San Luis Valley near Jaroso, Colorado (USFWS 2003). Raptor species known to nest within the San Luis Valley include red-tailed

hawks, Swainson's hawks, and American kestrels (*Falco sparverius*), all of which primarily use trees as nesting platforms. The northern harrier and short-eared owl nest in the dense vegetation of wet meadows, including tall emergent wetlands habitat (CSP 1996, USFWS 2003). Great horned owls (*Bubo virginianus*) use a variety of nest sites including trees, holes in banks of canals, and Canada goose nesting structures (CSP 1996, USFWS 2003).

The corvids, ravens (*Corvus corax*), crows (*Corvus brachyrhynchos*), and magpies (*Pica hudsonius*) are present as migrants and also as year-round residents to the San Luis Valley (USFWS 2003). They are major predators of waterfowl and other migrant and resident bird eggs and young and also the young and small adults of other wildlife species. Corvids are also effective scavengers of wildlife and agricultural crop remains and waste grain.

3.2.4.6 Songbirds

Migrating, nesting, and wintering songbirds (passerine birds), use the San Luis Valley upland, wetlands, and riparian habitats. Riparian habitats of the Rio Grande support the greatest number of passerine birds (USFWS 2003). Several of the passerine species are neotropical migrants, species that breed in one hemisphere and winter in the other. Of the migrant songbirds present in the San Luis Valley, 32 species are known to nest on ANWR and MVNWR, including sage thrasher (*Oreoscoptes montanus*) and Brewer's sparrow (*Spizella breweri*) (upland shrublands), western meadowlark (*Sturnella neglecta*) and vesper sparrow (*Poocetes gramineus*) (saltgrass meadows), and common yellowthroat (*Geothlypis trichas*) and marsh wren (*Telmatodytes palustris*) (dense cattails). Nesting riparian songbirds include the yellow warbler (*Dendroica petechia*), western wood peewee (*Contopus sordidulus*), Bullock's oriole (*Icterus bullockii*), song sparrow (*Melospiza melodia*), and many others (USFWS 2003).

3.2.4.7 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

Habitats of the Table Mountain and Gribbles Park sites are characterized predominantly by piñon pine – juniper and ponderosa pine woodlands and montane grasslands. These habitats support a number of migratory bird species (see Table D-1, Appendix D). Bird species of conservation concern known for this area include gray vireo, black-throated gray warbler, Williamson's sapsucker (*Sphyrapicus thyroideus*), Grace's warbler, flammulated owl, prairie falcon, and mountain plover.

Table Mountain parcels proposed for exchange support piñon pine – juniper habitat along with some stands of ponderosa pine woodland. Tall and short shrub habitat is present as woodland understory and as small stands characterized by Gambel oak and mountain mahogany. Woody vegetation is also interspersed with openings of montane grasslands. Piñon pine – juniper communities cover more than 70 percent of the Table Mountain site and represent key nesting habitat. Migratory bird species that commonly use piñon pine – juniper woodlands include black-chinned hummingbird (*Archilochus alexandri*), gray flycatcher (*Empidonax wrightii*), Cassin's kingbird (*Tyrannus vociferans*), gray vireo, juniper titmouse, black-throated gray

warbler, Scott's oriole (*Icterus parisorum*), ash-throated flycatcher (*Myiarchus cinerascens*), Bewick's wren (*Thryomanes bewickii*), mountain chickadee (*Parus gambelii*), white-breasted nuthatch (*Sitta carolinensis*), and chipping sparrow (*Spizella passerina*) (BLM 2005a).

Ponderosa pine woodlands occupy about 20 percent of the proposed Table Mountain exchange parcels where Gambel oak provides an important understory component in terms of habitat structure and insect prey species. Migratory birds typically observed in this woodland/tall shrubland habitat include Williamson's sapsucker, pygmy nuthatch (*Sitta pygmaea*), western bluebird (*Sialia mexicana*), band-tailed pigeon, Mexican spotted owl (*Strix occidentalis mexicanus*), Grace's warbler, flammulated owl, red-breasted nuthatch (*Sitta canadensis*), violet-green swallow (*Tachycineta thalassina*), western tanager (*Piranga ludoviciana*), and chipping sparrow (BLM 2005a).

Gribbles Park proposed exchange parcels primarily support montane grassland habitat characterized by Arizona fescue, mountain muhly, western wheatgrass, and fringed sagewort and small areas of coniferous forest and woodland habitat characterized by bristlecone pine trees. Approximately 85 percent of the Gribbles Park parcels support montane grassland. Migratory birds that use herbaceous montane habitats in this area include mountain bluebird (*Sialia currucoides*), mountain chickadee, white-breasted nuthatch, prairie falcon, mountain plover, and horned lark (*Eremophila alpestris*) (BLM 2005a).

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Habitats of the Biedell Creek and La Jara Reservoir sites are characterized predominantly by piñon pine – juniper woodland, grasslands of the semidesert shrub-steppe, and montane grasslands. These habitats support a number of migratory bird species (see Table D-1, Appendix D).

Biedell Creek parcels proposed for exchange primarily support semidesert shrub-steppe and piñon pine – juniper habitat that together cover 85 percent of the site. Woodland vegetation is interspersed with small- to medium-sized openings of montane grasslands. Piñon pine – juniper communities cover more than 35percent of the Biedell Creek site and represent key nesting habitat. Up to half the site supports semidesert shrub-steppe characterized by perennial grass species (Indian ricegrass, needle-and-thread, blue grama, James' galleta, alkali sacaton) and scattered short and dwarf-shrubs (four-wing saltbush, rabbitbrush, Mormon tea, snakeweed, winterfat).

Migratory bird species that commonly use the piñon pine – juniper woodlands of Biedell Creek include turkey vulture (*Cathartes aurea*), Cooper's hawk (*Accipiter cooperi*), mourning dove, black-chinned hummingbird, gray flycatcher, Cassin's kingbird, gray vireo, scrub jay, western bluebird, American robin (*Turdus migratorius*), juniper titmouse, black-throated gray warbler, Scott's oriole, ash-throated flycatcher, Bewick's wren, mountain chickadee, white-breasted nuthatch, and chipping sparrow (BLM 2005a). Those that commonly use shrub-steppe habitat include turkey vulture, red-tailed hawk, golden eagle, American kestrel, burrowing owl (typically in the presence of prairie dog colonies), common nighthawk (*Chordeiles minor*), black-billed magpie, common raven, lark bunting (*Calamospiza melanocorys*), Cassin's

sparrow (*Aimophila cassinii*), grasshopper sparrow, black-throated sparrow (*Amphispiza bilineata*), lark sparrow (*Chondestes grammacus*), western meadowlark, bobolink (*Dolichonyx oryzivorus*), and horned lark.

La Jara Reservoir parcels proposed for exchange equally support semidesert shrub-steppe, piñon pine – juniper, and montane grassland habitat that together cover 75 percent of the site. The shrub-steppe vegetation is interspersed with patches of perennial grasslands while woodland vegetation is interspersed with small- to medium-sized openings of montane grasslands. Piñon pine – juniper communities cover more than 25 percent of the La Jara Reservoir site and are intermixed with stands of ponderosa pine that together represent key nesting habitat. Up to one-third of the site supports semidesert shrub-steppe and grasslands characterized by perennial grass species (Indian ricegrass, needle-and-thread, blue grama, James' galleta, alkali sacaton) and scattered short and dwarf-shrubs (four-wing saltbush, rabbitbrush, Mormon-tea, snakeweed, winterfat).

Migratory bird species that commonly use piñon pine – juniper and ponderosa pine woodlands of the La Jara Reservoir site include turkey vulture, Cooper's hawk, mourning dove, black-chinned hummingbird, northern flicker (*Colaptes cafer*), gray flycatcher, Cassin's kingbird, gray vireo, scrub jay, western bluebird, American robin, juniper titmouse, black-throated gray warbler, Scott's oriole, ash-throated flycatcher, Bewick's wren, mountain chickadee, white-breasted nuthatch, and chipping sparrow (BLM 2005a). Those that commonly use shrub-steppe habitat include turkey vulture, red-tailed hawk, golden eagle, American kestrel, burrowing owl (typically in the presence of prairie dog colonies), common nighthawk, black-billed magpie, common raven, lark bunting, Cassin's sparrow, grasshopper sparrow, black-throated sparrow, lark sparrow, western meadowlark, bobolink, and horned lark.

Proposed San Luis Valley Exchange Parcels

SLB parcels proposed for exchange primarily support greasewood shrublands and semidesert shrub-steppe habitat that together cover approximately 80 percent of the site. These habitats are interspersed with small to large playas that are nearly devoid of vegetation but provide important foraging and nesting habitat for migrant shorebirds. Greasewood shrubland communities cover more than 40 percent of the SLB site and are characterized by extensive stands of greasewood, rabbitbrush, and four-wing saltbush, often associated with a bunchgrass and forb understory. However, some greasewood stands are nearly devoid of understory vegetation. The semidesert shrub-steppe community covers up to 35 percent of the site and is characterized by perennial grass species (Indian ricegrass, needle-and-thread, blue grama, James' galleta, alkali sacaton) and scattered short and dwarf-shrubs (four-wing saltbush, rabbitbrush, Mormon tea, snakeweed, winterfat).

Migratory bird species that commonly use the greasewood and shrub-steppe habitat include turkey vulture, red-tailed hawk, northern harrier, golden eagle, American kestrel, burrowing owl (typically in the presence of prairie dog colonies), common nighthawk, black-billed magpie, common raven, sage thrasher, lark bunting, Brewer's sparrow, Cassin's sparrow, grasshopper sparrow, black-throated sparrow, lark sparrow, western meadowlark, bobolink, and horned lark. Playas occupy a significant land area and represent an important resting, foraging,

and nesting habitat for shorebirds the more common species include American avocet, killdeer, black-necked stilt, Wilson's phalarope, snowy plover, piping plover, and spotted sandpiper.

3.2.4.8 Environmental Consequences/Mitigation

Migratory bird species are protected under international, national, and state laws and are valuable elements of the biodiversity within the project area, contributing to the local culture and economy. Some migratory bird species are also protected under the ESA, are Colorado state-listed as threatened or endangered, or are identified by the BLM as sensitive. An effect on migratory birds would be considered (1) insignificant if it is within the range of natural variability and is otherwise not observable or measurable, (2) low if it is within the range of natural variability, but is detectable and of short-term duration, (3) moderate if it is readily measurable and outside the range of natural variability and occurs occasionally to habitat and activities necessary for the species survival, and (4) high if it is readily measurable and outside the range of natural variability and/or results in permanent habitat loss or effects species over the long term.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. Habitat for migratory birds on Federal lands would be addressed according to the RMP management directives and Executive Order 13186 as mandated by Federal laws; mitigation measures might include scientific research related to bird migration and biology. There would be no change in livestock grazing practices or recreation patterns resulting in long-term, insignificant effects on migratory bird habitat and populations. Within the Table Mountain site, quarry operations would likely continue at current levels resulting in long-term, insignificant to low adverse effects on migratory bird habitat and presence in the immediate vicinity due to noise, dust, and human presence.

Within the SLB parcels proposed for exchange, important shrubland, grassland, and playa wetlands habitat for several migratory bird species occurs and there would be no change in land use, resulting in long-term, insignificant to low beneficial effects on migratory bird species.

Proposed Action

Under the Proposed Action, the BLM parcels would be exchanged to SLB management, and SLB parcels would be exchanged for management by the BLM, USFWS, and NPS. The SLB would manage BLM exchange parcels primarily to support grazing livestock under lease agreements, with minor removal of harvestable trees and firewood where forest and woodland stands occur resulting in long-term, insignificant to low adverse effects on migratory bird species and habitat. The majority of the Table Mountain and Gribbles Park parcels would be immediately merged into current SLB grazing leases, as there are no active BLM grazing permits resulting in long-term, insignificant effects on migratory bird species or their habitat. Mineral potential for the Table Mountain parcels would be evaluated by the SLB mineral section and a small percentage of the area would likely be quarried in the future resulting in

long-term, insignificant to low adverse effects on migratory bird habitat and presence in the immediate vicinity due to noise, dust, and human presence.

Within the Biedell Creek and La Jara Reservoir sites, there would be no change in the livestock grazing land use practices; existing BLM permits would be honored until expiration; and grazing plans would be developed by the SLB and NRCS resulting in long-term, insignificant adverse effects on migratory bird species and habitat. Timber management by the CSFS would result in potential limited harvest on the Biedell Creek and La Jara Reservoir parcels resulting in short- and long-term, insignificant to low, adverse effects on migratory bird habitat. Mineral potential, considered very limited for the La Jara Reservoir parcels, would be evaluated by the SLB mineral section resulting in long-term, insignificant effects on migratory bird habitat.

Proposed SLB exchange parcel 31 would be managed by the BLM, likely to support grazing livestock resulting in long-term, insignificant effects on migratory bird habitat. USFWS management of exchange lands during CCP preparation beginning in 2011 and under Executive Order 13186 would focus on providing quality habitat for migratory birds resulting in long-term, insignificant to moderate beneficial effects from habitat evaluation, improvement, and monitoring. There would be long-term, insignificant to low, beneficial effects on migratory birds resulting from public education and scientific research conducted by researchers and Federal and state management agencies.

Mitigation in the form of BNWR management actions would include (1) assessing habitat conditions, (2) continuing and evaluating current irrigation practices, (3) evaluating grazing and haying activities to improve vegetation health and wildlife habitat, (4) evaluating prescribed fire to improve habitat for wildlife, (5) assessing wildlife use, (6) assembling existing hydrology data, (7) developing research needs, and (8) evaluating water management options (USFWS 2005). The USFWS would develop partnerships with the research community, NPS, and TNC to inventory and monitor upland, wetlands, and riparian habitats using ecosystem-wide monitoring protocols. Developing upland, wetlands, and riparian management actions on baseline and monitoring data would result in long-term, low to moderate beneficial effects on these resources as migratory bird and wildlife habitat.

NPS management of exchange lands under Executive Order 13186 would focus on providing quality habitat for migratory birds resulting in long-term, insignificant to moderate, beneficial effects from habitat evaluation, improvement, and monitoring. Removal of irrigation systems would likely reduce the amount of wet meadow habitat currently available to migratory birds resulting in long-term, insignificant to low adverse effects on migratory birds adapted to wet meadow habitats. There would be long-term, insignificant to low, beneficial effects on migratory birds resulting from public education and scientific research conducted by researchers and Federal and state management agencies.

3.2.5 Federal Threatened, Endangered, Candidate, and Colorado BLM Sensitive Species

This section has been divided into two subsections. The first addresses federally-threatened, endangered, and proposed species and the second addresses sensitive species. The NPS and

USFWS (2007) have prepared a BA to discuss and present proposed land exchange effects on 14 Federal threatened or endangered species and one critical habitat within the regional influence of this project. The Colorado BLM State Director's list of sensitive species was examined for habitat and range to identify the 21 plant and animal species evaluated under the second subsection.

3.2.5.1 Threatened, Endangered, or Proposed Species

The purpose of the BA (see Appendix E) is to analyze the effects of the proposed land exchange and to document whether this action is likely to jeopardize the continued existence of any threatened, endangered, or proposed species as required under section 7(a)(2) of the ESA (16 U.S.C. 1531 et seq.). All Federal agencies must use their existing authorities to conserve threatened and endangered species, and consult with the USFWS to ensure that their actions do not jeopardize listed species or adversely modify proposed or designated critical habitat. The BA is presented in Appendix E and only pertinent summary information is provided in this subsection.

Concurrence on a list of candidate, threatened, and endangered species and critical habitat in the project vicinity was obtained in a letter from the USFWS dated April 12, 2005. Fourteen wildlife species were identified, in addition to one critical habitat. Five species and the critical habitat were evaluated in detail: (1) bald eagle (*Haliaeetus leucocephalus*), (2) Mexican spotted owl (*Strix occidentalis lucida*), (3) Mexican spotted owl critical habitat, (4) southwestern willow flycatcher, (5) yellow-billed cuckoo (*Coccyzus americanus*), and (6) Canada lynx (*Lynx canadensis*). Nine species were dismissed from further analysis in the BA (see Appendix E): (1) Gunnsion sage grouse (*Centrocercus minimus*), (2) black-footed ferret (*Mustela nigripes*), (3) boreal toad (*Bufo boreas boreas*), (4) Arkansas darter (*Etheostoma cragini*), (5) bonytail (*Gila elegans*), (6) Colorado pikeminnow (*Ptychocheilus lucius*), (7) humpback chub (*Gila cypha*), (8) razorback sucker (*Xyrauchen texanus*), and (9) Uncompahgre fritillary butterfly (*Boloria acronema*). Table 3-2 provides a summary of the analysis prepared for the five threatened or endangered species and the Mexican spotted owl critical habitat.

3.2.5.2 Colorado BLM Sensitive Species

This section presents information for the rare species that are listed as sensitive by the BLM state director and could be included on the Federal candidate list at some future date (see Table 3-3). While sensitive species are not federally protected, it is BLM policy to manage for these species habitat to prevent future listing, thereby affording them the same level of protection as threatened or endangered species in BLM programs. Twenty-one BLM sensitive species (four mammals, nine birds, one fish, two reptiles and amphibians, and five plants) are listed for the affected field office management areas in Table 3-3 and are addressed herein for the proposed land exchange.

3.2.5.3 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

Eleven rare species could occur in the habitats of Fremont County where BLM parcels proposed for exchange occur. They include two mammals, four birds, one reptile, one amphibian, and three plant species as follows and as discussed individually below:

- Black-tailed prairie dog (*Cynomys ludoviciana*)
- Gunnison's prairie dog (*Cynomys gunnisonii*)
- Northern goshawk (*Accipiter gentilis*)
- Ferruginous hawk (*Buteo regalis*)
- Mountain plover (*Charadrius montanus*)
- Peregrine falcon (*Falco perigrinus anatum*)
- Milk snake (*Lampropeltis triangulum taylori*)
- Northern leopard frog (*Rana pipiens*)
- Dwarf milkweed (*Asclepias unicialis*)
- Brandegee wild buckwheat (*Eriogonum brandegeei or E. brandegei*)
- Golden blazing star (*Mentzelia chrysantha*).

3.2.5.4 Black-tailed Prairie Dog

Black-tailed prairie dogs occupied 631,000 acres within Colorado and 2,799 acres of Fremont County during 2001, based on aerial surveys conducted by CDOW throughout their historic range (BLM 2005a). There were no black-tailed prairie dogs documented on lands administered by BLM, approximately 2,352 colony-acres occurred on private land and approximately 447 colony-acres occurred on SLB lands. There were no black-tailed prairie dog populations documented on the mountainous topography of the Table Mountain and Gribbles Park parcels proposed for exchange (BLM 2005a).

Black-tailed prairie dog colonies occupy the Great Plains where suitable soils (deep and structured to support burrows without collapsing) occur on plains, hills, mesas, drainage slopes, and in swales. Their distribution lies east of the foothills of the Rocky Mountain range. Black-tailed prairie dogs typically occupy dry, flat to rolling, open grasslands with low, relatively sparse vegetation, including areas heavily grazed by cattle (NatureServe 2009d). They also occupy former range in urbanized areas where open areas remain following development of surrounding lands. The most abundant and important plant communities occupied include the Mixed Grass Prairie and Short Grass Plains ecological systems (NatureServe 2009e). Colonies commonly occur on silty clay loams, sandy clay loams, and loams presumably because burrows and other structures tend to retain their shape and strength better than in coarse, loose soils. Burrows typically range from 3 feet to 14 feet deep and 13 feet to 109 feet long, with tunnel diameter of 4 to 5 inches. Shallow slopes of less than 10 percent are preferred, in part, because such areas drain well and are only slightly prone to flooding. By colonizing areas with low

TABLE 3-2. PROPOSED, ENDANGERED, AND THREATENED SPECIES EVALUATED FOR THIS PROPOSED LAND EXCHANGE PROJECT

Species / Status / BA Determination	Discussion of Effects
Bald Eagle / federally-threatened, within United States / might affect, not likely to adversely affect	Direct Effects: None. Indirect Effects: Bald eagle winter range includes most of the area analyzed with a proposed net result of approximately 57,000 acres transferred to Federal management and approximately 3,880 acres transferred to SLB management. One winter roost area of approximately 400 acres would be transferred to GRSA.
Mexican Spotted Owl / federally- threatened / might affect, not likely to adversely affect	Direct Effects: None. Indirect Effects: The Table Mountain parcels proposed for exchange are located in proximity to protected activity centers and support vegetation that could provide wintering habitat.
Mexican Spotted Owl critical habitat / might affect, not likely to adverse affect	Direct Effects: None. Indirect Effects: Proposed exchange parcels do not include the primary constituent elements of Mexican spotted owl critical habitat.
Southwestern Willow Flycatcher / federally-endangered / might affect, not likely to adversely affect	Direct Effects: None. Indirect Effects: Southwestern willow flycatcher potential habitat under Federal control will be reduced by 10.2 acres. The SLB will manage these areas for the maintenance and improvement of southwestern willow flycatcher habitat.
Yellow-billed Cuckoo / Federal candidate, distinct population segment / might affect, not likely to adversely affect	Direct Effects: None. Indirect Effects. Yellow-billed cuckoo potential habitat of the proposed exchange parcel area analyzed would have a net result of approximately 51 acres transferred to Federal management.
Canada Lynx / federally- threatened / might affect, not likely to adversely affect	Direct Effects: None. Indirect Effects: The La Jara Reservoir parcels proposed for exchange represent 1.1 percent of available Canada lynx habitat within adjacent USFS and BLM Lynx Analysis Units.
Gunnison's prairie dog (*Cynomys gunnidonii)*	Direct Effects: None. Indirect Effects: There is a net gain of more than 41,000 acres of potentially suitable habitat coming into Federal estate through the land exchange at the refuge and park sites. Populations of prairies dogs in these areas would be managed as a protected candidate species on the Federal lands.

Source: BA, USFWS, and NPS 2007, Appendix E

TABLE 3-3. COLORADO BLM STATE DIRECTOR'S SENSITIVE SPECIES LIST (ANIMALS AND PLANTS) JUNE 2000

SPECIES Common Name	Scientific Name	Designation of other agencies: CNHP Global and State Ranking G_/S_; Forest Service FS; Colorado Div. of Wildlife SC	Occurrence[2] BLM Field Offices		
			Northwest	Southwest	Front
Mammals					
Bat, Townsend's big-eared	*Corynorhinus townsendii*	G4/S2, FS	WR, GJ	UN, SJ	RG, LJ, S
Prairie Dog, Gunnison's	*Cynomys gunnisonii*	--	--	--	--
Prairie Dog, black-tailed	*Cynomys ludoviciana*	--	--	--	--
Myotis, fringed	*Myotis thysanodes*	G5/S3	WR, GJ, GS	UN, SJ	RG
Myotis, Yuma	*Myotis yumanensis*		WR, GJ	UN, SJ	RG, LJ, S
Bat, big free-tailed	*Nyctinomops macrotis*	G5/S1	GJ	SJ	RG, LJ, S
Birds					
Goshawk, northern	*Accipter gentilis*	G5/S3S3BS2N, FS	LS, WR, K, GJ, GS	UN, GN, SJ	RG, LJ, S
Goldeneye, Barrow's	*Bucephala islandica*	G5/S2BSZN, SC	LS, WR, K, GJ, GS		RG, LJ, S
Hawk, ferruginous	*Buteo regalis*	G4/S3BS4N, FS, SC	LS, WR, K, GJ	UN, SJ	RG, LJ, S
Grouse, Gunnison sage	*Centrocercus minimus*	G1/S1, SC	GJ, GS	UN, GN, SJ	LJ, S
Plover, mountain	*Charadrius montanus*	G2/S2BSZN, FS, SC (Petition for listing)	LS, WR, K		RG, LJ, S
Plover, western snowy	*Charadrius alexandrinus nivosus*	G4T3/S1BSZN, SC	GJ		RG, LJ, S
Tern, black	*Chlidonias niger*	G4/S3S4BSZN, FS	LS, WR, K, GJ	SJ	RG, LJ, S
Cuckoo, western yellow-billed	*Coccyzus americanus occidentalis*	G5T3/SR, FS	GJ		--
Falcon, peregrine	*Falco peregrinus anatum*	--	--	--	--
Curlew, long-billed	*Numenius americanus*	G5/S2BSZN, FS, SC	LS*, WR, GJ	UN	RG
Ibis, white-faced	*Plegadis chihi*	G5/S2BSZN, FS	LS, WR, K, GJ, GS	UN, GN, SJ	RG, LJ, S
Pelican, American white	*Pelecanus erythrorhynchos*	G3/S1BSZN SC	GJ		RG, LJ, S
Fish					
Darter, Iowa	*Etheostoma exile*	G5/S3, SC			RG
Darter, Orangethroat	*Etheostoma spectabile*	G5/S3S2, SC			RG

TABLE 3-3. COLORADO BLM STATE DIRECTOR'S SENSITIVE SPECIES LIST (ANIMALS AND PLANTS) JUNE 2000

SPECIES Common Name	Scientific Name	Designation of other agencies: CNHP Global and State Ranking G_/S_; Forest Service FS; Colorado Div. of Wildlife SC	Occurrence[2] BLM Field Offices		
			Northwest	Southwest	Front
Topminnow, plains	*Fundulus sciadicus*	G4/S4, FS, SC	WR		RG
Chub, Rio Grande	*Gila pandora*	G3/S1?, SC			LJ, S
Chub, flathead	*Hybopsis gracilis*	G5/S5, FS, SC			RG, LJ, S
Shiner, river	*Notropis blennius*	G5/SR, SC			RG
Stonecat	*Noturus flavus*	G5/S1, SC			RG
Trout, Rio Grande cutthroat	*Oncorhynchus clarki virginalis*	G4T3/S3, FS, SC			RG, LJ, S
Reptiles					
Kingsnake, common	*Lampropeltis getula*	G5/S1, SC			RG
Milk snake	*Lampropeltis triangulum taylori*	G5T4Q/S2?, FS, SC	GJ		RG, LJ, S
Lizard, Texas horned	*Phrynosoma cornutum*	G4G5/S3, FS, SC		SJ	RG, LJ, S
Massasauga	*Sistrurus catenatus*	G4/S3, SC			RG
Amphibians					
Frog, northern cricket	*Acris crepitans*	G5/SH, SC	GJ		RG
Frog, northern leopard	*Rana pipiens**	G5/S3, FS, SC	WR, K, GJ, GS	UN	RG, LJ, S
Frog, plains leopard	*Rana blairi*	G5/S3, SC			RG
Spadefoot, Great Basin	*Spea intermontana*	G5/S3, SC	WR, LS, GJ		--
Plants					
Golden columbine	*Aquilegia chrysantha var. rydbergii*	G4T1/S1			RG
Dwarf milkweed	*Asclepias uncialis*	G3T1T2/S1S2; FS			RG
Brandegee milkvetch	*Astragalus brandegeei*	G5/S1S2			LJ, S
Ripley's milkvetch	*Astragalus ripleyi*	G3/S2, FS			LJ, S
Low northern sedge	*Carex concinna*	G4G5/S1			RG
Livid sedge	*Carex livida*	G5/S1, FS			RG
Canadian single spike sedge	*Carex scirpoidea*	G5/S2			RG
Green sedge	*Carex viridula*	G5Q/S1			RG
Slender spiderflower	*Cleome multicaulis*	G2G3/S2S3			LJ, S
Slender rock-brake	*Cryptogramma stelleri*	G5/S2			RG

TABLE 3-3. COLORADO BLM STATE DIRECTOR'S SENSITIVE SPECIES LIST (ANIMALS AND PLANTS) JUNE 2000

SPECIES Common Name	Scientific Name	Designation of other agencies: CNHP Global and State Ranking G_/S_; Forest Service FS; Colorado Div. of Wildlife SC	Occurrence[2] BLM Field Offices		
			Northwest	Southwest	Front
Brandegee wild buckwheat	*Eriogonum brandegeei*	G1G2/S1S2; FS			RG
Slender cottongrass	*Eriophorum gracile*	G5/S2			RG
Northern twayblade	*Listera borealis*	G4/S2		GN	RG
Golden blazing star	*Mentzelia chrysantha*	G1G2/S1S2			RG
Royal Gorge stickleaf	*Mentzelia densa*	G2/S2			RG
Rock loving neoparrya	*Neoparrya lithophila*	G2/S2; FS			LJ, S
Few flowered ragwort	*Packera pauciflora*	G4G5/S1S2			RG
Degener beardtongue	*Penstemon degeneri*	G2/S2; FS			RG
Greenland primrose	*Primula egaliksensis*	G4/S2; FS			RG
Porter feathergrass	*Ptilagrostis porteri*	G2/S2; FS			RG
Silver willow	*Salix candida*	G5/S2			RG
Low blueberry willow	*Salix myrtifolia*	G5/S1; FS			RG
Autumn willow	*Salix serissima*	G4/S1; FS			RG
Weber saw-wort	*Saussurea weberi*	G3Q/S2			RG
Little bulrush	*Scirpus rollandii*	G2G3Q/S1			RG
Pale blue-eyed grass	*Sisyrinchium pallidum*	G2G3/S2			RG

[1] STATUS: The sources used to assign status are from
Colorado's Natural Heritage: Rare and Imperiled Animals, Plants, and Plant Communities; Vol.3, No.1, 10/1997. Colorado's Threatened, Endangered, and Special Concern Wildlife; May/98.
Conservation Status Handbook: Colorado's Animals, Plants and Plant Communities of Special Concern Vol. 3, No.2, 5/1999. GROUP: CNHP

-- No data available

CNHP - <u>Global Rarity Ranking</u> is based on the rangewide status of a species.
G1 - Critically imperiled globally because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction. (Critically endangered throughout its range.)
G2 - Imperiled globally because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extinction throughout its range. (Endangered throughout its range.)
G3 - Very rare or local throughout its range or found locally in a restricted range (21 to 100 occurrences). (Threatened throughout its range.)
G4 - Apparently secure globally, though it might be quite rare in parts of its range, especially at the periphery.
G5 - Demonstrably secure globally, though it could be quite rare in parts of its range, especially at the periphery.
T - Taxa of subspecies or varieties, ranked on same criteria as G1-G5.

CNHP - <u>State Rarity Ranking</u> is based on the status of a species (relative abundance of individuals) in each state.
S1 - Critically imperiled in state because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extirpation from the state. (Critically endangered in state.)
S2 - Imperiled in state because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extirpation from the state. (Endangered or threatened in state.)
S3 - Rare in state (21 to 100 occurrences.)
S#B - Refers to the breeding season imperilment of elements that are not permanent residents.
S#N - Refers to the nonbreeding season imperilment of elements that are not permanent residents. Where no consistent location can be discerned for migrants or nonbreeding populations, a rank of SZN is used.
SZ - Migrant whose occurrences are too irregular, transitory, or dispersed to be reliably identified, mapped, and protected.

AGENCY: *U.S. Forest Service, Region 2*

FS - Sensitive: those plant and animal species identified by the Regional Forester for which population viability is a concern as evidenced by:
a. Significant current or predicated downward trends in population numbers or density.
b. Significant current or predicated downward trends in habitat capability that would reduce a species' existing distribution.

State: *Colorado Division of Wildlife*
SC - Species of Special Concern

[2] OCCURRENCE:

Indicates Field Office of known occurrence using the following codes:
Northwest=
LS Little Snake
WR White River
KR Kremmling
GJ Grand Junction
GS Glenwood Springs

Southwest**=**
UN Uncompahgre
GN Gunnison
SJ San Juan

Front Range **=**
RG Royal Gorge
LJ LaJara
SSaguache

vegetation stature, prairie dogs often select areas with past human and animal disturbance, including abandoned agricultural land, homesteads, water tanks, and long-term supplemental feeding sites for livestock.

3.2.5.5 Gunnison's Prairie Dog

Gunnison's prairie dogs are rare in Fremont and Park counties and suitable habitat, including grasslands and sparse shrublands, is uncommon on the mountainous topography of the Table Mountain and Gribbles Park parcels proposed for exchange. Suitable habitat occurs in the Gribbles Park proposed exchange parcels (382.1 acres of montane grassland), but there are no records of Gunnison's prairie dog occurrence. CDOW recently provided known records of Gunnison's prairie dogs in southeastern Colorado, but few colonies were documented.

Gunnison's prairie dog colonies are limited to high mountain valleys, parks, and plateaus in the southern Rocky Mountains, generally occurring above 6,000 feet in elevation. Their distribution is centered in the Four Corners region where the state boundaries of Utah, Colorado, New Mexico, and Arizona join. The northernmost population of Gunnison's prairie dog occurs in South Park, north of the proposed Gribbles Park exchange parcels, while the southernmost population occurs in southwestern New Mexico. Gunnison's prairie dog habitat varies in terms of topography and plant communities. In addition, the burrow systems are more similar to those of smaller ground squirrels than they are to other species of prairie dogs. Entrances are usually located on slopes or small hummocks rather than in drainages or depressions. Gunnison's prairie dogs often occur in semi-social aggregations; yet, their colonies are generally smaller than those of other species of prairie dogs and usually consist of fewer than 50 to 100 individuals.

3.2.5.6 Northern Goshawk

The northern goshawk could rarely occur within the Table Mountain and Gribbles Park parcels proposed for exchange as residents or as seasonal migrants largely influenced by prey availability (NatureServe 2009f). Some seasonal northern goshawk movements are elevational and depend on prey availability. Important prey species include squirrels, snowshoe hares, cottontail rabbits, woodpeckers, American robins, grouse, and insects. Northern goshawks primarily inhabit forested sites including coniferous, deciduous, and mixed forest stands.

Table Mountain parcels proposed for exchange support 1,514 acres of woodland habitat (mostly piñon pine – juniper woodland) and Gribbles Park parcels proposed for exchange support 96 acres of mixed forest stands. Breeding northern goshawks nest in trees of a variety of coniferous species including ponderosa pine, Douglas-fir, and lodgepole pine. They forage in heavily forested stands to relatively open habitats. The northern goshawk population is affected by timber harvest (which opens forest stands to other species including red-tailed hawks), grazing, fire suppression, and insect outbreaks. Great horned owls are a predator of both young and adult northern goshawks.

3.2.5.7 Ferruginous Hawk

Ferruginous hawks occur within the Table Mountain and Gribbles Park parcels proposed for exchange as seasonal migrants, winter residents, and rare summer residents, and could nest in Fremont County if appropriate structures/sites are available. They primarily use grassland and shrubland habitat and agricultural lands, and occasionally use piñon pine – juniper woodland habitat.

Table Mountain proposed exchange parcels support 84 acres of prairie and foothill grassland habitat and 1,196 acres of piñon pine – juniper habitat, while Gribbles Park proposed exchange parcels support 382 acres of montane grassland habitat and 6 acres of montane shrublands. Generally, breeding ferruginous hawks nest on tall, isolated structures including trees, rock outcrops, power poles, windmills, or they will nest on the ground (NDIS 2009a). Wintering individuals concentrate in the vicinity of prairie dog towns and numbers and distribution fluctuate greatly dependent on the availability of prairie dogs. Local population declines are attributed to the effects of grazing, reduction of prey base due to poisoning, cultivation, mining, human presence, and fire in nesting habitats (Bechard and Schmutz 1995).

3.2.5.8 Mountain Plover

Mountain plovers have not yet been observed or otherwise documented on the Table Mountain or Gribbles Park parcels proposed for exchange (BLM 2005a). The Gribbles Park parcels support montane-subalpine grassland habitat (382 acres) that might be suitable for mountain plovers to breed and nest. Breeding habitat in Colorado can generally be described as flat, dry land with very short vegetation and moderate to high exposure of bare ground. However, recent research by CNHP suggests that some peculiarities in South Park breeding habitat exists, e.g., mountain plovers in South Park will nest on steeper slopes (9 percent to 12 percent) than the relatively flat sites used on the plains, they will nest in comparatively thick/tall vegetation, and near stark edges (within ~100m) (BLM 2005a). While exposure of bare ground on the South Park landscape is relatively constant, height of vegetation and degree of slope vary across the topography. A majority of mountain plovers in South Park nest in habitats that offer the gentlest slopes and the shortest vegetation (BLM 2005a).

3.2.5.9 Peregrine Falcon

Peregrine falcons occupy three eyries or nest sites located in the vicinity of the Table Mountain parcels proposed for exchange; they are in upper Beaver Creek near Victor and lower Beaver Creek and Little Turkey Creek southwest of Colorado Springs (BLM 2005a). The eyries have been occupied since 1988, 1998, and 1994, respectively, and young have fledged from each eyrie. Recovery goals for nesting peregrine falcons were exceeded several years ago and Colorado documents more than 100 nesting pairs each year (BLM 2005a).

Habitats of the proposed Table Mountain and Gribbles Park exchange parcels include cliffs and rock outcrops that provide nesting, perching, and hunting sites, as well as migration and wintering areas. All habitats present at both the Table Mountain and Gribbles Park sites

represent potential hunting areas for peregrine falcons. Typical nesting sites are cliffs more than 200 feet high that overlook water and permit extensive views of the surrounding landscape. Prey abundance and diversity, mostly shorebirds, waterfowl, and passerine birds attracted to these conditions are major factors in eyrie (nest) selection. Peregrine falcons can travel up to 17 mi from nesting cliffs to hunting areas that include cropland, meadows, rivers, marshes, and lakes.

3.2.5.10 Milk Snake

Milk snakes of this subspecies are known only in Utah, western Colorado, and parts of Arizona (NatureServe 2009g). They have not been observed in Fremont County, but could occur in the available habitats. They can occupy an array of habitats that include prairies, foothill grasslands, high meadows, and agricultural land. Prairie, foothill, and montane-subalpine grasslands are present in the Table Mountain (12 acres prairie, 72 acres foothill) and Gribbles Park (382 acres montane-subalpine) parcels proposed for exchange.

3.2.5.11 Northern Leopard Frog

The northern leopard frog occurs throughout Colorado; however, little potential habitat occurs within the Table Mountain (2 acres of montane woodland and shrubland) or Gribbles Park (9 acres of wet meadow) proposed exchange parcels. Generally, the northern leopard frog is found in 34 states, the Navajo Nation, and in Canada, and typically inhabits the banks and shallow water of marshes, ponds, glacial kettle ponds, beaver ponds, lakes, reservoirs, streams, and irrigation ditches, and wet meadows. It occurs between elevations of 3,500 feet and 11,000 feet in central to southern Colorado (NatureServe 2009h). The habitat continues to be altered and lost to commercial development and water transfer systems. In some areas there is competition/ predation by bullfrogs or other introduced species. Exposure to pH 5.5 or lower increases vulnerability to bacterial infection and laboratory results suggest that there could be an interaction between crowding, temperature, and mortality from bacterial infection (e.g., red-leg disease) (NatureServe 2009h).

3.2.5.12 Dwarf Milkweed

Dwarf milkweed (wheel milkweed of some authorities) occurs north of Canon City in the Oil Well Flats area and farther north, near Dinosaur, Colorado; however, no habitat exists for this species on the proposed exchange parcels comprising the Table Mountain and Gribbles Park sites (BLM 2005a, NatureServe 2009i). It occupies 17 widely scattered populations in five states with two known occurrences in Colorado. One occurrence in Fremont County near Oil Well Flats supported 24 individual plants in 1996. It is a short perennial forb of the milkweed family and produces one inflorescence per plant with greenish and pinkish flower parts. Dwarf milkweed habitat consists of shortgrass prairie, often on sandstone-derived soils and gravelly or rocky lower side slopes of canyon walls at elevations between 4,000 feet and 6,500 feet. Associated plant species include juniper, mountain mahogany, blue grama, yucca, and prickly pear cactus (NatureServe 2005i). Dwarf milkweed habitat is declining due to conversion of

shortgrass prairie to agricultural fields and residential development and from military training exercises and motorized recreation.

3.2.5.13 Brandegee Wild Buckwheat

Brandegee wild buckwheat occurs south of the Table Mountain and Gribbles Park parcels proposed for exchange, but no habitat exists for this species on the proposed exchange parcels. Generally, it occupies 11 known occurrences (two of these are questionable) and the remaining occurrences are on five sites (USFS 2006a). It is a tufted perennial forb of the buckwheat family with narrow leaves and a densely woolly flowering stem supporting a terminal cluster of tiny white to rose-colored flowers. Its habitat consists of white to grayish soils derived from limestone and shale of the Morrison Formation exposed within open stands of sagebrush shrublands and piñon pine – juniper woodlands.
The Colorado Natural Areas Program, in cooperation with TNC, designated a site in Chaffee County as the Droney Gulch Colorado Natural Area containing the best known occurrence for Brandegee wild buckwheat. Another important site is Cleora, located southeast of Salida; however, the population there appeared to have a disease during 1995 inventories (USFS 2006a). It also occurs in the vicinity of Garden Park north of Canon City, and within the Gold Belt planning area (BLM 2005a). Garden Park was designated a BLM Research Natural Area, a BLM Area of Critical Environmental Concern, and a Colorado Natural Area with Brandegee wild buckwheat as one of the defining elements. Several thousand individual plants occur in several sites along Fourmile Creek (BLM 2005a). The habitat has been disturbed by past mining, fossil collecting, and off-highway vehicle use, which has increased in recent years. Two sites bisected by state highways and residential development near Salida could focus on habitat occupied by Brandegee wild buckwheat.

3.2.5.14 Golden Blazing Star

Golden blazing star occurs adjacent to SH 115 near the Table Mountain parcels proposed for exchange; however, no habitat exists for this species on the Table Mountain and Gribbles Park sites. Generally, it occupies 26 known occurrences (6 occurrences are roadside populations) within a 31-mile reach of the Arkansas River valley from approximately Pueblo Reservoir to Canon City (USFS 2006b). It is a tall, perennial forb of the loasa family and produces 10-petaled lemon-yellow flowers. Its habitat consists of barren, alkaline slopes of limestone, shale, or clay, at elevations between 5,120 feet and 5,700 feet, which occur on south-facing roadcuts and natural exposures. The habitat is highly suitable for developed subdivisions and limestone quarries and also supports livestock grazing, gravel mining, and motorized vehicle recreation (USFS 2006b). BLM-managed lands support two populations of golden blazing star considered to be in excellent condition, one in the Fourmile Creek drainage north of Canon City and the other near Blue Heron ponds in the adjacent, dry uplands (BLM 2005a).

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Sixteen rare species could occur in the area of Saguache and Conejos counties where BLM parcels proposed for exchange occur: three mammals, eight birds, one fish, one reptile, one amphibian, and two plant species as follows and discussed below:

- Townsend's big-eared bat (*Corynorhinus townsendii*)
- Yuma myotis (*Myotis yumanensis*)
- Gunnison's prairie dog (*Cynomys gunnisonii*)
- Northern goshawk (*Accipiter gentilis*)
- Ferruginous hawk (*Buteo regalis*)
- Mountain plover (*Charadrius montanus*)
- Western snowy plover (*Charadrius alexandrinus nivosus*)
- Black tern (*Chlidonias niger*)
- Peregrine falcon (*Falco perigrinus anatum*)
- Long-billed curlew (*Numenius americanus*)
- White-faced ibis (*Plegadis chihi*)
- Rio Grande cutthroat trout (*Oncorhynchus clarkii virginalis)*
- Milk snake *(Lampropeltis triangulum taylori*)
- Northern leopard frog (*Rana pipiens*)
- Ripley's milkvetch (*Astragalus ripleyi*)
- Slender (many-stemmed) spiderflower (*Cleome multicaulis*).

3.2.5.15 Townsend's Big-eared Bat

Townsend's big-eared bats have been documented in the Deadman Creek drainage east and northeast of the Biedell Creek and La Jara Reservoir parcels proposed for exchange, and could use appropriate habitats within the proposed parcels (NPS 2005). They commonly use riparian habitat within desert scrub, piñon pine – juniper woodland, and deciduous and coniferous forests (Schmidt 2003). Specifically in Colorado, Townsend's big-eared bats have been documented using abandoned mines, montane forest, ponderosa pine woodland, piñon pine – juniper woodland, sagebrush, semidesert scrub, and boulder-strewn slopes.

Within the Biedell Creek parcels proposed for exchange, are 4,512 acres of forest and woodland habitat, 5,803 acres of shrubland habitat, and 12 acres of cliff and canyon habitat. Within the La Jara Reservoir parcels proposed for exchange, are 2,790 acres of forest and woodland habitat, 21 acres of shrubland habitat, and 2 acres of cliff and canyon habitat. Townsend's big-eared bats are vulnerable to human disturbance at the roost, particularly maternity roosts. Maternity roosts are often at lower elevations due to warmer temperatures that increase neonatal development.

3.2.5.16 Yuma Myotis

Yuma myotis have been observed in the San Luis Valley on both the ANWR and MVNWR (USFWS 2003). They are generally distributed throughout the western United States and within Colorado, an estimated 21 to 100 occurrences have been reported (NatureServe 2009j). Yuma myotis use all habitats that are present within the San Luis Valley and the Biedell Creek and La Jara Reservoir proposed exchange parcels, including human habitations and mines, to roost (NatureServe 2009j).

Yuma myotis are more closely associated with water than most other bat species (NatureServe 2009j). They occur in a wide variety of upland and lowland habitats, including riparian, desert scrub, moist woodlands, and forests, but are usually found near open water, of which little occurs on the Biedell Creek and La Jara Reservoir parcels proposed for exchange. La Jara Reservoir is located in the northwestern portion of the site bearing its name, and containing the parcels offered for exchange. This lack of open water in the proposed exchange parcels could limit their use by Yuma myotis. Nursery colonies usually are in buildings, caves and mines, and under bridges (NatureServe 2009j).

3.2.5.17 Gunnison's Prairie Dog

Gunnison's prairie dogs were documented within the San Luis Valley on the eastern edge of the Zapata Ranch along Highway 6N in Alamosa County (CNHP 1999a) and were reported as occurring in both the ANWR and MVNWR (USFWS 2003). Suitable habitat described from these localities included grasslands and semidesert and montane shrublands. Gunnison's prairie dogs forage on species of grass, sedge, rush, forbs, sagebrush, and rabbitbrush (CNHP 1999a).

Suitable habitat for Gunnison's prairie dog within the Biedell Creek parcels offered for exchange includes 1,323 acres of grasslands, 12,302 acres of shrub steppe, and 104 acres of semidesert shrubland. Suitable habitat for Gunnison's prairie dog within the La Jara Reservoir parcels offered for exchange includes 1,694 acres of grasslands, 3 acres of shrub steppe, and 24 acres of semidesert and montane shrubland. Additionally, there is 1 acres of agricultural land on the La Jara Reservoir exchange parcels that could support small populations of Gunnison's prairie dogs.

3.2.5.18 Northern Goshawk

The northern goshawk was reported as a rare permanent or year-round resident within GRSA (NPS 1989). Northern goshawks could also occur within the Biedell Creek and La Jara Reservoir sites offered for exchange as rare residents and migrants, largely influenced by prey availability (NatureServe 2009f). Some seasonal movements are also elevational, driven primarily by prey availability. Northern goshawks use forested habitats including coniferous, deciduous, and mixed forest stands. Biedell Creek proposed exchange parcels support 4,512 acres of woodland habitat (mostly piñon pine – juniper woodland). La Jara Reservoir proposed exchange parcels support 2,790 acres of mostly piñon pine – juniper woodland, but also significant acreage of mixed forest and woodland stands.

3.2.5.19 Ferruginous Hawk

Ferruginous hawks occur within the Biedell Creek and La Jara Reservoir parcels proposed for exchange, at GRSA as a rare permanent or year-round resident (NPS 1989), and also within ANWR and MVNWR (USFWS 2003). Pineda et al. (CNHP 1999a) reported a nesting pair of ferruginous hawks at a structure placed on the eastern edge of the Zapata Ranch. They primarily use grassland and shrubland habitat, agricultural lands, and occasionally use piñon pine – juniper woodland habitat. Biedell Creek proposed exchange parcels support 1,323 acres of semidesert and montane grassland habitat, 5,686 acres of semidesert shrub steppe habitat, and 4,103 acres of piñon pine – juniper habitat, while La Jara Reservoir proposed exchange parcels support 1,694 acres of montane grassland habitat, 3 acres of semidesert shrub steppe, and 454 acres of piñon pine – juniper woodland habitat.

3.2.5.20 Mountain Plover

Mountain plovers breed within the San Luis Valley, predominantly in the vicinity of the towns of Capulin and La Jara near the La Jara Reservoir parcels proposed for exchange (CNHP 1999a, Giroir 2005). Mountain plovers typically occupy shortgrass plains, agricultural fields, and sandy deserts, and nest on grasslands with short vegetation (AOU 1983). The proposed La Jara Reservoir exchange parcels support semidesert and montane-subalpine grassland habitat (1,694 acres) and semidesert shrub-steppe habitat (3 acres), which might be suitable for mountain plovers to breed and nest. Similarly, the Biedell Creek proposed exchange parcels support 1,323 acres of semidesert and montane-subalpine grassland habitat and 5,686 acres of shrub steppe habitat that could accommodate mountain plover nesting. A small amount of agricultural habitat (approximately 1 acre) is present within the La Jara Reservoir proposed exchange parcels.

3.2.5.21 Western Snowy Plover

Western snowy plovers breed on the BLM-managed Blanca wetlands site, where BLM provides specific managing protocols. They were also documented as nesting historically at San Luis Lakes prior to the early 1980s (CNHP 1999a). This shorebird typically uses beach, dry mud or salt flat, and sandy shoreline habitats (NatureServe 2009k). Western snowy plovers nest on the ground of broad open beaches or dry salt or mudflats. Habitats preferred by resting, feeding, and nesting western snowy plovers do not occur on the parcels proposed for exchange at the Biedell Creek and La Jara Reservoir sites.

3.2.5.22 Black Tern

Black tern pairs were observed in the San Luis Valley on both ANWR and MVNWR during the spring through early fall seasons; however, nesting has not been documented (USFWS 2003). Juvenile black terns have been observed in both refuges the past few years, but it is unknown if they fledged there or represent migrants. Habitats preferred by black terns include open water and tall-stature emergent wetlands vegetation such as bulrush. The refuges are managed such

that water levels in tall emergent wetlands are kept constant during the mid-May through July breeding season. Habitat preferred by black terns does not occur on the exchange parcels proposed at the Biedell Creek and La Jara Reservoir sites.

3.2.5.23 Peregrine Falcon

Peregrine falcons occur within the San Luis Valley during spring and fall migrations, hunting for shorebirds and other small water birds within ANWR and MVNWR (USFWS 2003) and in other valley habitats. Nesting is expected to occur in the mountainous terrain 5 miles west of the wildlife refuge complex, in the vicinity of the La Jara Reservoir parcels offered for exchange. This observation was confirmed by fledgling sightings in the vicinity of Jarosa in the southern portion of the San Luis Valley (USFWS 2003). Habitats of the Biedell Creek and La Jara Reservoir sites include cliffs and rock outcrops that provide nesting and hunting sites, as well as migration and wintering areas. There are 12 acres and 2 acres of cliff and canyon habitat available to peregrine falcons in the Biedell Creek and La Jara Reservoir proposed exchange parcels, respectively, and all habitats of the parcels can be used for foraging activities.

3.2.5.24 Long-billed Curlew

Long-billed curlews are shorebirds that use shoreline and mudflat habitat in ANWR and MVNWR (USFWS 2003). These habitats are important during migration for foraging, as nesting occurs east of the San Luis Valley on shortgrass prairies and sometimes in wheat fields and fallow fields (NDIS 2009b). A recent inventory documented a single, potentially transient long-billed curlew using wetlands around Cotton and Dollar lakes in the San Luis Valley (Giroir 2005). There is no emergent wetlands, mudflat, or shoreline habitat documented within the proposed exchange parcels of the Biedell Creek and La Jara Reservoir sites.

3.2.5.25 White-faced Ibis

White-faced ibis use both ANWR and MVNWR, mostly the latter (USFWS 2003). They prefer short-stature emergent wetlands, shallow water, and other wetlands, which are used in the spring, summer, and fall seasons as cover, for resting, and to forage. Four major nesting colonies occur in the San Luis Valley at Bowen and Parker ponds within MVNWR, Russell Lakes State Wildlife Management Area, and on a privately owned lake south of Alamosa (USFWS 2003). During 2001, approximately 500 pairs of white-faced ibis nested on Bowen Pond. Preferred habitat for the white-faced ibis is not present within the proposed exchange parcels of the Biedell Creek and La Jara Reservoir sites.

3.2.5.26 Rio Grande Cutthroat Trout

Rio Grande cutthroat trout are known to occur in rapidly flowing water in small headwater streams of the Rio Grande drainage in Colorado and New Mexico (CNHP 1999a, NatureServe 2009l). This species is present in Medano and Little Medano creeks within GRSA and within

Carnero Creek, which flows along the southern boundary of the Biedell Creek parcels proposed for exchange. The Rio Grande cutthroat trout of Carnero Creek experience high mortality when water is diverted to flood irrigate hay meadows (CNHP 1998). The species has not been reported from the creeks that drain the La Jara Reservoir proposed exchange parcels located on the western San Luis Valley rim. Medano Creek habitat was reclaimed by CDOW to support Rio Grande cutthroat trout, and was selected because it has no outlet, thus serving as a refuge. The Rio Grande cutthroat trout range is small, occupying 480 mi of stream and 1,120 acres of lake habitats in Colorado and 260 mi of stream in New Mexico (NatureServe 2009l). Rangewide, there are about 100 genetically pure populations, including remnant and transplanted populations.

3.2.5.27 Milk Snake

Milk snakes of this variety are known only in Utah, western Colorado, and parts of Arizona (NatureServe 2009g). The milk snake, subspecies unspecified, was listed as occurring in ANWR and MVNWR (USFWS 2003). They are known to occupy an array of habitats that include prairies, foothill grasslands, high meadows, and agricultural land. Within the Biedell Creek exchange parcels as proposed, potential milk snake habitat includes montane-subalpine grasslands (862 acres), semidesert grasslands (462 acres), and semidesert shrub steppe (5,686 acres). Within the La Jara Reservoir exchange parcels as proposed, potential milk snake habitat includes montane-subalpine grasslands (1,694 acres) semidesert shrub steppe (3 acres), and agricultural land (1 acre).

3.2.5.28 Northern Leopard Frog

The northern leopard frog occurs throughout much of Colorado (NatureServe 2009h), and was reported for the ANWR and MVNWR (USFWS 2003), and was identified along Little Spring Creek within the San Luis Valley. This species could be present in any of the drainages, playas, marshes, wet meadow, and open water habitats of the Biedell Creek and La Jara Reservoir parcels proposed for exchange. Appropriate habitat covers approximately 13 acres within the Biedell Creek site and approximately 1 acre occurs within the La Jara Reservoir site. Several creeks drain from these two areas into the San Luis Valley.

3.2.5.29 Ripley’s Milkvetch

Ripley’s milkvetch occurs within the La Jara Reservoir parcels proposed for exchange where it occupies ponderosa pine, mixed conifer, and piñon pine – juniper woodland habitats (BLM 1989). A total of 229 individual plants on 54 acres were identified in Ra Jadero Canyon within the La Jara Reservoir parcels proposed for exchange (BLM 1989, USFS 2003). Ra Jadero Canyon was designated as an Area of Critical Environmental Concern (ACEC) in the San Luis Valley Center for Public Lands (SLVCPL)-RMP (BLM 1991) primarily to protect Ripley’s milkvetch populations, and the site was later designated a Colorado Natural Area.

Preferred habitats cover approximately 2,114 acres within the La Jara Reservoir parcels proposed for exchange. Ripley's milkvetch has not been reported from the Biedell Creek site; however, 4,499 acres of potential woodland habitat occurs within those proposed exchange parcels. Geographically, Ripley's milkvetch occupies a narrow range of 600 mi^2 between Terrace Lakes, Colorado; and Tres Piedras, New Mexico, and appears to be associated with the San Juan volcanic field. It is locally abundant with anywhere from less than 10 individuals to as many as 1,000 plants comprising a discrete patch or stand. Its distribution is fragmented; however, a total of 41 occurrences have been reported in Colorado.

Ripley's milkvetch is a tall (up to 4 feet), perennial forb of the legume family that produces pale yellow flowers on multiple, purple-based stems. Its habitat consists of bunchgrasses with scattered shrubs, ponderosa pine, Douglas-fir, and quaking aspen trees. Ripley's milkvetch can tolerate moderate or rotational grazing and resprouts from root propagules following fire, but mortality increases when recently burned habitats are subsequently grazed by livestock or American elk. Fire suppression activities may also affect Ripley's milkvetch abundance as reduced burning increases tree canopy cover, which decreases Ripley's milkvetch cover.

3.2.5.30 Slender (many-stemmed) Spiderflower

Slender spiderflower occupies many sites within the San Luis Valley where alkaline wet meadow, marsh, playa, and riparian habitats occur (NatureServe 2009b). It is unlikely that slender spiderflower occurs on parcels proposed for exchange at the Biedell Creek and La Jara Reservoir sites due to lack of this habitat. The distribution and natural history for slender spiderflower are described in the discussion presented below, from sites where the species has been documented.

Proposed San Luis Valley SLB Exchange Parcels

Sixteen rare species could occur in the area of Alamosa and Saguache counties where SLB parcels proposed for exchange are located: three mammals, nine birds, one fish, one reptile, one amphibian, and one plant species, as listed below and discussed in the following subsections:

- Townsend's big-eared bat (*Corynorhinus townsendii*)
- Yuma myotis (*Myotis yumanensis*)
- Gunnison's prairie dog (*Cynomys gunnisonii)*
- *Northern g*oshawk (*Accipiter gentilis*)
- Ferruginous hawk (*Buteo regalis*)
- Mountain plover (*Charadrius montanus*)
- Western snowy plover *(Charadrius alexandrinus nivosus)*
- *Black tern (Chlidonias niger*)
- *Peregrine falcon (Falco perigrinus anatum*)
- Long-*billed curlew (Numenius americanus*)
- White-faced ibis (*Plegadis chihi*)

- American white pelican (*Pelecanus erythrorhynchos*)
- Rio Grande cutthroat trout (*Oncorhynchus clarkii virginalis*)
- Milk snake (*Lampropeltis triangulum taylori*)
- Northern leopard frog (*Rana pipiens*)
- Slender (many-stemmed) spiderflower (*Cleome multicaulis*).

3.2.5.31 Townsend's Big-eared Bat

Townsend's big-eared bats have been documented in the Deadman Creek drainage to the east of the proposed SLB exchange parcels and could use appropriate habitats within them (NPS 2005). They commonly use riparian habitat within desert scrub, piñon pine – juniper woodland, and deciduous and coniferous forests (Schmidt 2003). Specifically in Colorado, Townsend's big-eared bats have been documented using abandoned mines, montane forest, ponderosa pine and piñon pine – juniper woodlands, sagebrush, semidesert scrub, and boulder-strewn slopes. Within the SLB parcels proposed for exchange there are 253 acres of forest and woodland habitat and 40,412 acres of shrubland habitat. Additionally, mining has occurred on 4 acres, which could include some adits. They are vulnerable to human disturbance at the roost, particularly maternity roosts. Maternity roosts are often at lower elevations due to the warmer temperatures that increase neonatal development.

3.2.5.32 Yuma Myotis

Yuma myotis bats have been observed in the San Luis Valley on the ANWR and MVNWR (USFWS 2003). They are generally distributed throughout the western United States and within Colorado, an estimated 21 to 100 occurrences have been reported (NatureServe 2009j). The Yuma myotis potentially can use all habitats that are present within the San Luis Valley, including human habitations and mines to roost. Yuma myotis are more closely associated with water than most other bat species. They occur in a wide variety of upland and lowland habitats, including riparian, desert scrub, moist woodlands, and forests, but are usually found near open water, of which 59 acres occur on SLB parcels proposed for exchange. Nursery colonies usually are in buildings, caves and mines, and under bridges.

3.2.5.33 Gunnison's Prairie Dog

Gunnison's prairie dogs were documented within the San Luis Valley on the eastern edge of the Zapata Ranch along Highway 6N in Alamosa County (CNHP 1999a) and were reported as occurring in both the ANWR and MVNWR (USFWS 2003). Suitable habitat described from these localities included grasslands, semidesert shrublands, and montane shrublands. Gunnison's prairie dogs forage on species of grass, sedge, rush, forbs, sagebrush, and rabbitbrush (CNHP 1999a). Suitable habitat for Gunnison's prairie dog within the SLB parcels proposed for exchange includes 962 acres of grasslands and forblands, 18,005 acres of shrub steppe, and 22,360 acres of semidesert and montane shrubland. Additionally, there are 2,036

acres of agricultural land, mostly irrigated hay meadows and 22 acres of developed land that could support small populations of Gunnison's prairie dogs along their edges.

3.2.5.34 Northern Goshawk

The northern goshawk was reported as a rare year-round resident within GRSA (NPS 1989). They could also occur within the proposed SLB exchange parcels as residents or possibly as migrants, largely influenced by prey availability (NatureServe 2009f). Some seasonal movements are elevational and depend on prey availability. Northern goshawks primarily use forested habitats including coniferous, deciduous, and mixed forest stands. The SLB proposed exchange parcels support 313 acres of woodland habitat (mostly piñon pine – juniper woodland).

3.2.5.35 Ferruginous Hawk

Ferruginous hawks occur within the SLB exchange sites as proposed, were reported to occur in GRSA as rare year-round residents (NPS 1989), and also occur at ANWR and MVNWR (USFWS 2003). Pineda and others with the Colorado Natural Heritage Program reported a nesting pair of ferruginous hawks on a structure placed on the eastern edge of the Zapata Ranch (CNHP 1999a). They primarily use grassland and shrubland habitat agricultural lands, and they occasionally use piñon pine – juniper woodland habitat. SLB proposed exchange parcels provide 746 acres of semidesert and montane grassland habitat, 19,540 acres of semidesert shrub steppe habitat, and 220 acres of piñon pine – juniper woodland habitat.

3.2.5.36 Mountain Plover

Mountain plovers breed within the San Luis Valley, predominantly in the vicinity of Capulin and La Jara, some 30 to 40 mi southwest of the proposed SLB exchange parcels (CNHP 1999a, Giroir 2005). Mountain plovers typically occupy shortgrass plains, agricultural fields, and sandy deserts and nest on grasslands with short vegetation (AOU 1983). The SLB parcels proposed for exchange occupy semidesert and montane-subalpine grassland habitat (746 acres) and semidesert shrub-steppe habitat (19,540 acres) that might be suitable for mountain plovers to breed and nest. A moderate amount of agricultural habitat in the form of irrigated hay meadows covers 2,640 acres.

3.2.5.37 Western Snowy Plover

Western snowy plovers breed on the BLM-managed Blanca wetlands site where BLM provides specific managing protocols. They were also documented as nesting historically at San Luis Lakes prior to the early 1980s (CNHP 1999a). This shorebird typically uses beach, dry mud or salt flat, and sandy shoreline habitats. Western snowy plovers nest on the ground of broad, open beaches or dry salt or mudflats. Habitats preferred by resting, feeding, and nesting western snowy plovers cover approximately 5,475 acres of the proposed SLB exchange parcels.

3.2.5.38 Black Tern

Black tern pairs were observed in the San Luis Valley on both ANWR and MVNWR during the spring through early fall seasons; however, nests have never been documented (USFWS 2003). Juvenile black terns have been observed in both refuges the past few years, but it is unknown if they fledged there or represent migrants. Habitats preferred by black terns include open water and tall-stature emergent wetlands vegetation such as bulrush. The refuges are managed such that water levels in tall emergent wetlands are kept constant during the mid-May through July breeding season. Habitat preferred by black terns occupies 83 acres on the proposed SLB exchange parcels. Additional habitat could occur within the extensive areas of playa associated with these parcels as proposed.

3.2.5.39 Peregrine Falcon

Peregrine falcons occur within the San Luis Valley during the spring and fall migration, where they hunt for shorebirds and other small water birds within ANWR and MVNWR (USFWS 2003) and in other habitats valleywide. Nesting likely occurs in the mountainous terrain 5 miles west of the wildlife refuge complex in the vicinity of Jarosa, south of the proposed SLB exchange parcels. Habitats of the SLB proposed exchange parcels provide foraging opportunities for migrating peregrine falcons in the form of open water, marsh, wet meadows, and adjacent shrublands.

3.2.5.40 Long-billed Curlew

Long-billed curlews are shorebirds that could occur on shoreline and mudflat habitat in ANWR and MVNWR (USFWS 2003) and on other sites within the San Luis Valley. These habitats are used during migration for foraging, as nesting occurs on shortgrass prairies and sometimes in wheat fields and fallow fields east of the valley (NDIS 2009b). A recent inventory documented a single, potentially transient long-billed curlew using wetlands around Cotton and Dollar lakes (Giroir 2005). Within the SLB parcels proposed for exchange, there are 5,475 acres of playa, emergent wetlands, mudflat, shoreline, and open water habitats that could attract long-billed curlews.

3.2.5.41 White-faced Ibis

White-faced ibis use both ANWR and MVNWR, mostly the latter (USFWS 2003). They prefer short-stature emergent wetlands, shallow water, and other wetlands, which are used in the spring, summer, and fall seasons as cover, for resting, and as forage. Four major nesting colonies occur in the San Luis Valley at Bowen and Parker ponds within MVNWR, Russell Lakes State Wildlife Management Area, and on a privately owned lake south of Alamosa (USFWS 2003). During 2001, approximately 500 pairs of white-faced ibis nested on Bowen Pond. Preferred habitat for the white-faced ibis covers approximately 5,475 acres in the form of playa, emergent wetlands, mudflat, shoreline, and open water habitats within the proposed SLB exchange parcels.

3.2.5.42 American White Pelican

The American white pelican uses open water habitat and islands for resting and forages in shallow water and marsh habitat during the spring, summer, and fall seasons. American white pelicans forage on fish, crayfish, and salamanders and can travel great distances daily to obtain food (NatureServe 2009m). Approximately 83 acres of open water and emergent marsh habitats are present within the SLB proposed exchange parcels.

3.2.5.43 Rio Grande Cutthroat Trout

Rio Grande cutthroat trout are known to occur in rapidly flowing water in small headwater streams of the Rio Grande drainage of Colorado and New Mexico (CNHP 1999b). This species is present in Medano and Little Medano creeks within GRSA and in Carnero Creek, which is tributary to San Luis Creek within proposed SLB exchange parcels to the west. Medano Creek habitat was reclaimed by CDOW to support Rio Grande cutthroat trout, selected because it has no outlet, thus serving as a refuge. The Rio Grande cutthroat trout range is small, occupying 480 mi of stream and 1,120 acres of lake habitats in Colorado and 260 mi of stream in New Mexico (NatureServe 2009l). Rangewide, there are about 100 genetically pure populations, including remnant and transplanted populations.

3.2.5.44 Milk Snake

Milk snakes of this variety are known only in Utah, western Colorado, and parts of Arizona (NatureServe 2009g). Milk snakes, subspecies unknown, were listed as occurring in ANWR and MVNWR (USFWS 2003). They occupy an array of habitats that include prairies, foothill grasslands, high meadows, and agricultural land. Within SLB exchange parcels as proposed, potential milk snake habitat includes montane-subalpine grasslands (13 acres), semidesert grasslands (561 acres), semidesert shrub steppe (18,005 acres), and agricultural land (2,036 acres).

3.2.5.45 Northern Leopard Frog

The northern leopard frog occurs throughout Colorado (NatureServe 2009h), was reported for ANWR and MVNWR (USFWS 2003), and was identified along Little Spring Creek within the San Luis Valley. This species could be present in any of the drainages, playas, marshes, wet meadow, and open water habitats of the San Luis Valley, of which approximately 5,590 acres occur. Both Saguache and San Luis creeks and their tributaries drain into the parcels proposed for exchange by the SLB.

3.2.5.46 Slender (many-stemmed) Spiderflower

Slender spiderflower occurs adjacent to and within many alkaline wetlands and wet meadow habitats and around alkaline playas of the lowest elevations of the San Luis Valley and some of

the largest populations have been observed around Russell, Mishak, and San Luis lakes; in ANWR and MVNWR; and in Blanca wetlands (NatureServe 2009b). The SLB parcels proposed for exchange support 5,297 acres of playa habitat, 14 acres of emergent marsh, 55 acres of open water, and 2,036 acres of agricultural land, mostly in the form of irrigated hay meadows that could support slender spiderflower.

Generally, the slender spiderflower occupies more than 25 known occurrences in Colorado and its historic distribution includes portions of Arizona, Texas, New Mexico, and northern Mexico. It is a tall, annual forb of the Caper family characterized by five-petaled white to pink flowers. Its habitat consists of mesic sites on the margins of wetlands, lakes, playas, and drainages at the approximately 7,500 foot elevation of the San Luis Valley. The habitat has been grazed by livestock and American elk until present and some is irrigated then mown to produce hay crops (NatureServe 2009b). Slender spiderflower could be affected by diminishing surface and groundwater levels via diversion from streams or groundwater pumping and drought.

3.2.5.47 Environmental Consequences/Mitigation

Federal-listed and BLM sensitive species and their distribution and habitats are evaluated in this section. Other migratory birds and more common wildlife species are discussed in appropriate sections of this EA. Effects on listed and sensitive biotic species and habitat would be considered (1) insignificant if they are unmeasurable and fall within the natural variability for the species and essential habitats; (2) low if there is small but measurable disruption of local migration or movement patterns, movement corridors, breeding, foraging, or other daily and seasonal activities or increased human disturbance or harassment; (3) moderate if there is small to moderate, measurable disruption of local migration or movement patterns, movement corridors, breeding, foraging, or other daily and seasonal activities or increased human disturbance or harassment; (4) or high if there is moderate to large, measurable disruption of local migration or movement patterns, movement corridors, breeding, foraging, or other daily and seasonal activities, loss of habitat, or increased human disturbance or harassment. A high adverse effect on sensitive species would also occur if the proposed land exchange would result in sensitive species listing under the ESA or would cause substantial changes to the abundance, diversity, or distribution of sensitive species.

No Action Alternative

Under the No Action Alternative there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. Federal-listed and BLM sensitive species would continue to be addressed in management plans and lease agreements as specified under the ESA, and CDOW would continue to manage terrestrial wildlife species and populations on all parcels. Current BLM management of listed and sensitive species habitat, including designation of ACECs, would be consistent with the two RMP objectives resulting in long-term, insignificant to low, beneficial effects on listed and sensitive species and habitat. BLM parcels proposed for exchange would continue to support livestock grazing where leased and could

provide regional and local resting, foraging, and breeding habitat for a variety of listed and sensitive mammals, birds, reptiles, and amphibians.

The SLB would continue management of the habitats on proposed exchange parcels in the San Luis Valley under the ESA and the guidance of CDOW. Listed and sensitive species habitat management would continue to be addressed by the SLB and lessees by contract language in Section 12, "Compliance with Environmental Laws" of the Agricultural Lease Agreement (AG 01/202). Existing access permissions for hunting recreation and provisions of the Stewardship Trust Program would be honored. Extant habitat for listed and sensitive species would be re-evaluated for grazing by livestock and experience ongoing grazing by American elk and would likely be irrigated for grass hay crops resulting in long-term, insignificant to low, adverse effects on listed and sensitive mammals, birds, reptiles, and amphibians.

Proposed Action

Under the Proposed Action the selected BLM parcels would be exchanged to SLB management, and SLB parcels would be exchanged for management by the BLM, USFWS, and the NPS. The BLM exchange parcels support foothill, mountain, and valley topography with diverse structured habitat (woodland, grassland, shrubland) potentially used/occupied by Federal-listed (bald eagle, Mexican spotted owl, southwestern willow flycatcher, yellow-billed cuckoo, and Canada lynx) and BLM sensitive mammals, birds, reptiles, and amphibians to SLB ownership and management under the guidance of CDOW and the CSFS and lease agreement stipulations with lessees. The SLB would honor existing BLM grazing leases and would seek to lease vacant lands for grazing livestock, woodland and forest products, mineral resources, and recreation in the form of hunting under the Public Access Program (PAP) resulting in long-term, insignificant to low, adverse effects on Federal-listed and BLM sensitive wildlife species and habitat.

The proposed SLB exchange parcel (31) to be managed by the BLM would likely be managed for livestock grazing under PLH Standard 4, resulting in long-term, insignificant effects on listed and sensitive wildlife species and habitat. The SLB parcels proposed for exchange that would be transferred to the USFWS/BNWR and NPS/GRSA would be evaluated, managed, and monitored for listed and sensitive species, habitat, and biodiversity as appropriate under their respective CCP and GMP with guidance from the ESA. Management to improve habitat for listed and sensitive species and protective management for biodiversity where possible would result in long-term, insignificant to moderate beneficial effects to Federal listed and sensitive wildlife species and habitat.

In terms of mitigation, the BNWR staff would collect wildlife use data in riparian habitats, particularly related to use by southwestern willow flycatchers and yellow-billed cuckoos to prepare future management plans (USFWS 2005). The GRSA staff would consult with the USFWS under the provisions of the ESA prior to initiating any actions that could affect listed or sensitive species (NPS 2007).

Standards for Public Land Health

The Finding on the Public Land Health Standard 4 states:

> *Special-status, threatened, or endangered species and other species and their habitats officially designated by the BLM are maintained or enhanced by sustaining healthy, native plant and animal communities.*

Standards for public land health (BLM 1997) describe conditions needed to sustain public land health and relate to all uses of public lands. Standards are applied on a landscape scale and relate to the potential of the landscape. Indicators for Standard 4 (▪) are:

- All the indicators associated with the plant and animal communities standard (Standard 3) apply:
  - Noxious weeds and undesirable species are minimal in the overall plant community.
  - Native plant and animal communities are spatially distributed across the landscape with a density, composition, and frequency of species suitable to ensure reproductive capability and sustainability.
  - Plants and animals are present in mixed age classes sufficient to sustain recruitment and mortality fluctuations.
  - Landscapes exhibit connectivity of habitat or presence of corridors to prevent habitat fragmentation.
  - Photosynthetic activity is evident throughout the growing season.
  - Diversity and density of plant and animal species are in balance with habitat/ landscape potential and exhibit resilience to human activities.
  - Appropriate plant litter accumulates and is evenly distributed across the landscape.
  - Landscapes composed of several plant communities that may be in a variety of successional stages and patterns.
- There are stable and increasing populations of endemic and protected species in suitable habitat.
- Suitable habitat is available for recovery of endemic and protected species.

Wildlife. Federal and SLB exchange parcels provide potential or known habitat for listed and sensitive mammal, bird, reptile, and amphibian species that have been addressed in detail in the attached BA and in this section of the EA. The listed wildlife species potentially affected by the exchange as proposed include four bird and one mammal species. Bald eagle winter range includes nearly all parcels considered in the proposed land exchange project. One bald eagle winter roost occurs on a proposed SLB exchange parcel that would be transferred to the NPS. Proposed Federal exchange parcels at Table Mountain could provide wintering habitat for the Mexican spotted owl proposed for exchange to the SLB for management. Grazing would be introduced to approximately 5 acres of southwestern willow flycatcher habitat proposed for exchange to the SLB. Approximately 74 acres of southwestern willow flycatcher habitat would potentially be exchanged from the SLB to NPS and USFWS management. Approximately 51 acres of potential yellow-billed cuckoo habitat are proposed for exchange from the SLB to the NPS and USFWS for management. A small portion (up to 3 percent) of the La Jara Reservoir

parcels proposed for exchange to the SLB could support Canada lynx denning, winter foraging, and other foraging activity.

BLM sensitive wildlife species potentially affected by the land exchange as proposed include 15 species: three mammals, nine birds, one fish, one reptile, and one amphibian. Townsend's big-eared bat and the Yuma myotis are likely to use habitats within all proposed Federal and SLB exchange parcels in Biedell Creek, La Jara Reservoir, and the San Luis Valley. The northern goshawk and ferruginous hawk are likely to occur in all forested habitats proposed in the exchange and the peregrine falcon would be expected to occur throughout the project area. SLB parcels proposed to be exchanged to the NPS and USFWS provide habitat for the mountain plover, western snowy plover, black tern, long-billed curlew, white-faced ibis, and American white pelican. Rio Grande cutthroat trout likely occur in drainages tributary to Carnero Creek on BLM parcels of the Biedell Creek site proposed for exchange to the SLB. The northern leopard frog was observed on Little Spring Creek, proposed SLB exchange land that would be managed by the NPS.

The Proposed Action would meet PLH Standard 4 for listed and sensitive wildlife species and for PLH Standard 3 for productive wildlife communities. SLB parcels proposed for exchange provide outstanding habitat for listed and sensitive mammal, bird, reptile, and amphibian species that have been addressed in detail in the attached BA and in this section of the EA. Endemic small mammals and insects also occur on this largely sand sheet substrate that further underscore the uniqueness of habitats on this site.

Under the Proposed Action, Federal parcels exchanged to the SLB for management would no longer be subject to PLH Standard 3 for productive wildlife populations or PLH Standard 4 for listed and sensitive wildlife species. Wildlife and habitat, including that of listed and sensitive species on SLB parcels, would be monitored by CDOW and addressed by the CSFS, as necessary. Former SLB parcels accepted by the NPS and USFWS would be evaluated, managed, and monitored for natural biodiversity and healthy wildlife populations and habitat, thus meeting or exceeding the PLH Standard 4 for listed and sensitive wildlife species, populations, and habitat.

Under the No Action Alternative, the Federal parcels proposed for exchange would remain under BLM management and listed and sensitive species and habitat would continue to be assessed under PLH Standards 3 and 4. Standards assessments would continue to be analyzed on a case-by-case basis in conjunction with grazing lease renewals and grazing management prescriptions. Therefore, the No Action Alternative would meet PLH Standard 4 on BLM parcels; however, no similar standard exists for SLB-managed parcels. Wildlife and habitat of SLB parcels would continue to be monitored by CDOW, through lease terms and agreements with the lessee, or the provisions of the Stewardship Trust Program.

Plants. There are no federally-listed, threatened or endangered plant species on the Federal or SLB parcels included in the Proposed Action. The BLM sensitive Ripley's milkvetch occurs in Ra Jadero Canyon of the La Jara Reservoir BLM exchange parcels where 54 acres of known habitat and up to 9,715 acres of potential habitat occurs. The slender spiderflower occupies

mesic sites on several SLB exchange parcels where up to 7,347 acres of potential habitat occurs.

Under the Proposed Action, Federal parcels exchanged to the SLB for management would no longer be subject to PLH Standards 3 or 4. Rare species would be managed by CDOW, through lease terms and agreements with the lessee, or the provisions of the Stewardship Trust Program and addressed by the CSFS, as necessary. Former SLB parcels accepted by the NPS and USFWS would be evaluated, managed, and monitored for natural biodiversity and healthy wildlife habitat, thus meeting or exceeding the PLH Standard 4 for the slender spiderflower.

Under the No Action Alternative, the Federal parcels proposed for exchange would remain under BLM management and Ripley's milkvetch habitat would continue to be assessed under PLH Standards 3 and 4. Standards assessments would continue to be analyzed on a case-by-case basis in conjunction with grazing lease renewals and grazing management and wildlife management prescriptions. Therefore, the No Action Alternative would meet PLH Standard 3 and 4 on BLM parcels. No similar standard exists for SLB-managed parcels where rare species would be managed by CDOW, through lease terms and agreements with the lessee, or the provisions of the Stewardship Trust Program.

3.2.6 Invasive Nonnative Species

The State of Colorado maintains a Noxious Weed Management Program under the Department of Agriculture, Division of Plant Industry. The program goals are "to prevent the introduction of new invasive plant species, eradicate species with isolated or limited populations, and contain and manage invasive species that are well established and widespread in Colorado." Preventative strategies to reduce the opportunities for new invasive species to spread into the state are promoted, to the extent possible, as follows: (1) provide information and resources to local weed managers to quickly and effectively eradicate small populations of established noxious weeds, (2) help establish local weed management areas emphasizing coordinated efforts among public and private landowners to effectively manage widespread weed populations, and (3) educate public agency staff and citizens about the negative effects associated with noxious weeds and how to successfully manage them (Lane 2005).

Permanent rules are in place for the administration and enforcement of the Colorado Noxious Weed Act (§§ 35-5.5-101 – 119. *Colorado Revised Statutes* [CRS] 2003). Under the act (2003), the following definitions apply: (1) infested acreage – an area of land containing a noxious weed species, defined by the actual perimeter of the infestation as delineated by the canopy cover of the plants and excluding areas not infested, (2) population—a group of designated noxious weeds of the same species occupying a particular geographic region and capable of interbreeding, and (3) eradication—a process that involves eliminating the plants of a specific population of noxious weeds within a specified period of time (once the reproduction of the population is halted, intensive efforts continue to detect and remove any additional plants that arise from seed or surviving rootstock in subsequent years until the population is permanently extirpated from an area).

The act (2003) provides three lists of noxious weed species labeled A, B, and C. Noxious weeds on list A are designated for eradication, on list B are slated for noxious weed management plans and voluntary management, and on list C are slated for noxious weed management plans and to encourage research and possibly introduce biological controls. Table 3-4 provides noxious weeds listed by counties involved in the land exchange, as proposed, and by state status. The study area counties are not listed in conjunction with any noxious weed species on list A.

Additional species that are not native to the study area counties and that are not considered noxious by the state are presented in this EA as invasive plant species. Identification and control of invasive plants are considered a priority for Federal agencies as they represent a threat to intact landscapes and are a major cause of reduced biodiversity (USFWS 2005).

TABLE 3-4. NOXIOUS WEED LISTS FOR FREMONT, SAGUACHE, CONEJOS[1], AND ALAMOSA COUNTIES

Noxious Weed Species	Colorado List	Study Area County Listed
Black henbane (*Hyoscyamus niger*)	B	Saguache
Canada thistle (*Cirsium arvense*)	B	Fremont, Saguache, Alamosa
Field bindweed (*Convolvulus arvensis*)	C	Saguache, Alamosa
Hoary cress (*Cardaria draba*)	B	Fremont, Saguache, Alamosa
Houndstongue (*Cynoglossum officinale*)	B	Fremont
Knapweed, diffuse (*Centaurea diffusa*)	B	Fremont, Saguache
Knapweed, Russian (*Acroptilon repens*)	B	Fremont, Saguache, Alamosa
Knapweed, spotted (*Centaurea maculosa*)	B	Fremont, Saguache
Leafy spurge (*Euphorbia esula*)	B	Fremont, Saguache
Musk thistle (*Carduus nutans*)	B	Fremont, Saguache
Toadflax, Dalmation (*Linaria dalmatica and Linaria genistifolia)*	B	Fremont
Toadflax, yellow (*Linaria vulgaris*)	B	Fremont

Source: <*http://www.ag.state.co.us*.>
Note: [1] There were no noxious weeds listed for Conejos County.

Nonnative and invasive plant species represent a serious management concern and their inventory, monitoring, and control is expensive for land managers. Within the land parcels and adjacent landscape affected by this exchange, between 50 and100 species of nonnative plants have been identified and 13 of these species are considered noxious. Nonnative species lower the value of wildlife habitat and compete with agricultural crops resulting in lower forage value and production. Once inventoried, methods commonly used to control nonnative species include biological, mechanical, and chemical. Controls must be ongoing to be effective in reducing, but only rarely eliminating, nonnative plant species. Effective levels of funding and staffing are necessary to provide responsible nonnative species inventory and control.

During vascular plant inventories, the CNHP documented 47 nonnative plant species within GRSA boundaries (Spackman et al. 2004, Whitson et al. 2000). The most important of these, determined in terms of the difficulty of control and because they are considered noxious weeds, are Canada thistle, field bindweed, leafy spurge, hoary cress, and Russian knapweed and the invasive species yellow and white sweetclovers (*Melilotus officianalis* and *M. alba*), smooth brome (*Bromus inermis*), crested wheatgrass (*Agropyron cristatum*), and cheatgrass (*Bromus tectorum*). Other perennial invasive species, largely grasses introduced for hay and forage production, occurring within GRSA include spike bentgrass and redtop (*Agrostis exarata* and *A. stolonifera*), meadow foxtail (*Alopecuris pratensis*), timothy, Kentucky bluegrass (*Poa pratensis*), orchardgrass, water cress (*Nasturtium officinale*), and red- and white-Dutch clovers (*Trifolium pratense* and *T. repens*) (Spackman et al. 2004).

Invasive and noxious plants have increased in population size annually on San Luis Valley wildlife refuges since the 1960s (USFWS 2003). Refuges can act as harbors for noxious and invasive plants because county weed districts are not authorized to enforce noxious weed laws on Federal lands. In addition, refuges are commonly managed to allow wetland plants to remain standing following the growing season to provide nesting habitat for migratory birds. Because the wetlands and meadows typically are neither grazed nor mown, noxious and invasive plant species benefit and can thrive. However, refuge neighbors are required by state and local laws to control noxious plants on their lands and cooperation between Federal and private land managers is encouraged.

Invasive plants of primary concern at BNWR include Canada thistle, tall whitetop or perennial pepperweed (*Lepidium latifolium*), Russian knapweed, and salt cedar or tamarisk (*Tamarix* spp.), which occur in wetlands and riparian habitats and other mesic sites. BNWR staff plans to assess the extent of weed infestations and prepare strategies to address known infestations within available funding and staff resources. The variety of control tools to be considered includes herbicide application, mowing, haying, biological control, grazing, and prescribed fire. The primary means of invasive plant control, in the short term, is anticipated to be mowing and grazing, particularly in the wet meadows. The USFWS is committed to active participation with neighbors, including Federal agencies, private property owners, and TNC to collectively and efficiently treat invasive plant infestations (USFWS 2005).

The ANWR and MVNWR have performed biological controls for Canada thistle since 1989. These efforts included 18 attempts involving the introduction of stem-mining weevils and gall-flys, but thus far, no sustaining populations of these insects have become established. Methods presently used for noxious and invasive plant control include mowing (reduces flower set and seed production), herbicide application (reduces plant vigor or kills plants outright), and disturbed site seeding (competition for habitat). Experimentation with livestock grazing, herbicide use, tilling, and manipulation of water levels (drowning noxious and invasive plants) is being conducted to determine effects on seed production, stem density, and root mass (USFWS 2003).

Control is expensive and requires perseverance because stands are not or only rarely eliminated by a single treatment or by treating for only one season. Control is important because seeds generated in or plants spreading by rhizomes from Federal lands can blow or grow onto

adjacent private or non-Federal public lands. Of course, the reverse is also true, furthering the need for communication and cooperation among landowners.

The San Luis Valley Geographic Information Sciences (GIS) / Global Positioning System (GPS) Authority maintains a weed map or cover layer for the road system (SLV GIS/GPS Authority 2009). This active database would be valuable for all private, state, and Federal landowners and managers to use as a guide for nonnative plant species population locations and potential points of introduction into adjacent properties. It would also be beneficial for all landowners and managers to provide any electronic weed distribution data to ensure this database is updated and viable.

3.2.6.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

There are no invasive or noxious nonnative plant species reported for the Table Mountain and Gribbles Park sites in Fremont County (BLM 2005a). However, the Southwest Regional Gap Analysis Program Project (SW ReGAP) vegetation mapping effort identified 1.6 acres of invasive perennial grassland on the Table Mountain site (parcel 4) in addition to 3.1 acres of recently mined or quarried land (parcels 3, 4, and 45). Quarry sites and their associated access roads represent disturbed areas where nonnative plant species are likely to become established. A small area of Table Mountain parcel 45 (0.7 acres) was mapped as agricultural land, another area with high likelihood of nonnative plant species introduction and establishment.

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

There are no invasive or noxious nonnative plant species reported for the Biedell Creek and La Jara Reservoir sites in Saguache and Conejos counties. The SW ReGAP vegetation mapping effort identified 1.1 acres of invasive perennial grassland on the La Jara Reservoir site, parcel 16. Agricultural land was delineated on both the Biedell Creek (0.7 acres, parcel 14) and La Jara Reservoir (23.3 acres, parcels 23 and 25) sites. Agricultural lands and their associated access roads represent disturbed areas where nonnative plant species are likely to become established.

Proposed San Luis Valley SLB Exchange Parcels

The San Luis Lakes State Park lies adjacent to SLB parcels proposed for exchange and several noxious and invasive plant species were documented (CSP 1996). The state list B noxious weed species present include: Canada thistle, hoary cress (whitetop), Russian-olive, and salt cedar or tamarisk. Perennial sow thistle (*Sonchus asper*) is on the state list C and has become established within San Luis Lakes State Park in addition to the invasive annual tumbleweeds kochia (*Kochia scoparia*) and Russian-thistle (*Salsola kali*). The aquatic and invasive widgeon grass or ditchweed (*Ruppia maritima*) is abundant in San Luis Lake (CSP 1996).

Within GRSA, the state list B noxious weeds Canada thistle, leafy spurge, hoary cress, and Russian knapweed have been documented (Spackman et al. 2004). One state list C noxious plant species present within GRSA is field bindweed. An additional 42 nonnative plant species

were listed within GRSA that are likely present in habitats of the San Luis Valley, particularly on mesic or disturbed sites.

South of the proposed SLB exchange parcels are ANWR and MVNWR, where noxious and invasive plant species have been identified and listed. The state list B noxious plants present include Canada thistle, Eurasian water milfoil (*Myriophyllum spicatum*), hoary cress (whitetop), perennial pepperweed (tall whitetop), and Russian knapweed. State list C noxious plants known to occur include field bindweed, halogeton (*Halogeton glomeratus*), Johnsongrass (*Sorghum halepense*), and perennial sowthistle. Additional invasive and nonnative plant species present on the refuges number 26 species.

The SW ReGAP vegetation mapping effort identified 222.3 acres of invasive annual and biennial forbland (parcels 26, 27, 28, 33, 35, 36, 37, and 41), 22.9 acres of invasive perennial grassland (parcels 26 and 40), 4.0 acres of recently mined or quarried land (parcel 26), 21.8 acres of medium-to high intensity developed land (parcels 26 and 27), and 2,639.8 acres of agricultural land (parcels 26, 27, 28, 29, 32, 33, 34, 35, 36, 37, 40, 41, and 43). Lands that are mined or quarried, developed, or used for agriculture and their associated access roads represent disturbed areas where nonnative plant species are likely to be introduced and become established. Agricultural land on SLB properties are largely irrigated hay meadows that are also used for livestock and American elk grazing.

3.2.6.2 Environmental Consequences/ Mitigation

The exchange of BLM and SLB land as proposed does not result in any changes in the distribution or number of nonnative plant species. The effect of invasives would increase over time if controls are not planned and funded or if funded controls are not implemented. An effect resulting from the presence of nonnative species would be considered (1) insignificant if scattered individual plants of a list C species or an unlisted, naturalized nonnative species were present; (2) low if scattered individual plants or small populations of list C species or small populations of unlisted, naturalized nonnative species were present; (3) moderate if scattered individual plants or small- to medium-sized populations of list B and C nonnative plant species or moderate- to large-sized populations of unlisted, naturalized nonnative species were present; or (4) high if medium- to large-sized populations of list A, B, and C nonnative plant species or moderate- to large-sized populations of unlisted, naturalized nonnative species were present.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. The Colorado Department of Agriculture, Division of Plant Industry, County Extension Offices, and the San Luis Valley GIS/GPS Authority would continue to provide information, control, inventory, and mapping services for nonnative and invasive plant species. The No Action Alternative would continue current Federal management of nonnative species on the proposed BLM exchange parcels consistent with the two RMP objectives and the Colorado Noxious Weed Management Act resulting in long-term insignificant to low beneficial effects on invasive species monitoring and control.

The SLB would continue management of nonnative plant species under the Colorado Noxious Weed Management Act, and where SLB parcels adjoin state and Federal highways, Colorado Department of Transportation (CDOT) would provide nonnative plant species control in rights-of-way. In general, SLB lessees would be responsible for control of listed noxious weeds on affected acreages resulting in long-term, insignificant to moderate, beneficial effects on invasive species monitoring and control.

Proposed Action

Under the Proposed Action, the selected BLM parcels would be exchanged to SLB management, and SLB parcels would be exchanged for management by the BLM, USFWS, and the NPS. Former BLM parcels exchanged to the SLB include mapped invasive perennial grassland and agricultural land that represent a source area for nonnative plant species invasions resulting in long-term, insignificant to low, adverse effects on SLB nonnative species inventory, control, and long-term management. Lessees would enact control efforts on noxious weeds listed under the Colorado Noxious Weed Management Act with assistance from the Colorado Department of Agriculture, resulting in long-term, insignificant to low, beneficial effects to nonnative species control.

The former SLB parcel 31 would be evaluated for invasive species presence by the BLM staff prior to initiating a grazing lease resulting in long-term, insignificant beneficial effects to invasive species identification and possible future control. SLB lands exchanged to the NPS and USFWS for management include mapped invasive annual and biennial forblands and perennial grasslands, developed land that serves as a source area for nonnative plant introduction, and irrigated and hayed agricultural land. These potential habitats for nonnative plant species would be surveyed and mapped by the Federal agencies resulting in short- and long-term, low to moderate, beneficial effects due to nonnative species inventory.

For mitigation, the USFWS prioritizes invasive plant identification, mapping, and control in their CCP because they are a threat to intact landscapes and serve to reduce biodiversity, particularly in wetlands and riparian habitats (USFWS 2005). The BNWR staff would assess invasive plant infestations and apply management tools including mowing, haying, grazing, herbicide application, biological controls, and prescribed fire resulting in short- and long-term, low to moderate, beneficial effects. In the GRSA GMP (NPS 2007) the park would identify and manage nonnative plant populations, reducing their effect on native plant communities or possibly eliminating some stands from the landscape resulting in short- and long-term, insignificant to moderate, beneficial effects on species composition and habitat quality.

3.2.7 Prime and Unique Farmlands

Prime and unique farmlands are two of several kinds of important farmland defined by the U.S. Department of Agriculture. They are protected under the Farmland Protection Policy Act of 1984 (FPPA), which establishes criteria to address adverse impacts (FR Part 658 1984). Prime and unique farmlands are of major importance in providing the national short- and long-range needs for food and fiber.

Prime farmland is defined (USDA 2000) as follows:

> *Land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Further, it could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0-6 percent.*

Unique farmland is defined (NEPA 2001) as follows:

> *Land other than prime farmland that is used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality and/or high yields of a specific crop when treated and managed according to acceptable farming methods. Examples of such crops are citrus, tree-grown nuts, olives, cranberries, fruit, and vegetables.*

Under section 2 (7 U.S.C. 4201) Congress finds, in part:

> *(1) the Nation's farmland is a unique natural resource and provides food and fiber necessary for the continued welfare of the people of the U.S.; (2) each year, a large amount of the Nation's farmland is irrevocably converted from actual or potential agricultural use to nonagricultural use; …; (4) the extensive use of farmland for nonagricultural purposes undermines the economic base of many rural areas; . It is the congressional intent to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses and to assure that federal programs are administered in a manner that, to the extent practicable, will be compatible with state, unit of local government, and private programs and policies to protect farmland (Federal Register 1984).*

Projects are subject to FPPA requirements if they irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a Federal agency (BLM) or with assistance from a Federal agency (NRCS). Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban built-up land (NRCS 2007).

3.2.7.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

There are no prime or unique farmlands on the proposed Table Mountain or Gribbles Park BLM exchange parcels in Fremont County (BLM 2005a).

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

There are no prime or unique farmlands on the proposed Biedell Creek or La Jara Reservoir BLM exchange parcels in Saguache and Conejos counties (BLM 2005a).

Proposed San Luis Valley SLB Exchange Parcels

Three categories of prime or unique farmland have been identified on proposed SLB exchange parcels within the BNWR boundary (see Figure 3-11): (1) farmland of unique importance (3,770 acres), (2) prime farmland if irrigated (78 acres), and (3) prime farmland if irrigated and reclaimed of excess salts and sodium (21 acres) (NRCS 2004). Together, these soils categories occupy 3,869 acres. All acreages identified as prime or unique farmland would be exchanged to the BNWR and would be managed by the USFWS.

Soils designated as prime and unique on SLB parcels proposed for exchange are generally associated with irrigated wet meadow and salt flat environments and include Vastine Loam, Alamosa Loam, Gunbarrel Loamy Sand, McGinty Sandy Loam, San Luis Sandy Loam, drained, and Zinzer Loam. These soil types are characterized by deep horizons with loamy and sandy loam textures, and are poorly to moderately well-drained (see Table 3-5). Water availability in the top 5 feet ranges between 4.1 in to 11.6 inches.

Soils form through the physical and chemical weathering of parent material. Physical soil properties are thus determined from the mineral composition of the parent material, climate under which the soil material has accumulated, biota associated with the soil environment, the corresponding topography, and the age or stage of development of the soil. Qualitative soil descriptions and specific quantitative data describing the physical properties of identified prime and unique soils are provided in Tables 3-5 and 3-6.

3.2.7.2 Environmental Consequences/Mitigation

The FFPA addresses prime farmland, unique farmland, and land of statewide or local importance. It is intended to minimize the impact of Federal programs on the unnecessary and irreversible conversion of farmland to nonagricultural uses. Farmland subject to FFPA requirements does not have to be currently used for cropland; an effect on prime and unique farmland would be considered (1) insignificant if there is no change in land use or current farming practices; (2) low if < 100 acres of prime and unique farmlands are converted to nonagricultural use; (3) moderate if 100 to1,000 acres of prime and unique farmlands are

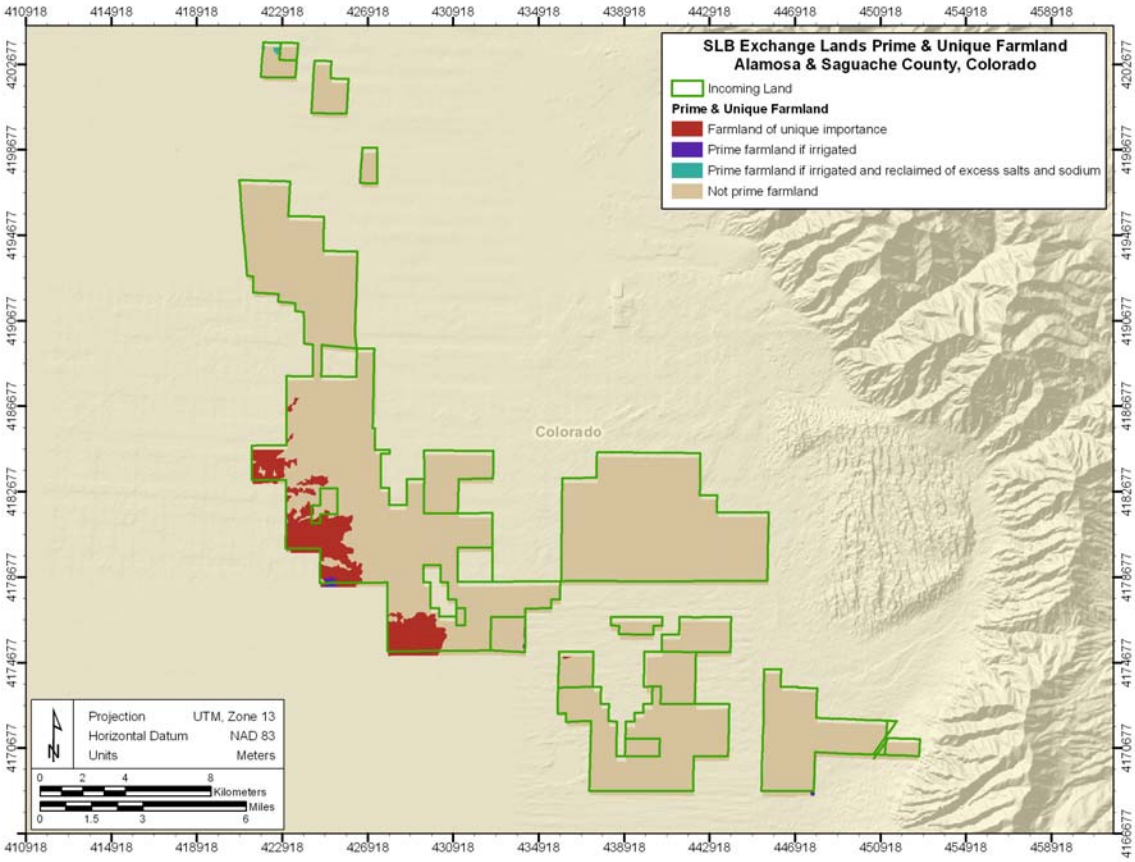

FIGURE 3-11. DISTRIBUTION OF PRIME AND UNIQUE FARMLAND ON SLB LAND PARCELS PROPOSED FOR EXCHANGE TO BNWR

converted to nonagricultural use; and (4) high if > 1,000 acres of prime and unique farmland are converted to nonagricultural use.

No Action Alternative

Under the No Action Alternative there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. There are no prime and unique farmlands on the BLM parcels proposed for exchange. Prime and unique farmlands of proposed SLB exchange parcels previously leased for hay production would be reconsidered for leasing, would likely continue to be irrigated for hay, and the properties of prime and unique farmland soils would remain intact resulting in long-term, insignificant beneficial effects resulting from leased management of and production from irrigated agricultural land.

Proposed Action

Under the Proposed Action, BLM parcels would be exchanged to the SLB for management resulting in no adverse effect on prime and unique farmland soils. SLB parcels would be

exchanged to the BLM (parcel 31) and NPS (several parcels) for management by GRSA resulting in no adverse effect on prime and unique farmland soils. SLB parcels would be exchanged to the USFWS for management by BNWR and these parcels include (1) farmland of unique importance (3,770 acres), (2) prime farmland if irrigated (78 acres), and (3) prime farmland if irrigated and reclaimed of excess salts and sodium (21 acres). An unknown amount of the total 3,869 acres was irrigated for hay prior to 2005; however, the assumption used for this EA is that 100 percent of the prime and unique farmland soils were supporting grass hay crops. The BNWR would evaluate irrigating and haying these lands in their CCP process to be prepared beginning in 2011, resulting in long-term, insignificant to high, adverse or beneficial effects on prime and unique farmlands based on the management decisions. It should be noted, however, that in the absence of irrigation and haying, the soil qualities that make these soils prime or unique would remain unchanged and hay production could be continued at some future time.

In terms of mitigation, a comprehensive analysis of the hydrologic characteristics of wet meadow irrigation effects on down-drainage users and resources would be undertaken and would include prime and unique farmland soils (USFWS 2005). Wet meadow distribution is tied to water management over the past century and is based on a relatively simple set of diversion structures and ditches that divert water from all creeks crossing BNWR. Several groundwater wells also provide irrigation water to wet meadows. The wet meadow irrigation activity is considered important groundwater recharge for the Closed Basin Project and its associated water right. West of the irrigated meadows, surface flows to Saguache and San Luis creeks have decreased. Continuation of wet meadow irrigation and maintenance of diversion structures would result in short- and long-term, insignificant to low, beneficial effects on prime and unique farmland soils. Cessation of wet meadow irrigation and maintenance to support biodiversity would result in long-term, insignificant to low, adverse effects on prime and unique farmland soils because the soil properties would remain intact.

The BNWR staff and partners would also evaluate water management options within wet meadows to measure their resultant effect on adjacent playas. Options could include managing surface flows so there is some return to playas because in most years the playas remain dry. Hydrologic support of playa biodiversity while maintaining irrigation to wet meadows would result in short- and long-term, insignificant effects on prime and unique farmland soils.

NRCS uses a land evaluation and site assessment system to establish a farmland conversion impact rating score on proposed sites of federally funded and assisted projects. This score is used as an indicator for the BLM and USFWS to consider alternative sites if the potential adverse impacts on the farmland exceed the recommended allowable level. A Farmland Conversion Impact Rating Form (AD-1006) would be completed by the USFWS to address the NRCS program. This resource would also be addressed in the USFWS CCP for BNWR that is planned to begin in 2011; if the management prescription is to maintain irrigation and hay production on these soils it would result in long-term, insignificant, beneficial effects on prime and unique farmland soils.

TABLE 3-5. QUALITATIVE SOIL DESCRIPTIONS

Soil Type	Map Unit	Ecological Site	Slope (%)	Depth Class	Drainage Class	Permeability	Ave Water Availability in top 5 feet (inches)	Runoff Class	Flooding Frequency	Depth to Seasonal High Water Table (inches)
Vastine Loam	79	Wet Meadow	0 –1	Very deep	Poor	Moderate	6.2	Low	Frequent	27– 72
Alamosa Loam	Am	Wet Meadow	0 –1	Very deep	Poor	Moderately slow	11.6	Medium	Frequent	15 –72
Gunbarrel Loamy Sand	Gn	Salt Flats	0– 1	Very deep	Poor	Rapid	4.1	Negligible	None	57– 72
McGinty Sandy Loam	Mc	Salt Flats	0– 1	Very deep	Moderate	Moderately rapid	7.6	Very low	None	57–72
San Luis Sandy Loam, drained	Sf	Salt Flats	0–1	Very deep	Poor	Moderately slow	6.4	Medium	None	33 –72
Zinzer Loam	ZnB	Salt Flats	1– 3	Very deep	Well	Moderate	7.9	Low	None	NA

TABLE 3-6. QUANTITATIVE PHYSICAL SOIL PROPERTIES

Soil Type	Depth (in)	Sand (%)	Silt (%)	Clay (%)	Moist Bulk Density (g/cc)	Saturated Hydraulic Conductivity (µm/sec)	Available Water Capacity (in/in)	Linear Extensibility Capacity (%)	Organic Matter (%)	Kw	Kf	T	Wind Erodibility Group	Wind Erodibility Index
Vastine Loam	0-8	--	--	20-27	1.25–1.4	4.23 –14.11	0.14–0.18	0.0–2.9	2.0–5.0	.20	.20	3	4L	86
	8-22	--	--	20-30	1.35–1.45	4.23–14.11	0.16–0.21	3.0–5.9	0.5–3.0	.28	.28			
	22-60	--	--	1-5	1.4–1.5	42.34 -141.14	.04–.08	0.0–2.9	0.0–1.0	.10	.17			
Alamosa Loam	0-8	--	--	15-22	1.25–1.40	0.6–2.0	0.16–0.2	0–2.9	2.0–5.0	.20	.20	5	4L	86
	8-55	--	--	25-35	1.3–1.4	0.2–0.6	.18–.2	3.0–5.9	1.0–2.0	.28	.28			
	55-65	--	--	5-20	1.4–1.5	0.6 –2.0	.08–.16	0.0–2.9	1.0–2.0	.28	.28			
Gunbarrel Loamy Sand	0-48	--	--	0-7	1.45–1.60	6–20	0.06–0.08	0.0–2.9	1.0–2.0	.17	.17	5	2	134
	48-60	--	--	0-7	1.45–1.60	6–20	0.04–0.08	0.0–2.9	0.0–0.5	0.15	0.15			
McGinty Sandy Loam	0-19	--	--	12-20	1.35–1.50	0.6–6	0.10–0.13	0.0–2.9	0.5–1.0	.28	.28	2	3	86
	19-60	--	--	10-18	1.35–1.50	2–6	0.10–0.15	0.0–2.9	0.0–0.5	.32	.32			
San Luis Sandy Loam, drained	0-7	--	--	10-20	1.30–1.40	2–6	0.10–0.13	0.0–2.9	0.5–1.0	.28	.28	3	3	86
	7-34	--	--	25-35	1.20–1.30	0.2–0.6	0.13–0.18	3.0–5.9	0.0–0.5	.37	.37			
	34-60	--	--	0-5	1.35 –1.45	6–20	0.04–0.06	0.0–2.9	0.0–0.5	.2	.24			
Zinzer Loam	0-5	--	--	15-27	1.25–1.40	0.6–2.0	0.14–0.16	0.0–2.9	2.0–4.0	.28	.28	2	4L	86
	5-60	--	--	18-35	1.25–1.40	0.6–2.0	0.12–0.14	0.0–2.9	0.5–1.0	.24	.24			

3.2.8 Surface and Groundwater Quality

The major drainages of the project region are presented in Figure 3-7. Surface water is lacking or is minimal on several of the parcels proposed in this land exchange. Groundwater could be near-to-surface as on most of the proposed exchange parcels in the San Luis Valley, or it might be several hundred feet below some of the proposed exchange parcels located on slopes and ridges.

Fremont County surface water quality is generally good because large volumes are the result of seasonal runoff from snowpack and from thunderstorms. Water quality becomes poor where runoff is derived from local badlands resulting in both high sediment and alkalinity/salt loading during storm events. Groundwater is often found at considerable depths and is typically of good quality in most wells.

Surface water quality in the San Luis Valley can range from good to alkaline depending on the source. Water flowing off the adjacent slopes is of good quality throughout the stream reaches draining them but can become alkaline by dissolving salts concentrated in soils of playas, closed basins, and ponds. In an example from the early 1900s, the San Luis Lake Club ceased operations at San Luis and Head lakes because water quality had become brackish due to high soil alkalinity and siltation (CSP 1996). This condition resulted in die-offs of the stocked warm water fishery and amphibians and aquatic insects.

Sanchez Reservoir, in the southeastern San Luis Valley, was sampled for mercury (Hg) uptake by sport fish resulting in recommendations that northern pike (*Esox lucius*) longer than 22 inches and walleye (*Sander vitreus vitreus*) longer than 17 inches not be consumed (CDPHE 2007b). Some fish of these sizes exceeded the Hg action level of 0.5 parts per million (ppm) set by the Colorado Department of Public Health and the Environment (CDPHE) and could cause adverse health effects if eaten by humans. Samples of northern pike tissue ranged from 0.35 ppm to 1.97 ppm Hg and walleye tissue samples ranged from 0.03 ppm to 1.75 ppm Hg (CDPHE 2007a). Yellow perch (*Perca flavescens*) tissue samples from Sanchez Reservoir were all below the 0.5 ppm Hg action level, averaging 0.3 ppm Hg. Additional analyte sampling in fish tissue at Sanchez Reservoir included arsenic (As), which ranged from 0.5 to1.45 milligrams per kilogram (mg/kg) in northern pike, 0 to1.44 mg/kg in walleye, and 0.03 to 0.05 mg/kg in yellow perch.

GRSA sampled 10 sites along Medano Creek for fecal coliform presence during 1995 (Sundermeyer 1997). Samples analyzed for June (flow of 70 cubic feet per second [cfs]) detected nearly no coliform bacteria in the water. Up to 50 organisms per 100 milliliters (ml) of water were detected during an August (flow of 10 cfs) analysis. During the October (flow of 2.5 cfs) sample analysis, coliform bacteria were detected at a rate of 80 organisms per 100 ml of water. These densities are considered in the safe range for water quality; Medano Creek is classified under the Recreational Body of Water, Division I (full body contact) by the Colorado Department of Health, Water Quality Division.

Groundwater quality of the two San Luis Valley aquifers (shallow and deep) is quite different. The shallow aquifer has highly mineralized and gaseous groundwater, while the deep aquifer

has less mineralized water, sometimes under enough pressure to maintain artesian flows at wellheads (CSP 1996). Total dissolved solids (TDS) from active salvage wells in the shallow aquifer have increased and are sometimes too high for the water to be conveyed to the Rio Grande (CSP 1996). On San Luis Lakes State Park, salvage well 66 requires extensive treatment for removal of heavy metals, minerals, alkalinity, and dissolved solids. Iron-feeding bacteria have been found in concentrations within this well (CSP 1996).

Nitrate concentrations in the shallow groundwater of the San Luis Valley were studied and the variability described using samples collected from 16 wells during 1994 to 1995 (Stogner 1997). The wells were completed in the top 41 feet of the shallow, unconfined aquifer. To adequately assess the spatial and temporal variability of nitrate concentrations (reported as nitrogen), each well was sampled four times during 1994 and four times during 1995 (e.g., samples were collected before the irrigation season in the spring and during irrigation season in the summer through fall).

To evaluate possible sources of nitrate, groundwater samples were analyzed for nitrogen isotopes (Stogner 1997). Generally, isotope ratios between -2 and 6 are indicative of mineral fertilizer sources, ratios between 6 and 10 are indicative of mixed sources or removal of nitrogen from the water by the process of denitrification, and greater than 10 are indicative of animal waste sources. In the wells sampled, nitrogen isotope ratios ranged from 2.9 to 28.6, with the lower ratios occurring between Center and Monte Vista, and the higher ratios occurring near the towns of Center and Hooper (see Figure 1-1) (Stogner 1997). The wells sampled near Hooper lie adjacent to the boundary of the proposed BNWR. Further analyses of these data identified mineral fertilizers as the primary source of nitrate in the shallow aquifer.

Sharkoff et al. (1996), in studies conducted by the NRCS during 1993 and 1994, determined that the amount of nitrogen fertilizer applied decreased by about 22 tons (20 percent) and residual soil nitrogen also decreased as a result of implementing nitrogen management practices at study sites in the San Luis Valley. Although nutrient and water management practices have decreased the amount of nitrogen available and its potential for transport to the shallow aquifer, it would take time for nitrate concentrations in the shallow groundwater to decrease because of the large amount of nitrate currently in the aquifer and unsaturated zone (Sharkoff et al. 1996).

3.2.8.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

There are no data concerning surface and groundwater quality associated with the Table Mountain parcels. Wells drilled to serve subdivisions in the vicinity range from approximately 200 feet to 600 feet deep and provide relatively small yields. The groundwater quality associated with wells drilled to these depths is generally considered good (BLM 2005c).

Groundwater associated with the Gribbles Park parcels can be near-to-surface (10 feet to 20 feet deep) within the alluvium deposited in drainages. Wells drilled outside the alluvial deposits have intercepted groundwater at depths from 300 feet to 400 feet. The groundwater quality associated with wells drilled to these depths is generally considered good (BLM 2005c).

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

There are no data concerning surface and groundwater quality or groundwater depth associated with the Biedell Creek and La Jara Reservoir parcels proposed for exchange. All of the perennial streams flowing through the proposed BLM parcels have good to excellent water quality (BLM 1989). An exception is Kerber Creek, which is considered heavily polluted from mining wastes (BLM 1989).

The La Jara Reservoir fishery was sampled for Hg uptake by sport fish resulting in < 0.1- to 0.14 ppm Hg for brook trout (*Salvelinus fontinalis*) and < 0.1 to 0.16 ppm Hg for splake (*Salvelinus namaycush x S. fontinalis*, a lake trout/brook trout hybrid) (CDPHE 2007a). These Hg concentrations are below the action level established by the CDPHE for human consumption of fish (0.5 ppm Hg). Additional analyte sampling in fish tissue at La Jara Reservoir included As and selenium (Se). In brook trout tissue samples, As levels were < 0.5 mg/kg and Se levels ranged from 0.7 to 1.24 mg/kg. In splake tissue samples, As levels were < 0.5 mg/kg and Se levels were 0.78 mg/kg.

Proposed San Luis Valley SLB Exchange Parcels

Most waters within the GRSA, some of which flows onto SLB parcels proposed for exchange, are thought to reflect near-natural water quality conditions. Mosca, Castle, Sawmill, Little Medano, Cold, and Sand creeks water quality was analyzed by the U.S. Geological Survey (USGS) to determine qualification for the outstanding waters designation and there were no exceedences of the instream standards (USGS Publication WRIR 02-4196). Medano Creek water quality was similarly tested, i.e., the creek is identified by the USGS (National Water Quality Assessment Program) as attaining the highest water quality in the upper Rio Grande drainage.

Potential sources of contamination to surface and groundwater include mines, landfills, and a small arms firing range (NPS 1995). The landfills were determined to contain no immediate hazardous materials dangers and none of the sites are located where they could contaminate potable water supplies or surface waters, particularly Medano Creek and Denton Springs. The inactive small weapons firing range probably contains lead from spent rounds, but lead is one of the more stable metals in the class of metallic environmental contaminants (NPS 1995).

Mineral development activities that could affect water quality of GRSA were listed as three categories, they are: (1) petroleum and gold exploration on Baca Grant lands, (2) past mining in the Cold Creek watershed within GRSA, and (3) past mining activity outside GRSA, but within watersheds that drain into the park (NPS 1995). However, most mines and prospects within and near GRSA are not thought to represent any potential for water quality degradation.

The prospect on a Cold Creek tributary is thought to be a source of some iron-oxide resulting in the cementation of sediment that occasionally occurs in Sand Creek (NPS 1995). However, there is little surface flow in Cold Creek, and rock-chip samples analyzed were devoid of concentrations of toxic materials. Lode-type mineral excavations outside of GRSA include the Myrtle K Mine and mill site on Sand Creek. Sulfides are present and could enter the surface

and groundwater systems (NPS 1995). Mosca Creek could be subject to copper loading due to releases of mineral processing reagents (NPS 1995); however, water quality testing did not indicate degraded water quality in Mosca Creek. An adit and small mill are present on North Arrastre Creek above GRSA, but there is no information concerning water quality effects (NPS 1995).

3.2.8.2 Environmental Consequences/Mitigation

Good water quality is important to healthy populations of wildlife and the riparian and wetland plant communities that provide forage and cover. An effect on water quality would be considered (1) insignificant if there is no or little change in land use practices or drainage patterns beyond natural processes and permitted activities; (2) low if water diversion is minimal and crops are rarely fertilized with commercial products; (3) moderate if water diversion temporarily or permanently alters flows and crops are intermittently fertilized with commercial products; and (4) high if water diversion permanently alters flows and crops are regularly fertilized with commercial products.

No Action Alternative

Under the No Action Alternative there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. Surface and groundwater quality of Federal lands would be addressed according to the RMP management directives and PLH Standard 5 conditions, resulting in short- and long-term, insignificant adverse effects on water quality due to livestock grazing effects and runoff from quarry sites and access roads.

The SLB would continue management of proposed exchange parcels within the San Luis Valley where livestock grazing and diversion of flows or groundwater pumping to irrigate crops would likely be reinstated on some parcels, as would application of fertilizer, resulting in short- and long-term, insignificant to low, adverse effects on water quality.

Proposed Action

Under the Proposed Action the SLB would assume management of surface and groundwater resources in the form of stock ponds and narrow drainages resulting in long-term, insignificant adverse effects on water quality due to waste products and habitat disturbance from grazing livestock.

The SLB parcels proposed for exchange would be managed by the BLM, USFWS, and the NPS. The BLM would manage parcel 31, a site with no surface water, and would manage water quality generally under PLH Standard 5 conditions resulting in long-term, insignificant, beneficial effects on water quality due to waste products and habitat disturbance from grazing livestock. The BNWR would manage surface and groundwater of San Luis, Saguache, and San Isabel creeks and their tributaries resulting in long-term, insignificant to low, beneficial effects due to water quality management for wildlife habitat and long-term, low, adverse effects on water quality should fertilizer be used to produce hay crops. The GRSA would manage surface

and groundwater of Sand, Little Spring, Big Spring, and Arena creeks resulting in long-term, insignificant to moderate beneficial effects due to restoration of natural flows and elimination of nutrients and nitrates from grazing livestock. BNWR and GRSA would manage water quality under the CWA and other applicable Federal laws and regulations. Management actions would be stipulated in CCPs and GMPs and all proposed management actions would be evaluated under the NEPA process resulting in long-term, negligible beneficial effects on water quality.

Standards for Public Land Health

The Finding on the Public Land Health Standard 5 states:

> *The water quality of all water bodies including groundwater where applicable located on or influenced by BLM lands would achieve or exceed the Water Quality Standards established by the State of Colorado. Water quality standards for surface and groundwaters include the designated beneficial uses, numeric criteria, narrative criteria, and anti-degradation requirements set forth under state law (5 CCR 1002-8), as required by section 303(c) of the CWA.*

Standards for public land health (BLM 1997) describe conditions needed to sustain public land health and relate to all uses of the public lands. Standards are applied on a landscape scale and relate to the potential of the landscape. Indicators for Standard 5 are:

- Appropriate populations of macroinvertebrates, vertebrates, and algae are present.
- Surface and groundwaters only contain substances (e.g., sediment, scum, floating debris, odor, heavy metal precipitates on channel substrate) attributable to humans within the amounts, concentrations, or combinations as directed by the Water Quality Standards established by the State of Colorado (5 CCR 1002-8).

Under the Proposed Action, Federal parcels proposed for exchange include seeps, springs, and ponds and ephemeral, intermittent, and perennial stream reaches. In Fremont County the flow is tributary to the Arkansas River which requires water quality sufficient to support Aquatic Life Cold 1, Recreation 1a, Water Supply, and Agriculture. In the San Luis Valley, the flows contribute to internal basins and to the Rio Grande via the Alamosa River which requires water quality sufficient to support Aquatic Life Warm 2, Recreation 1a, and Agriculture. Currently the water quality of the stream reaches of proposed BLM exchange parcels is supporting the classified beneficial uses. No stream reaches are listed as having impaired water quality.

Water quality of streams within the proposed SLB exchange parcels is generally unclassified, but likely reflects near-natural conditions with no exceedances of the instream standards. It is likely that these stream reaches would not have impaired water quality.

Under the No Action Alternative, the Federal parcels proposed for exchange would remain under BLM management and the water quality standard for healthy public lands would be met. The water quality of stream reaches would continue to support the classified beneficial uses. No impaired stream reaches are located within the BLM parcels remaining under Federal

management. Therefore the No Action Alternative would meet PLH Standard 5 on BLM parcels.

3.2.9 Air Quality

Air quality can be affected by pollution that is generated from many different sources including stationary (e.g., factories, power plants, smelters, dry cleaners, degreasing operations), mobile (e.g., cars, trucks, trains, airplanes), and naturally occurring (e.g., windblown dust, volcanic eruptions, etc.) (USEPA 2001). The Federal Clean Air Act of 1970 (CAA) (43 U.S.C. § 7401 et seq., as amended in 1977 and 1990) provides the principal framework for national and state efforts to protect air quality and requires the adoption of the National Ambient Air Quality Standards (NAAQS) to protect the public health, safety, and welfare from known or anticipated effects of air pollution. Amendments to the CAA require the U.S. Environmental Protection Agency (USEPA) to promulgate rules to ensure that Federal actions conform to the appropriate state implementation plan, e.g., these requirements are known as the General Conformity Rule (40 CFR 51.100 et seq. and 93.100 et seq.). They require any Federal agency responsible for an action to determine if the action conforms to pertinent guidelines and regulations that control or maintain air quality in the region. Certain actions are exempt from conformity determination, including those actions associated with transfers of land or facilities where the Federal agency does not retain continuing authority to control emissions associated with the properties. Federal actions can also be exempt if the projected emissions rates would be less than the specified emissions rate threshold known as *de minimis* limits.

NAAQS have been established by the USEPA, Office of Air Quality Planning and Standards, for six criteria pollutants that are deemed to potentially negatively affect human health and the environment: (1) carbon monoxide, (2) lead (Pb), (3) nitrogen dioxide (NO_2), (4) ozone (O_3), (5) particulate matter, < 10 microns (PM_{10}), and (6) sulfur dioxide (SO_2). Ozone is not emitted directly into the air, but is formed when sunlight acts on emissions of nitrogen oxides and volatile organic compounds (VOCs) (USEPA 1998).

The primary and secondary NAAQS concentrations are presented in Table 3-7. Primary standards are also known as health effects standards, which are set at levels to protect the most susceptible individuals in the human population (very young, very old, and those with respiratory illness such as asthma) (USEPA 2001). Secondary standards, also known as quality of life standards, set limits to protect public welfare including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. Since both short- and long-term exposures are addressed, a single pollutant could have more than one primary standard.

It is important to understand the terms exceedance and violation of a standard, as they are not interchangeable. An exceedance is any single value greater than the standard. A violation occurs when the limits for both concentration and frequency of occurrence, as established in the CAA and its amendments, are exceeded.

Alamosa, Conejos, Costilla, Fremont, and Saguache counties are part of the Western Slope Region of the Colorado Air Quality Control Commission. Air quality concerns in this region are primarily from the negative effects of a recent surge in energy development. In the 1990s,

air quality concerns were primarily related to woodstoves, unpaved roads, and street sanding. These "area" sources were addressed in many Western Slope communities and are no longer as significant as the impacts from energy development, including direct emissions, support service impacts, and associated growth. Prescribed burns, fire use burns, and wildfires are also a source of air pollution in this region (CAQCC 2009).

TABLE 3-7. NATIONAL AND COLORADO AMBIENT AIR QUALITY STANDARDS

USEPA and Colorado Ambient Air Quality Standards				
Pollutant	**Averaging Time**	**Primary NAAQS**	**Secondary NAAQS**	**Colorado Standards**
Nitrogen Dioxide	Annual (arithmetic mean)	0.053 ppm (100 µg/m^3)	0.053 ppm (100 µg/m^3)	100 µg/m^3
Sulfur Dioxide	Annual (arithmetic mean) 24 hour Average 3 hour Average	0.03 ppm (80 µg/m^3) 0.14 ppm (365 µg/m^3) NA	NA NA 0.5 ppm (1300 µg/m^3)	15 µg/m^3 100 µg/m^3 700 µg/m^3
Carbon Monoxide	1 hour Average 8 hour Average	35.0 ppm (40 mg/m^3) 9.0 ppm (10 mg/m^3)	NA NA	40 mg/m^3 10 mg/m^3
Ozone	1 hour Average 8 hour Average	0.12 ppm (235 µg/m^3) 0.08 ppm	0.12 ppm (235 µg/m^3) NA	235 µg/m^3 NA
Lead	Calendar Quarter	1.5 µg/m^3	NA	NA
Particulate Matter (PM_{10})	Annual (arithmetic mean) 24 hour Average	50 µg/m^3 150 µg/m^3	50 µg/m^3 150 µg/m^3	50 µg/m^3 150 µg/m^3
Particulate Matter ($PM_{2.5}$)	Annual (arithmetic mean) 24 hour Average	15 µg/m^3 65 µg/m^3	15 µg/m^3 65 µg/m^3	NA NA
Nitric Oxide	NA	NA	NA	0.0558 ppm 0.154 ppm (1 hr. max)
Sulfates	NA	NA	NA	4.2 µg/m^3 9.7 µg/m^3 (24 hr. max)

Source: USEPA NAAQS, <*http://www.epa.gov/airs/criteria.html*>. Note: NAAQS for ozone (8-hour average) and particulate matter ($PM_{2.5}$) have been developed but not yet legislated.

3.2.9.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

Limited air quality information is available for Fremont County in general and there is no site-specific information for the BLM parcels proposed for exchange. Generally, the Table Mountain and Gribbles Park sites experience good air quality year-around (USEPA 2005b). The air quality index for 2004 ranged from near 1 in February to about 35 in June, which are in the good range for air quality (USEPA 2005b). Also during 2004, there were no days above the air quality index number of 100, which is the indicator of unhealthy levels of air pollutants. The PM_{10} (Particulate, diameter 10 micrometers) levels measured for Fremont County during 2005 were 33 micrograms per cubic meter ($\mu g/m^3$) (24-hour maximum) and 18 $\mu g/m^3$ (annual mean). These values are well below the USEPA Standards that are 150 $\mu g/m^3$ (24-hour average) and 50 $\mu g/m^3$ (annual mean) (USEPA 2005d).

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Regional air quality has been addressed in the Rio Grande NF Forest Plan and applies generally to the proposed project area. Generally, air quality on the Rio Grande NF rates among the best in the country. To date there have been no violations of NAAQSs within the Rio Grande NF, nor have any activities caused violations of the NAAQSs elsewhere. The air quality within the Rio Grande NF is considered good for all pollutants. The Weminuche Wilderness and much of the Rio Grande NF consistently have some of the best visibility in the nation. Air pollution that does occur is generated largely from unpaved roads (dust) and the smoke from wildfires and forest stand management fires.

Proposed San Luis Valley SLB Exchange Parcels

The air quality in the San Luis Valley is considered excellent; the entire area has been designated either attainment or unclassified for all pollutants (BLM 1989). Limited air quality information is available for Alamosa County and no data were available for Saguache County. The SLB proposed exchange parcels experience good to moderate air quality year-around (USEPA 2005d). The air quality index for Alamosa County during 2004 ranged from near 5 in January, February, April, May, and November to about 95 in late May to early June, which are in the good to moderate ranges for air quality (USEPA 2005b). Also during 2004 in Alamosa County, there were no days above the air quality index number of 100, which is the indicator of unhealthy levels of air pollutants. The PM_{10} levels measured for Alamosa during 2005 were 142 $\mu g/m^3$ (24-hour maximum) and 23.9 $\mu g/m^3$ (annual mean). These values are below the USEPA Standards that are 150 $\mu g/m^3$ (24-hour average) (USEPA 2005d).

Section 118 of the CAA requires national parks to meet all local, state, and Federal air pollution standards (NPS 2007). Additionally, NPS *Management Policies* 2001 addresses the need to analyze potential impacts on air quality during planning. GRSA is classified as a class I air quality area with the identified sources of air pollution including vehicle exhaust, space and water heating equipment, fuel storage tanks, camp fires, wildfires, wood burning stoves, and

agriculture. During 2001 estimates of emissions were prepared and GRSA was determined to have attained state and Federal ambient air quality standards (NPS 2005).

Air quality samples were gathered and analyzed since 1995 on GRSA, in the sand dune area east of the SLB tracts (GSDNM 1997). Four air-filtering modules made of Teflon, nylon, and quartz were gauged to replicate particulates that would lodge in the villi of human lungs and to assess visibility. The filters collected samples of organic and elemental carbon, ammonium sulfate, ammonium nitrate, zinc, selenium, lead, bromine, and soil. Tests of samples captured on the filters indicated much higher than average air quality, with GRSA meeting standards for wilderness (GSDNM 1997). While most tests were well below national averages, soil suspension was high during the spring season and was attributed to cultivation of agricultural lands and associated dust dispersal in the San Luis Valley. At this time, only PM_{10} (particulates) are monitored in GRSA and visibility is the only air quality resource value known to be affected by pollution (NPS 2007).

The CDPHE (2006) summarized 1996 emissions that occurred near to GRSA (50 kilometer [km] radius around the park) in the source categories of VOCs, NO_x, SO_2, PM_{10}, $PM_{2.5}$, and ammonia (NH_3) as they pertained to area haze (CDPHE 2006). Large sources of organic carbon were associated with light-duty vehicle emissions, solvent utilization, and residential wood combustion. The dominant NO_x sources were on-road mobile and agricultural equipment emissions (light- and heavy-duty vehicle and fugitive dust from paved and unpaved roads). The largest contributors to SO_2 emissions were off-road mobile sources (e.g., equipment for lawn and garden, recreation, commercial and industrial, agriculture, railroad, logging). Coarse and fine particulate matter was attributed to agricultural activities and to fugitive road dust. Ammonia emissions were attributed to agricultural activities.

BLM (1989) discussed air quality-related values, which include visibility, odors, and effects on flora, fauna, soils, water, geologic, and cultural features. Acid precipitation was considered a possible impact source for the San Luis Valley. Wet deposition pH measured in Alamosa during the 1980s showed weighted average pH of 5.00 to 6.02 (winter), 5.45 to 6.73 (spring), 5.16 to 5.68 (summer), and 5.03 to 5.51 (fall). The natural pH of precipitation is approximately 5.6 (BLM 1989).

3.2.9.2 Environmental Consequences/Mitigation

The proposed exchange of BLM and SLB parcels would not have direct effects on air quality. The significance of air quality impacts is determined by comparing projected air quality to NAAQSs. These air quality standards specify acceptable concentrations of air pollutants to protect public health and the environment. An effect on air quality would be considered (1) insignificant if it results from natural sources or from barely detectable human generation sources; (2) low if measurable quantities of human generated pollutants are detectable but below NAAQS action values; (3) moderate if there are few violations of the NAAQSs, limited aggravation of existing air quality violations, and limited exposure of sensitive receptors to increased pollutant concentrations; and (4) high if there is a violation of the NAAQSs, further aggravation of an existing air quality violation, or exposure of sensitive receptors to increased pollutant concentrations.

No Action Alternative

Under the No Action Alternative there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. BLM parcels as proposed would not be authorized for exchange under the No Action Alternative therefore effects on air quality from land exchange actions would be insignificant. The three counties experience good air quality year-around and there have been no violations of the NAAQSs resulting in insignificant air quality effects on sensitive receptors. The SLB parcels proposed for exchange would not be offered to the Federal government; therefore, effects on air quality from land exchange activities would be insignificant. The San Luis Valley has excellent air quality and the region has been designated either attainment or unclassified for all pollutants resulting in insignificant air quality effects on sensitive receptors.

Proposed Action

Under the Proposed Action the SLB would assume management of BLM lands proposed for exchange, but there would be no change in land use practices resulting in insignificant effects on local and regional air quality. Air quality for all three counties with Federal exchange land is good year-around and there have been no violations of the NAAQSs.

The SLB parcels proposed for exchange would be managed by the BLM, USFWS, and the NPS. The BLM would manage parcel 31 and continue historic leasing activity for grazing livestock resulting in insignificant effects on local and regional air quality. The BNWR would manage SLB exchange lands to enhance waterfowl production resulting in long-term insignificant effects on air quality and short-term, low to moderate, adverse effects on local air quality when prescribed fire is used as a management tool. The GRSA would manage SLB exchange lands for natural open space resulting in long-term insignificant effects on air quality and short-term, low to moderate, adverse effects on local air quality when prescribed fire is used as a management tool. The San Luis Valley has excellent air quality, there have been no violations of the NAAQSs, and the entire valley has been designated either attainment or unclassified for all pollutants. The BNWR and GRSA are partners in the Greater Sand Dunes Interagency Fire Management Plan (NPS 2005) and would adhere to the planning and coordination measures developed therein.

3.2.10 Areas of Critical Environmental Concern, Colorado Natural Areas, and Potential Conservation Areas

This section describes Federal lands with special management designations and needs, state designations of land with important natural resource values, and lands with conservation potential. Definitions are provided for sections: “Areas of Critical Environmental Concern,” “Colorado Natural Areas,” and “Potential Conservation Areas.”

3.2.10.1 Areas of Critical Environmental Concern

ACECs require special management attention to protect their important and relevant values. Special management attention refers to management prescriptions developed expressly to protect the important and relevant values of an area from potential effects of actions otherwise permitted by an RMP. Special management attention is unique to the area delineated and includes terms and conditions specifically to protect the important and relevant values occurring in that area.

ACECs must meet one or more of the following relevance and importance factors:

Relevance

1. A significant historic, cultural, or scenic value (including but not limited to rare or sensitive archeological resources and religious or cultural resources important to Native Americans).
2. A fish or wildlife resource (including but not limited to habitat for endangered, sensitive, or threatened species or habitat essential for maintaining species diversity).
3. A natural process or system (including but not limited to endangered, sensitive, or threatened plant species, or habitat essential for maintaining species diversity).
4. Natural hazards (including but not limited to areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs). A hazard caused by human action may meet the relevance criteria if it is determined through the RMP process that it has become part of a natural process.

Importance

1. Has more than locally significant qualities that give it special worth, consequence, meaning, distinctiveness, or cause for concern, compared to any similar resource.
2. Has qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change.
3. Has been recognized as warranting protection in order to satisfy national priority concerns or to carry out the mandates of the Federal Land Policy and Management Act.
4. Has qualities that warrant highlighting in order to satisfy public or management concerns about safety and public welfare.
5. Poses a significant threat to human life and safety or to property.

3.2.10.2 Colorado Natural Areas

The Colorado Natural Areas Program was created by legislative act (Colorado Natural Areas Act; 33-33 CRS 1977)to identify, evaluate, and protect natural features or phenomena through a system of designated natural areas. To be protected are diverse ecosystems, ecological communities, and other natural features or phenomena representing the natural heritage of Colorado threatened with irreversible change (CNAA 1977). Ecological, geological, and paleontologic sites recognized under the Colorado Natural Areas Program provide one or more

of the following benefits: (1) serve as examples of the native condition in studies relating to air, water, and soil quality and habitat productivity; (2) serve as resource material from which new knowledge can be derived and as a reservoir of genetic material that has present and future value to scientific inquiry; (3) provide habitat for rare or endangered animal or plant species; (4) serve as outdoor classrooms and laboratories for scientific study by students of all ages; or (5) serve as areas of natural beauty, inspiration, and diversity that meet aesthetic needs and which enrich the meaning and enjoyment of human life (CNAA 1977).

3.2.10.3 Potential Conservation Areas

The CNHP delineates sites based on the ecological processes that are necessary to support the continued existence of an element or elements of natural heritage significance (CNHP 1999a). Generally, Potential Conservation Areas (PCAs) are areas of land that provide both the habitat and the ecological processes around which a planning boundary is established. Factors included in establishing boundaries include

- The extent of current and potential habitat for the elements present, considering the ecological processes necessary to maintain or improve existing conditions
- Species movement and migration corridors
- Maintenance of surface water quality within the site and the surrounding watershed
- Maintenance of the hydrologic integrity of the groundwater, e.g., by protecting recharge zones
- Land intended to protect the site against future changes in the use of surrounding lands
- Exclusion or control of invasive exotic species
- Land necessary for management or monitoring activities.

PCAs are ranked in terms of biodiversity significance (CNHP 1999a). The significance ranks can be “Outstanding,” “Very High,” “High,” “Moderate or Regional,” or “General Biodiversity” or “Local Biodiversity.”

3.2.10.4 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

There are no ACECs, Colorado natural areas, or PCAs within the Table Mountain parcels proposed for exchange. The Garden Park ACEC and designated Colorado natural area is about 13 miles west of the proposed Table Mountain parcels. There are no ACECs, Colorado natural areas, or PCAs within the Gribbles Park parcels proposed for exchange. The High Mesa Grassland ACEC and designated Colorado natural area is about 15 miles southeast of the proposed Gribbles Park exchange parcels.

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

There are no ACECs or Colorado natural areas within the Biedell Creek parcels proposed for exchange. Carnero Creek PCA is considered of moderate significance in terms of biodiversity rank, occurs on the east-facing slope of the San Juan Mountains, includes approximately 13,000 ac, and includes all or portions of proposed BLM exchange parcels 11, 12, 13, and 14 (CNHP 1998). At the elevation of BLM exchange parcels of the Biedell Creek site, Carnero Creek flows across private lands. The lower elevation habitat where BLM exchange parcels occur support piñon pine – juniper woodlands, mountain mahogany shrublands, blue grama shortgrass prairie, and mountain muhly – Arizona fescue montane grasslands (CNHP 1998). Mountain willow / mesic graminoids and speckled alder / mesic graminoids riparian shrubland associations occur along the creek. Also present are the rare native Rio Grande cutthroat trout and the nonnative white sucker (*Catostomus commersoni*) (CNHP 1998).

There are no ACECs, Colorado natural areas, or PCAs within the La Jara Reservoir parcels proposed for exchange. The Ra Jadero ACEC and designated Colorado natural area occurs on Federal land adjacent to the La Jara Reservoir parcels (but not part of the exchange as proposed) and supports Ripley's milkvetch, a BLM special-status plant species that occurs in this area (see Section 3.18). The site is part of the eastern ridges and canyons of the San Juan Mountains and protects part of the largest known Colorado population of Ripley's milkvetch. This ACEC also represents an outstanding example of relict montane grassland and ponderosa pine savanna plant communities (CNAP 2009). The name "Rajadero" possibly derives from the Spanish "rajador" – wood splitter, or "rajadura" – cleft, fissure, or crack (CNAP 2009).

Proposed San Luis Valley SLB Exchange Parcels

There are no ACECs within the SLB parcels proposed for exchange. The 640-acre Indian Spring designated Colorado natural area occurs on SLB parcels proposed for exchange located along Big Spring Creek. Indian Spring, also known as Big Spring by residents, was designated a Colorado natural area by the Colorado Natural Areas Program and SLB because it is the largest of the natural cold springs in the San Luis Valley, lying within the active, warm climate of the Great Sand Dunes field. Big Spring Creek has been separated from the Rio Grande for several thousand years, isolating the aquatic fauna of it and Indian Spring (CNAP 2009). The area supports a rare species of tiger beetle and an unusual diversity of wasp, bee, and butterfly species. There is evidence of Paleo-Indian occupation dating to approximately 11,500 years ago, supporting the suspected longevity and importance of these springs to rare species and to humans (CNAP 2009).

Three PCAs have been identified that partially occupy SLB parcels proposed for exchange: Great Sand Dunes, San Luis Lakes, and Weisman Lakes (CNHP 1998, 1999a). Great Sand Dunes PCA includes all or portions of parcels 27, 28, 29, 30, 31, 35, and 37. San Luis Lakes PCA includes all or portions of parcels 26, 27, 28, 29, 35, 36, 37, 38, 39, and 40. These PCAs have overlapping boundaries, thus the inclusion in each site of some of the same parcels proposed for exchange by the SLB. Weisman Lakes PCA includes all or portions of parcels 26 and 41.

Great Sand Dunes PCA is considered of outstanding significance in terms of biodiversity rank, occurs on the playa lakes, sand sheet, and main sand dune mass of the San Luis Valley, and includes approximately 300 mi^2 (CNHP 1999b). Included are the Great Sand Dunes and Sand and Medano creeks that drain the western slopes of the Sangre de Cristo Mountains. This ecosystem is considered one of the most significant biological sites in Colorado (CNHP 1999b). It provides habitat for six endemic insect species and more than 900 species of insects are presently known. In all there are 14 rare invertebrate species, 8 plant communities, 2 rare plant species, and 3 mammal subspecies present within this PCA (CNHP 1999a).

San Luis Lakes PCA is considered of very high significance in terms of biodiversity rank, occurs on the playa lakes area of the San Luis Valley, and includes approximately 34,815 acres (CNHP 1999a). Included are San Luis Lakes State Park and Big Spring and Sand creeks, which partially drain the western slopes of the Sangre de Cristo Mountains. San Luis Lakes State Park has two natural lakes that have no outlets in most years and Big Spring Creek that receives groundwater from the aquifer under the Great Sand Dunes beginning at Indian Springs. This area has the highest concentration of freshwater wetlands in the southern Closed Basin within the San Luis Valley (CNHP 1999a). The PCA contains one of the largest concentrations of the slender spider flower with more than one million plants estimated to occur within the wetland habitats. There are also eight plant communities (four are rare within Colorado), three additional rare plant species, two rare mammal subspecies, seven rare bird species, and two rare insect species (CNHP 1999a).

Weisman Lakes PCA is considered of high significance in terms of biodiversity rank, occurs in the playa lakes area of the San Luis Valley, and includes approximately 7,800 acres (CNHP 1998). The lakes have formed at the confluences of prominent drainages in the San Luis Valley, including San Luis, Saguache, Deadman, Cottonwood, and Russell creeks. Permanent wetlands and open water occur, particularly large stands of spikerush (*Eleocharis palustris*). Also present are the rare native Rio Grande chub (*Gila pandora*), introduced fathead minnows (*Pimephales promelas*), eared grebe (*Podiceps nigricollis*), striped chorus frog (*Pseudacris triseriata*), plains spadefoot (*Spea bombifrons*), and Great Plains toad (*Bufo cognatus*) (CNHP 1998). Drier areas in the southern portion of this site support greasewood / saltgrass shrubland habitat and associated San Luis Valley endemic small mammals the silky pocket mouse (*Perognathus flavus sanluisi*) and the thirteen-lined ground squirrel (*Spermophilus tridecemlineatus blanca*).

3.2.10.5 Environmental Consequences/Mitigation

ACECs are considered nonrenewable because of the rarity of the resources so designated by the BLM. There are no ACECs, two Colorado natural areas, and four PCAs adjacent to or within proposed BLM and SLB exchange parcels. An impact on ACECs or other important resources would be considered (1) insignificant if the element and the site are subjected to natural processes and monitored; (2) low if the element and the site are subjected to barely measurable natural processes or low levels of human land use including livestock grazing, motorized recreation, or logging; (3) moderate if the element and site are subjected to measurable levels of natural processes or moderate to high levels of human land use including livestock grazing,

motorized recreation, or logging; and (4) high if the element for which the site was designated were lost or damaged irreparably.

No Action Alternative

Under the No Action Alternative there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. SLB management of portions of the Indian Springs designated Colorado natural area, Great Sand Dunes PCA, San Luis Lakes PCA, and Weisman Lakes PCA would continue under Colorado Natural Areas Program articles of designation, Stewardship Trust Program guidance, and provisions within lease agreements resulting in long-term, insignificant to low, adverse effects due to livestock and American elk grazing, irrigation, mowing, and prescribed fires.

Proposed Action

Under the Proposed Action the BLM parcels would be exchanged to SLB management, and SLB parcels would be exchanged for management by the BLM, USFWS, and NPS. There are no ACECs or other specially designated areas within the Federal exchange parcels of the Table Mountain and Gribbles Park sites resulting in long-term insignificant effects. The Carnero Creek PCA occupies a portion of the Federal Biedell Creek exchange parcels resulting in long-term, insignificant to low adverse effects due to water diversion for irrigation, livestock and American elk grazing, potential motorized recreation, and potential development. There are no ACECs or other specially designated areas within the Federal exchange parcels of the La Jara Reservoir site.

There are no ACECs or other specially designated areas within SLB parcel 31 that would be exchanged to the BLM resulting in long-term insignificant effects. The Weisman Lakes PCA occupies a portion of the SLB parcels proposed for exchange to the USFWS resulting in long-term, insignificant to low, beneficial effects due to resource monitoring, habitat maintenance and management, and habitat protection. The Great Sand Dunes and San Luis Lakes PCAs (and included Indian Springs designated Colorado natural area) occupy portions of the SLB parcels proposed for exchange to the NPS resulting in long-term, insignificant to low, beneficial effects due to resource monitoring, habitat maintenance and management, environmental education programs, research, and habitat protection.

3.2.11 Wild and Scenic Rivers

During the decade of the 1960s, it was apparent that many rivers in the United States were rapidly being dredged, dammed, diverted, and degraded. In response, Congress established the Wild and Scenic Rivers Act (P.L. 90-542, as amended) in 1968 with the following statement of policy:

> *It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar*

> *values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of future generations. The Congress declares that the established national policy of dam and other construction at appropriate sections of the rivers of the United States needs to be complemented by a policy that would preserve other selected rivers or sections thereof in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes.*

National wild and scenic rivers are designated in one of two ways: (1) by act of Congress or (2) by the Secretary of the Interior at the request of a governor. The designation of a river under the Wild and Scenic Rivers Act provides legal protections from adverse development and provides a mechanism for management of the river's resources (*National Environmental Compliance Handbook 2003*). The principle effect of the act is to preclude or to severely limit construction of dams and other water resources projects that might affect the free-flowing character of the river or adversely affect the values for which a river was designated.

Boundaries of wild and scenic rivers are limited to no more than 320 acres per river mile (on both sides of the river) and purchase of fee title within this boundary is limited to no more than 100 acres per mile (*National Environmental Compliance Handbook 2003*). Ongoing regular uses of private lands, particularly those existing at the time of designation, are not directly affected. Most private land uses, such as homes, farms or ranches, are compatible with wild, scenic, and recreational river management. Rights to future development of private lands can be purchased under land acquisition authorities; however, the designation affects the management of Federal lands in the river corridor.

Three classifications of wild and scenic rivers have been defined in the Wild and Scenic Rivers Act:

- Wild: Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. (These represent vestiges of primitive America.)
- Scenic: Those rivers or sections of rivers that are free of impoundments with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.
- Recreational: Those rivers or sections of rivers readily accessible by road or railroad that might have some development along their shorelines, and that might have undergone some impoundment or diversion in the past.

An evaluation by the NPS to determine eligibility of creeks within GRSA to be designated and managed as wild and scenic rivers would be the first of three steps necessary, e.g., a river or river segment is determined eligible, meaning it is free flowing, and has outstandingly remarkable values. Outstandingly remarkable values are the river-related values that qualify the river segment as unique and worthy of special protection, forming the basis for the designation as a wild and scenic river. The second step would be to declare the river or river segment as suitable; identify it as wild, scenic, or recreational; determine the river corridor; and prepare a

management plan. The third step would be creating and confirming the Federal legislation required for designation of the river or river segment.

3.2.11.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

There are no wild and scenic rivers within the Table Mountain or Gribbles Park parcels proposed for exchange.

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

There are no wild and scenic rivers within the Biedell Creek or La Jara Reservoir parcels proposed for exchange.

Proposed San Luis Valley SLB Exchange Parcels

There are no currently designated wild and scenic rivers within the SLB parcels proposed for exchange. Three creeks that flow near or across SLB parcels proposed for exchange were evaluated for wild and scenic river status by the NPS. They are Sand, Big Spring, and Little Spring. In all, 12 creeks (including two segments of Sand Creek) that constitute the major waterways within GRSA were evaluated (NPS 2007). Sand Creek was evaluated in two segments because the character of the drainage changes significantly where it flows west from the Sangre de Cristo Mountain Range. The creeks evaluated were:

- Mosca Creek (entire length, approximately 5.25 miles)
- Medano Creek (from Medano Lake onto the sand sheet, past the southern end of the dunes, approximately 15.5 miles)
- Castle Creek (entire length, approximately 2.75 miles)
- Sawmill Creek (entire length, approximately 3.0 miles)
- Buck Creek (entire length, approximately 3.0 miles)
- Little Medano Creek (entire length, approximately 5.0 miles)
- Cold Creek (entire length, approximately 6.0 miles)
- Sand Creek (evaluated in two segments from the headwaters to where the creek exits the park and preserve, approximately 21.0 miles)
- Pole Creek (from where the stream enters the park and preserve to where it flows underground, approximately 4.5 miles)
- Deadman Creek (within the park and preserve boundaries, approximately 4.5 miles)
- Big Spring Creek (from Indian Springs to where the creek is diverted into irrigation ditches, approximately 8.5 miles)
- Little Spring Creek (from the origin of the spring to where it enters a playa lake, approximately 4.0 miles).

Ten of the 12 creeks, or segments thereof, were found eligible and suitable for inclusion in the National Wild and Scenic River System including Sand and Big Spring creeks.

3.2.11.2 Environmental Consequences/Mitigation

Designated wild and scenic rivers do not occur in the vicinity of BLM parcels proposed for exchange. Eligible wild and scenic rivers (creeks) flow across or into some SLB parcels proposed for exchange to the NPS. An effect on wild and scenic rivers would be considered (1) insignificant if there is little, unmeasurable increase in visitation by humans; (2) low if there is slight, measurable increase in visitation by humans but no encroachment by development near boundaries; (3) moderate if there is low, measurable increase in visitation by humans or minor development near boundaries; and (4) high if there is low to moderate, measurable visitation by humans or low development near boundaries.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. Management of Federal lands proposed for exchange would result in no effects on wild and scenic river designations. There would be no change in eligible wild and scenic river visitation or human encroachment under the No Action Alternative. Future negotiations between the NPS and SLB to designate the eligible Sand and Big Spring creeks corridors could occur resulting in long-term, negligible to moderate beneficial effects by extending the natural resource management focus along creek corridors.

Proposed Action

Under the Proposed Action, the BLM parcels would be exchanged to SLB management, and SLB parcels would be exchanged for management by the BLM, USFWS, and NPS. The BLM parcels would be exchanged to the SLB for management as trust lands resulting in insignificant effects to wild and scenic river designations. The SLB parcel exchanged to the BLM does not contain rivers or creeks. The SLB parcels exchanged to the USFWS do not support stream segments that are eligible to become wild and scenic rivers. SLB parcels exchanged to the NPS contain reaches of the eligible Sand and Big Spring creeks that would be further evaluated for wild and scenic river designation by the NPS resulting in long-term, negligible to moderate beneficial effects by extending the natural resource management focus along the creek corridors.

3.2.12 Wilderness

The Wilderness Act of 1964 provides for designation and protection of some roadless tracts of land. The statement of policy includes the following provisions of Section 2, a definition is provided in provision “c”:

a) In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness. For this purpose there is hereby established a National Wilderness Preservation System to be composed of Federally-owned areas designated by Congress as "wilderness areas," and these shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness; and no Federal lands shall be designated as "wilderness areas" except as provided for in this chapter or by a subsequent Act.

b) The inclusion of an area in the National Wilderness Preservation System notwithstanding, the area shall continue to be managed by the Department and agency having jurisdiction thereover immediately before its inclusion in the National Wilderness Preservation System unless otherwise provided by Act of Congress. No appropriation shall be available for the payment of expenses or salaries for the administration of the National Wilderness Preservation System as a separate unit nor shall any appropriations be available for additional personnel stated as being required solely for the purpose of managing or administering areas solely because they are included within the National Wilderness Preservation System.

c) A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this chapter an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

3.2.12.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

There are no wilderness areas encompassing the Table Mountain BLM parcels proposed for exchange. The southern boundary of the Beaver Creek Wilderness Study Area is located

approximately one mile north of the proposed Table Mountain parcels. There are no wilderness areas encompassing the Gribbles Park BLM parcels proposed for exchange.

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

There are no wilderness areas encompassing the Biedell Creek BLM parcels proposed for exchange. The La Garita Wilderness is located to the west-northwest of the Biedell Creek site and the South San Juan Wilderness is located to the southwest. There are no wilderness areas encompassing the La Jara Reservoir BLM parcels proposed for exchange. The South San Juan Wilderness is located to the west-southwest of the La Jara Reservoir site and the Weminuche Wilderness lies to the west.

Proposed San Luis Valley SLB Exchange Parcels

There are no wilderness areas encompassing the SLB parcels proposed for exchange. The Great Sand Dunes Wilderness Study Area occurs immediately east and north of the SLB site and parcels exchanged to the NPS would be evaluated for their wilderness potential (NPS 2007).

3.2.12.2 Environmental Consequences/Mitigation

Designated wildernesses and wilderness study areas occur in the vicinity of parcels proposed for exchange. An effect on wilderness would be considered (1) insignificant if there is little, unmeasurable increase in visitation by humans; (2) low if there is slight, measurable increase in visitation by humans but no encroachment by development near boundaries; (3) moderate if there is low, measurable increase in visitation by humans or minor development near boundaries; and (4) high if there is low to moderate, measurable visitation by humans or low development near boundaries.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. There would be no change in wilderness status of proposed exchange parcels resulting in long-term insignificant effects. Selected SLB parcels could be considered for addition to the Great Sand Dunes Wilderness Study Area resulting in long-term, insignificant to low, beneficial effects on a functioning wilderness landscape.

Proposed Action

Under the Proposed Action, the proposed BLM parcels would be exchanged to SLB management, and SLB parcels would be exchanged for management by the BLM, USFWS, and NPS. The BLM parcels would be exchanged to the SLB for management as trust lands resulting in insignificant effects on wilderness designations. The SLB parcel 31 exchanged to the BLM generally does not possess wilderness values. SLB parcels exchanged to the BNWR generally do not possess wilderness values. SLB parcels exchanged to the NPS would be

evaluated for wilderness potential resulting in long-term, negligible to moderate beneficial effects by potentially expanding and enriching the Great Sand Dunes Wilderness Study Area.

3.2.13 Hazardous or Solid Wastes

A Phase I Environmental Site Assessment was performed on all properties proposed for exchange (Michael Baker Jr., Inc. (MBI) 2009a-e). The purpose of a Phase I Environmental Site Assessment is to identify recognized environmental conditions (RECs) or other environmental liability associated with the parcels proposed for exchange. Phase I Environmental Site Assessments conducted herein were performed in accordance with American Society for Testing and Materials, E 1527-05: *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process* and ASTM E 2247-08: *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process for Forestland or Rural Property*.

The Phase I ESAs provided findings that were limited to information obtained from sources contacted during records review and interviews and observations recorded onsite. A general property walk- and drive-through using existing roads and trails, interviews, records review, and an agency database search was the typical level of effort. A site description was prepared that provided the following:

- Vicinity characteristics
- Descriptions of structures, roads, and other improvements on the subject property
- Current uses of the property
- Past uses of the property
- Current uses of adjoining properties.

A records review was conducted to identify general site conditions and occurrences (operational and historical) that might have affected proposed parcels or land in its general vicinity that could have resulted in releasing contaminants to the environment. Historical use information for both the parcels subject to exchange and of adjoining properties was sought. The records review provided information encompassing the following:

- Standard environmental record sources, Federal and state
- File search
- Physical setting sources
- Site topography and surface drainage features
- Geologic and hydrogeologic characterization.

Please refer to the “Vegetation,” “Floodplains,” “Wetlands,” and “Riparian Habitat” sections for maps and descriptions of wetlands present on the proposed exchange parcels.

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

The Table Mountain BLM (parcels 1–4, 45 and 46) site comprises 4,372.62 acres 16 miles east-northeast of Canon City, is adjoined by SLB and private land, and has been managed by the Federal government since the lands were ceded under the 1848 Treaty of Guadalupe Hidalgo (MBI 2009a). The landscape is characterized by shrublands, piñon pine – juniper woodlands, and sparsely vegetated rock outcrops and talus slopes.

Table Mountain parcels are undeveloped and support cattle grazing, recreation in the form of hunting, and decorative rock harvesting by permit. The adjoining SLB lands also appear to be undeveloped and have similar economic and recreational values. Adjacent, privately owned properties are mostly undeveloped; home sites are rare and widely distributed (MBI 2009a).

Environmental Data Resources, Inc. (EDR) of Milford, Connecticut performed an environmental records search of Federal and state records to identify contaminant releases into the environment from Table Mountain parcels proposed for exchange or from adjacent properties. The Fort Carson Military Reservation was identified in the records search; it is located east of parcels 1 and 46.

The Colorado Division of Minerals and Geology County database (CODMG 2009) was used to determine if current or past mines occur on Table Mountain parcels proposed for exchange or in the vicinity. Mining operations (past and present) were evaluated and High Plains Stone Company was determined to have the only active mine or quarry. It is located outside the boundaries of the BLM exchange parcels, occurring on a neighboring property (see Table 3-8). Environmental concerns typically connected with mining include acid mine drainage, equipment refueling and potential spills, and equipment maintenance. However, on the Table Mountain BLM exchange parcels there is no evidence of any type of environmental contaminants (MBI 2009a).

Site visits by MBI staff occurred on two dates in 2009 (April 21, 22) to visually inspect the property for evidence of environmental concerns. Some of the property however was inaccessible because of the terrain and few roads. An abandoned homestead was recorded, along with a few discarded tires, a water collection system, and a washtub. Abandoned mines were evident at the Table Mountain parcels but do not represent a recognized environmental condition (REC). There were no hazardous substances, hazardous substance containers, underground storage tanks, or aboveground storage tanks observed. Additionally, there were no abnormal odors or pools of liquid other than water flowing in perennial creeks. No PCB-containing equipment, drums, or visible signs of solid waste disposal were observed nor was radon exposure considered a potential issue since there are no structures present.

Gribbles Park BLM parcels (5, 6, and 7) proposed for exchange comprise 720 acres located 23 miles northwest of Parkdale, are characterized by herbaceous rangelands with patches of woodlands, and are adjoined by SLB and private land. These parcels were ceded under the Treaty of Guadalupe Hidalgo in 1848 and have been under Federal management since that time (MBI 2009b).

Gribbles Park BLM exchange parcels are undeveloped, evidently mostly unused, and support horse grazing The adjoining SLB lands also appear to be undeveloped and have similar economic and recreational values. Adjacent, privately owned properties are mostly undeveloped and also support grazing and hunting recreation (MBI 2009b).

EDR performed an environmental records search of Federal and state records to identify contaminant releases into the environment from the Gribbles Park parcels proposed for exchange or from adjacent properties. No records of contaminants or releases were found. A Colorado Division of Minerals and Geology GIS map (CODMG 2009) was used to determine if current or past mines occur on Gribbles Park parcels and none were recorded.

Site visits by MBI staff on April 21 and 22, 2009 identified no hazardous substances, hazardous substance containers, underground storage tanks, or above-ground storage tanks. Additionally, there were no abnormal odors or pools of liquid other than water flowing in perennial creeks. No PCB-containing equipment, drums, or visible signs of solid waste disposal were observed nor was radon exposure considered a potential issue since there are no structures present.

In summary, neither the Table Mountain nor Gribbles Park BLM parcels proposed for exchange in Fremont County have known or suspected RECs or other known environmental liabilities.

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Biedell Creek BLM proposed exchange parcels (8, 9, 10, 11, 12, 13, and 14) comprise 11,479.58 acres located 5 miles north of La Garita in Saguache County. The parcels are characterized by shrublands and piñon pine – juniper woodlands. These parcels were ceded under the Treaty of Guadalupe Hidalgo in 1848 and have been under Federal management since that time (MBI 2009c).

Biedell Creek parcels are mostly undeveloped and support cattle grazing and recreation in the form of camping and hunting. Most of the adjoining Federal and SLB lands also appear to be undeveloped and have similar economic and recreational values. Adjacent, privately owned properties are more developed, containing several houses and fallow fields. The remaining private land supports cattle grazing (MBI 2009c).

EDR performed an environmental records search of Federal and state records to identify contaminant releases into the environment from proposed Biedell Creek exchange parcels or from adjacent properties. No records of contaminants or releases were determined. A Colorado Division of Minerals and Geology County Report GIS map (CODMG 2009) was used to determine if mines occur on the Biedell Creek site and no operating mines were recorded.

A site visit was conducted by MBI staff on April 19 and 20, 2009, to visually inspect the property for any evidence of environmental concerns. Some of the property; however, was inaccessible because of the terrain and few roads. Some trash including cans and bottles were observed and recorded in parcel 11, near an old campsite.

TABLE 3-8. PAST AND CURRENT ACTIVE AND INACTIVE MINES OCCURRING ON TABLE MOUNTAIN BLM PARCELS AND ON ADJACENT PROPERTIES

Operator	Permit Type	Permit Status	Location	Commodities Mined
Capraro Mining Corporation	Constructed limited impact	Revoked & Terminated (2001)	Township 17S, Range 68W, Section 21 (Within Parcel 45)	Anhydrite and gypsum
Clinton and Emma Williams	Illegal	Terminated (2002)	Township 18S, Range 68W, Section 4 (West of Parcel 4 and South of Parcel 45)	Sand and gravel
Heather Land and Cattle Corporation / Heather Pit #1	Constructed limited impact	Terminated (1994)	Township 17S, Range 68W, Section 23 (Adjacent to Parcel 46)	Quartz
Heather Land & Cattle Corporation / Heather Quarry	Construction regular operation	Application withdrawn (1987)	Township 17S, Range 68W, Section 15 (Within Parcel 2)	Sandstone
High Plains Stone Company / South 40 Quarry	Constructed limited impact	Active (Surface)	Township 17S, Range 68W, Section 14 (North of Parcel 46; South of Parcel 1)	Stone
Lakewood Brick & Tile Company / Gypsy 1 & 2	Constructed limited impact	Terminated (2002)	Township 18S, Range 68W, Section 10 (South of Parcel 4)	Clay
Nutritional Research & Development / Gypsum	Construction regular operation	Terminated (Date not available)	Township 17S, Range 68W, Section 21 (Within Parcel 45)	Gypsum
Nutritional Research & Development / Red Devil Mine	Construction regular operation	Terminated (2002)	Township 17S, Range 68W, Section 23 (Within Parcel 46)	Gypsum
Table Mountain Quarries, Inc. / Table Mountain Quarry	Construction regular operation	Revoked (1991)	Township 17S, Range 68W, Section 22 (Adjacent to Parcel 45)	Aggregate
Green Construction Company / Table Mountain Quarry	Construction regular operation	Terminated (1974)	Township 17S, Range 68W, Section 26 (South of Parcel 26)	Granite, granite gneiss

Source: MBI 2009a

There were no hazardous substances, hazardous substance containers, underground storage tanks, or aboveground storage tanks observed on the Biedell Creek parcels. Additionally, there were no abnormal odors or pools of liquid other than water flowing in perennial creeks. No PCB-containing equipment, drums, or visible signs of significant solid waste disposal were observed. An inactive campsite occurs in parcel 11. Radon exposure was not considered a potential issue since there are no structures present on the Biedell Creek BLM parcels proposed for exchange.

La Jara Reservoir BLM parcels (15, 16, 17, 18a, 18b, 18c, 19, 20, 21, 22, 23, and 24) proposed for exchange comprise 4,537.38 acres located 37 miles southwest of Alamosa in Conejos County are characterized by grasslands, shrublands, and piñon pine – juniper woodlands and montane and subalpine forests, including stands of quaking aspen. These parcels were ceded under the Treaty of Guadalupe Hidalgo in 1848 and have been under Federal management since that time (MBI 2006d).

La Jara Reservoir exchange parcels are largely undeveloped and support cattle grazing and recreation in the form of camping, fishing, and hunting. Most of the adjoining CDOW lands appear to be undeveloped. The adjoining Federal and SLB lands also appear to be undeveloped and have similar economic and recreational values. Adjacent, privately owned properties to the east have been developed with several home sites and ranching operation centers (MBI 2009d).

EDR performed an environmental records search of Federal and state records to identify contaminant releases into the environment from La Jara Reservoir exchange parcels or from adjacent properties. No records of contaminants or releases were found. A Colorado Division of Minerals and Geology County GIS map (CODMG 2009) was used to determine if mines occur on La Jara Reservoir parcels and none were recorded.

MBI staff conducted a site visit on April 19, 2009, to visually inspect the property for any evidence of environmental concerns. Some of the property, however, was inaccessible because of the terrain and few roads. No debris, structures or significant improvements were noted on the property.

There were no hazardous substances, hazardous substance containers, underground storage tanks, or aboveground storage tanks observed on the La Jara Reservoir parcels. Additionally, there were no abnormal odors or pools of liquid, other than water flowing in perennial creeks. No PCB-containing equipment, drums, or visible signs of significant solid waste disposal were observed nor was radon exposure considered a potential issue because there are no structures present.

In summary, for Biedell Creek and La Jara Reservoir proposed BLM exchange parcels, there are no known RECs or other known environmental liabilities.

Proposed San Luis Valley SLB Exchange Parcels

San Luis Valley SLB parcels (26–44, and 47) proposed for exchange comprise 57,056.11 acres located north of Alamosa and northeast of Monte Vista in Alamosa and Saguache counties.

These parcels are characterized by grasslands and shrublands, riparian woodlands, and some agricultural lands. Forming a portion of the school trust lands and managed by the SLB, the USFWS and TNC represent major tenants (MBI 2009e). Two private landowners (parcels 31 and 33) are also tenants. The State of Colorado or the Medano-Zapata Ranch has owned the land since the 1870s with the primary use that of supporting American bison and cattle grazing. Historically, parcels 32, 34, 41, 42, and 26 were part of the Cabeza de Vaca Land and Cattle Company Ranch. The Medano parcels of the Medano-Zapata Ranch included parcels 27, 28, 29, 30, 35, 36, 37, 38, 39, 40, and portions of 26.

The Medano-Zapata Ranch headquarters occupied by TNC (parcel 37) includes a one-story structure for the administration office, a garage attached to the one-story structure, and large corrals for holding and working with American bison. The former, abandoned Medano-Zapata Ranch (west of parcel 37) is composed of several wooden structures including the ranch house, storage buildings, and corrals (where a large cattle dipping tank is present). On parcel 27, there is an abandoned wooden ranch house, shed, corrals, and support buildings/structures. TNC property adjoining parcel 28 has a two-story wooden residential house used by a TNC employee and an unpaved parking area. There is also a two-story wooden residential cabin with unpaved parking at this location.

The U.S. Bureau of Reclamations's (USBR) Closed Basin Project is located in the San Luis Valley and is part of a water management program. In essence, Colorado water users resupply the Rio Grande for use in New Mexico and down-drainage (MBI 2009e). Some portions of the SLB parcels proposed for exchange lie within this water management program's jurisdictional area (located at the western and southwestern boundaries of the SLB parcels).

Leasing arrangements with the SLB for use of the proposed exchange parcels include TNC for the southernmost parcels, USFWS for the parcels located to the west and southwest, and private landowners lease parcel 33 (located at the northern boundary) and parcel 31 (located at the eastern boundary). TNC's land use includes managing a preserve and providing grazing for more than 900 head of American bison. The majority of land used by all tenants is undeveloped.

Adjoining properties include BNWR and grazing lands to the north, agricultural and grazing lands to the south, GRSA and open range to the east, and private land and the CSP-managed San Luis Lakes State Park to the west**.**

EDR performed an environmental records search of Federal and state records to identify contaminant releases into the environment from SLB or from adjoining properties. One recorded site was located near parcel 30, a gas station with a leaking underground storage tank. This recorded site was reported in June 1990 and its status is "closed." A Colorado Division of Minerals and Geology GIS map (CODMG 2009) was used to determine if mines occur on SLB parcels. The county report identified one mine site listed as an "illegal borrow pit" near parcel 26. The pit was inspected but no environmental impacts were evident (MBI 2009e).

Site visits by MBI staff were conducted on four dates in 2009 (April 14, 15, 16, and 18) to visually inspect the property for any evidence of environmental concerns and to verify findings

from an earlier Phase I Environmental Site Assessment performed in December 2005 and a Phase II investigation in May 2007. Some of the property, however, was inaccessible because of the terrain and few roads. Six potential RECs were observed in the December 2005 Phase I Environmental Site Assessment. The sites and the findings from the Phase II investigation are described in Table 3-9.

Some potentially hazardous materials were observed on adjoining properties including materials used for cattle dipping (see Table 3-9). "Black Leaf 40" was a very viscous compound used to treat cattle; the cattle were treated three times at two-week intervals in the fall during times of heavy pest infestation (MBI 2009e). Several other containers, including paint cans, are present on these parcels.

There are three aboveground storage tanks currently in use on parcel 37; however, there are no obvious signs of leaks. Additionally, there is one old aboveground storage tank located on the former Medano-Zapata Ranch which was associated with cattle dipping. Several rusted drums were observed on SLB parcels proposed for exchange during the site visits; the contents were unknown. Stressed vegetation was observed in the vicinity of the cattle dip tank, near an empty drum from an abandoned ranch site, and at other locations documented during the site visits (see Table 3-9).

No unusual odors, PCB-containing equipment, or pools of liquid, other than water flowing in perennial creeks, were observed on the parcels. There are several historic artesian wells located on the SLB parcels but they were not considered areas of potential contamination. Two dump sites located on parcel 26 contained several pieces of solid waste (see Table 3-9). One of the sites was characterized by glass bottles, car parts, 5-gallon metal cans, and some ceramic pieces. The other dump site is smaller and was characterized by piles of wood, pieces of metal, empty paint cans, and several plastic 5-gallon buckets. On parcel 39, there is an abandoned trailer (MBI 2009e). Because there are structures present on the SLB parcels proposed for exchange, there is potential for radon exposure.

In summary, six potential RECs were observed and recorded in the 2005 Phase I Environmental Site Assessment. A Phase II investigation in 2007 concluded that these sites do not impact the subject exchange parcels. A follow-on Phase I Environmental Site Assessment in 2009 confirmed these findings and stated that no known RECs or other environmental liabilities are associated with the proposed San Luis Valley exchange parcels.

3.2.13.1 Environmental Consequences/Mitigation

An effect on hazardous and solid waste management would be considered (1) insignificant if there are no RECs or other environmental liability; (2) low if there are RECs or other environmental liability that have low hazard potential following sampling in a Phase II Environmental Site Assessment; (3) moderate if there is a REC or other environmental liability with moderate hazard potential following sampling in a Phase II Environmental Site Assessment; and (4) high if there are multiple RECs or other environmental liability that have high hazard potential following sampling in a Phase II Environmental Site Assessment.

TABLE 3-9. POTENTIAL RECOGNIZED ENVIRONMENTAL CONDITIONS OBSERVED AND RECORDED ON SLB PARCELS

Township/Range Section/Parcel	Location	Description of Potential REC	Comments
T40 N/R12 E Section 17 Parcel 37	Current Medano-Zapata Ranch Headquarters	Three aboveground storage tanks	No secondary containment noted; Phase II investigation concluded no impacts to subject property were evident.
T40 N/R12 E Section 19 Parcel 27	Former Ranch Headquarters (abandoned)	Abandoned aboveground and underground storage tanks; petroleum products storage area; white powder material in storage shed; empty 55-gallon drum and can	Rusted tanks and drums, some stressed vegetation, but no visible signs of stained soils; Phase II investigation concluded no impacts to subjectd property were evident.
T40 N/R12 E Section 20 Parcel 37 (adjoining property)	Former Medano-Zapata Ranch, approximately 1,000 feet west of Parcel 37	Cattle dip tank	Potentially hazardous materials were observed. The Phase II investigation concluded that although soil contamination was apparent on adjoining property, groundwater sampling indicated that an impact on the subject property (Parcel 37) is unlikely.
T40 N/R12 E Section 20 Parcel 37 (adjoining property)	Former Medano-Zapata Ranch	Aboveground tank	Possibly associated with dip tank; Phase II investigation concluded that an impact on the subject property (Parcel 37) is unlikely.
T40 N/R11 E Section 4 Parcel 26	5.5 miles northwest of current Medano-Zapata Ranch Headquarters	Surface debris (numerous cans and drums)	Scattered debris field approximately 10 cubic yards in size. The Phase II investigation found no contamination above detection limits; no further assessment is warranted.
T41 N/R10 E Section 27 Parcel 26	10.2 miles northwest of current Medano-Zapata Ranch Headquarters	Surface dumpsite (numerous metal, piles of wood, empty paint cans, plastic 5-gallon buckets)	Scattered debris field estimated to be approximately 20 cubic yards. The Phase II investigation found no contamination above detection limits; no further assessment is warranted.

No Action Alternative

Under the No Action Alternative there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. There would be no RECs or other environmental liabilities to manage on the SLB parcels and on BLM's Table Mountain, Gribbles Park, Biedell Creek or La Jara Reservoir sites resulting in short- and long-term, insignificant effects from hazardous and solid waste management.

Proposed Action

Under the Proposed Action the BLM parcels would be exchanged to SLB management, and SLB parcels would be exchanged for management by the BLM, USFWS, and NPS. Six potential RECs were observed on the SLB's parcels proposed for exchange based on a 2005 Phase I Environmental Site Assessment. A Phase II investigation during 2007 and a follow-on Phase I assessment in 2009 concluded that there were no RECs or other environmental liabilities associated with these sites. Therefore, implementation of the proposed action would result in short- and long-term, insignificant effects from hazardous and solid waste management.

3.2.14 Environmental Justice

Executive Order 12898 (*Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations*) was published in the *Federal Register* (59 FR 7629) (1994). Executive Order 12898 requires Federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations, low-income populations (defined as those living below the poverty level), and American Indian tribes. Executive Order 13045 requires Federal agencies to identify and address disproportionately high and adverse human health or environmental effects of Federal programs and policies on children.

3.2.14.1 Affected Environment

The parcels involved in the proposed land exchange are located in Alamosa, Fremont, Saguache, and Conejos counties. These counties are predominately rural, with economies based on agriculture, tourism and recreation, and various other activities tied to public lands. Demographic characteristics of the affected counties reflect their heritage, with relatively fewer whites, and substantially more Hispanic or Latino residents in the three counties in the San Luis Valley and relatively more whites and fewer Hispanic or Latino residents in Fremont County. Median household incomes are below the state average in all four counties and poverty rates are higher than the statewide average (see Table 3-10). In 2000, American Indians composed 2.9 percent of the region's population, compared to 1.9 percent statewide. More than half of the American Indians in the four counties resided in Fremont County. There are no established American Indian reservations in the four counties.

The demographic and income characteristics of the four counties suggest a potential for environmental justice concerns. However, all of the parcels involved in proposed land exchange are undeveloped, located in outlying areas that are relatively remote from communities and other development, and are not known to support any substantial level of subsistence use by minority or low-income populations.

TABLE 3-10. SELECTED DEMOGRAPHIC CHARACTERISTICS

	Race: White (2000)	Hispanic or Latino (2000)	Median Household Income (2004)	Persons in Poverty in (2004)
Alamosa County	74.6%	41.4%	$ 31,587	19.2%
Conejos County	76.1%	58.9%	$ 27,077	19.1%
Fremont County	91.2%	10.3%	$ 35,129	14.2%
Saguache County	74.1%	45.3%	$ 23,638	22.7%
Colorado	85.2%	17.1%	$ 50,105	10.2%

3.2.14.2 Environmental Consequences

All of the lands involved in the proposed exchange are undeveloped and anticipated to remain in public management for the foreseeable future. Hunting and grazing would be discontinued on the former SLB lands that would be managed by the NPS in the future. Grazing would likely continue on the former BLM lands. Other uses, including hunting, grazing, and recreation, would be largely unaffected. Consequently, the proposed land exchange is not expected to result in impacts meeting the thresholds of either of these executive orders.

3.2.15 Native American Consultation and Religious Concerns

Under Section 106 of the NHPA, the NPS initiated Native American consultation on February 8, 2005, by letter (see Appendix C) to 38 tribes that have a cultural affiliation with the BLM and SLB lands proposed for exchange (See Baca Land Exchange Executive Summary of Tribal Consultation prepared by Dan Haas of the BLM provided in Appendix C [referenced as Haas 2009]). The tribes consulted by the NPS and BLM included the following:

Apache of Oklahoma
Cheyenne and Arapaho Tribes of Oklahoma
Cheyenne River Sioux
Comanche Nation of Oklahoma
Crow Creek Sioux
Hopi Nation
Jicarilla Apache
Kiowa Tribe of Oklahoma
Navajo Nation
Northern Arapaho
Northern Cheyenne
Oglala Sioux
Pawnee Nation of Oklahoma
Picuris Pueblo
Pueblo of Acoma
Pueblo de Cochiti
Pueblo of Isleta
Pueblo of Jemez
Pueblo of Laguna
Pueblo of Nambé
Pueblo of Pojaque
Pueblo of San Felipe
Pueblo of Sandia

Pueblo of Santa Ana
Pueblo of Santo Domingo
Pueblo of Zia
Rosebud Sioux
San Ildefonso Pueblo
San Juan Pueblo
Santa Clara Pueblo
Shoshone Tribe (Eastern Band)
Southern Ute
Standing Rock Lakota
Taos Pueblo
Tesuque Pueblo
Northern Ute
Ute Mountain Ute
Zuni Pueblo

Following initial contact by the NPS the tribes were invited to attend a government-to-government consultation meeting hosted by the BLM at the Great Sand Dunes National Park and Preserve headquarters. As part of this process, tribal representatives were invited to provide information on traditional cultural properties associated with the parcels evaluated in this EA. Tribes expressing an interest in the proposed land exchange and consulting with Federal agencies included Cheyenne River Sioux, Hopi, and the Jicarilla Apache Nation. The Cheyenne River Sioux and Hopis responded by letter (see Appendix C) requesting to be informed of project activities and issues. The Jicarilla Apache Tribe attended the consultation meeting held March 3, 2005, at GRSA (Haas 2009).

On September 28, 2005, the BLM mailed a second consultation letter by certified mail (see Appendix C) to tribes that had not responded to the NPS consultation letter of February 8 and that did not attend the consultation meeting of March 3. Following the second letter, eight tribes requested consultation: the Cheyenne River Sioux, Comanche Nation of Oklahoma, Hopi tribe, Jicarilla Apache Nation, Oglala Sioux tribe, Pueblo of Laguna, Southern Ute tribe, and the Sandia Pueblo, requested to be further consulted for interest in any Native American Graves Protection and Repatriation Act (NAGPRA)-related items discovered during the field inventory and the need to review archeological reports and findings (Haas 2009).

The cultural resource reports for Table Mountain (Bevilacqua and Slaughter 2006), Gribbles Park (Bevilacqua and Wunderlich 2006), La Jara Reservoir (Wells et al. 2008) and Biedell Creek (Bevilacqua et al. 2007) were sent to the eight interested tribes for review and additional consultation. Tribes were provided 45 days to respond to the draft reports. The Cheyenne River Sioux, Comanche Nation of Oklahoma, Oglala Sioux tribe, Pueblo of Laguna, Southern Ute tribe, and the Sandia Pueblo did not have any comment on the reports or replied that they had no interest or issues with the reports. Despite the Southern Ute response that the project would not adversely affect any properties of religious and cultural significance to them, they were further consulted due to the high probability of sites with Southern Ute tribal affinity (Haas 2009).

The Hopi tribe claimed cultural and ancestral affinity to the prehistoric Hisatsinom, whom are defined archeologically as the Anasazi cultural group. The Hopi tribe supported avoidance of any disturbance to archeological sites attributed to the various Anasazi cultural groups. They requested consultation on the treatment of adverse effects on all ancestral Puebloan sites. The Hopi requested consultation on the discovery of any Puebloan human remains, which are not anticipated. The Hopi tribe concurred that the adverse effects on cultural resources as a result of the land exchange can be mitigated by the State Register of Historic Places nominations by

developing an MOA with the State of Colorado to preserve these sites, and the perpetual classification of the exchange parcels that contain eligible resources as Stewardship Trust Lands. They did not want to sign the MOA as a concurring party (Haas 2009).

The Jicarilla Apache Nation did not comment on the cultural resource inventory reports during the consultation period. However, they notified BLM in October 2008 that they wanted an opportunity to review these reports and the draft treatment plan because of their interest in the archeological sites with potential Apache affiliation. Upon review of these documents, they supported the approach of listing properties to the Colorado State Register of Historic Places and wanted to participate in the development of the MOA on the adverse effects on historic properties resulting from the land exchange. The draft MOA was sent to Dr. Jeff Blythe, Tribal Historic Preservation Officer (THPO), for review. The Jicarilla concurred with the draft MOA as long as a provision was included that required the Colorado State Land Board to consult with them during the development of the management plan and that a list of sites with Apachean affiliation be appended to the document. Dr. Blythe provided the BLM with the list of sites with Apachean affiliation. Finally, the Jicarilla requested to be a concurring party to the MOA (Haas 2009).

3.3 NON-CRITICAL ELEMENTS

Non-critical elements are those areas of the environmental not considered critical to the environmental analysis for the land exchange, but must be addressed due to the involvement of Standards for Public Land Health.

3.3.1 Soils

Soils were described for Fremont County by the NRCS (formerly the Soil Conservation Service) in 1996, Saguache County in 1984, Conejos County in 1980, and Alamosa County in 1973. This subsection presents information and maps derived from these principal sources.

3.3.1.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

Two general map units describe the Table Mountain and Gribbles Park sites of Fremont County. The Travesilla-Ustic Torriorthents-Roygorge unit is characterized by shallow to deep, well-drained, gently sloping to steep soils on fan terrace edges, hills, ridges, hogbacks, cuestas, canyon sides, and mountainsides (NRCS 1996). It is located on the eastern side of Fremont County and includes Table Mountain. The Bushvalley-Ess-Hoodle unit is characterized by shallow and deep, well-drained, gently sloping to steep soils of fan terraces, mountainsides, hills, foot slopes, ridges, and mesas (NRCS 1996). It is located on the northwestern side of Fremont County and includes Gribbles Park.

Soils are distributed across the Table Mountain and Gribbles Park sites as depicted in Figures 3-12 and 3-13, respectively. Their general description is provided in Table 3-11. The Table Mountain parcels lie on relatively steep topography and are covered predominantly by the Travesilla-Rock outcrop complex (5 to 50 percent slopes) and the Ustic Torriorthents-Sedillo Complex (15 to 40 percent slopes) (NRCS 1996). Gribbles Park parcels lie on gentle to moderately steep topography and the overlying soils are predominantly Hoodle loam (5 to 20 percent slopes), Morset loam (2 to 8 percent slopes), and Bushvalley-Whiteman cobbly loams (15 to 50 percent slopes) (NRCS 1996).

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Two general map units describe the Biedell Creek site of Saguache County, as follows: (1) the Travelers-Garita-Rock outcrop unit occupies higher elevations and steep topography and is characterized by deep and shallow, gently sloping to steep, well-drained and somewhat excessively drained, stony and gravelly loamy soils, and Rock outcrop on hills, ridges, mesas, fans, and foot slopes; and (2) the Garita-Olatoro-Luthon unit occupies middle elevations and gentle to moderately steep topography and is characterized by deep, nearly level to moderately sloping, well-drained gravelly and loamy soils on fans, foot slopes, and valley side slopes (NRCS 1980).

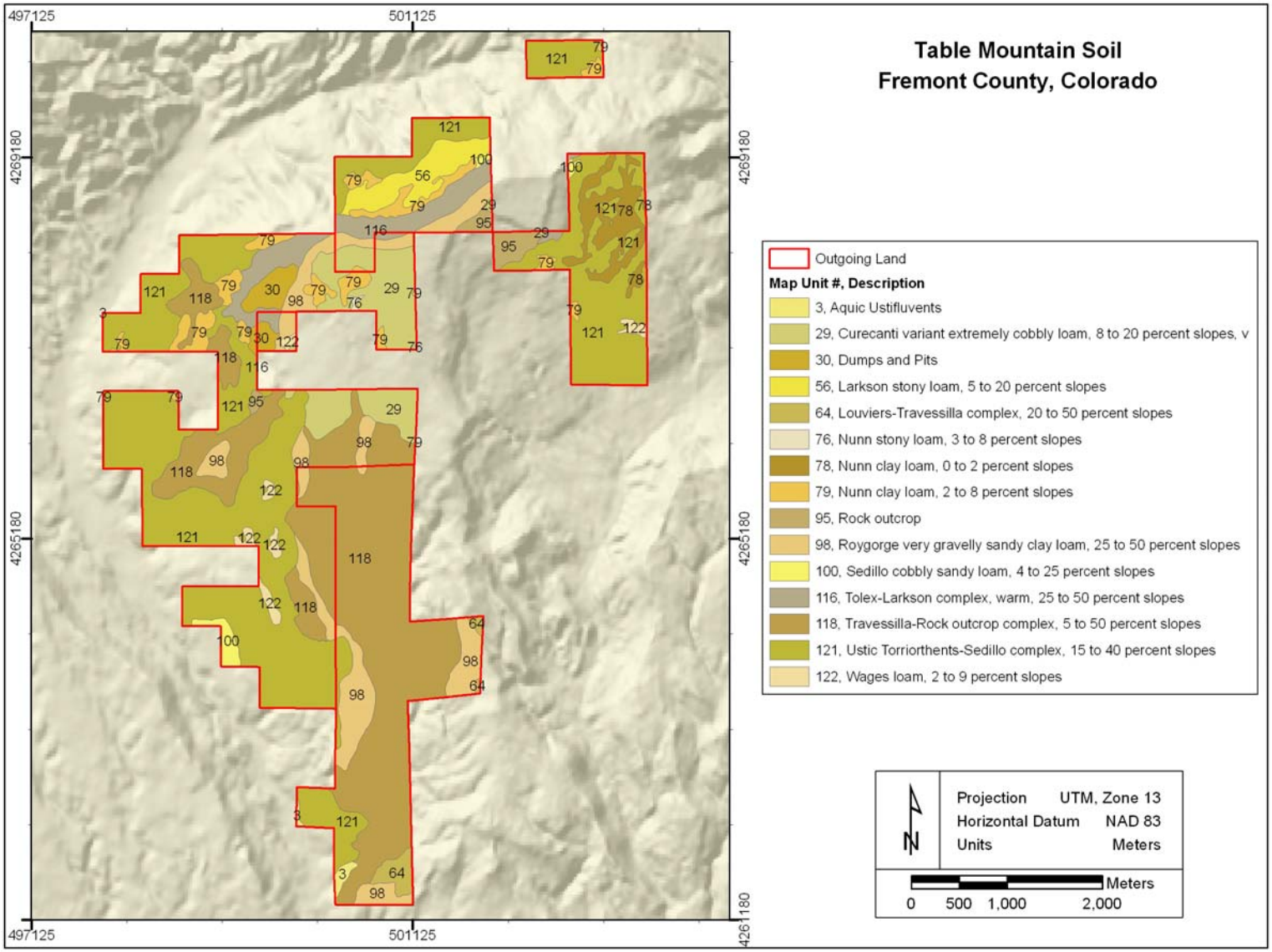

FIGURE 3-12. SOILS OF THE PROPOSED TABLE MOUNTAIN BLM EXCHANGE PARCELS

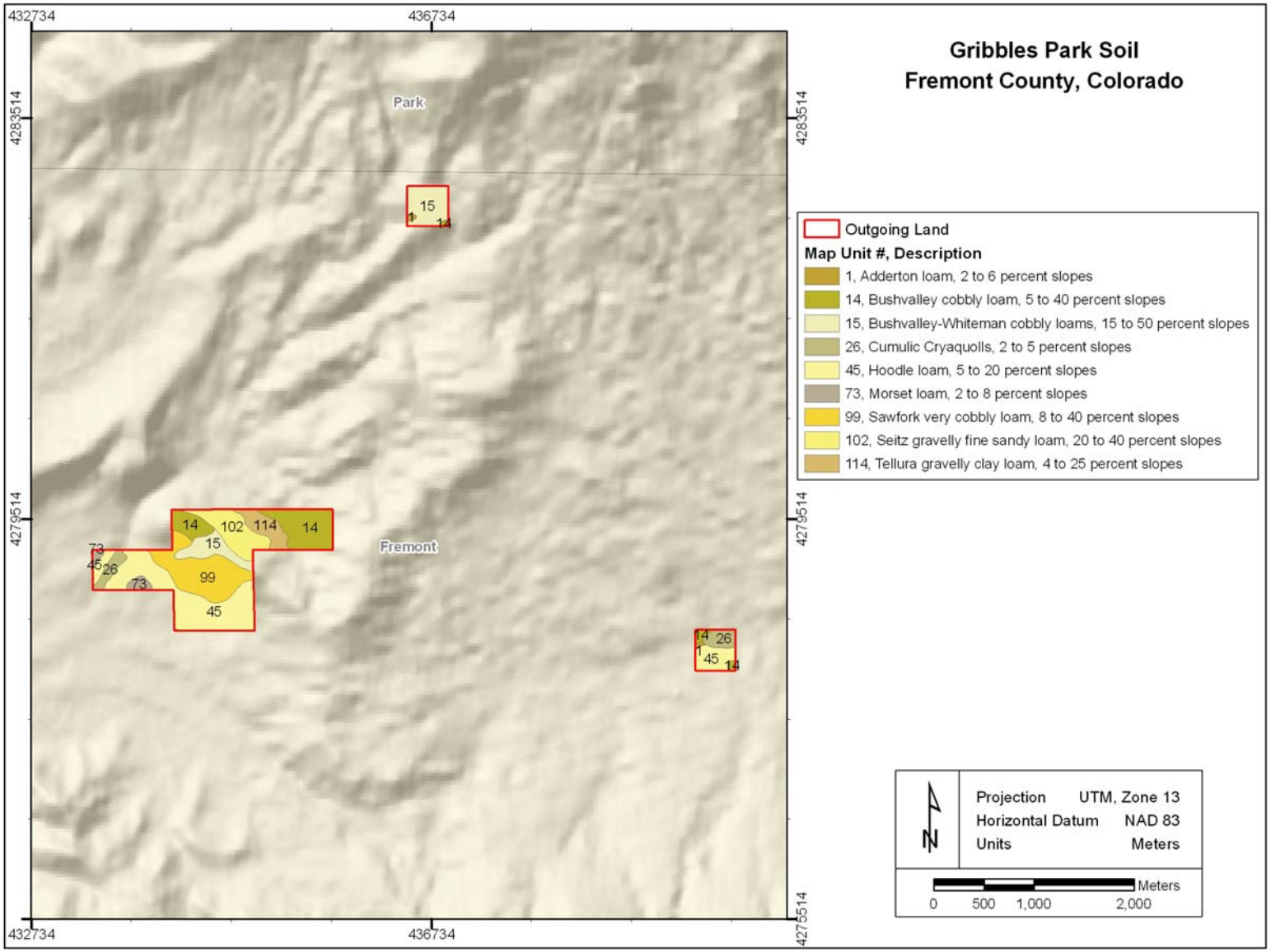

FIGURE 3-13. SOILS OF THE PROPOSED GRIBBLES PARK BLM EXCHANGE PARCELS

TABLE 3-11. SOIL TYPES PRESENT ON TABLE MOUNTAIN AND GRIBBLES PARK BLM PARCELS PROPOSED FOR EXCHANGE IN FREMONT COUNTY

Map Unit – Name	Description
1 – Adderton loam, 2–6% slopes	Deep, well-drained soil of stream terraces and toe slopes that formed in mixed alluvium.
3 – Aquic Ustifluvents, 0–1% slopes	Deep, moderately well-drained and somewhat poorly drained soil of stream terraces and floodplains that formed in stratified alluvium.
14 – Bushvalley cobbly loam, 5–40% slopes	Shallow, well-drained soil of hills, mesas, and mountainsides that formed in residuum derived from breccia and tuff.
15 – Bushvalley-Whiteman cobbly loams, 15–50% slopes	Shallow, well-drained soils of ridges and mountainsides that formed in residuum from andesite tuff, breccia, rhyolite, and granite.
26 – Cumulic Cryaquolls, 2–5% slopes	Deep, very poorly drained soil of stream terraces that formed in alluvium.
29 – Curecanti Variant extremely cobbly loam, 8–20% slopes, very stony	Deep, well-drained soil of mesas and cuestas that formed in alluvium derived from sandstone.
30 – Dumps and Pits	Large piles of coal mine tailings and a few areas of pits and quarries that form a hilly landscape.
45 – Hoodle loam, 5–20% slopes	Deep, well-drained soil of fan terraces and foot slopes that formed in alluvium and colluvium.
56 – Larkson stony loam, 5–20% slopes	Deep, well-drained soil of fan terraces that formed in alluvium and colluvium derived from sedimentary rock.
64 – Louviers-Travesilla complex, 20–50% slopes	Shallow, well-drained soils of hills, ridges, hogbacks, and canyonsides that formed in residuum derived from shale, siltstone, and sandstone.
73 – Morset loam, 2–8% slopes	Deep, well-drained soil of toe slopes and fans that formed in alluvium.
76 – Nunn stony loam, 3–8% slopes	Deep, well-drained soil of fan terraces that formed in alluvium.
78 – Nunn clay loam, 0–2% slopes	Deep, well drained soil of fans and fan terraces that formed in loess and alluvium.
79 – Nunn clay loam, 2–8% slopes	Deep, well-drained soil of fans, fan terraces, and foot slopes that formed in alluvium.
92 – Riverwash	Nearly barren alluvial sand, gravel, and cobbles of stream channels that are subject to scouring and receive fresh deposits of alluvium from floodwater.
93 – Rizozo-Neville complex, 3–30% slopes	Shallow to deep, well-drained soils of fan terraces, pediments, and fans that formed in residuum derived from red sandstone and alluvium derived from red sandstone and siltstone.
95 – Rock outcrop	Steep mountainsides, which are mainly barren.
98 – Roygorge very gravelly sandy clay loam, 25–50% slopes	Shallow, well-drained soil of mountainsides that formed in residuum derived from gneiss and granite.
99 – Sawfork very cobbly loam, 8–40% slopes	Deep, well-drained soil of side slopes of dissected fan terraces that formed in colluvium and residuum derived from tuff and ash flow.
100 – Sedillo cobbly sandy loam, 4–25% slopes	Deep, well-drained soil of fan terraces that formed in calcareous, gravelly and cobbly alluvium and landslide deposits.
102 – Seitz gravelly fine sandy loam, 20–40% slopes	Deep, well-drained soil on north-facing mountainsides that formed in alluvium and colluvium.

TABLE 3-11. SOIL TYPES PRESENT ON TABLE MOUNTAIN AND GRIBBLES PARK BLM PARCELS PROPOSED FOR EXCHANGE IN FREMONT COUNTY

Map Unit – Name	Description
114 – Tellura gravelly clay loam, 4–25% slopes	Deep, well-drained soil of fans and fan terraces that formed in alluvium and residuum derived from andesitic and basaltic breccia.
116 – Tolex-Larkson complex, warm, 25–50% slopes	Shallow to deep, well-drained soils of foot slopes below sandstone escarpments that formed in residuum derived from sandstone and siltstone.
118 – Travesilla-Rock outcrop complex, 5–50% slopes	Shallow, well-drained soils of canyonsides, hogbacks, and cuestas.
121 – Ustic Torriorthents-Sedillo complex, 15–40% slopes	Shallow to deep, well-drained soils of fan terrace edges and hills resulting from deep dissection of terraces by streams and that formed in residuum and colluvium derived from thinly bedded sandstone, siltstone, and shale.
122 – Wages loam, 2–9% slopes	Deep, well-drained soil of foot slopes and fan terraces that formed in mixed alluvium and eolian material.
128 – Wiley loam, cool, 2–6% slopes	Deep, well-drained soil of fan terraces and foot slopes that formed in alluvium and eolian fine sands and silt.
130 – Youga sandy loam, 3–10% slopes	Deep, well-drained soil of foot slopes and fans that formed in alluvium and colluvium.

Source: NRCS 1996

Three general map units describe the La Jara Reservoir site of Conejos County and include (1) the Bushvalley-Miracle-Youga unit which occupies the high to moderate elevations and moderately steep topography and is characterized by moderately sloping to steep, shallow to deep, well-drained soils on mountains, ridges, and mesas; (2) the Cumbres-Empedrado-Curecanti unit which occupies middle elevations and gentle to moderately steep topography and is characterized by moderately deep to deep, well-drained soils on hills, mountains, alluvial fans, and terraces; and (3) the Travelers-Garita unit which occupies nearly level topography and is characterized by shallow and deep, somewhat excessively drained and well-drained soils on alluvial fans, terraces, ridges, mesas, and hills (NRCS 1980).

Soils are distributed across the Biedell Creek and La Jara Reservoir sites as depicted in Figures 3-14 and 3-15, respectively. Their general description is provided in Tables 3-12 and 3-13. The Biedell Creek parcels lie on gentle to steep topography and are covered predominantly by Luhon loam (0 to 3 percent slopes), Travelers-Garita complex (6 to 35 percent slopes), Tolman, dry-Rock outcrop complex (9 to 65 percent slopes), and Rock outcrop, steep (NRCS 1980). One soil series that is highly susceptible to water erosion, the Bushvalley, occurs in the upper reaches of the Biedell Creek drainage (BLM 1989). It is formed from volcanic rocks.

La Jara Reservoir parcels lie on moderately steep to steep topography and the overlying soils are predominantly Garita cobbly loam (3 to 25 percent slopes), Empedrado-Curecanti complex (5 to 25 percent slopes), and Seitz very stony loam (10 to 65 percent slopes) (NRCS 1980). Evidence of past-accelerated erosion exists along the western side of the San Luis Valley; however, most of the areas are eroding slowly with a gradual trend towards stabilization (BLM 1989).

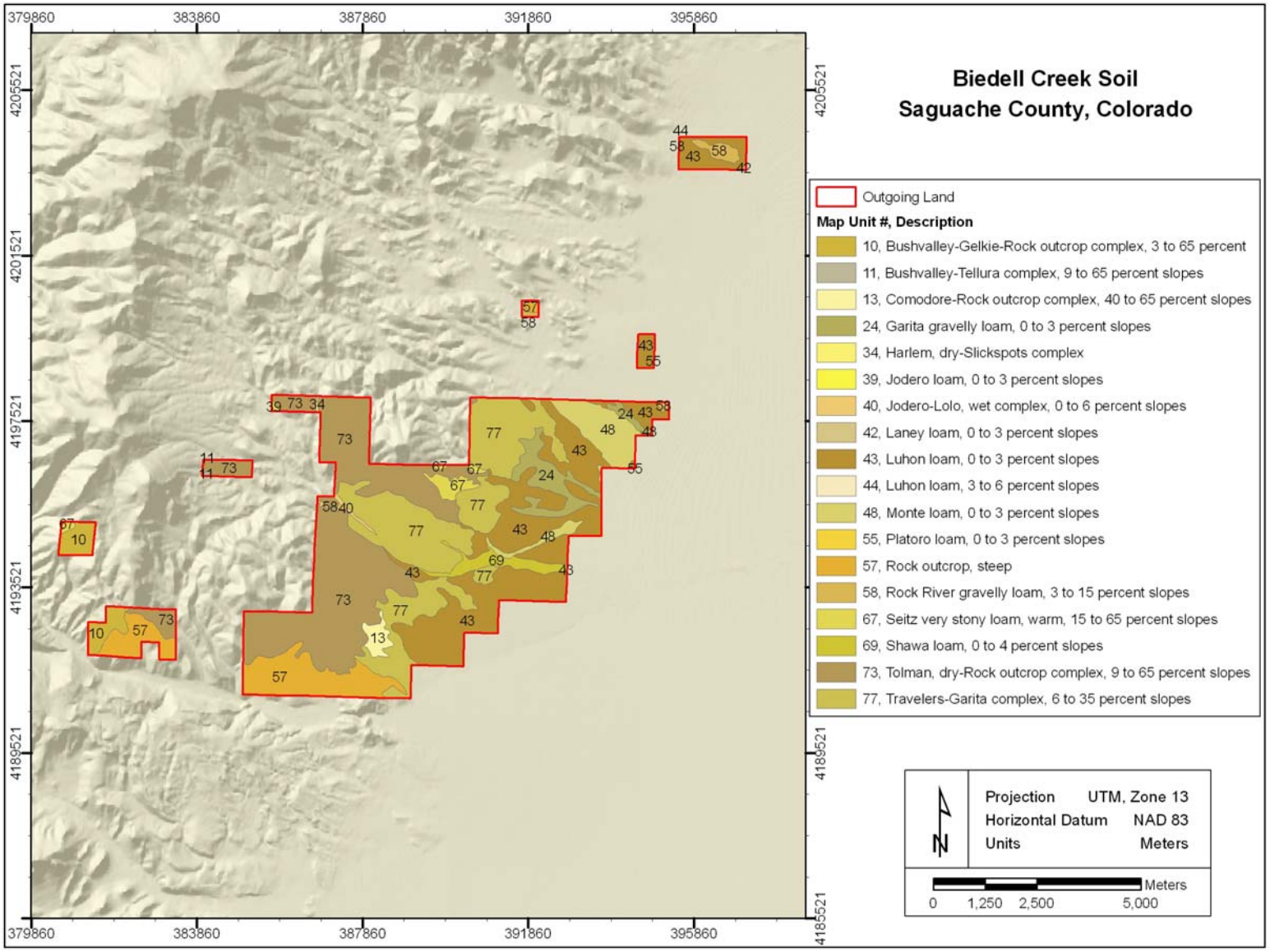

FIGURE 3-14. SOILS OF THE PROPOSED BIEDELL CREEK BLM EXCHANGE PARCELS

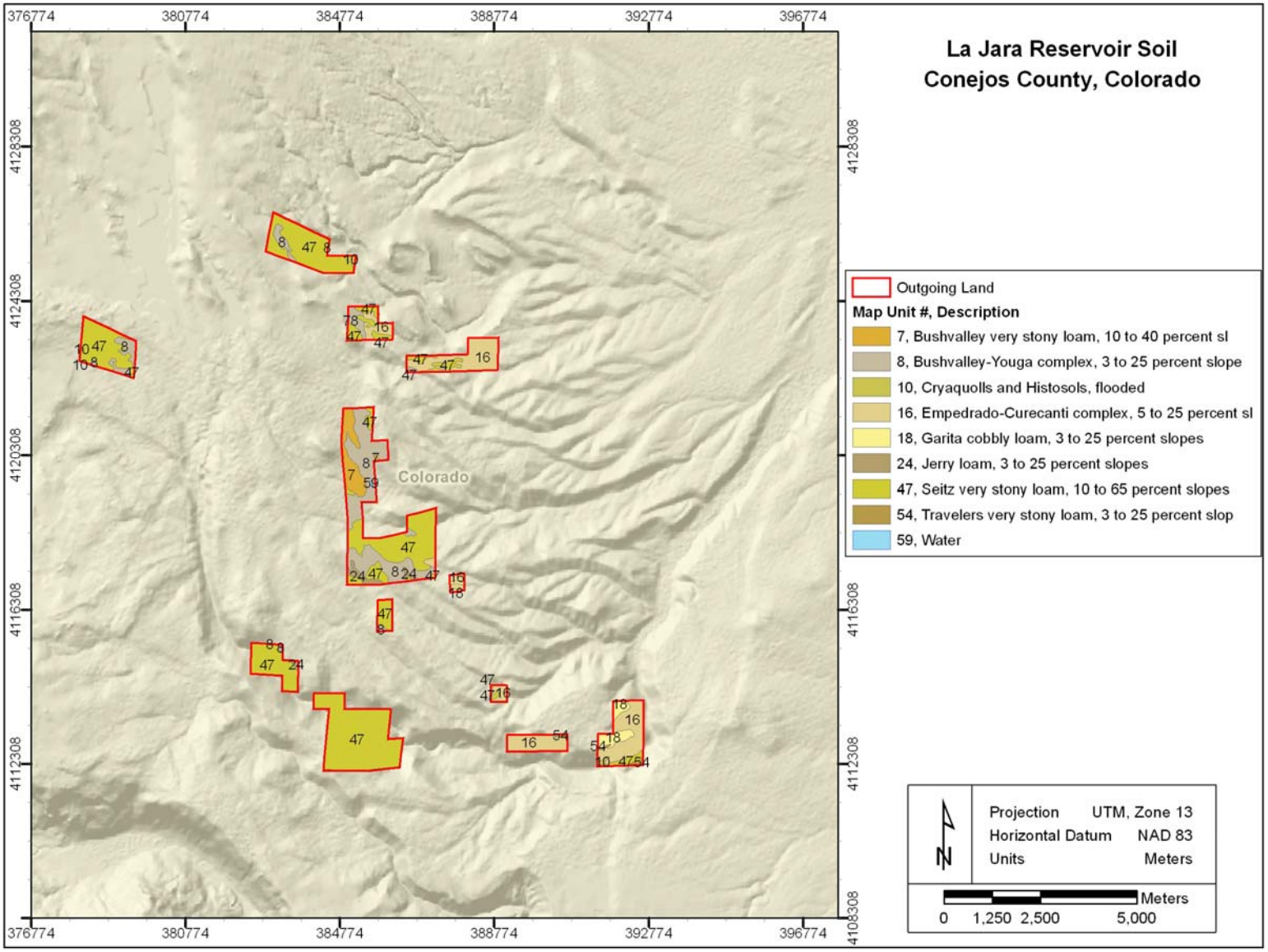

FIGURE 3-15. SOILS OF THE PROPOSED LA JARA RESERVOIR BLM EXCHANGE PARCELS

TABLE 3-12. SOIL TYPES PRESENT ON BIEDELL CREEK BLM PARCELS PROPOSED FOR EXCHANGE IN SAGUACHE COUNTY

Map Unit – Name	Description
10 – Bushvalley-Gelkie-Rock outcrop complex, 3–65% slopes	Shallow to deep, well-drained soil of mountainside slopes and toe slopes that formed in colluvium from igneous rocks.
11 – Bushvalley-Tellura complex, 9–65% slopes	Shallow to deep, well-drained soil of ridges and mountainside slopes that formed in colluvium from igneous rocks.
13 – Comodore-Rock outcrop complex, 40–65% slopes	Shallow, well-drained soil of mountainsides that formed in thin colluvium from igneous and metamorphic rocks. The Rock outcrop consists of rhyolite, closely associated volcanic material, and conglomerate materials.
21 – Des Moines gravelly clay loam, dry, 0–2% slopes	Deep, well-drained soil of alluvial valley floors and fans that formed in alluvium derived from igneous rock.
24 – Garita gravelly loam, 0–3% slopes	Deep, well-drained soil of fans that formed in calcareous gravelly, alluvium.
27 – Gelkie loam, 3–25% slopes	Deep, well-drained soil of toe slopes and mountainside slopes that formed in colluvium derived from igneous rock.
34 – Harlem, dry-Slickspots complex	Deep, moderately well-drained soil of low terraces and floodplains on alluvial valley floors that formed in calcareous clayey alluvium.
39 – Jodero loam, 0–3% slopes	Deep, well-drained soil of alluvial fans and stream terraces that formed in alluvium.
40 – Jodero-Lolo, wet complex, 0–6% slopes	Deep, well-drained and moderately well-drained soil of low terraces along drainages that formed in alluvium.
42 – Laney loam, 0–3% slopes	Deep, well-drained, saline-alkali affected soil of floodplains and fans of alluvial valley floors that formed in calcareous alluvium.
43 – Luhon loam, 0–3% slopes	Deep, well-drained soil of fans on alluvial valley floors that formed in calcareous alluvium.
48 – Monte loam, 0–3% slopes	Deep, well-drained soil of fans and floodplains on alluvial valley floors that formed in calcareous alluvium derived from igneous rocks.
55 – Platoro loam, 0–3% slopes	Deep, well-drained soil of fans and terraces on alluvial valley floors that formed in alluvium derived from basalt.
57 – Rock outcrop, steep	Exposed bedrock of granite, schist, basalt, tuff, rhyolite, andesite, and breccia with 30-100% slopes.
58 – Rock River gravelly loam, 3–15% slopes	Deep, well-drained soil of fans and valley sideslopes that formed in calcareous alluvium.
67 – Seitz very stony loam, warm, 15–65% slopes	Deep, well-drained soil of mountainsides and ridges that formed in colluvium derived from igneous rock.
69 – Shawa loam, 0–4% slopes	Deep, moderately well-drained soil of fans and low terraces adjacent to streams on valley floors that formed in alluvium.
73 – Tolman, dry-Rock outcrop complex, 9–65% slopes	Shallow, well-drained soil of mountain and foothill sideslopes that formed in colluvium from rhyolitic tuff.
77 – Travelers-Garita complex, 6–35% slopes	Shallow to deep, somewhat excessively drained to well-drained soil of basalt-capped mesas and foot slopes that formed in colluvium and calcareous gravelly alluvium derived from basalt.

Source: NRCS 1980

TABLE 3-13. SOIL TYPES PRESENT ON LA JARA RESERVOIR BLM PARCELS PROPOSED FOR EXCHANGE IN CONEJOS COUNTY

Map Unit – Name	Description
7 – Bushvalley very stony loam, 10–40% slopes	Shallow, very stony well-drained soil of mountainsides that formed in thin colluvium over volcanic rocks.
8 – Bushvalley-Youga complex, 3–25% slopes	Shallow to deep, well-drained soil of mountains that formed in colluvium from volcanic rocks or glacial till and outwash material.
10 – Cryaquolls and Histosols, flooded	Deep, poorly drained organic soils of wet, boggy swales and mountain meadows that formed in mixed alluvium in valley bottoms and swales.
16 – Empedrado-Curecanti complex, 5–25% slopes	Deep, well-drained soil of foothills and old alluvial fans that formed in mixed alluvium and alluvium derived from rhyolite and andesite.
18 – Garita cobbly loam, 3–25% slopes	Deep, well-drained soil of alluvial fans and terraces that formed in thick, calcareous, gravelly and cobbly alluvium derived from basalt.
19 – Graypoint gravelly sandy loam, 0–1% slopes	Deep, well-drained soil of broad alluvial fans and terraces that formed in alluvium derived from basalt.
20 – Graypoint gravelly sandy loam, 1–3% slopes	Deep, well-drained soil of broad alluvial fans and terraces that formed in alluvium derived from basalt.
24 – Jerry loam, 3–25% slopes	Deep, well-drained soil of mountainsides and valley filling sideslopes that formed in cobbly alluvium derived from rhyolite.
29 – Luhon loam, 3–9% slopes	Deep, well-drained soil of moderately sloping alluvial fans that formed in mixed calcareous alluvial sediment.
33 – Miracle loam, 3–9% slopes	Moderately deep, well-drained soil of ridges and mesas in foothills that formed in outwash material derived from igneous rock and the underlying Santa Fe Formation.
38 – Monte loam, 1–3% slopes	Deep, well-drained soil of alluvial fans and floodplains that formed in mixed calcareous alluvium derived from igneous rocks.
47 - Seitz very stony loam, 10–65% slopes	Deep, well-drained soil of mountainsides and ridges that formed in slope wash from igneous rocks.
48 – Shawa loam, 0–1% slopes	Deep, well-drained to moderately well-drained soil of alluvial fans and terraces that formed in mixed alluvium derived from igneous rocks.
49 – Shawa loam, 1–3% slopes	Deep, well-drained soil of alluvial fans and terraces that formed in mixed alluvium derived from igneous rocks.
50 – Shawa loam, wet	Deep soil of alluvial fans that formed in mixed alluvium derived from igneous rocks.
54 – Travelers very stony loam, 3–25% slopes	Shallow, excessively drained soil of hills, ridges, and mesas that formed in material weathered from basalt.

Source: NRCS 1980

Proposed San Luis Valley SLB Exchange Parcels

Four general map units describe the SLB sites as proposed for exchange in Saguache and Alamosa counties, as follows: (1) the Hooper-Corlett association occupies flat topography and is characterized by deep, nearly level to hummocky, well-drained and somewhat excessively drained, moderately fine-textured to coarse-textured soils that are strongly affected by alkali (NRCS 1973); (2) the Space City-Cotopaxi unit occupies nearly level to moderately sloping

topography and is characterized by deep, somewhat excessively drained, sandy soils on valley floors (NRCS 1980); (3) the Hooper-Hagga-Hapney unit occupies nearly level and gently sloping topography and is characterized by deep, poorly drained and moderately well-drained loamy soils on floodplains, terraces, and fans (NRCS 1980); and (4) the Big Blue-Gerrard unit occupies nearly level and gently sloping topography and is characterized by deep, poorly drained loamy soils on floodplains, low terraces, and fans (NRCS 1980).

Soils are distributed across the proposed SLB parcels as depicted in Figure 3-16. Their general description is provided in Table 3-14. There is some difference in soil taxonomy between the Alamosa and Saguache county surveys and the types are combined when possible in Table 3-14 (NRCS 1973, 1984). SLB parcels proposed for exchange lie on relatively gentle to moderately sloping topography and the overlying soils are predominantly Cotopaxi sand (2 to 15 percent slopes), Space City loamy sand, saline (0 to 3 percent slopes), Biedell clay loam, and Hapney clay loam.

Five soil series are considered highly susceptible to wind erosion, e.g., the Corlette, Costilla, Cotopaxi, Dune Land, and Space City series that are located along the eastern edge of the San Luis Valley (BLM 1989). These soils are formed from eolian sand and sandy alluvium and contribute particle volume to the Great Sand Dunes.

3.3.1.2 Environmental Consequences/Mitigation

Earth resources are limited and nonrenewable with characteristics that can easily be degraded by physical disturbances. The exchange of land does not directly cause any change in the state or classification of soils resources; however, post-exchange management could result in effects on soil resources. An effect on soils would be considered (1) insignificant if it is within the natural variability of landscape conditions; (2) low if it results in accelerated wind or water erosion over the short-term that does not affect the structure; (3) moderate if it results in accelerated wind or water erosion, loss of topsoil to form pedestals around or expose root systems of plants, or creates minor rills and gullies; and (4) high if it would result in substantial wind or water erosion, loss of topsoil removing vegetation, or would create major rills and gullies.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. On Federal parcels, current BLM management of the soils resource consistent with the two RMP’s objectives and with the Colorado public land health standards would occur. Soils associated with BLM parcels proposed for exchange consist of seven general units that are gentle to steep and occupy alluvial fans, fan terraces, footslopes, hills, ridges, hogbacks, cuestas, valley sideslopes, canyonsides, mountainsides, mountains, and mesas. They would be subject to natural wind and water erosion, particularly during high winds, heavy precipitation events, and following stand-replacing fires.

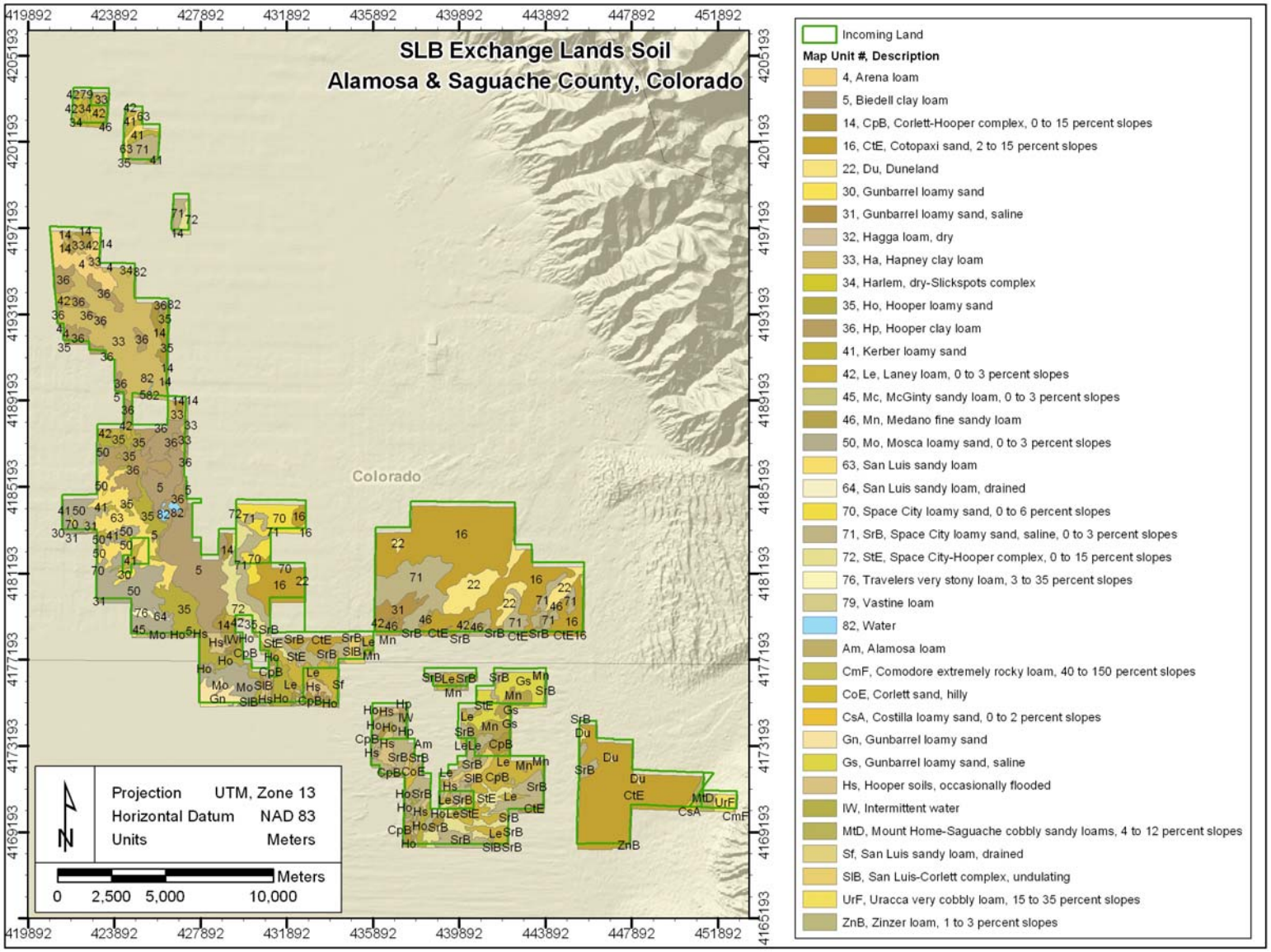

FIGURE 3-16. SOILS OF THE PROPOSED SLB EXCHANGE PARCELS

TABLE 3-14. SOIL TYPES PRESENT ON SLB PARCELS PROPOSED FOR EXCHANGE IN ALAMOSA AND SAGUACHE COUNTIES

Map Unit – Name	Description
4 – Arena loam	Moderately deep, poorly drained, alkali affected soil of floodplains and fans on alluvial valley floors that formed in alluvium.
5 – Biedell clay loam	Deep, poorly drained saline-alkali affected soil of old dry lakebeds and depressions on alluvial valley floors that formed in alluvium derived from basalt.
14, CpB – Corlett-Hooper complex, 0-15% slopes	Moderately well-drained, alkali soils of terraces and fans adjacent to old creek channels and in old lake basins on alluvial valley floors that formed in alkaline eolian sands, alluvium derived from basalt, and have a wind-deposited sandy surface layer.
16, CtE – Cotopaxi sand, 2–15% slopes	Deep, somewhat excessively drained soil of dunelike hills and ridges on alluvial valley floors that formed in eolian sand.
22, Du - Duneland	Dunes made up of constantly shifting sand that has been wind deposited.
30, Gn – Gunbarrel loamy sand	Deep, somewhat poorly drained, alkaline and saline soil of terraces and low fans on alluvial valley floors that formed in alluvium.
31, Gs – Gunbarrel loamy sand, saline	Deep, poorly drained soil, severely affected by salts and alkali, of terraces and low fans on alluvial valley floors that formed in alluvium.
32 – Hagga loam, dry	Deep, poorly drained soil of low floodplains on alluvial valley floors that formed in calcareous alluvium.
33, Ha – Hapney clay loam	Deep, moderately well-drained soil of terraces and fans on alluvial valley floors that formed in alluvium.
34 – Harlem, dry-Slickspots complex	Deep, moderately well-drained soil of low terraces and floodplains of alluvial valley floors that formed in calcareous clayey alluvium.
35, Ho – Hooper loamy sand	Deep, moderately well-drained soil of floodplains and fans on alluvial valley floors that formed in alluvium derived from basalt and with a wind-deposited surface layer.
36, Hp – Hooper clay loam	Deep, moderately drained soil of floodplains and fans on alluvial valley floors that formed in alluvium derived from basalt.
41 – Kerber loamy sand	Deep, somewhat poorly drained, salt and alkali affected soil of fans and floodplains on alluvial valley floors that formed in alluvium derived from basalt.
42, Le – Laney loam, 0–3% slopes	Deep, well-drained, saline and alkali-affected soil of floodplains and fans on alluvial valley floors that formed in calcareous alluvium.
45, Mc – McGinty sandy loam, 0-3% slopes	Deep, moderately well-drained soil of fans on alluvial valley floors that formed in calcareous alluvium derived from igneous rock.
46, Mn – Medano fine sandy loam	Deep, poorly drained soil of floodplains on alluvial valley floors that formed in alluvium.
50, Mo – Mosca loamy sand, 0–3% slopes	Deep, well-drained soil, moderately affected by alkali, of fans and floodplains on alluvial valley floors that formed in alluvium derived from basalt.
63 – San Luis sandy loam	Deep, somewhat poorly drained, salt and alkali affected soil of fans and floodplains on alluvial valley floors that formed in alluvium derived from basalt.
64, Sf – San Luis sandy loam, drained	Deep, moderately well-drained soil of fans and floodplains on alluvial valley floors that formed in alluvium derived from basalt.

TABLE 3-14. SOIL TYPES PRESENT ON SLB PARCELS PROPOSED FOR EXCHANGE IN ALAMOSA AND SAGUACHE COUNTIES

Map Unit – Name	Description
70 – Space City loamy sand, 0–6% slopes	Deep, somewhat excessively drained soil along the margins of intermountain valleys and basins on alluvial valley floors that formed in eolian sand.
71, SrB – Space City loamy sand, saline, 0–3% slopes	Deep, well-drained soil along the margins of intermountain valleys and basins on alluvial valley floors with undulating topography that formed in eolian sand.
72, StE, Space City-Hooper complex, 0–15% slopes	Deep, somewhat excessively drained and moderately well-drained soils of low dunes on alluvial valley floors that formed in eolian sand on low dunes, on alluvium derived from basalt, and have a wind-deposited surface layer.
76 – Travelers very stony loam, 3-35% slopes	Shallow, somewhat excessively drained soil of hills, ridges, and basalt-capped mesas that formed in colluvium derived from basalt.
79 – Vastine loam	Deep, poorly drained soil on floodplains on alluvial valley floors that formed in alluvium.
Am – Alamosa loam, 0–1% slopes	Deep, somewhat poorly drained soil on floodplains on alluvial valley floors that formed in alluvium.
CmF – Comodore extremely rocky loam, 40–150% slopes	Shallow, well-drained soil of mountainsides that formed in colluvium and are covered by angular stones and rounded cobblestones.
CoE – Corlett sand, hilly	Deep, somewhat excessively drained, alkali soils of low dunes and ridges on the valley floor that formed in eolian sand.
CsA – Costilla loamy sand, 0–2% slopes	Deep, somewhat excessively drained soil of alluvial floodplains that formed in alluvium.
Hs – Hooper soils, occasionally flooded, 0–1% slopes	Deep, somewhat poorly drained soil of old lake beds that formed in alluvium.
MtD – Mount Home-Saguache cobbly sandy loams, 4–12% slopes	Deep, somewhat excessively drained soils of fans at the foot of the Sangre de Cristo Range that formed in alluvium.
SlB – San Luis-Corlett complex, undulating	Deep, somewhat poorly drained or poorly drained strongly alkali affected soils of floodplains on the valley floor that formed in alluvium underlain by sand.
UrF – Uracca very cobbly loam, 15–35% slopes	Deep, somewhat excessively drained soil of fans covered by cobble at the foot of the Sangre de Cristo Range that formed in alluvium.
ZnB – Zinzer loam, 1–3% slopes	Deep, well-drained soil of floodplains on the valley floor that formed in calcareous mixed alluvium.

Source: NRCS 1973, 1984

Under the No Action Alternative, the SLB would continue current state management of the soils resource within the SLB parcels located in the San Luis Valley. Soils associated with SLB parcels proposed for exchange consist of four general units that are gentle to moderately sloping and occupy lake beds, depressions, floodplains, alluvial valley floors, alluvial fans, alluvial terraces, eolian sand, dunes, sandy ridges, foot slopes, and colluvial slopes. They would be subject to natural wind and water erosion, particularly during high winds, heavy precipitation events, and following stand-replacing fires. Soils whose characteristics have been altered by irrigation would continue to be irrigated and further form anaerobic soil traits

resulting in long-term, insignificant to low, adverse effects on soil chemistry and type classification.

Proposed Action

The Proposed Action would transfer BLM parcels proposed for exchange, containing soils resources classified into seven general units, and occupying mostly hilly to mountainous terrain to SLB ownership and management. The transfer of land management responsibility would not affect soil structure or type classification.

Under the Proposed Action, relatively flat and undulating San Luis Valley soils classified into four general units would be transferred from SLB ownership and management to Federal management by the BLM, USFWS, and NPS. The transfer of land management responsibility to Federal agencies would not affect soil structure or type classification. The soils resource transferred to the USFWS on the BNWR would be addressed in the CCP and in site-specific management plans during assessment of wildlife habitat management needs and application of irrigation flows resulting in long-term, insignificant to low, possibly adverse effects on soil structure and type classification. Changes in the soil chemistry and structure resulting from many decades of irrigation would persevere for an indeterminate time and are possibly permanent in this semiarid environment. The soils transferred to the NPS on the GRSA are addressed in the GMP and would be assessed in site-specific management plans during vegetation and wildlife habitat management planning resulting in long-term, insignificant, possibly adverse effects on soil structure due to wind erosion.

Standards for Public Land Health

The Finding on the Public Health Standard 1 states:

> *Upland soils exhibit infiltration and permeability rates appropriate to soil type, climate, landform, and geologic processes; Adequate soil infiltration and permeability allows for the accumulation of soil moisture necessary for optimal plant growth and vigor, and minimizes surface runoff.*

Standards for public land health (BLM 1997) describe conditions needed to sustain public land health and relate to all uses of the public lands. Standards are applied on a landscape scale and relate to the potential of the landscape. Indicators for Standard 1 are as follows:

- Expression of rills, soil pedestals is minimal.
- Evidence of actively eroding gullies (incised channels) is minimal.
- Canopy and ground cover are appropriate.
- There is litter accumulating in place and is not sorted by normal overland water flow.
- There is appropriate organic matter in soil.
- There is diversity of plant species with a variety of root depths.
- Upland swales have vegetation cover or density greater than that of adjacent uplands.
- There are vigorous, desirable plants.

Soils of the Federal parcels proposed for exchange are predominantly shallow to moderately deep and upland, are derived from sedimentary or igneous geologic formations, contain many boulders, cobbles, and rocks, and have formed on ridges, hills, slopes, and some flats. Also included are areas of deep alluvial soils formed on the edge of the San Luis Valley where they support primarily rabbitbrush-dominated shrublands. In general the soils of proposed Federal parcels support a variety of Front Range and lower San Juan Mountain woodland, shrubland, and herbaceous plant communities common to the region. Erosion of soils is minimal, as noted during archeological, mineral, and hazardous waste surveys conducted for this project.

Under the Proposed Action, 320 acres of land presently managed by the SLB would be exchanged to and managed by the BLM. This parcel is located on the edge of the San Luis Valley and consists of well-vegetated sand flat and toeslope topography with deep alluvial soils. Upon completion of the exchange, this parcel would be evaluated by BLM under the upland soil standard for public land health and managed accordingly. The remaining SLB parcels occupy sand flat and playa topography and would meet the Upland Soil Standard for healthy public lands based on the current vegetation density and lack of soil erosion. Future management by the NPS and USFWS would ensure healthy native vegetation/wildlife habitat cover on these potentially erosive soils.

Under the No Action Alternative, the Upland Soil Standard for healthy public lands would be met. Upland soil condition for the proposed Federal exchange parcels would remain unchanged and would reflect ongoing BLM management prescriptions. Any future land management prescriptions, road maintenance, mineral development, or right-of-way grants would need to address effects of the activity on upland soil health.

3.3.2 Vegetation

The vegetation of southern Colorado has generally been classified under the Dry Domain, Tropical/Subtropical Steppe Division of Bailey (1995). The project area is classified as the Southern Rocky Mountains Steppe – Open Woodland – Coniferous Forest – Alpine Meadow Province (Bailey 1995). The striking feature of the region and of the project area is pronounced vegetation zonation, controlled by the combination of altitude, latitude, direction of prevailing wind, and slope exposure. Major vegetation zones present within the project area include the montane zone characterized by ponderosa pine and Douglas-fir woodlands, the foothill woodland zone characterized by piñon-juniper woodlands or mountain mahogany or Gambel oak tall shrublands, and grass or shrub dominated parks (Bailey 1995).

NatureServe (2003) has defined ecological systems to represent recurring groups of biological communities that are found in similar physical environments and are influenced by similar dynamic ecological processes such as fire or flooding. Ecological systems represent classification units that are readily identifiable by conservation and resource managers in the field. The vegetation descriptions for each set of parcels presented herein are prepared in the framework of ecological systems and illustrated on the state-level vegetation mapping effort described below.

Colorado vegetation was interpreted and mapped as part of the Colorado Gap Analysis Program then remapped under the SW ReGAP (USGS 2005), with the resulting polygon cover served by the CNHP (USGS 2005). Mapping vegetation or land cover under the SW ReGAP was performed using delineation of aerial photography signatures that were relatively homogenous at the 1:100,000-scale. General vegetation types were interpreted and automated statewide using the SW ReGAP methodology (e.g., vegetation types characterized according to their dominant or codominant plant species or, in the absence of dominant plant species, the dominant land cover feature) (Scott and Jennings 1998). Vegetation was mapped to the alliance level of NatureServe (2003), which typically represents groups of plant associations. Groups of vegetation alliances compose and define each ecological system presented in the following discussion.

3.3.2.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

Vegetation is distributed across the Table Mountain and Gribbles Park parcels proposed for exchange as shown in Figures 3-17 and 3-18. Generally, the vegetation of these Fremont County sites can be classified into two life zones described by Bailey (1995), and they are the montane and foothill woodland zones. Ecological systems best representing these zones (USGS 2005, NatureServe 2003) and their percent of the total vegetation cover [%] include the following:

- Rocky Mountain Aspen Forest and Woodland [<1.0%][2]
- Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodland [4.3%][2]
- Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland [1.5%][2]
- Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland [2.9%][2]
- Rocky Mountain Lodgepole Pine Forest [<1.0%][2]
- Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland [1.3%][2]
- Rocky Mountain Ponderosa Pine Woodland [18.7%, 2.3%][1,2]
- Southern Rocky Mountain Piñon-Juniper Woodland [70.4%][1]
- Rocky Mountain Gambel Oak-Mixed Montane Shrubland [5.6%, <1.0%][1,2]
- Inter-Mountain Basins Montane Sagebrush Steppe [<1.0%][2]
- Southern Rocky Mountain Montane-Subalpine Grassland [84.4%][2]
- Western Great Plains Foothill and Piedmont Grassland [4.3%][1]
- Western Great Plains Shortgrass Prairie [<1.0%][1]
- Rocky Mountain Lower Montane Riparian Woodland and Shrubland [1.6%][1]
- Rocky Mountain Alpine-Montane Wet Meadow [1.2%][2]
- Recently Mined or Quarried [<1.0%][1]
- Invasive Perennial Grassland [<1.0%].[1]

[1] = Table Mountain; [2] = Gribbles Park

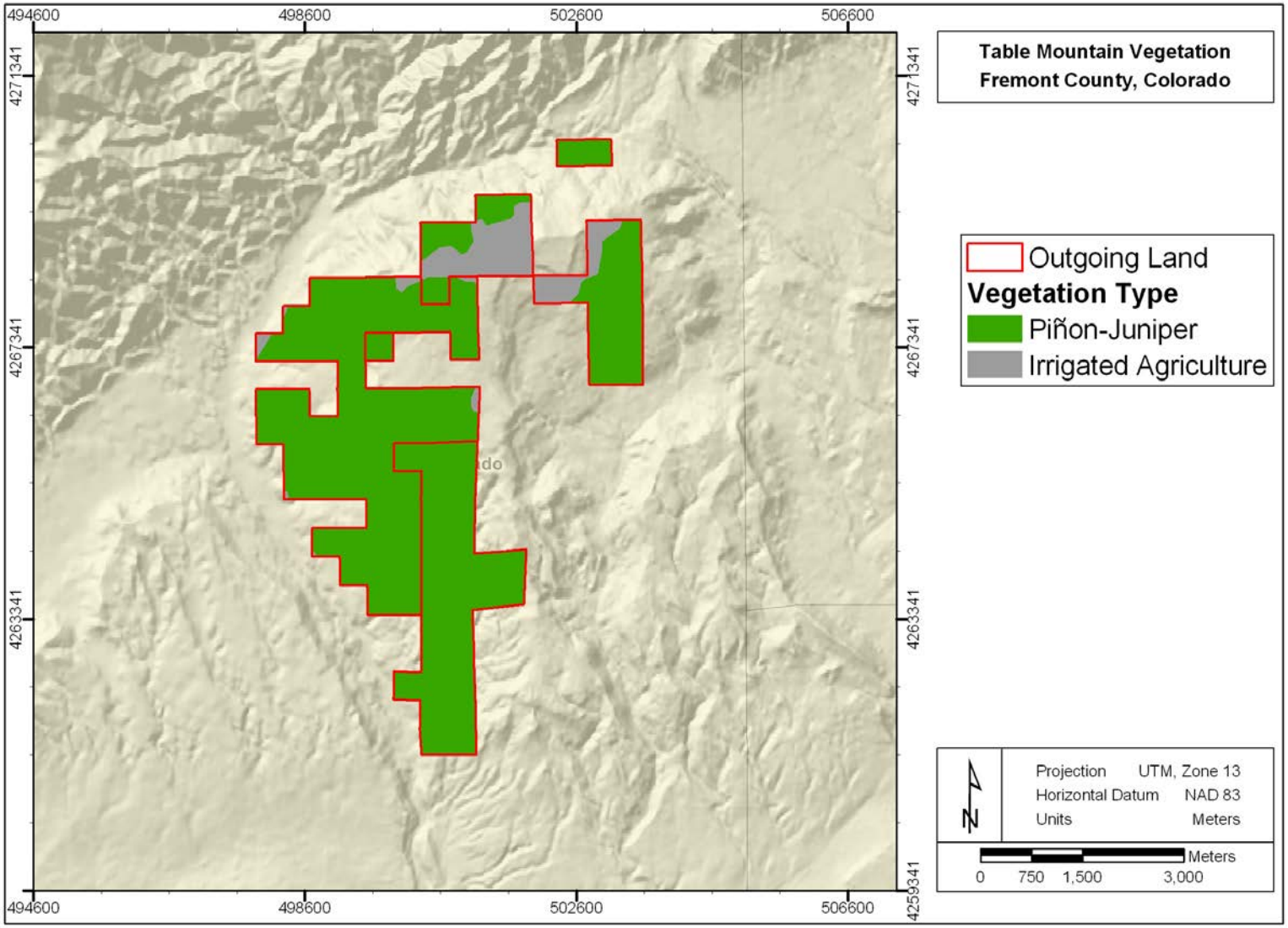

FIGURE 3-17. VEGETATION MAP OF PROPOSED TABLE MOUNTAIN BLM EXCHANGE PARCELS

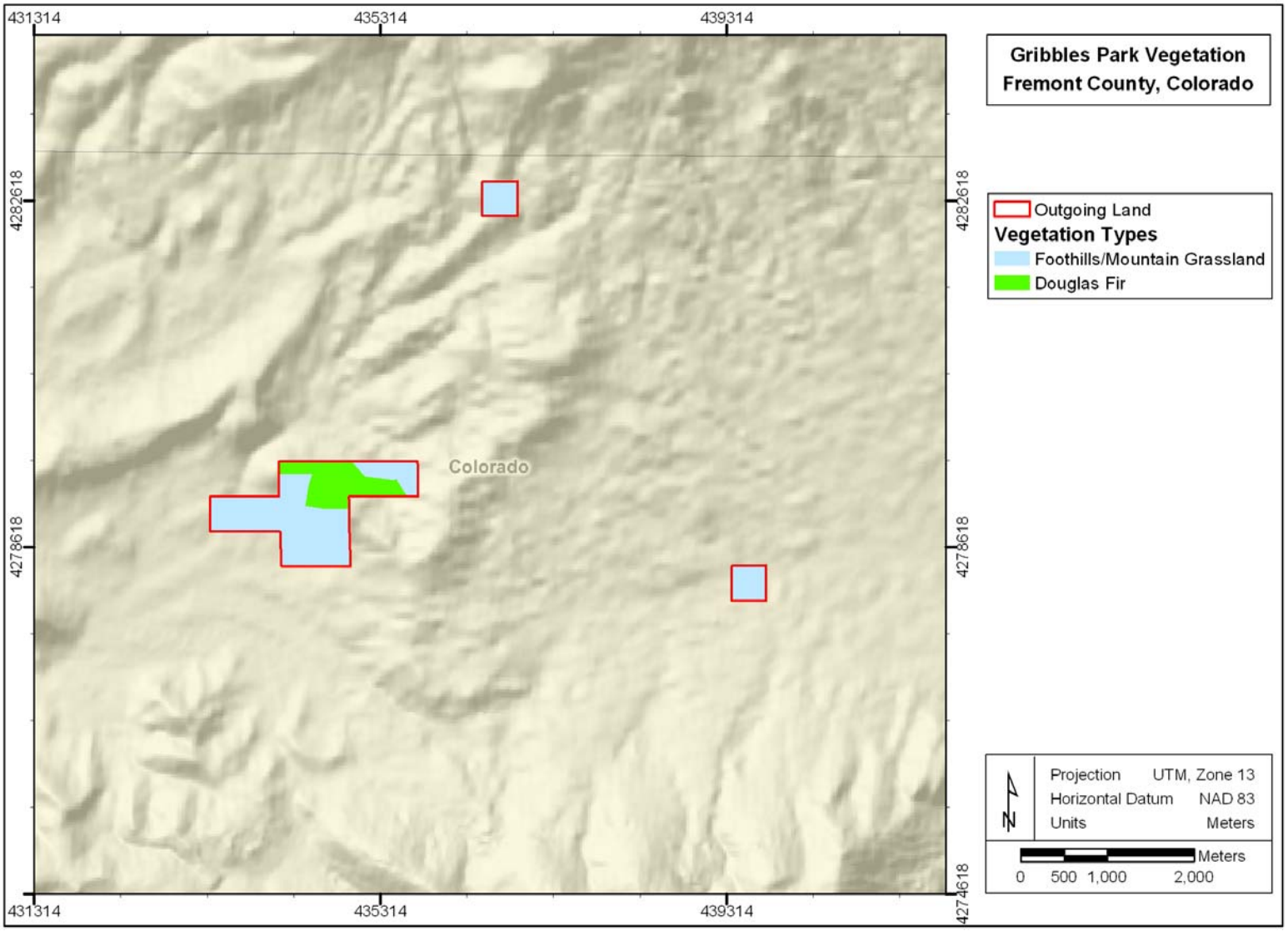
Gribbles Park Vegetation
Fremont County, Colorado
Outgoing Land
Vegetation Types
Foothills/Mountain Grassland
Douglas Fir
Colorado
431314
435314
439314
4282618
4278618
4274618
Projection UTM, Zone 13
Horizontal Datum NAD 83
Units Meters
N
Meters
0 500 1,000 2,000

FIGURE 3-18. VEGETATION MAP OF PROPOSED GRIBBLES PARK BLM EXCHANGE PARCELS

The proposed Table Mountain and Gribbles Park exchange parcels provide habitat for eight forest and woodland, three shrubland, five grassland/meadow, and two nonnative ecological systems under the SW ReGAP (USGS 2005) vegetation mapping methods. Further onsite information was provided by the BLM Royal Gorge Resource Area biologists (2005) and is enhanced with regional ecological system and vegetation alliance information from NatureServe (2003).

Table Mountain exchange parcels, as proposed predominantly support stands of piñon pine (*Pinus edulis*) – juniper (*Juniperus* spp.) woodland with intermixed stands of ponderosa pine (*Pinus ponderosa*) woodland and limited narrowleaf cottonwood forest patches along drainages (USGS 2005). The driest exposures of flats, slopes, ridges, mesas, and canyons often support sparse to moderately dense piñon pine – juniper woodlands. The site topography ranges from 0 to 94 percent slopes. These woodland stands are characterized by an open canopy of piñon pine and one-seed (*Juniperus monosperma*) or Rocky Mountain (*Juniperus scopulorum*) juniper that are short stature, typically between 2 m to 5 m tall (NatureServe 2009n). The understory ranges from nearly devoid of vegetation to various grass or shrub layers. Perennial grasses including Arizona fescue (*Festuca arizonica*), blue grama (*Bouteloua gracilis*), mountain muhly (*Muhlenbergia montana*), slimstem muhly (*Muhlenbergia filiculmis*), and squirreltail (*Elymus elymoides*) are likely to occur in sparse to moderate cover. Shrubs, including snakeweed (*Gutierrezia* spp.), prickly-pear (*Opuntia* spp.), mountain mahogany (*Cercocarpus montanus*), and skunkbrush sumac (*Rhus trilobata*) often occur.

Ponderosa pine woodlands are characterized by this medium-tall tree in addition to Douglas-fir , piñon pine, and species of juniper. The understory is shrubby with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), kinnikinnick (*Arctostaphylos uva-ursi*), mountain mahogany, and serviceberry (*Amelanchier* spp.) often present. Common understory grasses include the bunchgrasses needle-and-thread (*Hesperostipa comata*), Indian ricegrass (*Achnatherum hymenoides*), and Arizona fescue, and the shortgrass blue grama.

Where canopy openings occur or where tree and shrub species have not established due to dry conditions or past disturbance, small grassland stands occur. At higher elevations these sites support predominantly bunchgrasses including Arizona fescue and needle-and-thread. At lower elevations blue grama and James' galleta (*Pleuraphis jamesii*) are more common.

Wet drainages and their associated floodplain terraces in Banta Gulch and Patton Canyon support patches of deciduous tree-dominated wetland and riparian vegetation (USGS 2005). Groundwater is typically within one meter of the ground surface and the sites are subject to seasonal flooding due to runoff from snowmelt and thunderstorms. Narrowleaf cottonwood forms an association with species of willow (*Salix* spp.), western birch , and chokecherry tall shrubs and species of rushes (*Juncus* spp.), sedges (*Carex* spp.), and mesic grasses in the herbaceous understory (NatureServe 2003). The herbaceous understory is further characterized by species of forbs, including fleabane (*Erigeron* spp.), bluebells (*Mertensia* spp.), lupines (*Lupinus* spp.), and mule's-ears (*Wyethia glabra*).

Gribbles Park proposed parcels predominantly support Foothills / Mountain Grassland, some stands of ponderosa pine woodland mixed with bristlecone pine (*Pinus aristata*), and Douglas-fir woodland (USGS 2005, BLM 2005a). The site topography ranges from 0 to 51 percent slopes. Grasslands occupy the dry exposures of the parks, valleys, slopes, and ridge tops typically where deeper soils or dry rocky soils occur. The grasslands are characterized by a moderately dense herbaceous layer of the medium tall bunchgrass, Arizona fescue, and the sod-forming shortgrass, blue grama (NatureServe 2009o). Additional bunchgrasses that might be codominant on some sites include slimstem muhly, mountain muhly, pine dropseed (*Blepharoneuron tricholepis*), prairie Junegrass (*Koeleria macrantha*), squirreltail, Parry oatgrass (*Danthonia parryi*), mutton bluegrass (*Poa fendleriana*), and Sandberg bluegrass (*Poa secunda*). Sparse herbaceous cover by forbs includes species such as pingue (*Hymenoxys richardsonii*), wild buckwheat (*Eriogonum umbellatum*), scarlet globemallow (*Sphaeralcea coccinea*), yarrow (*Achillea millefolium*), pussytoes (*Antennaria parvifolia*), and Indian paintbrush (*Castilleja integra*). A sparse layer of dwarf-shrubs often occurs, including fringed sagewort (*Artemisia frigida*), rabbitbrush (*Chrysothamnus* spp.), snakeweed (*Gutierrezia sarothrae*), and prickly-pear (*Opuntia polyacantha*).

Mixed stands of ponderosa pine, bristlecone pine, and Douglas-fir occur on shallow soils and rocky substrates of slopes and on ridgetops (USGS 2005, BLM 2005a). The composition and structure of the overstory trees is dependent on the temperature and moisture relationships of the site and the successional status of the stand. In addition to the dominant trees, other conifers present in these sparse to moderately vegetated stands include bristlecone pine and species of juniper (NatureServe 2009p). Scattered shrubs of mountain mahogany and oceanspray (*Holodiscus dumosus*) are occasionally present as are the grasses Arizona fescue, blue grama, and little bluestem (*Schizachyrium scoparium*).

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Vegetation is distributed across the proposed Biedell Creek and La Jara Reservoir proposed exchange parcels as shown in Figures 3-19 and 3-20. Generally, the vegetation of these Saguache and Conejos county sites can be classified into two life zones described by Bailey (1995) they are the montane and foothill woodland zones. Ecological systems best representing these zones (USGS 2005, NatureServe 2003) and their percent of the total vegetation cover [%] include the following:

- Rocky Mountain Cliff and Canyon [<1.0%, <1.0%][4,5]
- Inter-Mountain Basins Active and Stabilized Dune [<1.0%][5]
- Rocky Mountain Aspen Forest and Woodland [2.9%][5]
- Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodland [<1.0%, <1.0%][4,5]
- Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland [<1.0%][5]
- Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland [<1.0%][4]
- Rocky Mountain Lodgepole Pine Forest [<1.0%][5]

- Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland [<1.0%, 1.7%][4,5]
- Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland [<1.0%, 5.2%][4,5]
- Rocky Mountain Ponderosa Pine Woodland [2.8%, 5.0%][4,5]
- Southern Rocky Mountain Piñon-Juniper Woodland [35.2%, 26.0%][4,5]
- Inter-Mountain West Aspen-Mixed Conifer Forest and Woodland Complex [<1.0%][5]
- Rocky Mountain Gambel Oak-Mixed Montane Shrubland [<1.0%, <1.0%][4,5]
- Rocky Mountain Lower Montane-Foothill Shrubland [<1.0%][4]
- Inter-Mountain Basins Big Sagebrush Shrubland [<1.0%, 2.4%][4,5]
- Inter-Mountain Basins Mixed Salt Desert Scrub [<1.0%][5]
- Inter-Mountain Basins Montane Sagebrush Steppe [<1.0%][5]
- Inter-Mountain Basins Semidesert Shrub-Steppe [48.8%, 26.6%][4,5]
- Rocky Mountain Subalpine Mesic Meadow [<1.0%][5]
- Southern Rocky Mountain Montane-Subalpine Grassland [7.4%, 21.8%][4,5]
- Inter-Mountain Basins Semidesert Grassland [4.0%, 7.0%][4,5]
- Rocky Mountain Subalpine-Montane Riparian Shrubland [1.0%, <1.0%][4,5]
- Rocky Mountain Subalpine-Montane Riparian Woodland [<1.0%][5]
- Rocky Mountain Lower Montane Riparian Woodland and Shrubland [<1.0%, <1.0%][4,5]
- Inter-Mountain Basins Greasewood Flat [<1.0%][4]
- Rocky Mountain Alpine-Montane Wet Meadow [<1.0%][5]
- Agriculture [<1.0%, <1.0%][4,5]
- Invasive Perennial Grassland [<1.0%].[5]

[4] = Biedell Creek; [5]= La Jara Reservoir

The proposed Biedell Creek and La Jara Reservoir exchange parcels and immediate vicinity provide habitat for 11 forest and woodland, 8 shrubland, 3 grassland/meadow, 2 topographic/edaphic, and two nonnative ecological systems under the SW ReGAP (USGS 2005) vegetation mapping methods. Further regional information was obtained from ecological system and vegetation alliance information provided by NatureServe (2003). Biedell Creek proposed exchange parcels predominantly support stands of Semidesert Shrub-Steppe and Grasslands and Piñon Pine – Juniper Woodland with intermixed patches of montane and subalpine grasslands (USGS 2005). The site topography ranges from 0 to 124 percent slopes. The driest exposures of alluvial fans and flats support grasslands with an open shrub layer, including Indian ricegrass, blue grama, saltgrass, needle-and-thread, James' galleta, alkali sacaton (*Sporobolus airoides*), four-wing saltbush (*Atriplex canescens*), big sagebrush (*Artemisia tridentata*), rabbitbrush species, Mormon-tea (*Ephedr*a spp.), snakeweed, and winterfat (*Krascheninnikovia lanata*) (NatureServe 2009o). These stands are often patchy in appearance and occupy moderately deep to deep soils.

Slopes, hills, and canyons support sparse to moderately dense Piñon Pine – Juniper Woodland stands that are characterized by an open canopy of piñon pine and one-seed or Rocky Mountain juniper of short stature, typically between 2 m to 5 m tall (NatureServe 2009q). The understory

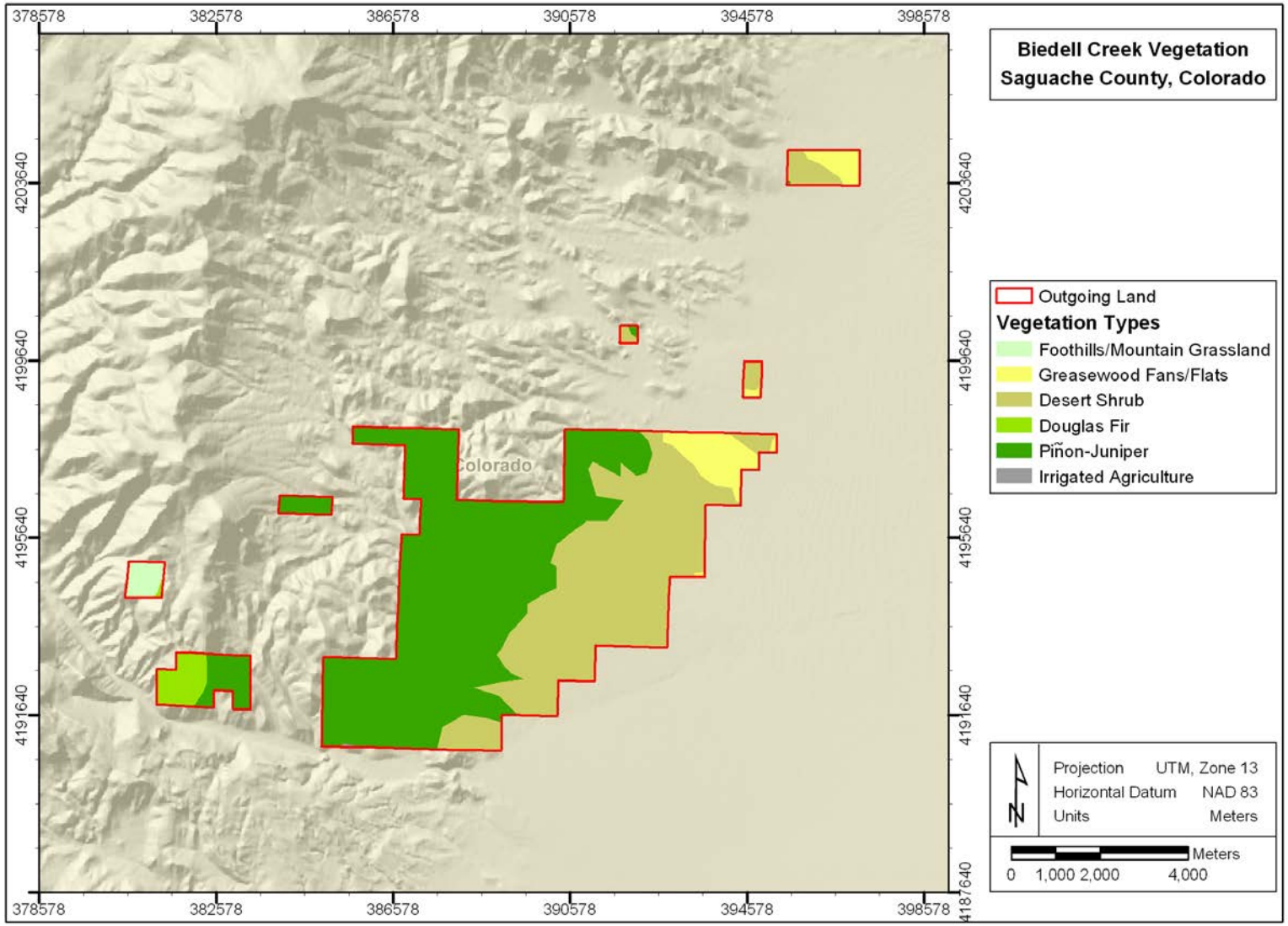

FIGURE 3-19. VEGETATION MAP OF PROPOSED BIEDELL CREEK BLM EXCHANGE PARCELS

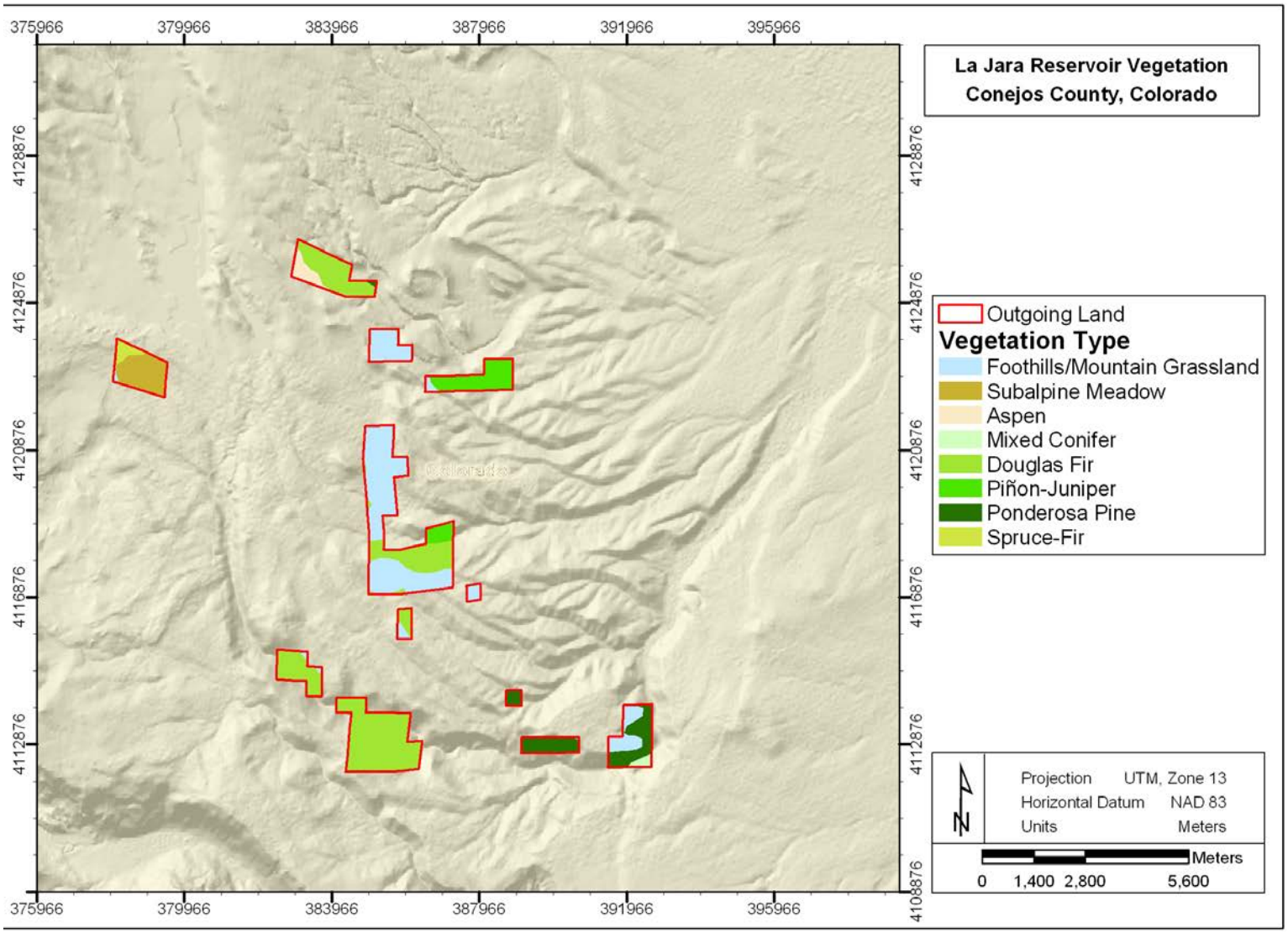

FIGURE 3-20. VEGETATION MAP OF PROPOSED LA JARA RESERVOIR BLM EXCHANGE PARCELS

ranges from nearly devoid of vegetation to various grass or shrub layers. Perennial grasses including Arizona fescue, blue grama, mountain muhly, slimstem muhly, and squirreltail are likely to occur in sparse to moderate cover. Shrubs, including snakeweed, prickly-pear, mountain mahogany, and skunkbrush sumac are often present. Grasslands occurring at the higher site elevations are characterized by species of oatgrass (*Danthonia* spp.), fescue (*Festuca* spp.), slimstem muhly, or bluebunch wheatgrass (*Pseudoroegneria spicata*). Montane and subalpine grasslands typically occupy the dry exposures in tree canopy openings, valleys, slopes, and ridge tops typically where deeper soils or dry rocky sites occur. Deep soils resemble prairie soils in that the A-horizon is dark brown, relatively high in organic matter, slightly acid, and are usually well-drained.

Parcels proposed for exchange in the La Jara Reservoir site equally support stands of Semidesert Shrub-Steppe and Grasslands and Piñon Pine – Juniper Woodland with intermixed patches of montane and subalpine grasslands (USGS 2005). Smaller areas of vegetation cover are contributed by ponderosa pine and mixed conifer stands that form open-canopied woodlands on some slopes and in canyons. The site topography ranges from 0 to 121 percent slopes. The driest exposures of alluvial fans and flats support grasslands with an open shrub layer, including Indian ricegrass, blue grama, saltgrass, needle-and-thread, James' galleta, alkali sacation, four-wing saltbush, big sagebrush, rabbitbrush species, Mormon-tea, snakeweed, and winterfat (NatureServe 2009o). These stands are often patchy in appearance and occupy moderately deep to deep soils.

Slopes, hills, and canyons support sparse to moderately dense Piñon Pine – Juniper Woodland stands that are characterized by an open canopy of piñon pine and one-seed or Rocky Mountain juniper of short stature, typically between 2 m to 5 m tall (NatureServe 2009q). The understory ranges from nearly devoid of vegetation to various grass or shrub layers. Perennial grasses including Arizona fescue, blue grama, mountain muhly, slimstem muhly, and squirreltail, shrubs, mountain mahogany, and skunkbrush sumac are often present.

Grasslands occurring at the higher site elevations are characterized by species of oatgrass, fescue, slimstem muhly, or bluebunch wheatgrass. Montane and subalpine grasslands typically occupy the dry exposures in tree canopy openings, valleys, slopes, and ridge tops typically where deeper soils or dry rocky sites occur. Deep soils resemble prairie soils in that the A-horizon is dark brown, relatively high in organic matter, slightly acid, and are usually well-drained.

Proposed San Luis Valley SLB Exchange Parcels

Vegetation is distributed across the SLB proposed exchange parcels as shown in Figure 3-21. Generally, the vegetation of these Alamosa and Saguache county sites can be classified into one life zone described by Bailey (1995) it is the foothill woodland zone. Ecological systems best representing this zone (USGS 2005, NatureServe 2003) and their percentage of the total vegetation cover [%] include the following:

- Inter-Mountain Basins Active and Stabilized Dune [4.6%][6]
- Inter-Mountain Basins Playa [10.3%][6]

- Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland [<1.0%][6]
- Rocky Mountain Ponderosa Pine Woodland [<1.0%][6]
- Southern Rocky Mountain Piñon-Juniper Woodland [<1.0%][6]
- Rocky Mountain Gambel Oak-Mixed Montane Shrubland [<1.0%][6]
- Inter-Mountain Basins Big Sagebrush Shrubland [<1.0%][6]
- Inter-Mountain Basins Semidesert Shrub-Steppe [35.0%][6]
- Southern Rocky Mountain Montane-Subalpine Grassland [<1.0%][6]
- Inter-Mountain Basins Semidesert Grassland [1.1%][6]
- Rocky Mountain Subalpine-Montane Riparian Shrubland [<1.0%][6]
- Rocky Mountain Lower Montane Riparian Woodland and Shrubland [<1.0%][6]
- Inter-Mountain Basins Greasewood Flat [43.4%][6]
- North American Arid West Emergent Marsh [<1.0%][6]
- Rocky Mountain Alpine-Montane Wet Meadow [<1.0%][6]
- Open Water [<1.0%][6]
- Developed, Medium - High Intensity [<1.0%][6]
- Agriculture [4.0%][6]
- Recently Mined or Quarried [<1.0%][6]
- Invasive Perennial Grassland [<1.0%][6]
- Invasive Annual and Biennial Forbland [<1.0%].[6]

[6] = SLB parcels

The SLB proposed exchange parcels and immediate vicinity provide habitat for three forest and woodland, six shrubland, four grassland/meadow, two topographic/edaphic, two nonnative, and four land-use type ecological systems/map units under the SW ReGAP (USGS 2005) vegetation mapping methods. Further regional information was obtained from ecological system and vegetation alliance information from NatureServe (2003). The SLB proposed exchange parcels predominantly support stands of greasewood and Semidesert Shrub-Steppe and Grasslands primarily in addition to barren to nearly barren playas (USGS 2005). The site topography ranges from 0 to 5 percent slopes. Alluvial fans and flats with deeper soils support grasslands with an open shrub layer, including Indian ricegrass, blue grama, saltgrass, needle-and-thread, James' galleta, alkali sacation, four-wing saltbush, big sagebrush, rabbitbrush species, Mormon-tea, snakeweed, and winterfat (NatureServe 2009o). These stands are often patchy in appearance and occupy moderately deep to deep soils.

Extensive stands of greasewood short shrubs occupy stream terraces along drainages, small dunes, and flats, and form rings around playas that are nearly devoid of vegetation. The stands typically occupy sites with saline soils, shallow water tables, and intermittent flooding. Associated shrubs and understory grasses commonly include four-wing saltbush, shadscale (*Atriplex confertifolia*), winterfat, alkali sacaton, and spike-rush (*Eleocharis* spp.). Playas generally have salt crusts with small saltgrass beds established on raised areas. Characteristic plant species include iodinebush, greasewood, and species of saltbush (*Atriplex* spp.), but

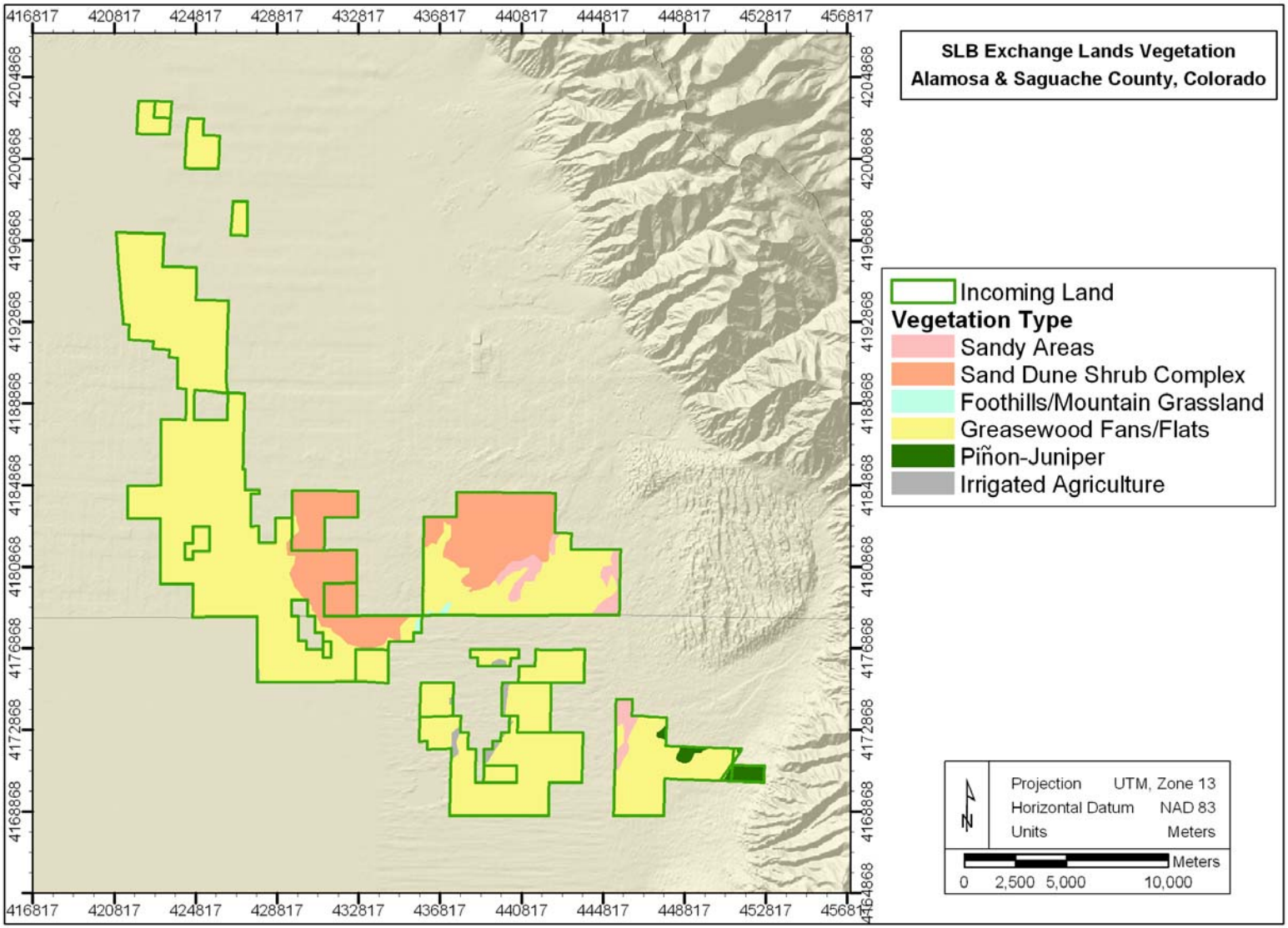

FIGURE 3-21. VEGETATION MAP OF PROPOSED SLB EXCHANGE PARCELS

always in sparse to low cover. Playas have wetland characteristics and are also discussed under "Wetlands and Riparian Zones." Within BNWR generally, the playas, flats, and dunes support predominantly semidesert shrubland and grassland plant communities including the eight vegetation/habitat types and two nonvegetated types and their contribution to total ground cover listed below (CDOW 2004 in USFWS 2005). Common shrubs include rubber rabbitbrush (*Ericameria nauseosa*), greasewood, four-wing saltbush, shadscale, and winterfat. Grassland dominants include Indian ricegrass, alkali sacaton, western wheatgrass, and blue grama. Nonnative grass species include the annual cheatgrass and perennial bunchgrass crested wheatgrass (*Agropyron cristatum*) (USFWS 2005). Others present within BNWR include the following:

- Rabbitbrush / Grass Mix [48%]
- Greasewood [27%]
- Herbaceous Riparian [10%]
- Sedge [4%]
- Grass Dominated [4%]
- Shrub / Grass / Forb Mix [4%]
- Cottonwood [2%]
- Bare Soil [1%]
- Irrigated Agriculture [1%]
- Sand Dune Complex [<1%].

3.3.2.2 Environmental Consequences/Mitigation

Vegetation resources include the plant associations and component species present on the landscape. An effect on the vegetation resources would be considered (1) insignificant if it is barely detectable, would affect a minimal area, or is of short duration; (2) low if it is slight but detectable, affects a small area, or is of short duration; (3) moderate if it is readily observable, affects a large area, or is of long duration; and (4) high if it would cause substantial changes to the abundance, diversity, distribution, or habitat value of plant associations or species or cause a plant species to be listed under the ESA. Natural events, including drought, insects, flooding, and fire can contribute to the disturbance and alteration of existing vegetation.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. BLM management of the vegetation resources would be consistent with the two RMP's objectives and with the Colorado PLH Standard 3. Vegetation associated with BLM parcels proposed for exchange consists of 12 forest and woodland types, 9 shrubland types, 7 herbaceous types, and 1 nonnative type. Continued BLM management of extant vegetation would result in long-term, insignificant beneficial effects due to range monitoring and grazing management and control of invasive plant species. Within the Table Mountain parcels, quarry expansion would result in long-term, low to moderate, adverse

effects to piñon pine – juniper woodland and Gambel oak shrubland associations due to vegetation and substrate removal and alteration.

The SLB would continue current state management of the vegetation resource within the SLB parcels in the San Luis Valley. Vegetation associated with SLB parcels proposed for exchange consists of four woodland types, five shrubland types, four herbaceous types, and two nonnative types. Continued SLB management of extant vegetation would result in long-term insignificant effects due to range monitoring and grazing management, irrigation of hay crops, and control of invasive plant species. Lessees would be responsible for control of nonnative species on SLB parcels.

Proposed Action

The Proposed Action would transfer BLM parcels proposed for exchange supporting vegetation resources classified into 29 types and occupying mostly hilly to mountainous topography to SLB ownership and management resulting in long-term, negligible adverse and beneficial effects due to range monitoring and grazing management and control of invasive plant species. Within the Table Mountain parcels, quarry expansion would result in long-term, low to moderate, adverse effects on piñon pine – juniper woodland and Gambel oak shrubland associations due to vegetation and substrate removal and alteration. Within the Biedell Creek and La Jara Reservoir parcels, timber management by the CSFS would result in long-term, insignificant to moderate, adverse effects on forest and woodland associations due to timber harvest. Mitigation relating to the CSFS supervising all timber harvests and ensuring use of appropriate timber harvest practices would result in insignificant to low adverse effects.

Under the Proposed Action, relatively flat to undulating San Luis Valley topography supporting vegetation resources classified into 15 types would be transferred to the BLM, USFWS, and NPS for management resulting in insignificant to moderate effects on the vegetation resource due to implementation of management actions. BLM management of the vegetation resources on parcel 31 would be consistent with the RMP objectives and with the Colorado PLH Standard 3 resulting in long-term, insignificant to low, beneficial effects. The USFWS would manage the vegetation under an approved CCP that focuses on providing high-quality wildlife habitat, management of native species and communities, and nonnative species control resulting in long-term, low to moderate, beneficial effects on plant communities. Vegetation management tools could include livestock grazing, prescribed fire, mowing, introduction of bio-controls, or herbicide application, among others. Surface and groundwater management could be used to maintain aquatic, wetland, and riparian vegetation resulting in long-term, insignificant to moderate, beneficial effects on diverse waterfowl and shorebird habitat. The NPS would manage the vegetation resource to identify and reduce nonnative species populations, preserve rare communities or rare species habitat, and to achieve healthy biodiversity resulting in long-term, insignificant to moderate, beneficial effects. Management actions could include cessation of irrigation. Wet meadow plant communities would adapt and change to a drier habitat resulting in long-term, insignificant to moderate, beneficial effects due to restoration of historic native plant communities and long-term, insignificant to moderate, adverse effects due to loss of wetland acreage.

Mitigation in the form of BNWR management actions would include (1) assessing habitat conditions, (2) evaluate grazing and haying activities to improve vegetation health and wildlife habitat, (3) evaluate prescribed fire to improve habitat for wildlife, and (4) assess wildlife use (USFWS 2005). The USFWS would develop partnerships with the research community, NPS, and TNC to inventory and monitor upland habitats using ecosystem-wide monitoring protocols. Developing upland vegetation management actions on baseline and monitoring data would result in long-term, low to moderate, beneficial effects on vegetation resources as wildlife habitat.

Standards for Public Land Health

The Finding on the Public Land Health Standard 3 states:

> *Healthy, productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species and habitat's potential; Plants and animals at both the community and population level are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations and ecological processes.*

Standards for public land health (BLM 1997) describe conditions needed to sustain public land health and relate to all uses of the public lands. Standards are applied on a landscape scale and relate to the potential of the landscape. Indicators for Standard 3 are as follows:

- Noxious weeds and undesirable species are minimal in the overall plant community.
- Native plant and animal communities are spatially distributed across the landscape with a density, composition, and frequency of species suitable to ensure reproductive capability and sustainability.
- Plants and animals are present in mixed age classes sufficient to sustain recruitment and mortality fluctuations.

Animals. Federal parcels proposed for exchange provide habitat for large and small mammals, birds, reptiles and amphibians, and limited aquatic habitat. Some wildlife communities of the Federal parcels have been assessed and found to meet PLH Standard 3 for productive wildlife communities, based in part on grazing lease renewals. SLB parcels proposed for exchange provide outstanding habitat for migratory birds, including waterfowl and shorebirds. A large herd of American elk, up to 6,000 head, traverses these parcels as a portion of their range within the San Luis Valley. Endemic small mammals and insects also occur on this largely sand sheet substrate.

Under the Proposed Action, Federal parcels exchanged to the SLB for management would no longer be subject to PLH Standard 3 for productive wildlife populations. Wildlife and habitat of SLB parcels would be monitored by CDOW. Approximately 320 acres of SLB land supporting woodland and shrubland wildlife habitat would be managed by the BLM under PLH Standard 3 following the land exchange. Former SLB parcels accepted by the NPS and USFWS would be managed to reduce nonnative species, increase natural biodiversity, and promote healthy

wildlife populations and habitat, thus meeting or exceeding the PLH Standard 3 for healthy and sustainable wildlife populations and habitat.

Under the No Action Alternative, the Federal parcels proposed for exchange would remain under BLM management and wildlife populations and habitat would continue to be assessed under PLH Standard 3. Standards assessments would continue to be analyzed on a case-by-case basis in conjunction with grazing lease renewals and grazing management prescriptions. Therefore, the No Action Alternative would meet PLH Standard 3 on BLM parcels; however, no similar standard exists for SLB-managed parcels. Wildlife and habitat of SLB parcels would continue to be monitored by CDOW.

Plants. Under the Proposed Action, Federal parcels exchanged to the SLB for management would no longer be subject to PLH Standard 3. Approximately 320 acres of SLB land supporting piñon pine – juniper woodlands and rabbitbrush shrublands would be managed by BLM under PLH Standard 3 following the land exchange. Former SLB parcels accepted by the NPS and USFWS would be managed for natural biodiversity and healthy wildlife habitat, thus meeting or exceeding the PLH Standard 3.

Under the No Action Alternative, the Federal parcels proposed for exchange would remain under BLM management and vegetation resources would continue to be assessed under PLH Standard 3. Standards assessments would continue to be analyzed on a case-by-case basis in conjunction with grazing lease renewals and grazing management prescriptions. Therefore, the No Action Alternative would meet PLH Standard 3 on BLM parcels; however, no similar standard exists for SLB-managed parcels.

3.3.3 Terrestrial Wildlife

The elevation range and topographic relief encompassed by the BLM and SLB parcels proposed for exchange includes a diversity of plant communities and geologic exposures that provide habitat for an array of resident and migrant wildlife species. As a result, the discussion herein is not all inclusive but rather provides a context for consideration of groups of wildlife species that might be differentially affected by the exchange. Also, the habitats are discussed in a contextual framework of ecological systems or life zones, although several taxa, particularly larger and more mobile species, move among the ecological systems during their daily and annual life cycles. Under this life zone concept, the proposed exchange parcels occupy Montane Forest and Woodland, Foothill Piñon Pine – Juniper Woodland, Sand Sheet, and Sabkha (NPS 2005). The Fremont County parcels are a combination of montane and foothill ecological systems and plant communities, while those parcels in Alamosa, Saguache, and Conejos counties encompass all four life zones.

Wildlife habitats of the parcels under consideration for exchange generally range from steep woodlands, shrublands, and grasslands of hills and mountain slopes in Fremont County and along the western edge of the San Luis Valley to flat shrublands, grasslands, and playas of the San Luis Valley bottom. As much as 90 percent of the Table Mountain site supports piñon pine – juniper and ponderosa pine woodlands while nearly 85 percent of the Gribbles Park site supports montane grasslands. Both the Biedell Creek and the La Jara Reservoir parcels have

extensive piñon pine – juniper woodland cover and shrub-steppe habitat and the La Jara Reservoir parcels also support significant montane grasslands. The SLB parcels are characterized by the flattest topography and support primarily greasewood shrubland, shrub-steppe, and playa habitats.

Ponderosa pine woodlands occur on dry sites in Table Mountain, Biedell Creek, and La Jara Reservoir parcels and are characterized by open stands of mature trees. On the more mesic sites typical of this woodland habitat on Table Mountain, ponderosa pine stands are relatively dense and nearly closed-canopy stands are common (BLM 2005a). Common understory shrubs providing structure in these stands include Gambel oak, mountain mahogany, and wax currant (*Ribes cereum*). Tree species sometimes intermixed with ponderosa pine include Rocky Mountain juniper, piñon pine, and Douglas-fir.

Ponderosa pine distribution on Table Mountain is influenced heavily by soil moisture and fire, where fire intensity and frequency determines woodland/forest species composition and structure. Historically, frequent, low-intensity fires that cleared understory vegetation, other tree species, and saplings with lower fire tolerance left unharmed the large trees with their thick bark. Heavy grazing in the 1800s and early 1900s reduced and made discontinuous the grass fuels that fed the low-intensity ground fires, resulting in less frequent fires and shrub and sapling tree establishment. Insects, including the mountain pine beetle (*Dendroctonus ponderosae*), have killed many ponderosa pine trees on Table Mountain providing more diverse habitat, such as that used by cavity-nesting birds. Past logging of ponderosa pine trees from Table Mountain to support mining and railroad construction removed many mature trees.

Piñon pine – juniper woodland habitat includes relatively open canopies of short stature trees. Such habitat is common on Table Mountain, Biedell Creek, and La Jara Reservoir parcels. At elevations higher than semidesert shrublands and grasslands piñon pine – juniper woodlands form bands of vegetation and also intermix with ponderosa pine and montane grassland stands. The relative proportions of juniper and piñon pine trees can vary greatly within this habitat and pure stands of either species could occur. Piñon pine dominance increases with increasing elevation and soil moisture and individual trees become larger. Juniper trees dominate completely at the lower and drier elevations of woodland establishment. Depending on site-specific conditions, piñon pine – juniper woodland habitat can range from an open savanna to a closed forest. Piñon pine – juniper understories vary from sparse to dense, the densest understories occur where Gambel oak shrubs have become established or have been invaded by the canopy trees.

Some Gambel oak shrubland has become established in the upper portion of piñon pine – juniper woodland stands on Table Mountain (BLM 2005a). Other associated shrubs include serviceberry, mountain mahogany, chokecherry, and snowberry (*Symphoricarpos* spp.). Gambel oak reproduces by root suckers, and forms clones that are fire tolerant. The shrubs vigorously resprout from stem bases or from underground structures following fire. A thick layer of leaf litter and oak mast is typically present, leaving little bare ground in this habitat.

Small dunes can be present on the SLB exchange parcels that occupy the basin of the San Luis Valley. Most of the land is composed of sand sheet grasslands and shrublands and sabkha

playas, sparse grasslands, and sparse shrublands. The vast sand sheet surrounding the Great Sand Dunes is stabilized by a mixture of grassland comprised of short to medium-tall bunchgrasses interspersed by sparse shrublands of four-wing saltbush, rabbitbrush, and greasewood. The sand sheet also supports nearly pure stands of greasewood shrubland that tend to collect sand particles and provide deeper mounds around their bases.

Small to large playas ringed by sparse stands of saltgrass, alkali sacaton, saltbush, and greasewood occur on low-lying, salt-encrusted sabkha (NPS 2005). Although dry during periods of inadequate snowmelt and precipitation, the playa lakes and wetlands provide important habitat for a variety of migratory birds, particularly shorebirds.

Some SLB parcels proposed for exchange lie in proximity to SH-17 and are traversed by San Luis Creek, which is fed in its northern reach by Saguache Creek and a number of other tributary creeks. Lands along this drainage are irrigated to produce grass hay then grazed by cattle. Irrigation water is primarily from snowmelt runoff during the spring and summer seasons but is augmented by groundwater wells. Irrigation flows are diverted to support wet meadows important to many wildlife species as habitat.

Habitats, recognized as life zones herein, have been described in more detail previously as ecological systems and plant communities and their general distribution mapped under the vegetation section of this EA. Within this section, wildlife will be discussed by major group, which includes mammals, birds, reptiles and amphibians, fish, and invertebrates for each site containing proposed exchange parcels.

3.3.3.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

Table Mountain and Gribbles Park parcels proposed for exchange support a variety of mammals, birds, reptiles, amphibians, and invertebrates. The BLM has the responsibility to manage wildlife habitat and CDOW has the responsibility to manage the wildlife species. Proposed Table Mountain exchange parcels are within CDOW big game management unit 59 (bounded on the north by US 24, on the east by I-25, on the south by US 50, and on the west by SH-67 and Phantom Canyon Road) and the proposed Gribbles Park parcels are within CDOW big game management unit 58 (bounded on the north by US 24, on the east by PCR 59 and SH 9, on the south by US 50, and on the west by Kaufmann Ridge and Badger Creek) (CDOW 2007).

Mammal species common to the piñon pine – juniper and ponderosa pine woodlands and Gambel oak shrublands characteristic of the proposed Table Mountain exchange parcels include American elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), black bear (*Ursus americana*), mountain lion (*Felis concolor*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), common raccoon (*Procyon lotor*), American badger (*Taxidea taxus*), striped skunk (*Mephitis mephitis*), mountain cottontail (*Sylvilagus nuttallii*), pocket gopher (*Thomomys talpoides*), deer mouse (*Peromyscus maniculatus*), long-eared myotis (*Myotis evotis*), and long-legged myotis (*Myotis volans*). These species use habitats for forage, during breeding, and for protective cover

while resting. Montane grassland habitat of proposed Gribbles Park parcels supports the same species in lesser densities, but is used predominantly for foraging activity due to lack of structured vegetation to provide hiding and resting cover. Montane grassland habitats with deeper soils support several species of small mammals, including voles (*Microtus* spp.).

Large mammal species of proposed Table Mountain and Gribbles Park exchange parcels are important economically (hunting), for research, and in terms of recreation (photography and hunting). They include American elk, mule deer, black bear, and mountain lion. American elk are common in both the Table Mountain and Gribbles Park sites and are increasing due primarily to migration by herds supported on Fort Carson lands to the east (BLM 2005a). American elk of the Gribbles Park area use the montane grassland habitat, which is considered both a critical winter habitat for forage and an important migration corridor. They are generalist feeders, e.g., both grazers and browsers. Grasses and shrubs compose most of the winter diet, with the former becoming of primary importance in the spring and fall months. Forbs are increasingly important in the diet during late spring and summer. Browse from shrubs and trees constitute more than 55% of the winter diet for American elk.

American elk tend to inhabit higher elevations during spring and summer and migrate to lower elevations for winter range where they form large mixed-age/sex herds. American elk breed in the fall and calving typically occurs in late May or early June. Calving grounds are carefully selected by the cows and are generally in locations where cover, forage, and water are in juxtaposition (BLM 2005a). Mortality is due mostly to predation on calves, hunting, and winter starvation.

Mule deer occupy all habitats of the Table Mountain parcels proposed for exchange but are uncommon on proposed Gribbles Park exchange parcels due to lack of hiding and resting cover. Excellent Gambel oak shrubland habitat has become established on the Table Mountain exchange parcels and it provides important forage and cover for mule deer (BLM 2005a). Fall and winter diets of mule deer consist of browse from trees and shrubs, shifting to browse, forbs, and grasses during the spring and summer. Mule deer are migratory, generally summering at higher elevations then moving downslope with snow cover to winter range, including lower elevations and south-facing slopes. Montane woodlands and forests and piñon pine – juniper woodlands with diverse shrub understory, as occur on the proposed Table Mountain exchange parcels, represent good winter range for mule deer. Mule deer breed in November and December and fawn during May and June. Mortality of mule deer varies with age and region, e.g., fawns to predation and starvation and adults from hunting, winter starvation, or age. Predators include coyotes, bobcats (*Lynx rufus*), golden eagles, mountain lions, black bears, and domestic dogs (*Canis familiaris*).

Black bears in very low numbers occupy all habitats within the proposed Table Mountain and Gribbles Park exchange parcels. Preferred black bear habitat supports montane shrublands, woodlands, and forests with Gambel oak and berry-producing shrubs (e.g., serviceberry, chokecherry) dominant. Black bears are omnivorous and their diet includes the foods seasonally available, but they focus on vegetation, including emerging grasses and succulent forbs, berries and other fruits, and oak mast and acorns. They also forage on insects, beetle larvae, social insects (e.g., ants, wasps, bees, termites), and will capture rodents, rabbits, and

young or unwary ungulates. Black bears are generally cautious, staying in proximity to rough topography or dense vegetation that provides escape cover. They hibernate in rock cavities or excavations under shrubs and trees with winter denning beginning as early as October. Breeding occurs during the summer and cubs are born in the den during winter hibernation.

The mountain lion is relatively rare, occupies all habitats within the proposed Table Mountain exchange parcels, and can be transient across the Gribbles Park exchange parcels. They are most common in rough, rocky foothills and canyon country, often in association with montane woodlands and forests, shrublands, and piñon pine – juniper woodlands. Mountain lions prey mainly on mule deer and will capture American elk when available. Other food sources include mice, ground squirrels, beaver, rabbits, porcupines (*Erythizon dorsatum*), raccoons, and domestic livestock. Resident mountain lions maintain contiguous home ranges and individual mountain lions often show distinct winter-spring and summer-fall home ranges that correspond to movements of their ungulate prey and local weather conditions (BLM 2005a).

Canyons, caves, and riparian habitats of this portion of Fremont County are often used by bats that forage for insects among the trees in woodlands and along forest edges. The diversity of dry and mesic-slopes and canyons supports carnivores such as bobcats that commonly hunt for mountain cottontail, voles, wood rats (*Neotoma* spp.), and deer mice. Squirrels, including Abert's (*Sciurus abertii*) and red squirrels (*Tamiasciurus hudsonicus*), are common in the coniferous woodland and forest canopies.

Hunting recreation during 2006 resulted in the total harvest by American elk hunters of 143 and 123 animals for big game management units 59 (includes proposed Table Mountain exchange parcels) and 58 (includes proposed Gribbles Park exchange parcels), respectively (CDOW 2007). There were 847 hunters that spent a total of 4,018 recreation days in unit 59 and achieved a 17 percent kill success rate. In unit 58, 577 hunters spent a total of 2,896 recreation days and achieved a 21 percent kill success rate. The total deer harvest for 2006 from units 59 and 58 was 61 and 110 animals, respectively (CDOW 2007). A total of 451 hunters spent 1,985 recreation days in pursuit of deer with an average 40 percent kill success rate. A total of 29 pronghorn were killed by 52 hunters in unit 58; no pronghorn were harvested from unit 59. For both units, 55 hunters were present for 140 recreation days (CDOW 2007). Nine black bears were killed by hunters in units 59 (5) and 58 (4) who used a total of 36 recreation days.

A variety of raptors use the habitats of the Table Mountain and Gribbles Park exchange parcels, including golden eagle, peregrine falcon, prairie falcon, red-tailed hawk, Cooper's hawk, sharp-shinned hawk (*Accipiter striatus*), and American kestrel (BLM 2005a). Golden eagles are common in the area and nest in suitable habitats, primarily cliffs and rock outcroppings on Table Mountain. Peregrine falcon breeding pairs nest on cliffs and forage over adjacent woodland, forest, shrubland, and grassland habitat. Peregrine falcons occur in the Table Mountain area because they nest in the Upper Beaver Creek and Little Turkey Creek drainages. Prairie falcons are widespread in the area using cliff and rock habitats. Red-tailed hawks are the most common broad-winged hawk occurring at all elevations and using most habitats. Cooper's hawks and sharp-shinned hawks are woodland and forest species that are less abundant due to lack of appropriate habitat. The American kestrel occupies many habitats at lower elevations.

Merriam's turkeys (*Meleagris gallapavo*) are common in the proposed Table Mountain exchange parcels, which contain excellent habitat. They primarily occupy ponderosa pine woodlands and forests with an understory of Gambel oak, using the tall pines for roosting and foraging on the Gambel oak mast. Merriam's turkeys also commonly use mountain mahogany shrublands and piñon pine – juniper woodlands.

Other species of birds that commonly use habitats of the Table Mountain and Gribbles Park exchange parcels include ferruginous hawk, Cassin's sparrow, lark bunting, grasshopper sparrow, McCown's longspur (*Rhynchophanes mccownii*), western meadowlark, great horned owl, common raven, and mourning dove in grasslands. Mountain shrubland habitat provides valuable food and cover for many bird species that include the band-tailed pigeon, Lewis's woodpecker, Steller's jay (*Cyanocitta stelleri*), western scrub-jay (*Aphelocoma coerulescens*), green-tailed towhee (*Chlorura chlorura*), Virginia's warbler (*Vermivora virginiae*), and dusky flycatcher (*Empidonax oberholseri*). Piñon pine – juniper woodlands support a large number of nesting species; however, a ponderosa pine stand typically supports more species than a piñon pine – juniper stand (BLM 2005a). Common woodland species include black-chinned hummingbird, gray flycatcher, Cassin's kingbird, gray vireo, piñon jay, juniper titmouse, black-throated gray warbler, Scott's oriole, ash-throated flycatcher, Bewick's wren, mountain chickadee, white-breasted nuthatch, and chipping sparrow. Birds typical of the ponderosa pine woodland and forest include Merriam's turkey, Williamson's sapsucker, pygmy nuthatch (*Sitta pygmaea*), western bluebird, band-tailed pigeon, Grace's warbler, flammulated owl, red-breasted nuthatch, violet-green swallow, western tanager, and chipping sparrow.

In general, reptile and amphibian species are uncommon at these elevations and in this portion of Fremont County. Reptiles that are likely to use habitats in the proposed Table Mountain and Gribbles Park exchange parcels include the western terrestrial garter snake (*Thamnophis elegans*), gopher (bull) snake (*Pituophis melanoleucus*), western rattlesnake (*Crotalus viridis*), side-blotched lizard (*Uta stansburiana*), sagebrush lizard (*Sceloperus graciosus*), and many-lined skink (*Eumeces multivirgatus*). One western rattlesnake (*Crotalus viridis*) was observed on the Table Mountain exchange parcels during archeological surveys (Bevilacqua and Slaughter 2006). Amphibians likely to occur include Woodhouse's toad (*Bufo woodhousei*) and Couch's spadefoot (*Scaphiopus couchii*).

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Biedell Creek and La Jara Reservoir parcels proposed for exchange support a variety of mammals, birds, reptiles, amphibians, and invertebrate wildlife. The BLM has the responsibility to manage wildlife habitat and CDOW has responsibility to manage the wildlife species. Proposed Biedell Creek exchange parcels are within CDOW big game management unit 68 (bounded on the north by SH 114; on the east by US 285; on the south by SCRs G and 41G, USFS RDs 675 and 676, USFS TRs 796 and 787 and Saguache/Mineral County Line; and on the west by Continental Divide) and the proposed La Jara Reservoir exchange parcels are located within CDOW game management unit 81 (bounded on the north by USFS Roads 380 and 250, Alamosa River and La Jara Creek; on the east by Rio Grande; on the south by New Mexico; on the west by Continental Divide) (CDOW 2007).

Mammal species common to the piñon pine – juniper woodland and shrub-steppe habitats characteristic of both sites include American elk, mule deer, black bear, mountain lion, coyote, red fox, common raccoon, American badger, striped skunk, mountain cottontail, pocket gopher, deer mouse, and western small-footed myotis (*Myotis ciliolabrum*). These species use available habitats for forage, during breeding, and for protective cover while resting. Montane grassland habitat of the proposed La Jara Reservoir parcels supports the same species, but predominantly for foraging due to the scarcity of hiding and resting cover.

Large mammal species of the proposed Biedell Creek and La Jara Reservoir parcels are important economically, for research, and in terms of recreation. They include American elk, mule deer, black bear, and mountain lion. American elk are common in both areas and are increasing due primarily to migration by herds of up to 6,000 animals in the San Luis Valley proper. American elk of the La Jara Reservoir area use montane grassland habitat, which is considered both winter habitat for forage and an important migration corridor (BLM 2005a).

Mule deer occupy all habitats of the two sites and are common. They are somewhat migratory, summering at higher elevations then moving downslope with snow cover to winter range, including lower elevations and south-facing slopes. Montane woodlands and forests and piñon pine – juniper woodlands with diverse shrub understory represent good winter range.

Black bears occupy all habitats in very low numbers within both sites. Preferred habitats support montane shrublands, woodlands, and forests with Gambel oak and berry-producing shrubs (e.g., serviceberry, chokecherry) dominant. The mountain lion is relatively rare but could occupy all habitats within both sites. They are most common in rough, rocky foothills and canyon country, often in association with montane woodlands and forests, shrublands, and piñon pine – juniper woodlands (BLM 2005a).

Canyons, caves, and riparian habitats of this area are often used by bats that forage for insects among the trees in woodlands and along forest edges, including Townsend’s big-eared bat, long-eared myotis, and long-legged myotis. The diversity of dry and mesic-slopes and canyons supports carnivores such as bobcats that commonly hunt for mountain cottontail, voles, wood rats, and deer mice. Squirrels, including Abert’s and red squirrels, are common in the coniferous woodland and forest canopies.

During 2006, big game management unit 68 yielded a total harvest of 444 American elk that were killed by 3,147 hunters during more than 16,304 recreation days (CDOW 2007). A total of 802 American elk were killed by 4,283 hunters in unit 81 using 22,595 recreation days (CDOW 2007). The success rate for American elk hunters in these two units was 14 percent and 19 percent, respectively.

Hunting recreation during 2006 resulted in a total of 93 deer killed by 188 hunters within unit 68 over 825 recreation days (CDOW 2007). In unit 81, 172 deer were killed by 314 hunters who used 1,380 recreation days. A total of 25 pronghorn were killed in units 68 (9) and 81 (16) by 40 hunters who used 120 recreation days. During 2006, two black bears were killed in unit 81 by hunters that used four recreation days (CDOW 2007).

A variety of raptors use the hill, mountain slope, and San Luis Valley habitats of the Biedell Creek and La Jara Reservoir parcels proposed for exchange, including the golden eagle, peregrine falcon, prairie falcon, red-tailed hawk, rough-legged hawk, Cooper's hawk, sharp-shinned hawk, and American kestrel (BLM 2005a). Golden eagles are common in the area and nest in suitable habitats, primarily cliffs and rock formations. Peregrine falcon typically nest on cliffs and forage over adjacent woodland, forest, shrubland, and grassland habitat. Prairie falcons are widespread, also using cliff and rock habitats for nesting. Red-tailed and rough-legged hawks are the most common broad-winged hawk occurring at all elevations and using most habitats. Cooper's hawks and sharp-shinned hawks are woodland and forest species. The American kestrel occupies most habitats at lower elevations.

Other species of birds that commonly use habitats of both sites include the ferruginous hawk, Cassin's sparrow, lark bunting, grasshopper sparrow, McCown's longspur, western meadowlark, great-horned owl, common raven, and mourning dove. Mountain shrubland habitat provides valuable food and cover for many bird species that include the band-tailed pigeon, Lewis's woodpecker, Steller's jay, western scrub-jay, green-tailed towhee, Virginia's warbler, and dusky flycatcher. Piñon pine – juniper woodlands support a large number of nesting species; however, a single ponderosa pine stand typically supports more avian species than a single piñon pine – juniper stand (BLM 2005a). Common woodland species include black-chinned hummingbird, gray flycatcher, Cassin's kingbird, gray vireo, piñon jay, juniper titmouse, black-throated gray warbler, Scott's oriole, ash-throated flycatcher, Bewick's wren, mountain chickadee, white-breasted nuthatch, common flicker, and chipping sparrow. Birds typical of the ponderosa pine woodland and forest include Merriam's turkey, Williamson's sapsucker, pygmy nuthatch, western bluebird, band-tailed pigeon, Grace's warbler, flammulated owl, red-breasted nuthatch, violet-green swallow, western tanager, and chipping sparrow.

In general, reptile and amphibian species are uncommon to the proposed Biedell Creek and La Jara Reservoir parcels on the western edge of the San Luis Valley. Reptiles that can occupy the available terrestrial habitats include the western terrestrial garter snake, gopher (bull) snake, western rattlesnake, short-horned lizard (*Phrynosoma hernandesi*), prairie lizard (*Sceloporus undulatus*), and variable skink (*Eumeces gaigeae*). Amphibians likely to occur on uplands and where wetland and riparian habitats are available include Woodhouse's toad, western toad (*Bufo boreas*), and plains spadefoot.

Proposed San Luis Valley SLB Exchange Parcels

The SLB parcels proposed for exchange support a variety of mammals, birds, reptiles, amphibians, and invertebrates. Recent faunal inventories of GRSA identified at least 29 species of mammals, 110 species of birds, 6 species of reptiles, and 4 amphibian species (Valdez 2003, Giroir 2005, Muths and Street 2002). Principal streams draining into the parcels include Saguache and San Luis creeks, with San Luis Creek flowing across the length of the parcels from north to south (USFWS 2005). Irrigation from these sources sustains wet meadows that have been hayed and grazed for more than a century. Proposed SLB exchange parcels are within CDOW game management unit 82 (bounded on the north by Poncha Pass, on the north

and the east by Rio Grande-Arkansas River Divide, on the south by Alamosa-Costilla County line and US 160, and on the west by SH 17 and US 285) (CDOW 2007).

Mammals, including ungulates, carnivores, insectivores, rodents, lagomorphs, and bats, are common within habitats of the San Luis Valley (USFWS 2003). Mammal species common to the greasewood shrublands, semidesert shrub-steppe, and playa habitats characteristic of the proposed SLB parcels include American elk, mule deer, white-tailed deer (*Odocoileus virginianus*), pronghorn (*Antilocapra americana*), coyote, red fox, American badger, striped skunk, white-tailed jackrabbit (*Lepus townsendii*), cottontail, deer mouse, silky pocket mouse (*Perognathus flavus*), plains pocket mouse (*Perognathus flavescens*), and kangaroo rats (*Dipodomys* spp.). These species use the available habitats for forage, during breeding, and as year-around habitat.

Large mammal species of the proposed SLB parcels are important economically, due to their effect on hay production on private lands that are used to support livestock, for research, and in terms of recreation for photography and hunting. They include American elk, mule deer, white-tailed deer, and pronghorn. American elk population estimates within the GRSA and BNWR vicinity, including proposed SLB exchange parcels, total approximately 5,000 to 6,000 head, per CDOW annual survey data (USFWS 2005). Generally, they migrate between the BNWR, GRSA, TNC lands, and neighboring private land and can be a safety hazard to motorists when crossing public highways. It is unknown how American elk are affecting the native plant communities or if carrying capacity of the landscape has been met or exceeded due to population size. Research is presently underway by CDOW and USGS to monitor the condition of plant communities and assess the effects of grazing by American elk and where appropriate, by American bison (*Bison bison*) and cattle (*Bos taurus*) (USFWS 2005).

San Luis Valley ranchers and farmers have reported damage to haystacks and crops in addition to competition for cured hay and available grass for cattle due to the American elk population size (USFWS 2005). Comments received at scoping meetings included “there are too many elk” and “keep the elk off my land” and similar comments have been directed to CDOW for several years (USFWS 2005). A concern of CDOW is the liability relative to high value cropland located west of BNWR. Impacts on and the resultant devaluation of certified seed potato crops resulting from spread of disease organisms linked to American elk movement through the fields could easily approach $250,000 per field per year (USFWS 2005).

As a result, special dispersal hunts have been implemented (Medano-Zapata Ranch of TNC and leased SLB land on the Baca Ranch) in an attempt to reduce conflicts and to drive the main herd east of SH 17. Hunting in general has had limited success with an average of 355 head killed (regular hunting season and dispersal season total) annually. During 2006, 393 head of American elk were killed by 1,755 hunters in Game Management Unit 82 where hunters achieved a 22 percent success rate, in terms of harvest, over 8,400 total recreation days (CDOW 2007). During 2003, a total of 1,962 American elk were killed by 11,715 hunters (17 percent success) in the large Elk Data Analysis Unit 32 that included nearly all of Conejos County, a large portion of Rio Grande County, and the southwestern corner of Alamosa County (CDOW 2004).

Inaccessibility of the herd to hunters is the primary reason for the low harvest number because the American elk dispersed to Baca Ranch and NPS lands that are closed to hunting (USFWS 2005). BNWR would consider hunting as part of an American elk and habitat management program (USFWS 2005).

Mule deer and pronghorn occur generally across the proposed SLB parcels, foraging within the available habitats. They also use the hay meadows for forage during the course of the year. During 2006, a total of 120 pronghorn were killed by 172 hunters in game management unit 82 over 418 recreation days (CDOW 2007). White-tailed deer typically use riparian, wetland, wet meadow, and agricultural habitat where it is available and they are occasionally observed on SLB parcels. During 2006, a total of 81 deer were killed by 125 hunters in game management unit 82 over 617 recreation days (CDOW 2007).

The most frequently observed carnivores that use many habitats throughout the San Luis Valley include coyote, red and gray fox (*Vulpes vulpes* and *Urocyon cineroargenteus*), common raccoon, and American badger (CSP 1996, USFWS 2003). Small mammals are common to abundant in the proposed SLB parcel habitats and include desert and mountain cottontail (*Sylvilagus audubonii* and *S. nuttallii*) and white-tailed jackrabbit (USFWS 2003). Additional small mammals include thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), Botta's and northern pocket gopher (*Thomomys bottae* and *T. talpoides*), plains and silky pocket mice, Ord's kangaroo rat (*Dipodomys ordii*), deer mouse (*Peromyscus maniculatus*), and long-tailed, montane, and meadow vole (*Microtus longicaudis, M. montanus*, and *M. pennsylvanicus*) (CSP 1996, USFWS 2003). The nonnative house mouse (*Mus musculus*) can also be present, particularly in agricultural habitats.

Small mammal subspecies considered rare and endemic for the GRSA area observed by the CNHP (1999a) and that could occur on the proposed SLB parcels included the Gunnison's prairie dog , Ord's kangaroo rat, plains pocket mouse (*Perognathus flavescens relictus*), silky pocket mouse (*Perognathus flavus sanluisi*), thirteen-lined ground squirrel, and northern pocket gopher (*Thomomys talpoides agrestis*).

Bats are seasonal migrants in the San Luis Valley and are commonly observed foraging for insects at dusk. Species of bats known to occur include myotis, e.g., western small-footed, long-eared, little brown, and Yuma (*Myotis ciliolabrum, M. evotis, M. lucifugus*, and *M. yumanensis*); hoary bat (*Lasiurus cinereus*); silver-haired bat (*Lasionycteris noctivagans*); big brown bat (*Eptesicus fuscus*); Townsend's big-eared bat; and Brazilian free-tailed bat (*Tadarida brasiliensis*).

Most bird species using SLB parcels proposed for exchange within the San Luis Valley are migrants and are discussed above. More common species that are present for much of the year, or year-around, include the raptors and corvids (e.g., turkey vulture, golden eagle, red-tailed hawk, American kestrel, black-billed magpie, American crow, common raven). Raptors primarily forage within the habitats present due to lack of tall structures upon which to build nests. Other species of birds that commonly use upland habitats of the SLB parcels and for which nesting habitat is present include the lark bunting, sage sparrow, grasshopper sparrow,

western meadowlark, horned lark, loggerhead shrike (*Lanius ludovicianus*), and mourning dove (USFWS 2003).

Playa habitat and wet meadows along Saguache and San Luis creeks can support large numbers of migrating waterfowl and shorebirds; the most common include the mallard, gadwall, northern shoveler, green-winged teal, American avocet, black-necked stilt, killdeer, spotted sandpiper, lesser yellowlegs, and Wilson's phalarope. In deeper water, wading birds including great blue herons and sandhill cranes occasionally use playa wetland habitats. Depending on the permanence of the surface water and structure of the playa, several waterfowl and shorebird species might nest in habitats on the SLB parcels.

Nonnative bird species that have persisted in agricultural and developed habitats include ring-necked pheasant (*Phasianus colchicus*), rock dove or pigeon (*Columba livia*), European starling (*Sturnella neglecta*), and house sparrow (*Passer domesticus*).

The altitude, climate, and relative isolation of the San Luis Valley limits the number of documented reptile and amphibian species to 11; five additional species are expected to occur (see discussion below) (USFWS 2003, CSP 1996). Reptiles known for the San Luis Valley, including proposed SLB parcels, occupy predominantly upland habitats and include the short-horned lizard, prairie lizard, variable skink, milk snake (*Lampropeltis triangulum*), bullsnake, western terrestrial garter snake, and western rattlesnake (CHS 1999). Few amphibian species are present in the valley and most occur in or near wetland habitats (CSP 1996, USFWS 2003). The species identified to date include plains spadefoot (*Scaphiopus bombifrons*), western toad, Great Plains toad (*Bufo cognatus*), Woodhouse's toad, northern leopard frog, chorus frog (*Pseudacris crepitans*), and bullfrog (*Rana catesbeiana*) (CHS 1999).

Weissmann and Darrow (1992) have prepared a list of more than 850 species of arthropods present within GRSA (GSDNM 1997). Several species are endemic to the dune system and associated sand flats of GRSA; however, other species are more generally distributed onto shrubland, shrub-steppe, and playa habitats that compose the sand sheet and sabkha life zones of proposed SLB parcels.

3.3.3.2 Environmental Consequences/Mitigation

Resident terrestrial wildlife species and their habitats are evaluated in this section. Migratory birds and rare species that are BLM sensitive, state-listed, Federal-listed, or candidate threatened or endangered terrestrial wildlife species are discussed in appropriate sections of this EA. Effects on terrestrial wildlife species and habitat would be considered (1) insignificant if they fall within natural variability of species and habitat; (2) low if there is small but measurable disruption of local migration or movement patterns, movement corridors, breeding, foraging, or other daily and seasonal activities or increased human disturbance or harassment; (3) moderate if there is small to moderate, measurable disruption of local migration or movement patterns, movement corridors, breeding, foraging, or other daily and seasonal activities or increased human disturbance or harassment; and (4) high if there is moderate to large, measurable disruption of local migration or movement patterns, movement corridors,

breeding, foraging, or other daily and seasonal activities or increased human disturbance or harassment.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. The CDOW would continue to manage terrestrial wildlife species and populations on all parcels. Current Federal management of wildlife habitat would be consistent with the two RMPs objectives resulting in long-term, insignificant, beneficial effects on terrestrial wildlife and habitat.

The SLB would continue current state management of the terrestrial wildlife habitats on proposed exchange parcels in the San Luis Valley under the guidance of CDOW. Existing access permissions for hunting recreation and provisions of the Stewardship Trust would be honored. Diverse wildlife species and important habitat would continue to be grazed by livestock where permitted and irrigated for grass hay crops resulting in long-term, insignificant, adverse effects to terrestrial wildlife species.

Proposed Action

Under the Proposed Action, the BLM parcels would be exchanged to SLB management, and SLB parcels containing terrestrial wildlife habitat would be exchanged for management by the BLM, USFWS, and NPS. The former BLM parcels support foothill and mountain topography with diverse, structured habitat (woodland, grassland, shrubland) used by mammals, birds, reptiles, amphibians, and invertebrates would be transferred to SLB ownership and management under the guidance of CDOW and the CSFS. The SLB would continue to lease the parcels for grazing livestock, woodland and forest products, mineral resources, and recreation in the form of hunting resulting in long-term, insignificant to low, adverse effects on terrestrial wildlife species and habitat.

The proposed SLB exchange parcel 31 to be managed by the BLM would be managed for livestock grazing under PLH Standard 3 resulting in long-term, insignificant, beneficial effects on terrestrial wildlife species and habitat. The SLB parcels proposed for exchange that would be transferred to the USFWS/BNWR and NPS/GRSA would be managed for wildlife species habitat and biodiversity. The USFWS would manage habitat using livestock grazing, fire, and other methods as appropriate under the CCP to improve habitat for migratory and resident species, resulting in long-term, low to moderate, beneficial effects on terrestrial wildlife species and habitat. The NPS would likely remove livestock grazing as a management option per the GMP and rely on prescribed fire and other methods to manage wildlife habitat resulting in long-term, low to moderate, beneficial effects on terrestrial wildlife and habitat.

In terms of mitigation, the American elk herd would be researched to determine the biological information required to assist with the development and implementation of a management plan for BNWR (USFWS 2005). Hunting, a priority use on NWRs, would be considered with an approved hunting plan in place prior to establishing a hunting program. The BNWR and

CDOW would enter into a compatibility determination for dispersal American elk hunting when SLB parcels are exchanged to the BNWR for management. The American elk hunting program would be conducted under the guidelines and authorities of CDOW (Section 271 "Big Game Animals Causing Damage and Big Game Populations Over Objective"; Article XII, Colorado Wildlife Commission Regulations: "Special Hunting Seasons for Big Game Ungulates") which authorizes the CDOW director to establish special hunting seasons when necessary to control damage to property. Such a season is currently being conducted on the proposed SLB exchange parcels. Continuation of dispersal hunting would result in short- and long-term, insignificant to low, beneficial effects on habitat management, hunting recreation, and positive relationships with BNWR neighbors with respect to the American elk population.

Standards for Public Land Health

Finding on the Public Land Health Standard 3 states:

> *Healthy, Productive Plant and Animal Communities of Native and Other Desirable Species are Maintained at Viable Population Levels Commensurate with the Species and Habitat's Potential. Plants and animals at both the community and population level are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations and ecological processes.*

Standards for public land health (BLM 1997) describe conditions needed to sustain public land health and relate to all uses of the public lands. Standards are applied on a landscape scale and relate to the potential of the landscape. Indicators for Standard 3 are as follows:

- Noxious weeds and undesirable species are minimal in the overall plant community.
- Native plant and animal communities are spatially distributed across the landscape with a density, composition, and frequency of species suitable to ensure reproductive capability and sustainability.
- Plants and animals are present in mixed age classes sufficient to sustain recruitment and mortality fluctuations.

Terrestrial Wildlife. Wildlife habitats and populations on most of the proposed Federal exchange parcels have been assessed for concurrence with PLH Standard 3 as part of the grazing lease renewals and for this EA. These parcels have been determined to meet the standard for productive wildlife communities and support habitat for many big game, nongame mammal, bird, reptile, amphibian, and insect species. In particular, the parcels provide habitat for big game, migratory birds, and endemic small mammals and insects.

Under the Proposed Action, the Federal exchange parcels would no longer be managed by the BLM and would no longer require evaluation to PLH Standard 3. Terrestrial wildlife species habitat and hunting recreation would be managed by CDOW and the CSFS for and under access leases with the SLB.

Under the No Action Alternative, the land exchange would not occur and the Federal parcels proposed for exchange would continue to be managed by the BLM. Each parcel would be

assessed for PLH Standard 3 for terrestrial wildlife during grazing lease renewals on an individual basis.

3.3.4 Aquatic Wildlife

In general, aquatic habitats are limited on BLM parcels proposed for exchange and occur as small creeks or streams. There is more aquatic habitat present within SLB parcels proposed for exchange, in the form of creeks, ponds, playas, and seeps and springs. This area of the San Luis Valley has also been transformed over the past century using diversions in creeks to irrigate wet meadows to produce hay for livestock.

3.3.4.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

Table Mountain and Gribbles Park parcels proposed for exchange support a few mammal, bird, amphibian, and invertebrate species of mesic sites and intermittent standing water and flows but do not support fish due to lack of aquatic habitat. The BLM has the responsibility to manage wildlife habitat and CDOW has the responsibility to manage the aquatic species.

Canyons, caves, and riparian habitats of this portion of Fremont County are often used by bats that forage for insects among the trees in woodlands and along forest edges. Amphibians likely to occur on uplands and in mesic sites include Woodhouse's toad (*Bufo woodhousei*) and Couch's spadefoot (*Scaphiopus couchii*). The small reach of perennial flow of a tributary drainage at Gribbles Park can support the aquatic species leopard frog, chorus frog (*Pseudacris triseriata*), and tiger salamander (*Ambystoma tigrinum*).

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Biedell Creek and La Jara Reservoir parcels proposed for exchange support a variety of mammals, birds, reptiles, amphibians, fish, and invertebrate wildlife that occur in or use aquatic habitats. Canyons, caves, and riparian habitats of this area are often used by bats that forage for insects among the trees in woodlands and along forest edges, including Townsend's big-eared bat, long-eared myotis, and long-legged myotis.

In general, reptile and amphibian species are uncommon to the proposed Biedell Creek and La Jara Reservoir parcels on the western edge of the San Luis Valley. Amphibians likely to occur where wetlands and minor aquatic habitats are available include Woodhouse's toad, western toad (*Bufo boreas*), plains spadefoot, tiger salamander, western chorus frog, and northern leopard frog.

Carnero Creek, which flows along the southern boundary of the exchange parcels in the Biedell Creek site, supports the Rio Grande cutthroat trout and white sucker (CNHP 1998). The Rio Grande cutthroat trout in this stream reach are subject to mortality when flows are diverted into

meadows during spring and summer irrigation events. La Jara Reservoir supports brook trout populations and introductions of splake a brook trout/lake trout hybrid (CDPHE 2007a).

Proposed San Luis Valley SLB Exchange Parcels

The SLB parcels proposed for exchange support a variety of aquatic and riparian species of mammals, birds, reptiles, amphibians, and invertebrates, and a limited fishery in open water habitat. Principal streams draining into the parcels include Saguache and San Luis creeks, with San Luis Creek flowing across the length of the parcels from north to south (USFWS 2005). Irrigation from these sources sustains wet meadows that have been hayed and grazed for more than a century. In the late 1860s, the explorer Ferdinand Vandeever Hayden noted that the sump area of the San Luis Valley "although entirely disconnected from any other water system, the little streams are full of trout."

Small mammals are common to abundant in wetland and riparian habitats of the proposed SLB exchange parcels and include long-tailed, montane, and meadow voles (*Microtus longicaudis, M. montanus*, and *M. pennsylvanicus*) (CSP 1996, USFWS 2003). Bats are seasonal migrants in the San Luis Valley and are commonly observed foraging for insects at dusk, often over wetlands and ponds. Species of bats known to occur include myotis, e.g., western small-footed, long-eared, little brown, and Yuma (*Myotis ciliolabrum, M. evotis, M. lucifugus*, and *M. yumanensis*); hoary bat (*Lasiurus cinereus*); silver-haired bat (*Lasionycteris noctivagans*); big brown bat (*Eptesicus fuscus*); Townsend's big-eared bat; and Brazilian free-tailed bat (*Tadarida brasiliensis*).

Playa habitat and wet meadows along Saguache and San Luis creeks can support large numbers of migrating waterfowl and shorebirds; the most common include the mallard, gadwall, northern shoveler, green-winged teal, American avocet, black-necked stilt, killdeer, spotted sandpiper, lesser yellowlegs, and Wilson's phalarope. In deeper water, wading birds, including great blue herons, and sandhill cranes, might occasionally use playa wetland habitats. Depending on the permanence of the surface water and structure of the playa, several waterfowl and shorebird species might nest in habitats on the SLB parcels.

The altitude, climate, and relative isolation of the San Luis Valley limits the number of documented reptile and amphibian species to 11; five additional species are expected to occur (USFWS 2003, CSP 1996). Reptiles known for the San Luis Valley, including proposed SLB parcels include the snapping turtle (*Chelydra serpentina*) in aquatic habitat (CHS 1999). Few amphibian species are present in the San Luis Valley and most occur in or near wetland and aquatic habitats (CSP 1996 and USFWS 2003). The species identified to date include tiger salamander, plains spadefoot (*Scaphiopus bombifrons*), western toad, Great Plains toad (*Bufo cognatus*), Woodhouse's toad, western chorus frog, northern leopard frog, and the nonnative bullfrog (*Rana catesbeiana*) (CHS 1999).

The Weisman Lakes support populations of the rare Rio Grande chub and introduced fathead minnows (*Pimephales promelas*) (CNHP 1998). During the early 1900s, San Luis Lake and Head Lake were stocked with large-mouth bass (*Micropterus salmoides*) and tench (*Tinca tinca*) by members of the San Luis Lake Club (CSP 1996). San Luis Lake is now stocked with

rainbow trout (*Oncorhynchus mykiss*) and introduction of the grass carp (*Ctenopharyngodon idella*) for aquatic weed control was under consideration (CSP 1996). Wildlife refuges in the San Luis Valley report fathead minnows, red shiners (*Cyprinella lutrensis*), and carp (*Cyprinus carpio*), and the ANWR also stocks northern pike (*Esox lucius*) (USFWS 2003).

Weissmann and Darrow (1992) have prepared a list of more than 850 species of arthropods present within GRSA (GSDNM 1997). Several insect and other invertebrate species are adapted to aquatic habitats.

3.3.4.2 Environmental Consequences/Mitigation

Resident aquatic and some semi-aquatic wildlife species and their habitats are evaluated in this section. Aquatic and wetland migratory birds and rare aquatic species that are BLM sensitive, state-listed, Federal-listed, candidate threatened, or endangered species are discussed in detail in appropriate sections of this EA. An effect on aquatic wildlife species and habitat would be considered (1) insignificant if it results from natural seasonal fluctuations in water levels and quality but refugia remain intact and functional; (2) low if it results from a combination of natural and limited additional human-induced effects including seasonal diversion of irrigation flows but refugia remain intact and functional; (3) moderate if natural and human-induced effects cause measurable disruption of water levels, water quality, lowering of habitat values of refugia and elimination of smaller refugia, or otherwise measurably affect essential habitat for aquatic species; and (4) high if the Proposed Action would disrupt water levels, water quality, dry up refugia, otherwise eliminate essential habitat for aquatic species, or result in the species listing under the ESA.

No Action Alternative

Under the No Action Alternative there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. Limited aquatic habitat on the BLM proposed exchange parcels would continue to support few aquatic species and be utilized by livestock for water and forage resulting in long-term, insignificant to low, adverse effects on aquatic species, habitat, and water quality. The No Action Alternative would continue current Federal management of aquatic habitat consistent with the two RMPs' objectives.

The SLB would continue current state management of the aquatic habitats that occur on the proposed exchange parcels under the guidance of CDOW. Diverse aquatic habitats would continue to be affected by natural fluctuations in water quantity and quality and seasonal irrigation use by lessees resulting in long-term, insignificant to low, adverse effects on aquatic wildlife species and their habitat. Grazing livestock and American elk would continue to affect aquatic habitat and water quality resulting in long-term, insignificant to moderate, adverse effects.

Proposed Action

Under the Proposed Action the BLM parcels would be exchanged to SLB management, and SLB parcels containing aquatic habitat would be exchanged for management by the BLM, USFWS, and NPS. The BLM exchange parcels support limited aquatic habitat in the form of creeks and ponds, few aquatic species, and under SLB management would continue to be used by grazing livestock for water and forage resulting in long-term, insignificant to low, adverse effects on aquatic species, habitat, and water quality. Aquatic species and habitat would be managed by CDOW on the newly acquired SLB parcels.

Proposed SLB exchange parcels support diverse aquatic habitat in the form of creeks, lakes, ponds, playas, seeps, and springs, diverse aquatic species, and under USFWS and NPS management some land uses could change. There are no aquatic resources on exchange parcel 31 to be managed by the BLM.

The SLB exchange parcels to be managed by the USFWS would be considered for the enhancement of waterfowl production, shorebird support and production, and production and support of other aquatic and terrestrial wildlife species resulting in long-term, insignificant to low, beneficial effects on aquatic habitat quantity and aquatic species. Grazing effects on aquatic habitats and species by livestock and American elk would result in long-term, low to moderate, adverse effects on water quality and quantity, and aquatic species and their habitat. The BNWR would address aquatic habitat management under the Wetland Protection Executive Order 11990, and within the CCP process scheduled to be undertaken in 2011.

The SLB exchange parcels to be managed by the NPS would be subject to cessation of irrigation and livestock grazing, removal of human-introduced water management structures, and reduction in size of some aquatic habitats resulting in long-term, low, adverse effects on aquatic habitat quantity and low to moderate, beneficial effects on natural aquatic habitat, hydrology, and aquatic species habitat. Grazing of aquatic habitat by American elk would result in long-term, low to moderate, adverse effects on the aquatic resource and water quantity and quality. The NPS would address aquatic habitat management under Director's Order 77-1, Wetland Protection Executive Order 11990, and under the GMP prepared during 2007.

Standards for Public Land Health

Finding on the Public Land Health Standard 3 states:

> *Healthy, Productive Plant and Animal Communities of Native and Other Desirable Species are Maintained at Viable Population Levels Commensurate with the Species and Habitat's Potential. Plants and animals at both the community and population level are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations and ecological processes.*

Standards for public land health (BLM 1997) describe conditions needed to sustain public land health and relate to all uses of the public lands. Standards are applied on a landscape scale and relate to the potential of the landscape. Indicators for Standard 3 (▪) are as follows:

- Noxious weeds and undesirable species are minimal in the overall plant community.
- Native plant and animal communities are spatially distributed across the landscape with a density, composition, and frequency of species suitable to ensure reproductive capability and sustainability.
- Plants and animals are present in mixed age classes sufficient to sustain recruitment and mortality fluctuations.

Aquatic Wildlife and Plants. Aquatic habitat and communities are very limited on the proposed Federal exchange parcels consisting mostly of creeks and ponds. Many have been assessed as part of grazing release renewals and during the evaluation of this proposed land exchange. They have been found to meet the standard for productive wildlife communities for aquatic invertebrates and amphibians, and for supporting riparian and terrestrial wildlife species.

Under the Proposed Action, the BLM parcels identified for exchange would no longer be federally managed and would not be subject to PLH Standard 3. The 320-acre SLB parcel that would be managed by the BLM does not support aquatic habitat. Former SLB parcels accepted by the USFWS and NPS would be managed for natural biodiversity and healthy wildlife habitat, thus meeting or exceeding the PLH Standard 3.

Under the No Action Alternative, the land exchange would not occur and the Federal parcels proposed for exchange would remain under BLM management. Parcels would be assessed on an individual basis using standards-based criteria for aquatic habitat during grazing lease renewals.

3.4 OTHER NON-CRITICAL ELEMENTS

3.4.1 Geology and Minerals

Mineral resources are generally grouped in two categories, fluid minerals and locatable minerals. Fluid minerals include oil, gas, and geothermal water while locatable minerals include gold, silver, lead, zinc, copper, tungsten, iron, molybdenum, uranium, thorium, perlite, and turquoise (BLM 1989). In addition, mineral materials discussed in this section include dimension stone, moss rock, sand, gravel, riprap, and cinder.

The BLM completed a *Mineral Potential Report* in 2005 to address parcels under consideration for the proposed land exchange. The proposed Federal exchange lands were inspected by Diann Gese (BLM Geologist, Del Norte Field Office), Dan Grenard (BLM Geologist, Royal Gorge Field Office), and Bill Miller (BLM Realty Specialist, Monte Vista Field Office) during 2004 as summarized in Table 3-15.

The SLB has performed a mineral inventory for its administered lands through the Colorado Geological Survey. The inventory evaluates four types of mineral resources: (1) Oil and Gas

Resources, (2) Coal Resources, (3) Metallic Mineral Resources, and (4) Industrial Minerals and Construction Materials Resources. The results of this inventory assign a 0 to 5 rating to each mineral resource type with 0 indicating little or no potential and 5 indicating proven or demonstrated reserves (CGS 2000).

TABLE 3-15. LAND STATUS OF FEDERAL (A) AND NONFEDERAL (B) PARCELS REVIEWED FOR MINERAL POTENTIAL

Parcel Description	Location and Size
(a) Table Mountain: Federal minerals only	Fremont County: 1692.62 acres
(a) Table Mountain: Federal minerals only	Fremont County: 2680.00 acres
(a) Gribbles Park: Surface and mineral estate	Fremont County: 720.00 acres
(a) Biedell Creek: Surface and mineral estate	Saguache County: 11,519.58 acres
(a) La Jara Reservoir: Surface and mineral estate	Conejos County: 8724.42 acres
(a) La Jara Reservoir: Surface and mineral estate	Conejos County: 16,705.25 acres
(b) BNWR: Surface and mineral estate	Alamosa County: 4531.98 acres
(b) GRSA: Surface and mineral estate	Alamosa County: 12,045.42 acres
(b) BNWR: Surface and mineral estate	Saguache County: 22,846.64 acres
(b) GRSA: Mineral estate	Alamosa County: 2280.00 acres
(b) BNWR: Mineral estate	Alamosa County: 720.00 acres
(b) BNWR: Mineral estate	Saguache County: 2171.00 acres
Total Acres Assessed	**(a) 42,041.87 acres** **(b) 44,595.04 acres**

3.4.1.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

Geology. The rock formations within the proposed Table Mountain BLM site are composed largely of shale, sandstone, quartzite, limestone, and dolomite ranging in age from Pennsylvanian to Triassic (Taylor 1999, BLM 2005c). This period of time encompasses the age of dinosaurs and the early presence of flowering plants (Taylor 1999). Exposures include Dakota Sandstone, Purgatoire Formation, Fountain Formation, Morrison Formation, and Ralston Creek Formation.

Table Mountain parcels proposed for exchange are characterized by recent landslide deposits or blocks resulting from relatively weak shale layers in the underlying Morrison Formation slumping downhill off the Dakota Sandstone (BLM 2005c). The slump depressions became filled, in some areas, with hard sandstone blocks of Dakota Sandstone. The sandstone of Table Mountain tends to be somewhat harder than average, approaching the hardness of quartzite, resulting in well-preserved sandstone blocks. Near Patton Canyon, the sandstone is somewhat softer and is not well preserved (BLM 2005c). The Table Mountain tract contains about 55 percent landslide unit, 40 percent Dakota Sandstone (acting as caprock for the small plateau), and the remainder includes older Morrison Formation and other underlying formations, in addition to recent unconsolidated formations common to the region (BLM 2005c).

The middle elevations of the Table Mountain proposed site contains Quaternary landslide deposits formed from uplands covered by Cretaceous Dakota Sandstone, a yellowish-gray, fine- to medium-grained sandstone, and Purgatoire Formation sandstone and shale (Tweto 1979, CGS 1999). Small exposures of Morrison Formation sandstone, a varicolored mixture of sandstone, siltstone, limestone, and claystone, and Ralston Creek Formation claystone, sandstone, limestone, and gypsum occur at the parcel's lowest elevations. In addition, minor deposition of Quaternary gravel and rocks are present on drainage sides and bottoms at the lowest proposed parcel elevations (CGS 1999).

In terms of seismic hazards or earthquake potential, proposed Table Mountain exchange parcels fall within the lowest ranges for peak acceleration of 2%g to 4%g (second lowest tier of a seven-tiered scale from 1%g to 32+%g) based on the National Seismic Hazard Map (USGS 2002).

The proposed Gribbles Park BLM site is in northern Fremont County, at the southern end of South Park, and occupies Tertiary extrusive igneous exposures (Taylor 1999). These rocks are largely felsic to intermediate compositions, including tuff, ash-flow tuff, lava, breccia, and conglomerate that were deposited during the Cenozoic era between 2 and 65 million years ago. This area is part of the Thirty-nine Mile Volcanic Field of the South Park basin and this period of time generally encompasses the age of mammals and the development of modern flowering plants.

The proposed Gribbles Park BLM exchange parcels consist predominantly of Oligocene-age Gribbles Park Tuff, Antero Formation, and lower member of the Thirty-nine Mile Andesite (BLM 2005c). Quaternary-age earth flows and debris slides are present on steep slopes. The Antero Formation is significantly represented on this tract and it contains a complex set of conglomerate, limestone, sandstone, and paper shale of water-laid tuff. These were deposited in various portions of the lake basin according to the expansion and contraction of paleolake Antero (BLM 2005c).

The highest elevations of the proposed Gribbles Park exchange parcels are capped by Tertiary Arickaree Formation rocks consisting of sandstone with abundant volcanically derived material (Tweto 1979 and CGS 1999). The uplands are flanked by Guffey volcanic rocks consisting of hornblende andesite. A small exposure of Permian to Pennsylvanian age Sangre de Cristo Formation rocks consisting of arkosic conglomerate, sandstone, and siltstone is present on the western edge of the site (Tweto 1979 and CGS 1999). The lowest elevations of the proposed Gribbles Park exchange parcels contain exposures of Thirty-nine Mile Andesite, which is primarily andesite breccia. Small depositions of Quaternary Fan Deposits and Colluvium are present within drainages of the lowest parcel elevations. In terms of seismic hazards or earthquake potential, proposed Gribbles Park exchange parcels fall within the lowest ranges of for peak acceleration 2%g to 4%g (second tier of a seven-tiered scale) based on the National Seismic Hazard Map (USGS 2002).

Minerals. The first discovery of oil in western America occurred north of Canon City in 1862, triggering a boom in the Florence Oil Field (NRCS 1996). Also in operation were coal mines, oil wells, and smelting facilities. The town of Florence contained eight ore mills that processed gold ore from the Cripple Creek-Victor mines around 1900. Presently, coal mining, oil production, and other mining (bentonite, gypsum, decorative rock, and uranium ore) occur within Fremont County. Manufactured products include Portland cement and wallboard (NRCS 1996).

The Table Mountain area has an extensive history of mineral exploration and extraction and there are several documented sites where mining and removal of sandstone, shale, and other minerals occurred (BLM 2005c). Presently, there are three active permits registered with the Colorado Division of Minerals and Geology, they represent rock quarry and gypsum extraction sites. The Table Mountain area is classified as prospectively valuable for oil and gas (Allen et al. 1976 in BLM 2005c) but the area does not contain known geologic structures. There are no other known mineral developments including coal, oil, and gas, or locatable hard rock minerals, nor are there active lode or placer claims or oil and gas leases (BLM 2005c).

Table Mountain parcels as proposed for exchange have known commercial deposits of sandstone that is economically important as a source of riprap for road construction projects in the vicinity and for landscaping regionally. The rock is highly siliceous quartzite that has been quarried for a number of years from the upper slopes of Table Mountain. Beyond the parcels proposed for exchange, there is also mining for gypsum and the proposed Table Mountain exchange parcels are considered prospectively valuable for gypsum (BLM 2005c).

Rock production currently occurring at Table Mountain quarries is focused solely on Dakota Sandstone or landslide slopes that have slump blocks filled with Dakota Sandstone. Approximately 46 feet (vertical depth) of Dakota Sandstone have been removed from the main rock quarry. This deposit is known for its unusual hardness, thus the interest for various aggregate and riprap purposes. Rock quarrying at this site began during the 1960s and during the 1970s this material was used as riprap for Pueblo Dam, constructed by the U.S. Bureau of Reclamation on the Arkansas River. As riprap, the Dakota Sandstone from Table Mountain has held up well (BLM 2005c). During the 1980s, an attempt was made to use this material for concrete aggregate, but the rock proved to be too abrasive, due to its hardness, resulting in high production costs.

The largest active mineral operation on Table Mountain is the Castle Concrete - Table Mountain Quarry (see Figure 3-22), occurring within 450 acres of permitted mineral development land (both Federal and state land) (BLM 2005c). This operation is sufficiently large that the CDOT improved a section of SH 115 to accommodate the haul traffic from this site. Another active quarry, the South 40 Quarry (see Figure 3-23), removes rock from the Federal mineral estate for sale as landscape rock, primarily in the Denver metropolitan area (BLM 2005c). There is currently one trespass on Federal mineral estate on the east side of Table Mountain that is under appeal in the Interior Department Board of Land Appeals (BLM 2005c).

Source: BLM 2005

FIGURE 3-22. CASTLE CONCRETE MAIN QUARRY ON TABLE MOUNTAIN

Source: BLM 2005

FIGURE 3-23. SOUTH 40 QUARRY ON TABLE MOUNTAIN

The proximity of Table Mountain to the Colorado Springs metropolitan area makes the site valuable for Dakota Sandstone materials. Two quarries west of Colorado Springs and providing these landscape and construction products were closed due to their visual impact. There are two other, similar quarries along the SH 115 corridor. The rock quarries on the top and slopes of Table Mountain have sufficient material to make it a prime mining location for several decades at current levels of production (BLM 2005c).

The Table Mountain area also contains an active gypsum mine (Agri-Cal #1 Mine), which extracts from the Ralston Creek Formation that lies below the Morrison Formation. Two other sites proposed for gypsum mining remain undeveloped (Red Devil Mine and Caprara Lease) (BLM 2005c).

Rock storage sites along SH 115 near Penrose indicate that removal of surface rock and stone for landscaping is occurring on SLB land southeast of Table Mountain (BLM 2005c). Landscape rock removal is authorized by the SLB, but is not permitted through the Colorado Division of Minerals and Geology.

In summary, Table 3-16 provides the level of potential/level of certainty for mineral materials within the Table Mountain parcels. This summary is based upon a review of the geology, available minerals information, and present use (BLM 2005c).

TABLE 3-16. SUMMARY TABLE FOR TABLE MOUNTAIN MINERALS

Level of Potential	Level of Certainty			
	High	**Medium**	**Low**	**Insufficient Data**
High	Dakota Sandstone; gypsum; mineral materials	---	---	---
Moderate	---	---	---	---
Low	Other locatable minerals	---	---	Oil and gas; uranium
No Potential	Coal	---	---	---

Gribbles Park exchange parcels as proposed have had little mineral exploration, development, or production and are possibly prospectively valuable for uranium (BLM 2005c). There is no evidence of significant mineral deposits in the Gribbles Park area and the area does not overlie known geologic structures typical for oil and gas reservoirs (Allen et al. 1976 in BLM 2005c). Additionally, there are no active lode or placer claims, or oil and gas leases within the proposed Gribbles Park exchange parcels. However, during the 1970s and early 1980s, many mining claims were established in response to a period of intense uranium exploration. None of the uranium claims were maintained past 1982 and all are officially closed (BLM 2005c). However, there has been recent renewed interest in uranium mining and new claims have been located adjacent to the largest of the proposed Gribbles Park exchange parcels.

Table 3-17 provides a summary of the level of potential/level of certainty for mineral materials located within the Gribbles Park parcels. This summary is based upon a review of the geology, available minerals information, and present use (BLM 2005c).

TABLE 3-17. SUMMARY TABLE FOR GRIBBLES PARK MINERALS

Level of Potential	Level of Certainty			
	High	**Medium**	**Low**	**Insufficient Data**
High	---	---	---	---
Moderate	---	---	Uranium	---
Low	Mineral materials; other locatable minerals	---	---	---
No Potential	Coal; oil and gas	---	---	---

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Geology. The proposed Biedell Creek BLM tract is in southern Saguache County, on the west side of the San Luis Valley, and occupies predominantly Tertiary extrusive igneous exposures on the uplands and Quaternary alluvium on the lowlands (Taylor 1999). The upland areas of the parcels are rocks of early-intermediate lavas and breccias deposited during the Oligocene Period and during older volcanic activity (CGS 2000). They consist predominantly of upper Oligocene-age ash-flow tuffs from caldera sources in the San Juan Mountains and the Sawatch Range (BLM 2005c). The composition ranges from crystal-poor rhyolite to crystal-rich quartz latite. The lower elevation parcels have been filled by Quaternary alluvial deposits consisting of alluvium, terrace gravels, and alluvial fan deposits (CGS 2000).

At the contact between the proposed Biedell Creek exchange parcels uplands and lowlands are small exposures of Oligocene rocks described as Fish Canyon Tuff, Tunnel Outlet Member of La Garita Tuff, and Bachelor Mountain and Carpenter Ridge Tuffs (CGS 2000). Fish Canyon Tuff is described as ash-flow tuff of biotite-hornblende-plagioclase quartz latite with minor quartz and sanidine containing about 50 percent phenocrysts. The Bachelor Mountain and Carpenter Ridge Tuffs are crystal-poor rhyolite ash-flow tuff that are streaked and layered by secondary flow (locally compositionally zoned upward into crystal-rich biotite-hornblende quartz latite) (CGS 2000).

In terms of seismic hazards or earthquake potential, Biedell Creek parcels fall within the low ranges for peak acceleration of 4%g to 8%g (third tier of a seven-tiered scale) based on the National Seismic Hazard Map (USGS 2002).

The proposed La Jara Reservoir BLM tract is in northeastern Conejos County, on the southwestern side of the San Luis Valley, and occupies predominantly Oligocene exposures (Taylor 1999). This tract is underlain primarily by volcanic and volcaniclastic rocks of the San Juan volcanic field (CGS 2000). The ash-flow units include Tuff of Masonic Park (latite ash-flow tuff from the Mount Hope caldera); Upper and middle members (air-fall and local ash-flow tuffs from the Summitville caldera); Ra Jadero and Ojito Creek Members (quartz latite ash-flow tuffs from the Summitville caldera); and La Jara Canyon Member (Quartz latite ash-flow tuff from the Platoro caldera) of the Treasure Mountain Tuff (BLM 2005c). A major north-northwest-trending fault, commonly filled by Quaternary glacial and alluvial deposits, passes through the eastern and central part of the tract. Some large deposits of glacial drift cover areas of the tract and alluvium is present on the lowest elevations.

The highest elevations are capped by Pliocene and Miocene Hinsdale Formation basalt flows that consist of fine-grained silicic alkali olivine basalt and basaltic andesite, commonly containing olivine phenocrysts (xenocrysts of quartz and feldspar can be locally abundant) (CGS 2000). Most of the uplands of the proposed exchange parcels consist of exposures of Treasure Mountain Tuff deposited from the Summitville caldera during the Oligocene Period. It contains an Upper member (heterogeneous air-fall and local ash-flow tuffs), Ra Jadero Member (biotite-pyroxene-plagioclase quartz latite ash-flow tuffs containing up to 15 percent phenocrysts), Ojito Creek Member (biotite-pyroxene-plagioclase quartz latite ash-flow tuffs containing up to 15 percent phenocrysts), and Middle member (heterogeneous air-fall and local

ash-flow tuffs). Also associated with the basalt flows are narrow bands of Oligocene Tuff of Masonic Park origin, consisting of biotite-pyroxene-plagioclase quartz latite (ash-flow tuff containing up to 60 percent phenocrysts) originating from the Mount Hope caldera (CGS 2000).

Along the eastern slope of the proposed La Jara Reservoir exchange parcels are exposures of the Pliocene to Oligocene Period Los Pinos Formation that consist of mostly reworked bedded conglomerates, sandstones, and mudflow breccias containing rhyodacite and quartz latite clasts. Occasional beds of ash-fall and nonwelded ash-flow tuff also occur. At the base of the slopes are deposits of Quaternary gravels that represent the dissected remnants of older alluvial deposits typical of the west side of the San Luis Valley. Flats of the lowest parcel elevations are covered by Quaternary alluvial deposits consisting of alluvium, terrace gravels, and alluvial fan deposits.

In terms of seismic hazards or earthquake potential, La Jara Reservoir parcels fall within the low ranges for peak acceleration of 4%g to 8%g (third tier of a seven-tiered scale) based on the National Seismic Hazard Map (USGS 2002).

Minerals. A mineral-bearing lode claim was first recorded within Saguache County along Kerber Creek in 1880. Mineral production in Saguache County is considered to be of moderate importance and historically included precious and base metals, uranium, and sand and gravel. Mineral production from 1880 through 1958 was valued at about $11 million (BLM 2005c). Mineral production was generated from seven mining districts: Blake (Mirage, Cotton Creek), Cochetopa Creek, Crestone (Baca Grant, Eldorado), Crystal Hill, Embargo Creek, Bonanza (Kerber Creek), and Liberty (Music) (Vanderwilt 1947 in BLM 2005c).

East of the GRSA, along the western flank of the Sangre de Cristo Mountains, there are several minor mining districts. Gold and silver was discovered along Burnt Creek in the late 1890s to early 1900s. Mineralization occurs primarily in veins and fissures in Precambrian rocks and as replacements and veins in sedimentary rocks. There is no mineralization in the valley fill deposits. The Crestone mining district consists of mineralization and includes a portion of the Luis Marie Baca Grant No. 4 (BLM 2005c).

The Crystal Hill Mining District is 1.5 miles north of the proposed Biedell Creek exchange parcels. There were numerous shafts and adits opened into a brecciated volcanic pipe between Biedell and Sanderson creeks to obtain small amounts of silver and gold production. Prospecting also occurred in Biedell and Sanderson gulches. A total of 23,000 ounces of gold and 48,000 ounces of silver were obtained by open pit/cyanide heap leach processes from a brecciated volcanic pipe at Crystal Hill, Crystal Hill Mining District, from 1984 to 1986 (the mine closed in 1989) (BLM 2005c).

Oil and gas exploration has been active in the San Luis Valley and along the west slope of the San Juan Mountains. One well drilled in 1985 produced about 4,000 barrels of oil from a Tertiary sill in Dakota Sandstone, the first production well in the area (Holm and Dersch 1995 in BLM 2005c). During 1986, the BLM approved the South Fork Oil and Gas Development Contract that included about 770,000 acres of USFS, BLM, and SLB lands in Archuleta,

Conejos, Mineral, Rio Grande, and Saguache counties (BLM 1989). Both geophysical and exploration drilling have been used to determine location and value of oil reserves; however, the potential is considered low to moderate for oil and gas resources (BLM 1989). Wells drilled in 1995 on the Luis Maria Baca Grant No. 4 found remnants of Cretaceous sediments, and encountered shows of hydrocarbons (BLM 2005c). Additionally, it has been stated: "Small intermontane eolian deposits such as Great Sand Dunes…would become oil reservoirs that would be difficult to assess from limited outcrop and borehole data" (Andrews 1981 in BLM 2005c).

Two active mining operations for locatable minerals were recorded in the San Luis Valley, and within the vicinity of the exchange parcels, by the BLM (1989). The Crystal Hill Mine near La Garita is a heap leaching gold project. The King Turquoise Mine, east of Manassa, Colorado, produces high quality gem turquoise (BLM 1989). Recognized mining districts within the San Luis Valley include the Crestone, Liberty, Blanca, Orient, Bonanza, Crystal Hill, Jasper, Summitville, Platoro, Copper Butte, and Jack's creeks. Recognized San Luis Valley mining areas include Raspberry Creek, Steel Canyon, Wild Cherry Creek, Triple T Mine, Cat Creek, and Tracy Canyon (BLM 1989).

Current mineral production in Saguache, Alamosa, and Conejos counties is limited to high-grade limestone and aggregate (BLM 2005c). High-grade limestone is used for reclamation in the Bonanza mining district and aggregate is used locally for road construction and maintenance. There are large volumes of aggregate along major creeks and their tributaries within the San Luis Valley. Local production of landscape rock occurs, i.e., an SLB lease for moss rock includes about 468 acres near La Jara Reservoir (BLM 2005c). Approximately 250 tons of moss rock was removed during 2003 (Page 2004 in BLM 2005c).

Proposed Biedell Creek exchange parcels are considered valuable for mining mineral materials such as landscape rock and are possibly prospectively valuable for oil and gas, geothermal energy, and locatable metallic minerals (BLM 2005c). The proposed La Jara Reservoir exchange parcels are considered valuable for mineral materials such as landscape rock and are possibly prospectively valuable for oil, gas, and geothermal energy (BLM 2005c). There were no mining-related pits, adits, or shafts observed on the proposed Biedell Creek or La Jara Reservoir exchange parcels, but a few mining claims were made that are now closed (BLM 2005c). There are no active lode or placer mining claims or oil and gas leases on the proposed exchange lands.

The SLB, through the Colorado Geological Survey, evaluated mineral potential of lands adjacent to the Biedell Creek tract as proposed (CGS 2000). Results of the evaluation, expressed as a rating number between 0 and 5, are as follows: (a) Oil and Gas (0-1), (b) Coal (0-1), (c) Metallic Minerals (0-1), and (d) Industrial Minerals (0-4). The analysis indicated that the tract contains no coal resources, is not or is poorly/weakly prospective for metallic mineral resources, has some potential for biogenic natural gas production or other hydrocarbon production (from Tertiary sandstones at depths between 50 feet and 700 feet or from Cretaceous and possible Jurassic sandstones that underlie the San Juan Volcanic Field), and contains alluvial gravel deposits at a mineable depth of 15 feet (the gravel resource quality has not been determined).

Similarly, SLB-administered lands adjacent to the La Jara Reservoir tract were evaluated for mineral potential by the Colorado Geological Survey (2000). Results of the evaluation, expressed as a rating number between 0 and 5, are as follows: (a) Oil and Gas (0-1), (b) Coal (0-1), (c) Metallic Minerals (0-1), and (d) Industrial Minerals (2-4). The analysis indicated that the tract contains no coal resources, has no or minor prospective potential for metallic mineral resources, has little or no potential for hydrocarbon production (due to lack of most of the essential elements for hydrocarbon accumulations), and contains alluvial gravel or sand deposits at a mineable depth of 10 feet (the gravel resource quality has not been determined) and volcanic rock that is suitable for use as crushed rock and road base. Along the western edge of the San Luis Valley, mineral materials include low to high potential for sand and gravel production, low to high potential for cinder production, low to moderate potential for decorative rock production, and low to high potential for pumice production (BLM 1989).

In summary, Table 3-18 provides the level of potential/level of certainty for mineral materials within the Biedell Creek exchange parcels. This summary is based upon a review of the geology, available minerals information, and present use (BLM 2005c).

TABLE 3-18. SUMMARY TABLE FOR BIEDELL CREEK MINERALS

Level of Potential	Level of Certainty			
	High	**Medium**	**Low**	**Insufficient Data**
High	Mineral materials	---	---	---
Moderate	Mineral occurrences; metallic materials	---	---	---
Low	---	---	---	Oil and gas; geothermal resources
No Potential	Coal	---	---	---

Table 3-19 provides a summary of the level of potential/level of certainty for mineral materials within the La Jara Reservoir exchange parcels. This summary is based upon a review of the geology, available minerals information, and present use (BLM 2005c).

Watkins (1997) identified definite indications of Mesozoic sediment in the San Luis Valley that occur in the form of Mancos shale, Dakota Group sandstone, and Morrison Formation sediments. These layers had been thought to have eroded during the Laramide Orogeny. The evidence of widespread, near-to-surface Cretaceous oil deposits along the San Luis Valley edges indicate that there are significant Mesozoic deposits in the peripheral portions of the valley and they might exist below some areas of the valley floor.

TABLE 3-19. SUMMARY TABLE FOR LA JARA RESERVOIR MINERALS

Level of Potential	Level of Certainty			
	High	**Medium**	**Low**	**Insufficient Data**
High	Mineral materials	---	---	---
Moderate	Metallic materials	---	---	---
Low	Mineral occurrences	---	---	Oil and gas; geothermal resources
No Potential	Coal	---	---	---

The San Luis Valley represents a promising geothermal resource area because of (1) recent volcanism and other igneous activity, (2) tectonic activity resulting in numerous faults extending to depth, (3) high heat flow values present, (4) good reservoir rocks and a trapping mechanism, and (5) a good source of available water (BLM 1989). Hydrothermal springs are located throughout the San Luis Valley, but are considered low-temperature (less than 90 ^{o}C) and range from 20 ^{o}C to 60 ^{o}C (Cappa and Hemborg 1995 in BLM 2005c). Hot springs within the San Luis Valley include Mineral Hot Springs Spa, Valley View Hot Springs, Shaw's Warm Spring, Sand Dunes Swimming Pool Hot Water Well, Splash Land Hot Water Well, Dexter Warm Spring, Hooper Aquaculture Well, and McIntire Warm Spring (BLM 1989 and 2005).

Proposed San Luis Valley SLB Exchange Parcels

Geology. The proposed SLB land tracts all lay on Quaternary-age unconsolidated surficial deposits common to the San Luis Valley (Tweto 1979). Generally these deposits are classified as Eolian Deposits that include dune sand and silt and Peoria Loess and Unclassified Surficial Deposits and Underlying Alamosa Formation Gravel, Sand, and Silt (Tweto 1979). More specifically, Quaternary surficial deposits consist of active parabolic dunes of accumulation, fixed parabolic dunes of accumulation, longitudinal dunes, and parabolic dunes of deflation (CGS 2000). In addition, alluvial fan and pediment gravels, stream deposits, and volcanic debris are present and represent the Pleistocene- or Pliocene-age Alamosa Formation and Pliocene- and Middle Miocene-age Santa Fe Formation.

Andrews (1981 in BLM 2005c) described the geology of SLB lands as occurring in two of three provinces (trending downwind). The first (Province I) is low, alkali-cemented dunes forming discontinuous rings around broad, flat-bottomed, ephemeral lakes. The second (Province II) is undulating, vegetated dunes as high as 10 m, of barchan, parabolic shrub-coppice, and transverse type, with varying interdune types.

In terms of seismic hazards or earthquake potential, SLB parcels fall within the low ranges for peak acceleration of 4%g to 8%g (third tier of a seven-tiered scale) based on the National Seismic Hazard Map (USGS 2002).

Minerals. The SLB, through the Colorado Geological Survey, evaluated mineral potential of lands proposed for exchange that would make up much of the southern and western boundaries of GRSA and BNWR (see Figure 1-1) (CGS 2000). Results of the evaluation, expressed as a rating number between 0 and 5, are as follows: (a) Oil and Gas (0-1), (b) Coal (0-1), (c) Metallic Minerals (0-1), and (d) Industrial Minerals (0-4). The analysis indicated that the tract contains no coal resources, is not prospective for metallic mineral resources, has some potential for biogenic natural gas production (from Tertiary sandstones at depths between 50 feet and 700 feet), and contains alluvial gravel and eolian sand deposits at mineable depths of 15 feet (the gravel resource quality has not been determined) and up to 10 feet (eolian sand is a potential construction material resource neglected in the San Luis Valley to date), respectively (CGS 2000). Historically (1916), San Luis Lake produced several shipments of "soda" for the Chemical Products Company of Denver, Colorado. The lake is known to contain sodium carbonate, sodium sulfate, and sodium chloride minerals.

In terms of mineral materials, the BLM documented this entire area as having low to moderate potential for sand and gravel deposits and production. Lands adjacent to and west of the current GRSA boundary are considered moderate to high in terms of sand and gravel production potential (BLM 1989). Historically, the SLB issued oil and gas leases here, but there are no current oil and gas leases (Davis 2004 in BLM 2005c).

Oil has been located on the boundary of the GRSA and Luis Marie Baca Grant No. 4 where several Mesozoic sedimentary rock formations (e.g., Mancos Shale, Dakota Formation, and Morrison Formation) were determined (NPS 1995). The geophysical target is a low-angle, west-dipping detachment fault zone (cataclastic zone) that acts as an oil trap with Precambrian-age gneiss underlying the detachment zone. The oil is a biodegraded crude with a source of Cretaceous sediments. The size of this intermediate structural unit, refined through aero-magnetic survey techniques, is approximately 72 mi^2 (NPS 1995). Although the only known reservoir rocks are the Precambrian crystalline rocks immediately below the cataclastic zone, it is thought that deeply buried (16,000 feet deep) reservoir rocks are present.

Gold prospecting was attempted on the Luis Marie Baca Grant No. 4 lands between GRSA and Crestone. The geophysical target is a 24-to-27 million years ago, low-angle detachment style fault zone associated with the Rio Grande rift. The same type of clay layer that acts as a trap for petroleum also acts as a barrier for upward-migrating gold-bearing hydrothermal fluids (NPS 1995). The hydrothermal fluids pooled below the clay zone contain both oxidized and sulfidic, refractory disseminated gold. This zone likely extends beneath the Great Sand Dunes.

Lode mining occurred historically during the Spanish-exploration era, but reached its peak between 1880 and 1904 (NPS 1995). Small mines and prospects are present within the boundary of GRSA and numerous mines and prospects are present in the watershed that drains into GRSA and the San Luis Valley. These prospects and their tailings are being tested for water quality effects. Additional mining in the San Luis Valley includes past and current production of perlite, gravel, and turquoise (CSP 1996).

In summary, proposed SLB exchange parcels are considered valuable for mineral materials and for low-temperature geothermal resources. They are also considered prospectively valuable for

oil and gas. Table 3-20 provides a summary of the level of potential/level of certainty for mineral materials within the SLB exchange parcels. This summary is based upon a review of the geology, available minerals information, and present use (BLM 2005c).

TABLE 3-20. SUMMARY TABLE FOR STATE LAND BOARD PARCELS MINERALS

Level of Potential	Level of Certainty			
	High	**Medium**	**Low**	**Insufficient Data**
High	Mineral materials; geothermal resources	—	—	—
Moderate	Mineral occurrences	—	—	—
Low	—	—	—	Oil and gas
No Potential	Coal; metallic minerals	—	—	—

3.4.1.2 Environmental Consequences/Mitigation

Geology and mineral resources consist of sedimentary and igneous rocks and alluvium that are considered nonrenewable because of length of time required for rock formation and alluvial deposition. In general, exposed geologic formations erode over time while alluvial deposits thicken, and as a result, are often reworked by flooding and wind. Mining mineral deposits result in adverse effects on site-specific geologic formations and alluvial deposits, but typically do not affect the geologic structure from which minerals are extracted.

An effect on geologic resources would be considered (1) insignificant if it results from natural wind and water erosion or earth processes such as minor earthquakes, (2) low if it results from local quarrying and removal or earth processes such as moderate earthquakes, (3) moderate if it results from low to moderate quantities of commercial quarrying and removal or earth processes such as moderate to major earthquakes, and (4) high if it results from moderate to large quantities of commercial quarrying and removal or earth processes such as major earthquakes. Natural events, including erosion, freezing/thawing, flooding, and scouring and human-caused disturbance contribute to the loss of geologic formations and reworking of alluvium. An effect on mineral resources would be considered (1) insignificant if it consists of small deposits and commercial mining would be unprofitable, although some local use of the site could occur; (2) low if it consists of small but potentially profitable deposits of minerals; (3) moderate if it consists of small to medium-sized deposits of mineable and transportable deposits of usable minerals; and (4) high if it consists of medium- to large-sized, easily mined, and transported deposits of desirable and commercially valuable minerals.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. Geologic formations and minerals on Federal lands would be addressed according to the RMP management directives and opportunities to lease the mineral estate would be evaluated as proposals are received. SLB parcels located on

Quaternary deposits in the San Luis Valley represent depositional geology and have mineral values that could be leased for sand and gravel extraction.

Within the Table Mountain quarry sites, mining sedimentary rock of the Dakota Formation would continue under the permit resulting in long-term, low to moderate, adverse effects on site geologic formations. There would be long-term, low to moderate, beneficial effects resulting from the sale of riprap and other rock products. Removal of boulders and moss rocks for landscaping, if permitted, would result in long-term, insignificant to low, adverse effects on geologic resources of BLM parcels due to loss of surface-deposited erratics. There would be short-term, low, beneficial effects resulting from the sale of moss rock.

Proposed Action

Under the Proposed Action the BLM parcels would be exchanged to SLB management, and SLB parcels would be exchanged for Federal management by the BLM, NPS, and USFWS. The geology of BLM exchange parcels consists of mostly sedimentary rocks exposed on the Table Mountain site and igneous rocks exposed on the Gribbles Park, Biedell Creek, and La Jara Reservoir sites. The mineral potential of the Gribbles Park, Biedell Creek, and La Jara Reservoir parcels is considered very limited (Page 2006). Mineral potential for the Table Mountain parcels would be evaluated by the SLB Mineral Section and a small percentage of the area would continue to be leased for quarrying Dakota Sandstone.

Proposed SLB parcels in the San Luis Valley occur on Quaternary alluvial deposits that would be exchanged to Federal management resulting in long-term, insignificant, adverse effects on geologic deposits due to natural wind and water erosion, small amounts of sand and gravel extraction, and infrastructure construction.

Within the Table Mountain quarry sites, mining sedimentary rock of the Dakota Formation would result in long-term, low to moderate, adverse effects on geologic resources due to localized removal of the sandstone layer. There would be long-term, low to moderate, beneficial effects on mineral resources resulting from the sale of sandstone riprap, aggregate, and boulders. Removal of boulders and moss rocks for landscaping would result in long-term, insignificant to low, adverse effects on geologic resources of the exchange parcels due to loss of surface-deposited erratics. There would be short-term, insignificant to low, beneficial effects resulting from the sale of moss rock.

3.4.2 Paleontology

3.4.2.1 Affected Environment

In general, paleontologic resources are protected because they constitute a fragile and non-renewable scientific record of the history of life on earth. Once damaged, destroyed, or improperly collected, their scientific and educational value could be greatly diminished or lost forever (Smeins 2007).

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

The Table Mountain area contains potential paleontologic resources in a relatively undisturbed area in Patton Canyon (Smeins 2005). There has been little paleontologic analysis for potential dinosaur tracks; however, dinosaur tracks have been found within the Plainview member of the Dakota Sandstone Group in nearby localities. Some areas of Table Mountain are classified as Potential Fossil Yield Classification system (PFYC) Class 3, meaning that there are fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence, including sedimentary units of unknown fossil potential (Smeins 2005). It was recommended that a reconnaissance survey of this portion of the proposed Table Mountain site be performed using a north-to-south traverse ending in the Beaver Creek area prior to exchange activities (BLM 2005c); and this survey occurred in September 2005.

The foot survey encompassed approximately 1.7 miles of the bottom of Patton Canyon, but identified very little of the dinosaur track-bearing Plainview member of the Dakota Sandstone Group; those exposures encountered did not contain dinosaur tracks (Smeins 2005). However, two excellent Morrison Formation outcrops were observed and dinosaur bone was recovered in their vicinity (see Figure 3-24). Commonly, a piece of dinosaur bone can be traced to its origin in the outcrop where a larger piece of bone is typically exposed. Even though the dinosaur bone discovered in the bottom of Patton Canyon could not be traced to its origin in the outcrop, it still shows that local conditions foster fossil preservation and significant paleontologic resources could later be found in the area (Smeins 2005).

The Gribbles Park area has significant amounts of the Antero Formation, which in the vicinity yielded collections of fossil mammalian teeth, fragmentary jaws, and limb bones (BLM 2005c). Also, in the vicinity, this formation can contain fossils of insects, gastropods, and plants (fossil leaves and silicified wood) with affinitites to the assemblage at Florissant Fossil Beds National Monument (BLM 2005c). The Antero Formation is composed of white tuffs, highly tuffaceous sandstones, conglomerates, siltstones, mudstones, and limestones (Smeins 2007). It is similar in age to the Florissant Formation exposed within the Florissant Fossil Beds National Monument and has paper shales that contain plant fossils similar to those discovered in the Florissant Formation (Smeins 2007).

The Antero Formation is classified as PFYC Class 3 in relation to the parcel, meaning that there are fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence (or the unit has unknown fossil potential), in addition to sedimentary units of unknown fossil potential (BLM 2005c). It was recommended that a reconnaissance survey of the west part of the main proposed Gribbles Park parcel (parcel 6) be performed prior to exchange activities (BLM 2005c); and this survey occurred in September 2007 (Smeins 2007).

The foot survey determined there were no significant outcrops of the Antero Formation on proposed exchange lands; therefore, no paleontologic material was identified or recovered (Smeins 2007). It was recommended that the exchange proceed with no further need for paleontologic reconnaissance on Gribbles Park parcels, as proposed.

FIGURE 3-24. MORRISON FORMATION OUTCROPS AND DINOSAUR BONE FROM PATTON CANYON

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Both the proposed Biedell Creek and proposed La Jara Reservoir exchange parcels have paleontologic classifications of PFYC Class 3: "Little likelihood of finding fossils of use. No further considerations of fossils are necessary unless future discoveries require a change in classification" (BLM 2005c).

Proposed San Luis Valley SLB Exchange Parcels

The proposed SLB exchange parcels have little likelihood of providing fossils of use (Davis 2004 in BLM 2005c).

3.4.2.2 Environmental Consequences/Mitigation

Paleontological resources are considered nonrenewable because of the infrequency of fossil preservation and the resource values could be diminished or lost by physical disturbance. Fossil rarity and the scientific information yielded through research can be significant records of

ancient life. An impact on paleontological resources would be considered (1) negligible if it results from typical land use such as livestock grazing, (2) low if it is slight and measurable or occurs to common to abundant fossils of use, (3) moderate if it is readily measurable over time or occurs to uncommon to common fossils of use; and (4) high if it rapidly results in the permanent loss of fossils of use for future education and scientific research purposes. Natural events, including erosion, freezing/thawing, flooding, and scouring, and human-caused disturbance contribute to the loss of paleontologic information.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. Fossils on Federal lands would be addressed according to the RMP management directives; mitigation measures can include inventory, monitoring, recovery of fossils for preservation or educational and scientific purposes or conservation of the paleontologic resource *in situ*. The Biedell Creek and La Jara Reservoir sites have little likelihood of finding fossils of scientific importance and the BLM Paleo Coordinator should be consulted should fossils be discovered. The SLB site also has little likelihood of providing fossils of use and the Colorado State Archaeologist should be consulted should fossils be discovered.

Within the Table Mountain site, Patton Canyon contained an insignificant piece of dinosaur bone that was not traceable to its source bone; and within the Gribbles Park site, no paleontologic resources occur. Generally, significant fossils, including the piece of dinosaur bone, indicate local conditions favoring fossil preservation. These fossils, unless found, identified, recorded, and collected, could be damaged and eventually destroyed by wind and water erosion, the rapidity varying due to rock type, climate, topography, and composition of the fossils, resulting in long-term adverse effects. Removal of fossiliferous rocks for landscaping would result in long-term adverse effects on any known significant fossils of use due to ground and bedrock disturbance, potential exposure of underlying layers of fossil-bearing rock, and removal of rocks containing any potentially significant fossils from the site context. Mining sedimentary rock containing significant fossils at the Table Mountain site would result in long-term adverse effects due to blasting, breaking, crushing, and removal, bedrock disturbance including exposure of underlying layers of fossil-bearing rock, and removal of rocks containing significant fossils from the site context. Mitigation including reconnaissance surveys, identification of fossils and determination of fossil potential, and protection of fossils on the parcels proposed for exchange (as occurred on selected Table Mountain and Gribbles Park parcels) would result in long-term beneficial effects on fossil resources.

Proposed Action

Under the Proposed Action the BLM parcels would be exchanged to SLB management, and SLB parcels would be exchanged for management by the NPS, USFWS, and BLM. The former BLM parcels would be used primarily to support grazing livestock under lease agreements. The mineral potential of the Gribbles Park, Biedell Creek, and La Jara Reservoir parcels is

considered very limited (Page 2006). Mineral potential for the Table Mountain parcels would be evaluated by the SLB Mineral Section and a small percentage of the area would likely be quarried in the future. The majority of the Table Mountain parcels would be immediately merged into current SLB grazing leases, as there are currently no active BLM grazing permits.

Proposed SLB parcels in the San Luis Valley with little likelihood of containing fossils of use would be exchanged into Federal management and each Federal agency would consult with their Regional Paleontologists and Field Office Paleo Coordinators and management plans should discovery of fossils occur. Resource management would consist of reconnaissance surveys, identification of fossils, and protection and interpretation of fossils of use resulting in long-term, negligible, beneficial effects.

Within the Table Mountain site, Patton Canyon contained a piece of dinosaur bone that was not traceable to its source bone; and within the Gribbles Park site, no paleontologic resources occur. Generally, significant fossils, including the piece of dinosaur bone, indicate local conditions favoring fossil preservation. These fossils, unless found, identified, recorded, and collected, could be damaged and eventually destroyed by wind and water erosion, the rapidity varying due to rock type, climate, topography, and composition of the fossils resulting in long-term adverse effects. Mining sedimentary rock containing significant fossils at the Table Mountain site would result in long-term adverse effects due to blasting, breaking, crushing, removal, bedrock disturbance including exposure of underlying layers of fossil-bearing rock, and removal of rocks containing significant fossils from the site context. Removal of fossiliferous rocks for landscaping at the Table Mountain site would result in long-term adverse effects on any known significant fossils due to ground and bedrock disturbance, potential exposure of underlying layers of fossil-bearing rock, and removal of rocks containing any potentially significant fossils from the site context. Within the Biedell Creek and La Jara Reservoir sites, the BLM PFYC classification indicates little likelihood, or unknown potential, of finding fossils of use. Paleontologists contacted through the Colorado State Archaeologist's office should be consulted if fossils are discovered on these sites.

3.4.3 Socioeconomics

This section describes economic and social conditions in the four counties in which the parcels involved in the proposed land exchange are located. Potentially affected parcels transferring from SLB to Federal management are in Alamosa and Saguache counties and the parcels transferring from BLM to SLB management are in Saguache, Conejos, and Fremont counties. While all of the affected lands are undeveloped and in rural, unincorporated areas of their respective counties, public lands, the resources they contain, and the land uses they support are inextricably tied to the economic and social well-being of the area. Although current uses could continue following the land exchange, some uses and management could change

3.4.3.1 Affected Environment

Population. Parcels proposed in the exchange are in four, predominately rural counties in south-central Colorado. Fremont County abuts the metropolitan Pueblo and Colorado Springs

areas, while the other three are in the San Luis Valley. Proximity to the two metropolitan areas has contributed to stronger population and economic growth trends between Fremont and the other three counties. Throughout the 1970s and 1980s, Fremont County experienced substantial population growth, increasing by nearly 50 percent, comparable to the net population increase statewide. Alamosa and Saguache counties also experienced modest population growth during the 1980s, while population declined in Conejos County.

All four counties realized population growth between 1990 and 2006, ranging from 11.9 percent in Alamosa County to 51.3 percent in Saguache County in the San Luis Valley and 48.8 percent in Fremont County (see Table 3-21). In 2006, the resident population of these counties ranged from 8,406 in Saguache to 48,010 in Fremont (CDOW 2004). Statewide population growth was 43.7 percent during the same period, exceeding 4.75 million in 2006.

The underlying dynamics of recent population change vary among the counties. The change in Alamosa County reflects the combined effects of natural increases due to the local births, offset in part by out-migration. Growth in Saguache County occurred primarily due to agricultural workers and households settling in the Town of Center and an influx of residents into the Baca Grande subdivision near Crestone. Fremont County's population gains reflect a substantial increase in the number of staff and inmates associated with state and Federal correctional facilities in Canon City and Florence, several of which opened since 1990. Conejos County saw modest natural increases and in-migration.

The San Luis Valley is largely rural, reflecting the role of agriculture in its historical post-European settlement, with much or most of the resident population living in unincorporated areas. The City of Alamosa with an estimated population of 8,682 residents in 2005 and the county seat of Alamosa County is the largest community in the San Luis Valley. It also functions as the regional trade and services center. The county seat of Conejos County is Conejos, an unincorporated town of about 1,200. The majority of Saguache County residents, 3,845, lived in unincorporated areas including the Baca Grande subdivision just south of Crestone and abutting the northern boundary of the GRSA. Center and Saguache are the county's two largest communities (Table 3-22).

Fremont County, unlike the other three that are all in the San Luis Valley, straddles Colorado's Front Range in relatively close proximity to the Colorado Springs and the Pueblo metropolitan areas. Canon City, the county seat and largest community in the county, has an estimated population of 16,000. However, nearly 28,000 residents live in unincorporated areas, many whom commute to work in these two nearby cities; the 2000 Census reported more than 2,200 commuters.

TABLE 3-21. POPULATION GROWTH, 1990 TO 2006, SELECTED YEARS

County	1990	2000	2006	Change 1990 - 2006	Percent Change 1990--2006
Alamosa	13,602	14,974	15,225	1,623	11.9%
Conejos	7,479	8,411	8,406	927	12.4%
Fremont	32,254	46,307	48,010	15,756	48.8%
Saguache	4,632	5,993	7,006	2,374	51.3%
Colorado	3,307,618	4,326,872	4,753,377	1,445,759	43.7%

Source: U.S. Bureau of Economic Analysis, 2006

Economic Base. Key economic characteristics of the four counties generally mirror the above described population trends. Total employment in Fremont County was 19,737 in 2005, compared with 10,512 jobs in Alamosa County, 3,188 jobs in Conejos County, and 2,835 in Saguache County. All four counties had net gains in employment between 1990 and 2002, ranging from 7,123 new jobs (a 56 percent gain) in Fremont County to 497 jobs (an 18 percent gain) in Conejos County.

Employment data for 2005 reveal noteworthy differences in the economic base of the four counties (see Table 3-23). Agriculture plays a major role in the Saguache and Conejos counties economies, both directly in terms of farm employment, and indirectly through support for agricultural services, transportation, wholesale trade, and related private and government services. Agriculture is also important in Alamosa and Fremont counties; however, trade and services are more dominant, along with state and Federal government employment. In part, the latter reflects the roles of the cities of Alamosa and Canon City as regional trade and service centers, along with the role of educational, corrections facilities, other public facilities and institutions, and Federal resource management agencies in the economies.

The trade and services category includes lodging, restaurants, and other types of businesses that support tourism, hunting, and forms of outdoor recreation that are important to the local economies, particularly in the Town of Alamosa. A study prepared for the Colorado Tourism Office (CTO 2006) reported the following tourism spending and jobs impacts for the four counties, based on 2005 tourism and travel:

- Alamosa County - $21.2 million and 440 jobs
- Conejos County - $6.1 million and 180 jobs
- Fremont County - $50.75 million and 970 jobs
- Saguache County - $4.9 million and 90 jobs.

TABLE 3-22. POPULATION ESTIMATES; INCORPORATED PLACES AND UNINCORPORATED AREAS OF COUNTIES, 2005

County/Town	2005 Population	County/Town	2005 Population
Alamosa		Fremont	
Alamosa *	8,682	Canon City *	16,000
Unincorporated	6,572	Florence	3,685
Conejos		Unincorporated	27,965
Antonito	850	Saguache	
Manassa	1,024	Center *	2,497
Sanford	802	Crestone	84
Unincorporated, includes		Saguache	606
Conejos *	5,730	Unincorporated	3,845

* Denotes the county seat
Sources: U.S. Census Bureau 2007a and 2007b

TABLE 3-23. LOCAL ECONOMIC COMPOSITION, EMPLOYMENT BY MAJOR CATEGORY, 2005

County	Total Employment	Farm	Industrial *	Trade and Services **	Government
Alamosa	10,512	7%	12%	58%	23%
Conejos***	3,188	21%	19%	40%	20%
Fremont***	19,737	3%	17%	54%	26%
Saguache***	2,835	19%	25%	35%	21%

* Industrial includes forestry, manufacturing, construction, mining, utilities, transportation services, and warehousing.
** Trade and services includes wholesale and retail trade, information services, finance and insurance, real estate, professional and technical services, arts and recreation, and accommodation and food services.
*** Estimated due to data disclosure limitations.

Source: U.S. Bureau of Economic Analysis, 2006.

In addition to the GRSA, national forests, and national wildlife refuges, other attractions in these counties and the surrounding region include the Cumbres and Toltec Scenic Railroad, numerous state wildlife areas, San Luis Lakes State Park, San Luis Valley Historical Museum, the Los Caminos Antiguos Scenic & Historic Byway, Stations of the Cross Shrine, Fort Garland Museum, Royal Gorge and Royal Gorge Railroad, Gold Belt Tour Scenic Byway, and segments of the Old Spanish National Historic Trail. Tourism has a noticeable effect on the San Luis Valley economy, for example, GRSA recorded 267,204 visitors in 2004 (Headquarters West, Ltd., 2005).

Local lakes, reservoirs, streams, and rivers provide abundant fishing opportunities and portions of the Arkansas River in Fremont County offer world-class kayaking and whitewater rafting opportunities in the spring and summer. Tourism attractions in the vicinity of the proposed SLB exchange parcels include the UFO Watchtower, Colorado Gators farm, and the Sand Dunes

Swimming Pool. The Lost Stirrup Lodge and guest ranch is near the Gribbles Park parcels in northwest Fremont County.

The wildlife areas, public lands managed by various state and Federal agencies, and some private lands also support hunting for waterfowl, small game, and various big game species (primarily deer and American elk) (CDOW 2004). Expenditures by sportsmen support tourism-related merchants, sporting equipment dealers and suppliers, outfitters, and lodging providers. Sportsmen also use public campgrounds and engage in dispersed camping on public lands. According to a CDOW study, hunting and fishing accounted for the following expenditure and job impacts in 2002 (CDOW 2004):

- Alamosa County - $22.3 million in spending and 280 jobs
- Conejos County - $1.8 million in spending and 20 jobs
- Fremont County - $14.5 million in spending and 190 jobs
- Saguache County - $4.4 million in spending and 50 jobs.

The region's abundant wildlife also supports nonconsumptive enjoyment by residents and non-residents alike. The Monte Vista Sandhill Crane festival, which attracts thousands of visitors annually, is an example of such nonconsumptive use, which also supports the local economies. County-level estimates of these impacts are not available from CDOW; however, its 2004 impact report estimated statewide spending impacts of $940 million, supporting 13,000 jobs.

As noted above, agriculture plays a vital role in local economies. A total of 1,764 operating farms, encompassing more than 1.2 million acres of crop, pasture, and other lands, were tallied in the four counties in 2002 (USDA/NASS 2004). Saguache County had the largest acreage of farmland and the largest average size of farm, 1,893 acres (see Table 3-24). In 2005, annual sales of crops and livestock ranged from $17.83 million (Fremont County) to $67.86 million (Alamosa County). Crop sales were the primary source of revenues among farms in Alamosa and Saguache counties, while revenues derived from livestock sales were more important in Conejos and Fremont counties. Total net farm labor and proprietor's income in 2005 ranged from $1.74 million in Fremont County to $19.68 million in Alamosa County.

TABLE 3-24. PROFILE OF LOCAL AGRICULTURE

County	Number of Farms (2002)	Acres in Farms (2002)	Average Size – Acres (2002)	Market Value of Sales (2005)*			Farm Labor and Proprietors' Income (2005)*
				Crops	Livestock	Total	Total
Alamosa	318	204,640	644	$ 62.07	$ 5.79	$ 67.86	$ 19.68
Conejos	494	267,708	542	$14.13	$ 15.88	$ 30.01	$ 6.00
Fremont	700	264,650	378	$ 4.52	$ 13.31	$ 17.83	$ 1.74
Saguache	252	477,003	1,893	$ 48.09	$ 9.55	$ 57.63	$ 12.77
* Sales and income expressed in millions of dollars							

Sources: U.S. Department of Agriculture 2002 and U.S. Bureau of Economic Analysis 2006

Public lands, including those involved in the land exchange proposed herein play a role in supporting the local agriculture industry primarily by providing summer grazing (see Section 3.4.4). Total AUMs of grazing use authorized on the proposed BLM exchange parcels were in excess of 70 in 2006, with an unknown number of affected permittees. Authorized grazing use on the SLB lands totaled approximately 6,219 AUMs under multiple leases, some of which have terms extending through 2012. These leases generate nearly $45,000 annually in gross revenues to the SLB. Lease rates in 2003 were adjusted due to drought on a county-by-county basis and could be so affected in the future.

The public and SLB lands, including the Federal mineral estate, associated with the Table Mountain parcel proposed for exchange, supports commercial scale mineral development operations. Production from the site is used for aggregate and rip-rap, as well as in landscaping applications. Demand for commodities from the Table Mountain parcel has been strong due to proximity to the growth in the nearby metropolitan areas and suburban development in the foothills. The number of jobs directly associated with these operations is unknown.

In 2006, unemployment in the four counties was modestly higher than the state average, continuing long-term historical patterns (see Table 3-25). The region has generally avoided periods of rapid economic expansion and contraction that characterize many other local areas in Colorado that have economies tied more heavily to mineral and energy resource development. However, local employment and unemployment is seasonal, in response to tourism as well as agriculture.

TABLE 3-25. LABOR MARKET SUMMARY, 2006 ANNUAL AVERAGES

County	Labor Force	Employed	Unemployed	Unemployment Rate
Alamosa	8,229	7,840	389	4.7%
Conejos	3,802	3,550	252	6.6%
Fremont	19,667	18,566	1,101	5.6%
Saguache	3,234	3,029	205	6.3%
Colorado	2,651,718	2,537,037	114,681	4.3%

Source: U.S. Department of Labor 2007

Personal Income and Poverty. Total annual personal income among the four counties generally mirrors the scale of the economy in terms of employment; Saguache County having the lowest total income at $126.6 million and Fremont County, with $1.1 billion, having the highest personal income (see Table 3-26). With the exception of Conejos County, earnings paid to resident workers account for the single largest share of personal income. In Conejos County, nonlabor income, such as retirement benefits, social security, and other assistance payments, account for the largest share of income.

TABLE 3-26. CHARACTERISTICS OF LOCAL PERSONAL INCOME, 2005

County	Earning By Place of Work (A)	Net Residency Adjustment (B)	Transfers, Dividends, Rent & Other (C)	Total Personal Income (A+B+C)	Per Capita	
					Amount	Pct. Of State Average
Alamosa	$ 315.4	($ 35.9)	$ 101.6	$ 381.1	$ 24,985	67%
Conejos	$ 65.4	$ 29.4	$ 64.6	$ 159.4	$ 18,875	50%
Fremont	$ 636.5	$ 39.6	$ 335.5	$ 1,011.6	$ 21,231	57%
Saguache	$ 68.6	$ 15.7	$ 42.3	$ 126.6	$ 17,999	48%

Notes:
Columns (A), (B), and (C) are in millions of dollars.
Statewide Per Capita Income = $37,510
Fremont County per capita income for residents would be higher because this average is skewed (lower) by the presence of a substantial inmate population.
Source: U.S. Bureau of Economic Analysis, 2006

Conejos, Fremont, and Saguache counties all recorded a net residency inflow of income. That arises when earning by residents who commute to work elsewhere exceed the amounts paid by local employers to workers who commute to work from outside the county. In 2005, those three counties recorded a combined net inflow of $84.7 million. On the other hand, Alamosa County recorded a net residency outflow of $35.9 million, approximately 11 percent of the total wage and salary earning paid by local employers (USBEA 2007).

Following a long-term historical pattern, per capita incomes across the four counties in 2005 lagged behind the statewide average by considerable margins. Residents of Alamosa County had the highest average income, $24,985, but still one-third lower than the statewide average. Saguache County residents had the lowest per capita income, $17,999, less than half the statewide average of $37,510.

Similar patterns are exhibited in two other measures of economic well-being; median household income and the incidence of poverty. The median incomes in all four counties in 2004 were substantially lower than the statewide average of $50,105 and the incidence of poverty higher. Poverty rates ranged from 14.2 percent in Fremont County to 22.7 percent in Saguache County (see Table 3-27). The relatively lower incomes and higher incidence of poverty are not atypical for rural, primarily agrarian economies that do not also have mineral or energy resource development, a major winter recreation destination, or exceptional other recreation and amenity values that attract strong second-home development. Moreover, the lack of development or settlements near any of the proposed exchange parcels effectively militates against environmental justice concerns (see Environmental Justice section).

TABLE 3-27. 2004 MEDIAN HOUSEHOLD INCOME AND INCIDENCE OF POVERTY

County	Median Household Income	Percent in Poverty 2004
Alamosa	$ 31,587	19.2%
Conejos	$ 27,077	19.1%
Fremont	$ 35,129	14.2%
Saguache	$ 23,638	22.7%
Colorado	$ 50,105	10.2%

Source: U.S. Census Bureau, SAIPE 2007c

Land Ownership. Federal lands account for significant shares of the total land area of the four affected counties. The lowest concentration of Federal lands occurs in Alamosa County at 19 percent, with the highest share in Saguache County at 66 percent (see Table 3-28). Lands managed by various state agencies account for between 4 percent (Saguache) and 12 percent (Alamosa) of the county land area. A small share of the remaining land in each county is held by local governments, or quasi-public governmental entities such as school districts, but they are predominately private. Among the four counties, Alamosa County has the highest share of private lands, 69 percent, while less than one-third of all land in Saguache County is private.

TABLE 3-28. LAND OWNERSHIP, 1997

County	Total Land Area - Acres	Federal Land	State Land	Local and Private
Alamosa	462,854	19%	12%	69%
Conejos	825,741	59%	8%	34%
Fremont	981,175	45%	7%	48%
Saguache	2,027,724	66%	4%	30%
Colorado	66,614,084	37%	5%	58%

Source: Colorado Department of Local Affairs 2001

Lands managed by the USFS as parts of the Pike - San Isabel and the Rio Grande NFs are the predominate Federal land holdings in the four counties, about 1.3 million ac. Public lands managed by the BLM encompass more than 900,000 acres. Approximately 76,000 acres of Federal lands are presently managed by the NPS as part of the GRSA, and about 16,700 acres are managed by either the USBR or the USFWS.

Payments In Lieu of Taxes and Refuge Revenue Sharing. The affected county governments receive payments from the Federal government under either or both the PILT or the Refuge Revenue Sharing (RRS) payments.

PILT is administered by the Department of the Interior that makes annual payments to local governments with Federal lands within their jurisdictional boundaries. Within the context of the

proposed land exchange, the eligibility of the four counties to receive PILT is based primarily on the acres of Federal lands in the national forests, GRSA, national wildlife refuges, the USBR Closed Basin Project, and lands administered by BLM (Section 6902). PILT payments are intended to help offset the diminished property taxes receipts due to nontaxable Federal lands within county boundaries. Eligibility for PILT is reserved for local governments (usually counties) that provide services related to public safety, environment, housing, social services, and transportation. PILT receipts can be used for any governmental purpose and are not required to be further distributed to other local government units such as school districts or cities.

As provided in the legislation, the Department of the Interior uses two approaches to compute the eligible PILT payments authorized under Section 6902 with the higher of the two establishing the base entitlement. Payments are subject to a population ceiling limitation computed by multiplying a county's resident population with a corresponding dollar value (adjusted annually for inflation). Actual PILT payments are also affected by congressional appropriations. Any funding limitations created by such appropriations are equitably applied to all payments under the program. The PILT program has not received full funding for some time.

PILT eligible acreage for fiscal year 2007 ranged from 69,571 acres in Alamosa County to 1.34 million acres in Saguache County (see Table 3-30). The corresponding range in PILT payments was from a low of $95,373 in Alamosa County to $642,699 in Fremont County. The effect of the population caps is evident in the PILT payments of $465,482 to Saguache County, even with having nearly three times the PILT-eligible acreage of Fremont County. Annual PILT payments over the past 3 years have increased modestly in Conejos, Fremont, and Saguache counties, but decreased in Alamosa County due to reductions in the acreage of eligible public lands under BLM management.

TABLE 3-29. COUNTY RECEIPTS OF FEDERAL PAYMENT IN LIEU OF TAXES, FISCAL YEAR 2007

County	Total Land Area - Acres	PILT Entitlement Acres - 2007	Entitlement Acres (Share of Total) 2007	Total PILT Receipts - 2007
Alamosa	462,854	69,571	15.03%	$95,373
Conejos	825,741	499,008	60.43%	$609,120
Fremont	981,175	454,658	46.34%	$642,699
Saguache	2,027,724	1,340,318	66.10%	$465,483

Sources: Colorado Department of Local Affairs, 2001 and the BLM, 2007

The RRS program was initially authorized in 1935 (16 U.S.C. 715s) to share net receipts from the sale of products or privileges with local counties in which refuge lands were located. The revenue sharing provisions have since been amended, expanding the eligibility of counties to receive revenue sharing, even when no revenues were derived by an individual refuge, and for lands that were purchased or acquired through donation. The payment entitlements for purchased or donated lands are calculated using three different formulas with counties receiving the highest amount of three alternatives. As with PILT, Congress must authorize the

final budget and in instances where available funding is insufficient to meet all needs, payments to local governments will be reduced accordingly.

Historically, only Alamosa County received RRS payments. However, beginning with the initial land acquisition and establishment of the BNWR, Saguache County also began receiving RRS payments in 2004. In fiscal year 2006, the RRS payments to Alamosa County totaled $12,072. The fiscal year 2006 payment to Saguache County totaled $55,888 (USFWS 2007). In both instances, the payments received represented about 41 percent of the total entitlement, with the reduction reflecting limitations resulting from Congressional appropriations for the program.

3.4.3.2 Environmental Consequences/Mitigation

Potential impacts on social and economic conditions in the affected communities and surrounding areas are assessed in this section. Such impacts would arise indirectly as a result of changes in land use, public access to the lands, and land ownership and management. Social and economic effects would be considered (1) insignificant if they are at or below the level of detection or perception for a vast majority of residents or observers; (2) low if the effects are detectable, localized in geographic extent, and small in scale or magnitude, and affect few firms or small segments of the overall population (i.e., not raising environmental justice concerns); (3) moderate if the effects are readily apparent, of larger scale, and affect many people or institutions over a wider geographic area, either in the short-term or long-term; and (4) high if they are readily apparent to a majority of residents or observers, affect many people at a regional level, and have long-term impacts on established social, economic, or community structures.

No Action Alternative

Under the No Action Alternative, the proposed land exchange would not occur. Management of land parcels involved in the proposed exchange would continue per current management plans, leases, permits, and other pertinent management guidance and policies. Future changes in use, sale, exchange, or disposition of these parcels via other mechanisms would not be precluded.

Existing relationships between current use and management of these parcels and local, social, and economic conditions would continue. Lands managed by the SLB would support the local agriculture, recreation, and tourism sectors via livestock grazing, provision of wildlife habitat, and public access for hunting, hiking, wildlife viewing, and other recreation use. These benefits would accrue to individuals as well as the community at large. Revenues generated by leases would support management of the lands as well as public education. These contributions would be long-term and beneficial, but insignificant within the context of the overall region.

Parcels involved with the proposed land exchange managed by the BLM would maintain current linkages to local social and economic conditions. As with the SLB parcels, these linkages support local agriculture, recreation, and tourism. Current use also supports mineral development and limited collection of forest products for personal use. The affected parcels would remain part of the base on entitlement acres in the respective counties for purposes of the

Federal PILT program. These contributions are long-term and beneficial, but insignificant within the context of the overall region.

Proposed Action

Under the Proposed Action, Federal lands presently managed by the BLM would be exchanged to the SLB, and SLB parcels would be exchanged into the Federal domain with future management by the NPS, USFWS, and BLM. Former BLM lands would be evaluated by the SLB for continuation of appropriate uses and potential additional uses. All or portions of the proposed Table Mountain and Gribbles Park exchange parcels would be integrated with existing grazing leases on adjacent parcels, benefiting current lessees. Livestock grazing would continue on the proposed Biedell Creek and La Jara Reservoir exchange parcels, with the SLB honoring BLM permits currently in place. New grazing permits would be offered by the SLB as existing BLM permits expire or are relinquished. Due to differences in grazing fees, individual grazing permittees could experience higher fees over time as permits transition from BLM to SLB management.

Some of the former BLM parcels support potentially harvestable quantities of commercial quality timber resources, which could be offered for sale in the future. Several parcels also contain potentially economically recoverable minerals, which could be subject to future sale or lease. Future commercial timber harvest or mineral development would support added employment, income, induced economic activity, taxes, and revenues to the SLB to support its mission. The timing, duration, and scale of such impacts are indeterminate, but likely to be low.

Public access for hunting and other forms of recreation is likely to continue on the former BLM lands under SLB management and lease agreements with CDOW. All parcels would provide wildlife habitat that also provides support for hunting, recreation, and nonconsumptive enjoyment of wildlife.

Overall, the level of economic activity and the ties between the former BLM lands and local social conditions would remain largely unaffected by the changes in ownership, management, and use. The number of Federal PILT entitlement acres would decline in Fremont and Conejos counties as a result of the land exchange to the SLB.

Under the Proposed Action, state lands presently managed by the SLB would come into the Federal domain with future management by the NPS, USFWS, and BLM. Former SLB lands to be managed by the NPS would be managed in accordance with the GRSA GMP, which calls for the elimination of grazing and hunting on the affected lands. The lands would continue to provide wildlife habitat and support recreation, education, and other nonconsumptive public uses.

Former SLB lands to be managed by the USFWS would be evaluated for livestock grazing and wildlife habitat to support the mission of the BNWR. Future grazing and hunting might or might not be supported. Some levels and types of public recreation or other use might occur. Former SLB lands to be managed by the BLM would also be considered for grazing as part of adjacent allotments or as part of joint allotments with adjacent SLB permits.

Overall, the level of economic activity and the ties between the former SLB lands and local social conditions would decrease with respect to the support for agriculture and hunting, but likely increase in terms of visitor use, outdoor recreation, wildlife viewing, and other non-consumptive uses. The net effects would likely be low and adverse in the short-term, but insignificant to low and beneficial in the long-term.

The acreage of lands eligible for inclusion in the Federal PILT program would increase in Saguache and Alamosa counties, although the net payments would not necessarily increase proportionally. Both counties would see an increase in Refuge Revenue Sharing payments in conjunction with the expanded lands under USFWS management in the BNWR.

3.4.4 Range Management

Rangelands provide protection to watersheds; quality water supplies; recreation; scenic beauty; and opportunities for enjoyment, relaxation, and solitude. They provide forage for many wildlife species and plants that convert solar energy into food, fiber, and cover. Rangeland also provides forage and habitat to domestic livestock with operators authorized grazing use on allotments through approved grazing permits (BLM 2006b). Within Colorado, BLM management of rangeland occurs on approximately 8.4 million acres of public land.

Federal grazing permits are generally issued for 10-year terms. When permits are renewed, allotment management plans are also updated. Allotments undergo a review for conformance with land use plans and compliance with environmental documentation requirements prior to renewal (BLM 2006b). The renewal process must conform with NEPA and includes soliciting public comments and concerns and providing resource information through public scoping. The permittee of record is normally issued the new 10-year term permit. However, if an allotment is vacant, expressions of interest in obtaining grazing privileges are obtained. Applicants to graze new or vacant allotments are evaluated and selected through a grant process. Each land area is assessed for compliance with Colorado land health standards on a regular basis. Notices of grazing permit renewals and land health assessments are posted annually on field office Web sites.

New grazing regulations published in 2006 promote stability in livestock operations that rely on BLM grazing allotments for all or part of their operations. Among other changes, these regulations:

- Authorize the BLM and a grazing permittee or lessee to share title to future range improvements
- Phase in grazing-use decreases (as well as increases) of more than 10 percent over a 5-year period, consistent with existing law and in full recognition of the BLM's authority to respond as necessary to drought, fire, and other resource conditions
- Promote a consistent approach by BLM managers in considering and documenting the social, cultural, and economic effects of decisions that determine levels of authorized grazing use

- Remove a restriction that heretofore limited temporary nonuse of a grazing permit to 3 consecutive years
- Require the use of existing or new monitoring data in cases where the BLM has found, based on its initial assessment, that a grazing allotment is failing to meet rangeland health standards
- Allow up to 24 months instead of prior to the start of the next grazing season for the BLM to analyze and formulate an appropriate course of action in cases where grazing practices are at issue.

State grazing permits and leases are managed by the agricultural section of the SLB, which also leases cropland, recreation rights, and other surface rights to public and private entities to provide a reasonable and consistent income for SLB beneficiaries (Colorado SLB 2006). It is not necessary for lessees to be in the livestock business and nonuse is allowed; however, with nonuse the lease may be converted to a special use permit such as recreation and re-leased for grazing, as well.

Range improvements must be approved by the SLB and the lessee pays for the improvements (some cost-sharing may be available) but the lessee holds title to the improvements and is reimbursed on transfer. A range analysis of parcels, often consisting of evaluations of historic use levels or those on nearby Federal lands, is used to determine available AUM of forage. Poor condition parcels could be subject to a range plan, but no formal range monitoring occurs (Baldwin and Cody 1996). Within the SLB, management of rangeland occurs on approximately 3 million acres statewide (Colorado SLB 2006).

3.4.4.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

For the proposed Table Mountain exchange parcels, the public land included in Section 28, the W½SW¼ of Section 27, the W½W½ of Section 34 of T17S, R68W, the W½W½ of Section 3, and the NW¼NW¼ of Section 10 of T18S, R68W are included in the West Patton Canyon Allotment. This allotment is presently vacant and RMC Consultants Inc. (Bevilacqua and Slaughter 2006) confirmed during cultural resource field inventories that grazing has not been intense in the recent past.

The West Patton Canyon Allotment consists of mostly steep, rough canyons and draws that contain limited area suitable for livestock. Three AUMs of grazing use are authorized on public land within this allotment. The allotment is currently managed under “custodial management.” Custodial management is generally used on allotments that consist of relatively small, scattered parcels of public lands that are unfenced from large amounts of private land, are difficult to manage separately, and have limited resource issues. To be included in a custodial management classification, resources on an allotment are generally considered to be in acceptable condition and are generally producing at or near their potential. Under custodial management, the permit includes a specific number of livestock and the specific amount of grazing use (AUMs) authorized on public land. However, the permittee is not restricted to that specific number of

livestock, nor restricted to specific grazing dates, as long as the authorized amount of grazing use on public land within the pasture is not exceeded. The authorized amount of grazing use on these allotments equals the estimated carrying capacity of the allotment and is expected to result in utilization levels of 40 percent to 60 percent of the total annual forage production of key forage species. Grazing use that exceeds this level on public land is not authorized.

The remaining public lands in the Table Mountain area are included in the Patton Canyon and Beaver Creek allotments. The Patton Canyon Allotment includes public land in the E½SW¼ of Section 27, the E½W½ and the SE¼ of Section 34 of T17S, R68W, the E½W½ of sSection 3, and the NE¼NW¼ of Section 10 of T18S, R68W. The Patton Canyon Allotment currently has an estimated carrying capacity of 13 AUMs. The parcels in Sections 11, 15, and 21 of T17S, R68W are included in the Beaver Creek Allotment. The Beaver Creek Allotment also includes other public land that is not currently involved in the proposed land exchange. The estimated carrying capacity of those parcels within the Beaver Creek Allotment that are included in the exchange has not been determined.

The BLM parcels are mostly surrounded by and are unfenced from SLB land in the area. Due to the lack of fencing on the BLM parcels, it is impractical to manage these BLM parcels separately from the surrounding SLB land. BLM is processing an application for grazing from the current lessee on the surrounding SLB land. Approval of the application would allow the SLB and the BLM lands to both be leased to an individual rancher. Livestock grazing on the SLB land is currently managed under a grazing plan developed by the NRCS. Upon completion of the pending application, the BLM parcels in this area would be managed under the NRCS grazing plan for the entire area. The NRCS plan would allow for the protection and improvement of rangeland resources on both the SLB and BLM lands within the area.

Some of the Gribbles Park parcels proposed for exchange are leased to the Stirrup Ranch, others are leased to Everett Land and Cattle Company. The proposed BLM exchange parcels are unfenced from adjacent SLB land and grazed in conjunction with those SLB lands. There are no site-specific goals or objectives or monitoring information on the exchange parcels.

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Within the San Luis Valley, domestic livestock graze approximately 473,000 acres of BLM land or approximately 90 percent of the BLM-managed lands in the valley. In 1989, there were 148 grazing allotments with 109 individual permittees, mostly associated with family-operated ranches. A total of 32,560 AUMs of forage was available for livestock grazing within the San Luis Valley BLM lands (BLM 1989).

Timing of domestic livestock grazing is important in order to avoid competition for forage with wildlife, especially on key wildlife winter ranges. The period of ground-thaw, associated wet conditions, and the beginning of active plant growth are also critical times to consider grazing management. Grazing by cattle typically occurs in the summer and fall seasons, and sheep grazing occurs in the fall and winter season, generally avoiding conflicts during crucial periods (BLM 1989).

At the Biedell Creek site, proposed exchange parcels 8, 9, 10, and a portion of 14 are within the Tracy Commons Allotment and are currently grazed with adjacent SLB parcels by one rancher in a multiple pasture system. Proposed exchange parcels 11, 12, and a portion of 14 are within the East Carnero Creek Allotment; parcel 13 is part of the Hellgate Allotment; and these allotments, plus the adjacent L-Cross Ranch SLB lands, are managed by one rancher under a rest-rotation grazing system.

At the La Jara Reservoir site, seven proposed exchange parcels (16, 17, 18a, 20, 21, 23, and 24) have been unallocated for more than 10 years. A portion of the unallocated Del Rancho Allotment is made up of proposed exchange parcels 18c, 19, and 22, and parcel 18b makes up a portion of the Rahadero Canyon allotment that is grazed annually during the summer as a single pasture. The Chicago Bogs Allotment consists of proposed exchange parcel 15 and currently provides 56 AUMs between June 1 and September 30. It has been similarly grazed for several decades. Adjacent SLB lands surrounding these proposed BLM exchange parcels are being grazed at various levels and differing seasons of use.

Proposed San Luis Valley SLB Exchange Parcels

SLB parcels proposed for exchange are offered for grazing leases with specified levels of use in terms of AUMs. Parcel 31, which would be managed by the BLM, supports 48 AUMs. Parcels 26, 32, 33, and 34, which would be managed by the USFWS, support 2,758 AUMs. Parcels 27, 29, 30, 35, and 37, which would be managed by the NPS, have inactive grazing leases and all but parcel 35 have inactive oil and gas leases. Active improvements associated with these rangeland parcels include roads, fences, wells, stock tanks, and artesian wells that occur on parcels 26, 27, 29, 33, 35, and 41. Rights-of-way, including transportation, communications, power, and water and sewer corridors, are active on parcels 26, 27, and 30.

Lands within the former Baca Ranch that lie adjacent to the SLB proposed exchange parcels and that are presently managed by the BNWR have a long history of cattle grazing, some of which employed a season-long grazing plan with high stocking rates (USFWS 2005). The existing SLB grazing leases were transferred to the USFWS in 2005 and were not grazed during 2006 or 2007.

The USFWS considers grazing by domestic livestock on a targeted basis as a management tool that can be used to improve habitat quality for wildlife. Grazing has been used in the San Luis Valley to control invasive plant species such as perennial pepperweed and to enhance native vegetation communities. Stocking rates for rangeland within BNWR would be established using habitat-based goals and objectives that consider the condition of the habitats and future, more focused goals and objectives for individual habitat types.

Proposed SLB exchange parcels to be managed by the NPS are presently leased by TNC as part of their Medano Ranch American bison property. The NPS would evaluate continuation of American bison grazing as part of their GMP process.

3.4.4.2 Environmental Consequences/Mitigation

Rangelands are considered renewable resources for grazing livestock and wildlife habitats, but when severely disturbed in a semiarid environment, they might require many decades to recover following degradation of vegetation and soil resources. Plant communities that occur on rangeland within the proposed exchange parcels include nearly barren sand flats and playas, minor woodland and forest stands, shrublands, montane meadows and grasslands, and riparian stands. An effect on rangelands would be considered (1) insignificant if it is within the limits of natural variability or the range vegetation and soils would recover within the short-term, within 1–5 years; (2) low if the range vegetation and soils would likely recover within the short-term, within two decades, and the elements for recovery are in place; (3) moderate if it results in range vegetation replacement and measurable soil disturbance, but the elements for recovery in the long-term, within several decades, remain; and (4) high if it results in range vegetation elimination and irreparable soil damage with little likelihood of recovery.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. Rangeland would continue to be offered to grazing lessees at AUM rates determined by oversight or monitoring, adjusted for forage production variability due to drought or periods of above-average precipitation. Areas where adjoining BLM and SLB parcels are not fenced from one another would be managed jointly with the lessee. Effects on rangeland management for both BLM and SLB parcels proposed to be offered for exchange would be long-term, insignificant, and beneficial due to income derived from grazing leases.

Proposed Action

Under the Proposed Action, the BLM parcels would be exchanged to SLB for range management, and SLB parcels would be exchanged for various management approaches by the BLM, USFWS, and NPS. The majority of the Table Mountain and all Gribbles Park exchange parcels would be immediately merged into current SLB grazing leases (there are currently no active BLM grazing permits on the Table Mountain parcels) resulting in long-term, insignificant, beneficial effects on school trust income due to range management. The Biedell Creek and La Jara Reservoir parcels would be leased for livestock grazing by the SLB, initially honoring the permits currently in place by the BLM, resulting in short-term, insignificant, beneficial effects to the school trust income from the range management program. New grazing permits would be offered by the SLB as existing BLM permits expire and on lands that are currently idle, resulting in long-term, insignificant to low, beneficial effects on school trust income due to the range management program.

Proposed SLB exchange parcels in the San Luis Valley include parcel 31 that would be managed by the BLM resulting in long-term, insignificant, beneficial effects on livestock grazing management due to application of the land health monitoring program and protocols established in the RMP. SLB parcels exchanged to the USFWS would undergo evaluation for

management under the BNWR-CCP where livestock grazing and fire are considered management tools resulting in long-term, insignificant to low, beneficial effects on range resources for domestic livestock and wildlife habitat. SLB parcels exchanged to the NPS would undergo evaluation for management under the GRSA GMP and related individual plans where livestock grazing could be eliminated and wildlife habitat managed with other tools including fire resulting in long-term, insignificant to low, adverse effects on range management for domestic livestock grazing and long-term, insignificant to low, possibly beneficial effects for native range and wildlife habitat value.

In terms of mitigation for upland vegetation management, livestock grazing within BNWR would be reduced over time, if necessary and dependent on habitat condition and on habitat-based goals and objectives (USFWS 2005). Reduction of domestic livestock grazing would result in long-term, insignificant to low, adverse effects on range management due to loss of surface area grazed.

3.4.5 Forest Management

Management of forest resources by BLM includes commercial timber harvest from forest stands; fuelwood harvest from woodland stands; and personal collection of boughs, seeds, fuelwood, and other forest commodities. When authorized, commercial timber harvest is predicated on estimated allowable yield in terms of million board-feet of timber based on the type and quality of timber resources and the acreage of lands available for intensive forest product management using existing equipment and technology (BLM 1989). Forest trees most valued by harvesters include ponderosa pine, Douglas-fir, Englemann spruce, lodgepole pine, white fir, and quaking aspen. Productive, harvestable woodlands are those stands that occur on slopes of up to 35 percent and with tree canopy density averaging 40 percent or more (BLM 1989). Project stands are nearly all piñon pine – juniper woodlands from which fuelwood is harvested and sold by the cord. Most piñon pine – juniper stands are mature and exhibit a wide range of diameters and stocking density. In addition, some transplant trees and Christmas trees are sold each year from BLM lands.

Forest resources on SLB land parcels are managed by the CSFS, which encourages sound stewardship to prevent losses to fire, disease, and abuse (CSFS 2006). The CSFS Forest Management Division offers services to improve wood resources, watershed conditions, wildlife habitat, recreation, and other benefits derived from forested lands. The CSFS Fire Division, functioning from 18 field offices statewide, supports program activities with two goals: (1) protection of people and the environment from damaging wildfires, and (2) the safe use of fire to help meet the needs of the resources and society. Typically, the CSFS proposes potential projects on SLB lands using an annual work plan that must be approved by the commissioners.

3.4.5.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

The BLM parcels within the Table Mountain area have a mix of ponderosa pine forests (woodlands) and piñon pine – juniper woodlands that occur on approximately 1,500 acres. Ponderosa pine 12 in diameter at breast height (DBH) and greater have some value for producing lumber. Piñon pine – juniper trees are commonly utilized as firewood. The limited stand data for this area show sparse ponderosa pine in the 5 inches to 9 inches size class on the northernmost parcel 1. It is believed that most of the older trees that once covered the area were removed during the settlement of the Arkansas River Valley. Most of the trees that occur in this area today are less than 100 years old. There is little or no vehicle access to these parcels, which limits future forest management opportunities. An analysis of recent aerial photography during BA preparation indicated no recent tree removal from either Federal or state lands in the vicinity of Table Mountain (see Appendix E).

The BLM parcels within the Gribbles Park area have a mix of ponderosa and bristlecone pine. Ponderosa pine is used to produce lumber and bristlecone pine is valuable for transplants. The limited stand data for this area shows a ponderosa pine stand in the 9 inches to 16 inches size class on about 10 to 15 acres in parcel 6. It is believed that most of the older trees that once covered the area were removed during settlement of this area. Most of the trees are less than 100 years old. There is limited vehicular access to most of this land, which affects future forest management opportunities.

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

BLM lands with forest stands considered suitable for commercial timber harvest are commonly an ecotone between the open San Luis Valley floor and the more continuous forest stands on lands managed by the USFS. Many stands are narrow stringers or isolated patches averaging about 50 acres in area. Most management opportunities in such stands are for improving wildlife habitat and reducing fuel loadings and fire danger rather than commercial timber production. Sparse, patchy groups of trees and small isolated stands covering less than 10 acres are not included as suitable land for commercial timber harvest.

The four-county area containing BLM forest lands supported nine primary processing companies in 1989. At that time, the mill capacity was 42,400 million board-feet annually. Most ongoing timber sales occur on adjacent Rio Grande NF lands with very minor amounts of timber harvested from BLM lands. All recent BLM timber management activities in the San Luis Valley have had wildlife or fuels management objectives.

During the mid- to late 20th century, approximately 75 percent of the commercial forest acres had some type of harvest entry (BLM 1989). Most of those stands contained residual, poorly stocked stands of small, suppressed, or intermediate-sized trees. At that time, tree regeneration occurred naturally and trees were highly susceptible to dwarf mistletoe infections. Commercial forest stands on BLM lands were considered to be in fair to poor condition and in a deteriorating trend in 1989. There was no harvesting of forest products from riparian habitats.

The allowable fuelwood harvest from suitable piñon pine – juniper woodland stands was calculated to be approximately 570 cords annually from 10,688 acres and based on a 150-year rotation (plus a 25-year natural regeneration period). As many as 10 commercial fuelwood operators were active in the San Luis Valley in 1989 and the supply of fuelwood available far exceeded demand. On a demand basis, approximately 150 cords of fuelwood were sold annually to families and small commercial operators. An estimated 800 transplant trees and Christmas trees were sold annually (BLM 1989).

Parcels proposed for exchange at the Biedell Creek site support approximately 4,500 acres of woodland and forest stands, approximately 90 percent is piñon pine – juniper woodlands. As such, these stands would likely provide fuelwood and whole tree removal to be used as transplants.

Parcels proposed for exchange at the La Jara Reservoir site support approximately 2,400 acres of woodland and forest stands, including piñon pine – juniper (approximately 427 acres) and ponderosa pine (approximately 494 acres) woodlands and mixed conifer (approximately 942 acres) and quaking aspen (approximately 558 acres) forest stringers and stands. Woodland stands would likely provide fuelwood and whole tree removal to be used as transplants, while forest stands could provide merchantable timber if the trees and stands are sufficiently large to support commercial harvest. An analysis of recent aerial photography during BA preparation indicated no recent tree removal from either Federal or state lands in the vicinity of La Jara Reservoir (see Appendix E).

Proposed San Luis Valley SLB Exchange Parcels

Piñon pine – juniper woodland is present on one proposed exchange parcel (31) where it covers a small area. This stand would be managed by the BLM and could provide some fuelwood and some transplant trees. Other forest and woodland communities within the SLB exchange parcels as proposed are composed of riparian species and are not subject to forestry management.

3.4.5.2 Environmental Consequences/Mitigation

Forest and woodland stands are considered renewable resources but require many decades to restock following logging, insect kills, and fires. The majority of woodland stands are short stature piñon pine – juniper associations that typically provide fuelwood and transplants. There are a few patches and stringers of ponderosa pine, Douglas-fir, and quaking aspen trees at the higher elevations, in drainages, and on north-facing slopes. An effect on forest resources would be considered (1) insignificant if it is within the limits of natural variability or the stand would recover within the short-term, within a few years; (2) low if the stand would likely recover over the long-term, within a few decades, and the elements for stand recovery are in place; (3) moderate if it results in stand replacement, but the elements for recovery in the long-term, within several decades, remain; and (4) high if it results in stand elimination and substrate damage with little likelihood of recovery.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. The small stand of piñon pine – juniper woodland on SLB parcel 31 would be managed by the CSFS resulting in long-term, insignificant, beneficial effects due to fuelwood and transplant tree production. Federal parcels managed by the BLM would continue to be assessed for forest and woodland product harvest according to RMP management directives resulting in long-term, insignificant to low, beneficial effects due to fuelwood, transplant tree, Christmas tree, and lumber production. Fuel removal by prescribed fire would occasionally occur and result in changes in grass, forb, and shrub understories and habitat structure that typically benefit wildlife species.

Proposed Action

Under the Proposed Action, the BLM parcels would be exchanged to SLB management, and SLB parcels would be exchanged for management by the BLM, USFWS, and NPS. The SLB would manage BLM exchange parcels primarily to support grazing livestock under lease agreements, with minor removal of harvestable trees and firewood where forest and woodland stands occur, resulting in long-term, insignificant to low, beneficial effects due to fuelwood, transplant trees, Christmas trees, and lumber production. The former BLM parcels have forest and woodland resources that would be evaluated by the CSFS as to stand health and assessed and offered relative to product harvest resulting in long-term, insignificant to low, beneficial effects due to forest management practices.

Proposed SLB parcels in the San Luis Valley have little forest and woodland vegetation. The BLM would manage the parcel 31 stand of piñon pine – juniper woodland according to the RMP management directives resulting in long-term, insignificant, beneficial effects due to fuelwood and transplant tree production. The remaining riparian woodland stands would be managed by the USFWS and NPS under their CCP and GMP management directives, respectively, for wildlife habitat values and stand health resulting in long-term, insignificant effects on forest product harvest.

3.4.6 Hydrology and Water Rights

The major drainages of the project region are presented on Figure 3-7. Surface water is lacking, ephemeral, or limited to small stock ponds on several of the parcels proposed in this exchange. With the exception of the proposed parcels on the floor of the San Luis Valley, near-to-surface groundwater might also be a limited resource.

3.4.6.1 Water Rights

Western surface water rights originated in California during the Gold Rush of 1849 and the concept was exported to Colorado during the Gold Rush of 1859 (CSU 2007). The first miner to use water from a stream was given the right to use that water over any miner who arrived

later and the next miner to arrive and use water was given the right to use water over anyone arriving later, but they must defer to anyone with an older water claim. This system of surface water rights was named the Doctrine of Prior Appropriation (DPA) or the First-in-Time, First-in-Right doctrine (CSU 2007).

The DPA was adopted into the Colorado Constitution in 1876, where a water right could be obtained if the water was put to a beneficial use (CSU 2007). Water user preference was also established in the state constitution in the order of domestic, agricultural, and industrial. Further, water rights may be bought, sold, inherited, moved from one place to another, or changed from one type of use to another as long as the change does not injure other water rights. Tributary groundwater (water connected to a river or stream) was incorporated into the DPA under the Groundwater Management Act of 1957.

The Colorado water rights system is administered by the State Engineers office within the Division of Water Resources. This office reviews and approves applications for permits for the operation of water wells. To be perfected as a legal right, a Colorado water right must be approved in decree issued by one of the state's special Water Courts. Appeals from the decision of the Water Court may be taken directly to the Colorado Supreme Court as a matter of right. Colorado statutes also include detailed provisions concerning the use of the waters and administration of the water rights system. During most sessions, the Colorado General Assembly is asked to consider new legislation relating to water rights issues (WWL 2007).

Under the PPA-2000, the Secretary of the Interior is to obtain and exercise water rights that fulfill the purposes of the national park and preserve, provided the following occur:

- Such water rights are managed according to Colorado state law.
- The purposes and other substantive characteristics of water rights are established according to state law, except that the secretary is specifically authorized to appropriate water exclusively for maintaining groundwater levels, surface water levels, and stream flows on, across, and under the national park and preserve, to accomplish the purposes of the national park and preserve, and to protect park resources and park uses.
- Water rights are established without interfering with (1) any exercise of a water right for a non Federal purpose in the San Luis Valley that existed when the Act was passed, and (2) the Closed Basin Division project.
- Except as provided below, no Federal reservation of water may be claimed or established for the national park or preserve.

To the extent that a water right is established or acquired by the United States for Rio Grande NF, the water right will be (1) considered to be of equal use and value for the national park and preserve, and (2) retain its priority and purpose when included in the national park and preserve (PPA-2000). To the extent that a water right is established or acquired by the United States for GRSA, the water right will be (1) considered to be of equal use and value for the national park and preserve, and (2) retain its priority and purpose when included in the national park and preserve (PPA-2000).

Water rights for GRSA are recognized in several decrees. These decrees help to ensure that flow patterns and discharges of streams, springs, and groundwater are maintained, while also providing for the use of water for administrative purposes and protecting the rights of other water users. The NPS holds a unique federally-reserved water flow right for Mosca Creek for a designated flow amount and for Medano, Castle, Sawmill, Buck, Little Medano, and Cold creeks for a monthly decreed amount. There are no water rights associated with Pole Creek.

Two irrigation ditches in the headwaters of Medano Creek are associated with water rights senior to those of GRSA. The Hudson Ditch was constructed in 1886, likely under the Ditch Act of 1866. The Medano Ditch was constructed in 1892, likely under the provisions of the Ditch Act of 1891. The water level of San Luis Lake is maintained for fishing and boating recreation, using water from the Closed Basin Division project (CNHP 1999a).

The Closed Basin Division, San Luis Valley Project (Closed Basin Project) is in a topographic depression (the Closed Basin) in the San Luis Valley. The purpose of the project is to pump and deliver unconfined groundwater and available surface flows in the Closed Basin to the Rio Grande via a 42-mile conveyance channel. The project assists Colorado in meeting its water delivery commitment to New Mexico and Texas under the Rio Grande Compact of 1939, and assists the United States in meeting its water delivery commitment to Mexico under a treaty dated May 21, 1906. The project also delivers water to the ANWR. Features of the Closed Basin Project within GRSA are not to be affected by the park expansion. Management responsibility for Closed Basin Project features within GRSA is to remain with the USBR (PPA-2000).

3.4.6.2 Surface Water

The majority of Fremont County drains to the Arkansas River, which has eroded deep canyons from west to east across the county, through the mountains, and onto the plains. The most well-known of the deep canyons carved by the Arkansas River is the Royal Gorge. Hardscrabble and Oak creeks are the principal tributaries that drain the southeastern portion of Fremont County (NRCS 1996). Beaver and Eightmile creeks drain the northeastern portion of the county, Currant and Fourmile creeks drain the north-central portion, and the northwestern and western portion drain to Badger, Bernard, Cottonwood, Tallahassee, Stout, and Cherry creeks. The southern portion of Fremont County drains to Texas and Grape creeks and Copper Gulch (NRCS 1996).

A portion of Fremont County drains into South Park. South Park is approximately 50 miles long (north to south) and 35 miles wide (east to west) and the major drainage is the South Platte River. The South Platte River flows southeasterly across South Park and exits from the southern extension of the Tarryall Mountains in the southeastern portion of Park County.

Within the project area, the portions of Alamosa, Conejos, and Saguache counties drain internally into the northern San Luis Valley groundwater aquifer or to the Rio Grande (see Figure 3-7). The total watershed of the San Luis Valley covers about 5 million acres (BLM 1989). Approximately 2,800,000 acre-feet of water enter and leave the San Luis Valley annually (Emery 1997). The most important source of water to the San Luis Valley is surface-

water inflow, which recharges the aquifers and provides directly or indirectly the majority of the water used for irrigation and domestic and industrial purposes. Surface water largely results from snowmelt and runoff and historically has ranged from a high of 2,783,000 acre-feet in 1941 to a low of 743,000 acre-feet in 1951.

The Rio Grande enters the San Luis Valley from the west (east flank of the San Juan Mountains), then flows southeasterly through the valley. It receives drainage from the La Jara Reservoir area via La Jara Creek and the Alamosa River. North of Alamosa is an area of interior drainage where small streams and creeks flowing from the Sangre de Cristo Mountains sink into the sediments of the valley (Taylor 1999). The northern San Luis Valley drainages all lie within the San Luis Watershed that has a USGS cataloging unit number or hydrologic unit code of 13010003 (USEPA 2004). Preliminary hydrology research has shown that not only are hydrologic dynamics in the San Luis Valley complex, but that differing water sources vary widely in water quality (Cooper and Severn 1992).

Surface water occurs within the San Luis Valley as intermittent and perennial stream flows, seeps and springs, and ephemeral and permanent playas and lakes. Governor William Gilpin, in 1864, described San Luis Lake as being 60 miles long and having 19 tributary streams (CSP 1996). This large, historic lake and associated wetlands dictated an early travel network along the upland margins of the saturated soil. Historic to present groundwater pumping and water development have sufficiently lowered the water table to allow expansion of agriculture and access roads into the interior of the San Luis Valley. Hammond (1997) studied aerial photographs acquired from the 1930s through 1990s and determined that of 69 small ponds present along the western edge of GRSA in the 1930s, only five remained in the 1990s. The occurrence of these ponds is directly related to the level of the shallow or unconfined aquifer of the northern San Luis Valley (USGS 2003).

During the late 1800s, large canals were constructed to irrigate crops on the northern portion of the valley. Three large canals, e.g., the Empire, Del Norte (Rio Grande), and Citizen’s Ditch (Monte Vista), carried water to the interior of the San Luis Valley (CSP 1996). Additionally, some 3,000 artesian wells were drilled as supplementary water supplies typically at depths of 100 feet to 200 feet. Approximately 30 percent of the entire San Luis Valley is presently irrigated using water from the Rio Grande in addition to well water. More than 2,000 linear miles of smaller agricultural irrigation ditches have been constructed within the San Luis Valley.

Successful farming using canal irrigation was realized in the northern portion of the San Luis Valley for a short period of time, until groundwater levels rose nearly to the land surface, resulting in abandonment of most lands in favor of well drained lands south of the Rio Grande. Beginning in the 1930s, a drought of 20 to 30 years duration resulted in drilling groundwater wells to irrigate crops and hay fields. Presently, there are more than 7,000 flowing wells within the San Luis Valley (CSP 1996).

3.4.6.3 Groundwater

The San Luis Valley has two major groundwater aquifers, the shallow or upper unconfined (Alamosa Formation) and the deep or lower confined (Santa Fe Formation) (USFWS 2003). Groundwater is regionally separated in the shallow and deep aquifers due to a thick layer of impermeable clay, known locally as the blue clay layer, and also by lava flows. Both aquifers consist of unconsolidated clay, silt, sand, and gravel. Magee and Mueller (1991) determined that there is mixing of the unconfined and deep aquifers along the east side of the valley, because the clay layer was absent in monitoring wells drilled and sampled for their study.

The major discharge of water from the upper unconfined aquifer results from wells, springs, and upward leakage from the lower confined to the unconfined aquifer. Many flowing wells from the confined aquifer range in depths from 1,000 feet to over 2,000 feet, and some flow at volumes of more than 3,000 gallons-per-minute. Depth to water below the land surface is 12 feet or less over about 50 percent of the valley; however, in parts of the southern valley, depth to water exceeds 300 feet. GRSA installed 19 shallow groundwater wells between 1990 and 1993 to monitor the water levels at the base of the dune field (NPS 1995).

The southern portion of the San Luis Valley, generally south of the Rio Grande, is well-drained in terms of surface and groundwater. The northern portion of the San Luis Valley, north of the Rio Grande, encompasses approximately 2,500 square miles, includes the area of GRSA and BNWR, and is called the Closed Basin (CSP 1996). Due to a topographic rise in the valley floor, streams that drain the northern San Luis Valley and its surrounding hills and mountains (Cochetopa Hills, northern San Juan Mountains, northern Sangre de Cristo Mountains) do not flow into the Rio Grande, rather the water is stored underground within the Closed Basin and the lowest portion of this basin is known as the sump.

3.4.6.4 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

Surface and Groundwater. There is no perennial surface water in the form of streams, seeps, springs, or ponds on the Table Mountain parcels proposed for exchange, based on a BLM inventory. Three livestock watering ponds have been constructed, of which two are reliable water sources while the third holds water intermittently following large precipitation events. There are no data concerning groundwater associated with the Table Mountain parcels. Wells drilled to serve subdivisions in the vicinity range from approximately 200 feet to 600 feet deep and provide relatively small yields.

There is no perennial surface water in the form of streams, seeps, springs, or ponds on the Gribbles Park parcels proposed for exchange, based on a BLM inventory. One livestock watering pond has been constructed and it holds water intermittently following large precipitation events. Groundwater associated with the Gribbles Park parcels is generally near-to-surface (10 to 20 feet deep) within the alluvium deposited in drainages. Wells drilled outside the alluvial deposits have intercepted groundwater at depths from 300 feet to 400 feet.

Water Rights. There are no water rights associated with the proposed BLM Table Mountain and Gribbles Park exchange parcels in Fremont County (BLM 2005c).

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Surface and Groundwater. A BLM inventory of perennial surface water (streams, seeps, springs, or ponds) determined that none were present on the proposed exchange parcels. However, there are several livestock watering tanks that are filled via pipelines from springs on adjacent parcels. Surface runoff from the Biedell Creek parcels proposed for exchange emerges via La Garita Creek. It is fed by Carnero, Biedell, Cove, and Cottonwood creeks with intermittent flows from Sanderson and Dry gulches. Carnero Creek has North, South, and Middle Forks within the project area. On the San Luis Valley floor the historic Rio Grande Canal is within parcel 8.

Surface flows from the La Jara Reservoir parcels proposed for exchange emerge via La Jara Creek and the Alamosa River. Tributaries to La Jara Creek include Jaroso, Torsido, Hot, Jim, Piedroso, Ojito, and Fox creeks. Fredd Gulch and the canyons of Romero, Leandro, Canyon del Rancho, Vicente, Piedrosa, Ra Jadero, and Trujillo provide intermittent flows.

Water Rights. There are no water rights associated with the proposed BLM Biedell Creek and La Jara Reservoir exchange parcels in Saguache and Conejos counties.

Proposed San Luis Valley SLB Exchange Parcels

Surface and Groundwater. Perennial streams within the SLB parcels proposed for exchange include San Luis Creek and its tributaries San Isabel, Saguache, Crestone, Ball Arroyo, Cottonwood, Deadman, Big Spring, and Little Spring creeks (see Figure 3-7). Flows are also present in the Farmers Union Canal and in Gibson Ditch. Lakes that occur within the area include Weisman, Bachelor, Cotton, San Luis, Dollar, and Head. Surface water can also be present as playas, springs, seeps, and wetlands; two prominent springs are Antelope and Indian.

Big Spring Creek is unique within the San Luis Valley because it originates at Indian Spring, an emergent spring on the sand sheet west of the dune field. It flows to San Luis Lake and, based on a 2004 USGS study, more than 60 years are required for groundwater to migrate from Medano and Sand creeks to Big Spring Creek. Because it is fed by groundwater from seeps and springs, Big Spring Creek is nonflooding, has a regular flow, and is the only gaining system (NPS 2007).

Surface and groundwater are key resources at GRSA, transporting sediments for redistribution to the dune fields by wind, thus shaping the landscape and affecting distribution of plants, animals, and visitor use. The water resources are in a nearly natural condition and consist of perennial, intermittent, and ephemeral streams. Natural playa lakes, springs, seeps, and wetlands are also present on the landscape, e.g., hot springs occur in the San Luis Valley and are associated with vertical faulting. Stream flows are often heavy following snowmelt and during flood events following storms. Spring runoff from the Sangre de Cristo Mountains is

transported by Sand and Medano creeks and is the most plentiful source of surface and groundwater (CNHP 1999b).

Medano Creek flows from the mountains to around the dune field along its eastern and southeastern borders and then into the southern portion of the sand sheet. Sand Creek flows from the mountains to around the dune field on its northeastern, northwestern, and western edges and then into the northern portion of the sand sheet. Sand Creek becomes a braided, sand-bottomed creek in the vicinity of the dune field and on the sand sheet habitats.

Surge or pulsating flows in Medano and Sand creeks represent the mechanism for returning vast quantities of wind-blown sand onto the valley floor. Sand Creek is the largest creek in the GRSA but does not display surge flow as consistently as Medano Creek. The water-borne transport of sand by these creeks is a key part of the aeolian/hydrologic system that created and sustains the Great Sand Dunes. Sand blows or is eroded into the creek via landslide, as Medano Creek flows against the base of the dunes. The creeks surge because the sand builds up in the creek bottom creating a minor damming effect and when the water reaches sufficient volume it surges downstream with the load of sand. Castle Creek also displays outstanding surge flow at times and was the site at which the explanation for surge flow was developed.

Water Rights. Surface and groundwater hydrology and any associated water rights on SLB parcels would be addressed by the District Manager following evaluation by technical staff and approval by the Board. Lessees would not initiate water rights of any kind or divert, withdraw, or store water without the prior written approval of the Board and the Board would own the water right if sought and approved by the lessee.

Water rights associated with the proposed SLB exchange parcels in Alamosa and Saguache counties include some irrigation rights (occasional, low-priority water that reaches the lands only in extremely high water years – last documented year 1995) and also several artesian irrigation and livestock wells that will be exchanged to the USFWS. The National Park Service will receive any livestock wells on parcels they acquire and irrigation rights owned by the SLB for those lands, if any.

3.4.6.5 Environmental Consequences/Mitigation

The hydrology associated with Federal and state exchange parcels ranges from limited and ephemeral surface resources and deep groundwater to permanent streams and lakes and shallow groundwater. There likely are water rights associated with a few but not all parcels proposed for exchange. An effect on surface or groundwater hydrology would be considered (1) insignificant if there is no measurable change to surface water quantity and duration or groundwater depth, (2) low if there is measurable but minor change to surface water quantity and duration or groundwater depth, (3) moderate if changes to surface water quantity and duration or groundwater depth affect land management strategies, and (4) high if changes to surface water quantity and duration or groundwater depth halt implementation of land management strategies.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. Surface and groundwater hydrology and any associated water rights on Federal lands would be addressed according to the RMP management directives. The existing surface flows, ponds, and groundwater resources and any water rights would remain available to lessees and down-drainage users resulting in long-term, beneficial effects.

Surface flows, groundwater discharges, and water rights on SLB exchange parcels would continue to be available for irrigation, livestock production, and shallow wetlands, among other uses resulting in long-term, insignificant effects on surface water quantity and duration, groundwater depth, and water rights.

Proposed Action

Under the Proposed Action, the BLM parcels would be exchanged to SLB management, and SLB parcels would be exchanged for management by the NPS, BLM, and USFWS. Former BLM parcels and water supplies would be used primarily to support grazing livestock; SLB would honor BLM permits or would merge unpermitted acreage into current grazing leases. Some of the parcels have little surface water and groundwater might be several hundred feet deep while others might have perennial streams and springs. Active water rights would be listed by the SLB under the “Description of the Premises” (Section 1) of the SLB Agricultural Lease of state trust lands form (AG 01/202) resulting in insignificant effects on the water resource and water rights.

Parcel 31 would be exchanged to the BLM to lease for livestock grazing resulting in no effect on surface and groundwater hydrology or water rights. Parcels 26, 32, 33, 34, 39, 40, 41, 42, and 43 would be exchanged to the USFWS along with approximately 550 acres of water rights to manage for wildlife habitat on BNWR resulting in long-term, insignificant to low, beneficial effects on surface water quantity and distribution, groundwater depth, and water rights; existing water rights could be annulled and new water rights could be pursued. Parcels 27, 28, 29, 30, 35, 36, 37, and 38 would be exchanged to the NPS to manage for protected natural resource values and environmental education resulting in long-term, insignificant to low, beneficial effects on surface water quantity and distribution, groundwater depth, and water rights; existing water rights could be annulled and new water rights could be pursued.

In terms of mitigation, the BNWR staff has identified geomorphology, hydrology, and other abiotic factors influencing habitat as the most critical research and monitoring needs (USFWS 2005). They would assemble all available hydrologic and geomorphologic information and data and identify data gaps to form the basis for a water management plan for BNWR. An approved water management plan would result in long-term, low to moderate, beneficial effects on the water resources and water rights.

3.4.7 Visual Resources

"The American people are concerned about the quality of their visual environment. Because of this concern, the visual landscape is now considered a basic resource to be treated as an essential part of and receive equal consideration with other basic resources of the land (USFS 1977)." In general, the objective of visual resource management is to protect the scenic and visual values of public lands. Maintenance and protection of high-quality scenic and visual values on Federal lands is important to local economies.

Visual Resources Management. The BLM is mandated to protect scenic quality under the Federal Land Policy and Management Act (Section 102a 8) using Visual Resource Management (VRM). The visual resource inventory process provides BLM managers with a means for determining visual values. The inventory consists of a scenic quality evaluation, sensitivity level analysis, and a delineation of distance zones:

- Scenic quality is a measure of the visual appeal of a tract of land. Lands are awarded an A, B, or C rating based on the apparent scenic quality, which is determined using seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications.
- Sensitivity levels are a measure of public concern for scenic quality, and are assigned high, medium, or low sensitivity levels by analyzing the various indicators of public concern.
- Landscapes are divided into three distance zones based on relative visibility from travel routes or observation points (BLM 2005a).

Based on the above three factors, BLM-administered lands are placed into one of four visual resource inventory classes. These inventory classes represent the relative value of the visual resources with classes I and II being the most valued, class III representing a moderate value, and class IV being of least value. The inventory classes provide the basis for considering visual values in the RMP process for all BLM-administered lands. During the RMP process, the class boundaries are adjusted as necessary to reflect the resource allocation decisions made in RMPs (BLM 2005a). Visual management objectives are established for each class as follows:

Class I: The objective of this class is to preserve the existing character of the landscape. It provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention. VRM class I areas are managed to protect natural scenic quality by designing surface construction projects in VRM class I areas with low visual contrast standards.

Class II: The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the landscape. VRM class II areas are managed to preserve natural scenic quality by designing

surface construction projects in VRM class II areas with low to moderate visual contrast standards.

Class III: The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape. VRM class III areas are managed to preserve natural scenic quality by designing surface construction projects with moderate visual contrast.

Class IV: The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the focus of viewer attention; however, every attempt should be made to minimize the impact of activities through careful location, minimal disturbance, and repeating the basic elements. VRM class IV areas are managed to preserve natural scenic quality. Strong visual contrast in surface project design is allowed and no special standards are needed.

Viewer Sensitivity. Visual sensitivity is a subjective measure that is influenced by viewer attitudes, viewer activities, and the proximity of the viewer to the viewshed. In general, levels of viewer sensitivity are significant for viewsheds correlated with residential, recreational, or scenic areas. Conversely, viewer sensitivity is reduced in industrial or commercial areas where the scenic quality of the viewshed does not impact the value of the viewer's activity.

BLM exchange parcels primarily support native vegetation, grazing land use, and recreational activities that include hiking, hunting, and off-highway vehicle use. Viewer sensitivities are thus expected to range from moderate to high, because recreational users might expect high levels of air quality and site visibility. Visual management objective classes have been assigned to all BLM-administered lands in the planning areas and are used to guide resource management activities. Adherence to criteria would occur according to the respective class rating.

Site Visibility. Site visibility is a measure of how clearly distant objects can be seen and can be affected by air quality, which limits viewing distance. Visibility measures are difficult to quantify, but decline with increasing regional air pollution or haze. Without the effects of pollution, a natural visual range in the western United States is 120 to 180 mi. In general, visibility impairment for the worst days has remained unchanged over the 10-year period from 1992 to 2001, with a mean visual range of approximately 60 miles (USEPA 2005b). Visibility has become increasingly impaired in rural settings of the west, with visual range decreasing from 140 miles to 35 to 90 miles (USEPA 2005c). When assessing visual range, 61 to 78 miles = worst visibility, 89 to 111 miles = mid-range visibility, and 125 to 159 miles = best visibility (USEPA 2005c).

Decreases in visual range are attributable to air pollution from a multitude of sources (or a single stationary source) that impairs visibility over a large area and is described as regional haze. Haze results from sunlight encountering tiny particles of pollutants in the air that absorb

some of the light or scatter it so that it does not reach a human observer on the earth's surface. Pollutants in the air are generated from natural and human sources, including but not limited to windblown dust, smoke and soot from wildfires and forest management fires, vehicle exhaust, electric utility and industrial fuel burning (such as coal), and manufacturing operations. Haze is measured in deciviews, a measurement that gauges the impact air pollutants have on visibility, e.g., 0 deciviews is an indicator of clear conditions with no visibility impairment (USEPA 2005c).

The cultural value of high levels of visibility associated with high air quality is subjective. No Federal qualitative standard for visibility exists for pristine and scenic rural areas. However, the CAA (CAA; Section 169A; 1970) does stipulate the implementation of remedial measures to mitigate for existing or future impairment of visibility levels associated with human-caused air pollution in mandatory class I Federal areas. During 1987, the Interagency Monitoring of Protected Visual Environments (IMPROVE) network was established among several agencies to collect and analyze data to determine the type of pollutants primarily responsible for reduced visibility. In 1999, the USEPA initiated a regional haze program to address visibility impairment in national parks and wilderness areas that was caused by numerous sources located over broad regions. During 2000 to 2001, the IMPROVE monitoring network further expanded its data collection capability up to 110 sites. The IMPROVE site installed at GRSA is located at 8,215 feet elevation and the Weminuche Wilderness site is at 9,072 feet elevation.

Night Sky. Ambient light and its effect on the ability to view the night sky is another component of visual quality (NPS 2007). The NPS works to preserve natural ambient lightscapes, which are natural resources and values that exist in the absence of human-caused light (NPS Management Policies 2001).

3.4.7.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

Approximately half of the acreage in the Table Mountain parcels proposed for exchange is classified as VRM class II and the other half is classified as VRM class III. The Gribbles Park proposed exchange parcels are classified as VRM class III (BLM 2005a).

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Approximately two-thirds of the Biedell Creek parcels proposed for exchange are designated VRM class III, with the remaining one-third designated VRM class II. The VRMclass II areas are within the main proposed exchange parcel, just west of the pipeline (BLM 2005a). The La Jara Reservoir parcels proposed for exchange have been designated as follows: (1) parcel 4 lies almost exclusively within VRM class III areas, (2) a small segment of parcel 4 along La Jara Creek is designated VRM class IV, (3) the northeast one-third of parcel 5 is designated VRM class IV, and (4) the remainder of parcel 5 is designated VRM class III (BLM 2005a).

Measurements of haze were recorded for the Weminuche Wilderness adjacent to the BLM parcels proposed for exchange at the Biedell Creek and La Jara Reservoir sites. During the

period from 1988 to 1997, measurements of haze were from 4 to 14 deciviews. The lowest measurement was recorded in 1995 and the highest measurement was recorded in 1989 (Weminuche) (USEPA 2005c). Pollutants that contributed to regional haze for the wilderness are presented in Table 3-30. During 1997, the haze recorded in deciviews ranged from 5.5 to 12 (USEPA 2005c).

Proposed San Luis Valley SLB Exchange Parcels

SLB parcels proposed for exchange in Saguache and Alamosa counties consist of lands classified as VRM classes II, III, and IV. Class II lands comprise approximately 20 percent of the area and include the easternmost portions of the proposed SLB exchange lands, within the GRSA boundary. Approximately 30 percent of the proposed SLB exchange lands are designated VRM class III, and lie predominantly within BNWR. The remaining 50 percent of proposed SLB exchange lands are designated VRM class IV, and are on the westernmost portion of the site (BLM 2005a).

Measurements of haze were recorded for the GRSA along SH 150 near the entrance station (8,196 feet elevation), adjacent to the southeasternmost SLB parcels proposed for exchange. Natural visibility represents the visibility condition that would be experienced in the absence of human-caused impairment (CDPHE 2006). It is estimated that the natural visibility for GRSA would be 1.98 deciviews for the 20 percent best days and 7.1 deciviews for the 20 percent worst days.

TABLE 3-30. POLLUTANTS THAT CONTRIBUTED TO REDUCED VISIBILITY FOR WEMINUCHE WILDERNESS (WORST DAYS IN 1997)

Pollutant	Possible Source	Weminuche (% of total)
Sulfates	Predominantly from fossil fuel combustion	51%
Nitrates	Predominantly from motor vehicle exhaust	6%
Organic Carbon Particle	Open, wood, and forest management burning; wildfires; motor vehicle exhaust; and tire wear	18%
Elemental Carbon (soot)	Open, wood, and forest management burning; wildfire; and motor vehicle exhaust	8%
Crustal Material (soil dust)	Fugitive dust from roads, construction activities, wind erosion of soil surface, and agricultural activities	17%

Source: USEPA 2005c

During the period from 1988 to 1997, measurements of haze were from 5 to 15 deciviews at GRSA. The lowest measurement was recorded in 1995 and the highest measurement was recorded in 1994 (USEPA 2005c). CDPHE (2006) reported the baseline visibility at 4.5

deciviews for the 20 percent best days and at 12.8 deciviews for the 20 percent worst days. Pollutants that contribute to regional haze for the GRSA region are presented in Table 3-31. Visibility is generally best during the winter and worst in the spring.

TABLE 3-31. POLLUTANTS CONTRIBUTING TO REDUCED VISIBILITY FOR GRSA WILDERNESS (WORST DAYS 1997)

Pollutant	Possible Source	Great Sand Dunes (% of total)
Sulfates	Predominantly from fossil fuel combustion	42%
Nitrates	Predominantly from motor vehicle exhaust	9%
Organic Carbon Particle	Open, wood, and forest management burning; wildfires; motor vehicle exhaust; and tire wear	18%
Elemental Carbon (soot)	Open, wood, and forest management burning; wildfire; and motor vehicle exhaust	5%
Crustal Material (soil dust)	Fugitive dust from roads, construction activities, wind erosion of soil surface, and agricultural activities	26%

Source: USEPA 2005c

CDPHE (2006) prepared linear regressions of annual data points for seven haze-causing pollutants from GRSA for the years 1989 to 2004. Three trends were decreasing (ammonium sulfate, coarse mass, sea salt) and four trends were increasing (ammonium nitrate, organic carbon, elemental carbon, fine soil). The trends for ammonium sulfate and fine soil were considered statistically significant.

CDPHE identified several facilities that potentially affect the visual resources of the San Luis Valley region. These include refineries, cement plants, a steel mill, a pharmaceutical manufacturer, and 10 power plants (NPS 2007). Additional contributors to regional haze are vehicles, prescribed burns, wildfires, agricultural activity that disturbs the ground surface, burning ditches and fields, and dust from feedlots.

Due to its unique and diverse landscape and topography, GRSA provides opportunities for a wide range of scenic views. The dune field can be viewed from different positions of the landscape from all locations along the creeks under consideration. Primary interpretive themes that incorporate scenic resources have been prepared for GRSA, as follows:

- The unexpected combination of massive dunes surrounded by alpine peaks, an intermontane park or valley, and creeks flowing on the surface of the sand makes GRSA a unique landscape.

- Although the active dune field appears stark, in reality, GRSA is a rich and complex environment ranging from valley floor to snow-capped mountain peaks where many

different plants and animals have become adapted to a variety of distinct natural communities.

- The tall dunes and the life they support are the most visible indicators of the health of the natural system that extends beyond GRSA boundaries.

- This complex, dynamic dune system, with its distinctive geological and biological character, is dependent on the area's unusual, fragile, and near-pristine water system for its continued existence.

- The same physical characteristics that influenced the formation of the sand dunes created a cultural crossroad, resulting in a landscape of special significance to many people over thousands of years.

- The wilderness areas within GRSA offer open space, exceptional solitude and quiet, and a remarkably unspoiled day and night sky.

Commercial, residential, and agricultural development in the San Luis Valley can introduce light into otherwise naturally dark areas. Within GRSA, the administrative areas, campgrounds, Medano Ranch, and the visitor center are sources of artificial light. These sites are directly visible from vantage and viewing points. The NPS attempts to minimize extraneous light sources and protect the dark night sky by using shielded lighting, and strategically located light sources. In a similar manner, the Baca Grande community near the northern boundaries of BNWR and GRSA, has guidelines designed to minimize extraneous light, including (1) motion-activated lights; (2) shield or hooded exterior lighting; and (3) limit exterior lighting to entry walkways, porches, and exterior patios (Baca Grande 2002 in NPS 2007). Because of these efforts and the rural and undeveloped landscape surrounding GRSA, opportunities to view stars, planets, and the moon on clear nights are considered outstanding (NPS 2007).

3.4.7.2 Environmental Consequences/Mitigation

Visual resources are the features of the landscape that contribute to the scenic quality of the area. They are managed on Federal land parcels under the objectives and methods described in the BLM VRM Guidelines to protect the quality of the scenic or visual values of those lands. Effects on visual resources would be considered (1) negligible if they occur at or below detection limits, (2) low if they are detectable but the effect is small and local, (3) moderate if they are readily apparent, but limited in distribution, and (4) high if they are incompatible with VRM classifications of the BLM lands or substantially change the visual character of the region.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. Visual and scenic values and existing effects of

regional haze would remain the same in the foreseeable future resulting in long-term, insignificant effects.

Proposed Action

Under the Proposed Action, the BLM parcels would be exchanged to SLB management, and SLB parcels would be exchanged for management by the NPS, USFWS, and BLM. The former BLM parcels would be used primarily to support grazing livestock on native range resulting in long-term, insignificant effects on visual and scenic values. Within the Table Mountain, Gribbles Park, and Biedell creek sites, forest management would be conducted by the CSFS and include small-scale firewood cutting, tree transplant collection, and limited harvest resulting in short-term, negligible, adverse effects on visual and scenic values. Within the La Jara Reservoir site, forest management would be conducted by the CSFS and include timber harvest, firewood cutting, and tree transplant collection resulting in short-term, insignificant to low, adverse effects on visual and scenic values. Because removal of wood products would be selective, the visual and scenic effect would be limited to the season of harvest and a few ensuing years until successional vegetation recovery is apparent.

Proposed SLB parcels in the San Luis Valley would be exchanged into Federal management where VRM tools must be applied to evaluate the landscape insuring consideration of fundamental resources and values. As such, the former SLB parcels would remain visually similar resulting in long-term, insignificant effects on scenic and visual resources. Changes in irrigation patterns or elimination of irrigation on some parcels could result in short-term, insignificant, adverse effects on the vegetation pattern, texture, and color. Such changes in the visual and scenic resources of the San Luis Valley are essentially compatible with the local landscape.

3.4.8 Noise

A definition of noise is human-caused sound that is considered to be unpleasant and unwanted (NPS 2000). Mechanical noises generated by humans during land use activities can disturb or degrade ambient levels of sound associated with natural environments. Sources of noise can include humans conversing, vehicles, generators, or aircraft over-flights. Examples of sound levels related to activities or environmental conditions are presented in Table 3-32.

The Colorado Health Code (25-12-106) provides guidelines as noise restrictions for motor vehicles. Depending on date of manufacture the following range of noise limits was established using the criteria of maximum noise at a distance of 50 feet from the center of the lane of travel or 50 feet from a vehicle designed for off-highway use: (1) motorcycles, 86 - 88 db(A); (2) motor vehicles in excess of 6,000 lbs, 86 – 88 db(A); (3) any other motor vehicle, 84 – 86 db(A); and (4) self-propelled vehicles designed for off-highway use, 84 – 86 db(A).

TABLE 3-32. EXAMPLES OF SOUND DECIBEL LEVELS

Environmental Condition	Sound Levels in Decibels (dBA)
Threshold of hearing	0
Broadcast studio	20
Library	40
Conversational speech	60
Heavy truck 100 feet distant	80
Boiler room	100
Jet take-off 100 feet distant	120
Threshold of pain	140

Source: GSDNM 1997

3.4.8.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

Existing levels of ambient sound characterizing the proposed exchange parcels of Table Mountain and Gribbles Park are generally determined by sounds associated with flowing creeks, gusting winds, wildlife use, and grazing cattle. The degree of disturbance to the ambient sound environment is determined by the proximity to potential noise sources, topographical or structural insulation from noise disturbance, and the duration of the noise. The most susceptible exchange parcel with respect to noise disturbance might be parcel 46 of the Table Mountain site. This parcel would be affected by noise related to mining, rock loading and hauling, and moderate traffic volumes associated with SH 115, which is approximately 0.6 miles from the southwest parcel boundary (see Figure 1-1).

Additional noise disturbance sources in the overall project area include airplane overflights and county road traffic; the roads generally support low levels of vehicular traffic associated with rangeland management activities and therefore cause intermittent and minimal disturbance to ambient sound levels. For example, parcels 2, 4, and 45 of Table Mountain are intersected by or adjacent to county roads supporting periodic rural traffic. Parcels 5, 6, and 7 of the Gribbles Park site are also subject to low traffic volumes associated with adjacent county roads (CR) 2, 11, and F6. Noise affecting Table Mountain parcels as proposed is also expected to be generated at nearby Fort Carson during training exercises using armored vehicles, small arms, and helicopters, among other sounds related to troop training.

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

Existing levels of ambient sound characterizing the proposed exchange parcels of Biedell Creek and La Jara Reservoir are generally determined by sounds associated with flowing creeks, gusting winds, wildlife use, and grazing cattle. The degree of disturbance to the ambient sound environment is determined by the proximity to potential noise sources, topographical or structural insulation from noise disturbance, and the duration of the noise. Proposed BLM parcels 15, 16, 17, 18, 19, 20, 21, 23, and 25 of La Jara Reservoir and Biedell Creek parcels 8, 9, 10, 11, 13, and 14 are intersected by or adjacent to a network of infrequently traveled county roads.

Proposed San Luis Valley SLB Exchange Parcels

Existing levels of ambient sound characterizing the proposed SLB exchange parcels are generally determined by sounds associated with irrigated agriculture, ranching, vehicles using roadways, flowing creeks, gusting winds, wildlife use, and grazing cattle. The degree of disturbance to the ambient sound environment is determined by the proximity to potential noise sources, topographical or structural insulation from noise disturbance, and the duration of the noise. There are few barriers to noise on the relatively flat San Luis Valley.

For GRSA, NPS management policy states: “The NPS will strive to preserve the natural quiet and the natural sounds associated with the physical and biological resources of the parks. Activities causing excessive or unnecessary unnatural sounds in and adjacent to parks will be monitored and action will be taken to prevent or minimize unnatural sounds that adversely affect park resources or values or visitor’s enjoyment of them.” GRSA visitors stated that they expect some traffic-related noises in parks, but they also expect them to be confined to parking areas and roads (they tolerate the unpleasantness of this noise over the inconvenience of prohibiting automobiles).

Sound data were gathered within GRSA during 1993 and 1994 at monitoring stations at Medano Creek near the campgrounds and at Little Medano Creek in the backcountry (GSDNM 1997). The minimum ambient sound levels were 12 a-weighted decibels (dBA) and 17 dBA and average levels were 28 dBA and 33 dBA at each site, respectively. Background sound levels are less than 45 dBA 99 percent of the time. One aspect of the study was documentation of very quiet periods interrupted by brief, extremely loud (119–140 dBA) noise incidents. These readings were related to fast, low-flying military aircraft practicing maneuvers over GRSA (GSDNM 1997).

Several SLB parcels proposed for exchange abut state highways and county roads. Particularly susceptible parcels to SH 17 noise are numbers 26, 32, 41, and 43. Proposed parcels 30 and 31 lie near to or are crossed by the main GRSA entrance road, SH 150.

3.4.8.2 Environmental Consequences/Mitigation

Noise created by humans and the natural soundscape are quality of life perceptions by humans related to visiting or working in an area. They relate to human-caused sounds beyond normal

conversational speech and their effects. Wildlife species react normally to environmental cues and among themselves in a natural soundscape where wind and water generate most background sounds. Sound is managed on NPS land parcels in accordance with Director's Order 47 – *Sound Preservation and Noise Management*. Effects due to human-caused sound would be considered (1) insignificant if they occur within the levels and duration of natural sound; (2) low if they are detectable to the human ear but the effect is small in terms of wildlife response, of short duration, and local; (3) moderate if they cause a person to be temporarily distracted and mildly disturb wildlife, are of short to long duration, but are limited in distribution; and (4) high if they result in discomfort to human visitors and noticeably disturb wildlife, are of moderate to long duration, and are widespread.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. Noise would be generated similarly to the levels currently experienced in ranching and recreational pursuits resulting in insignificant adverse effects over the long-term and low to moderate, adverse effects on a case-by-case, typically short-term basis. SLB parcels would continue to experience traffic noise from state and county roadways over the long- term. The Table Mountain quarry sites would generate noise affecting recreationists and wildlife due to blasting, heavy equipment operation, loading, and hauling, resulting in long-term, low to moderate, adverse effects.

Proposed Action

Under the Proposed Action, the BLM parcels would be exchanged to SLB management, and SLB parcels would be exchanged for management by the BLM, NPS, and USFWS. The former BLM parcels would be used primarily to support grazing livestock resulting in long-term, insignificant, adverse effects on the natural soundscape. Within the Table Mountain site, quarries would generate noise affecting humans and wildlife due to blasting, heavy equipment operation, loading, and hauling, resulting in long-term, low to moderate, adverse effects on humans and wildlife.

Proposed SLB parcels in the San Luis Valley would be exchanged into Federal management where near-natural wildlife habitat and human visitor experience quality are of the highest priority. The western and southernmost of these parcels experience traffic noise from nearby state and county roadways resulting in long-term, low, adverse effects. The former SLB parcels would support activities similar to those on the BNWR in terms of noise related to hay production and seasonal hunting resulting in short-term, insignificant to low, adverse effects on wildlife and human visitors. The former SLB parcels exchanged to the NPS would experience traffic noise from SH 150 and other roads along the southern GRSA boundary resulting in long-term, low, adverse effects on recreationists.

3.4.9 Recreation Resources

Recreation use of the BLM and SLB parcels proposed for exchange is limited primarily to hunting on most proposed parcels and secondarily to hiking, dispersed camping, horseback riding, and wildlife viewing opportunities. In general, BLM lands in Fremont, Conejos, and Saguache counties offer a large amount of dispersed outdoor recreation opportunities in the following recreation opportunity spectrum classification (1) semi-primitive nonmotorized, (2) semi-primitive motorized, (3) roaded natural, and (4) rural. BLM parcels are typically managed to provide broad opportunities for many different types of recreation uses and users.

Fewer opportunities for public recreation access, mostly hunting leases by CDOW, occur on SLB parcels because the lessee controls the access. The CDOW and SLB have developed the PAP, a partnership that allows a special leasing agreement to make trust lands available to the public for a limited time each year for hunting, fishing, and other wildlife-related activities (CDOW 2007). CDOW maintains records for days spent hunting and hunter success within each game management unit, of which SLB lands are a portion. Individual exchange parcels, depending on size and available habitat could account for little to low amounts of hunting recreation within a game management unit.

3.4.9.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

The Table Mountain parcels proposed for exchange are within the Gold Belt Special Recreation Management Area. These parcels are surrounded by SLB and private land, and public access is either not available or limited by the restrictions placed on public access by SLB and CDOW leases in the PAP. The significant recreation resources nearby these parcels include Beaver Creek Wilderness Study Area, the Gold Belt Tour National Scenic Byway, Penrose Commons, Aiken Canyon, and Arkansas Headwaters Recreation Area. Canon City has recreation amenities that include the River Walk and Red Canyon Park.

Nonmotorized recreation activities in a remote, backcountry setting characterize the Beaver Creek Wilderness Study Area including hiking, dispersed camping, horseback riding, wildlife viewing, fishing, and hunting. The Gold Belt Tour National Scenic Byway provides opportunities for scenic driving and exploration of the region’s cultural and natural heritage. Aiken Canyon Preserve offers natural history education, hiking, and birding opportunities. It is an important wildlife corridor between the habitats within the Fort Carson Military Reservation and USFS lands. The Penrose Commons, 3,100 acres of public lands southwest and nearby the proposed exchange parcels, is primarily used for motorized recreation and includes an extreme jeep trail in addition to off-highway vehicle and other four-wheel-drive trails. Arkansas Headwaters Recreation Area provides diverse recreation opportunities including rafting, tubing, fishing, and camping in addition to the other traditional recreation opportunities.

Approximately 4,640 acres of SLB land in the Table Mountain area are leased annually by CDOW under the PAP program to provide hunting, fishing, and watchable wildlife

opportunities. To the west of the Table Mountain exchange parcels as proposed, CDOW manages Beaver Creek State Wildlife Area, which is approximately 3,000 acres in size.

The Gribbles Park parcels proposed for exchange provide limited opportunities for recreation because they are not contiguous with other public lands. Public access (nonmotorized only) is available on parcel 6. This parcel connects to SLB lands that are leased annually by CDOW for wildlife-related recreation from September 1 through February 28 under the PAP. This CDOW lease is the Waugh Mountain lease that encompasses 17,773 acres for hunting, fishing, and wildlife viewing opportunities. Public access is also possible from parcel 7 but it provides limited recreation opportunities because it is surrounded by private and state lands that are closed, at least seasonally, to public access.

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

The Biedell Creek parcels proposed for exchange lie within a matrix of private, SLB, and USFS lands north of Carnero Creek, making them attractive for motorized and nonmotorized recreation. The primary recreation use of these parcels includes hunting, horseback riding, and dispersed camping. Public access to adjacent SLB land is either not available or limited by the restrictions placed on public access by SLB lessees and CDOW hunting leases in the PAP. TNC maintains a small preserve along Carnero Creek that borders parcels 12, 13, and 14, but the remaining creek corridor is privately owned.

Recreation opportunities in the Biedell Creek area include those generally of the San Luis Valley described below, but more specifically include sites in closer proximity such as Russell Lakes State Wildlife Area, North Crestone Creek Campground, Hot Springs Canyon, and Carnero Pass Road (CFO 2007). Carnero Pass Road is a birding route that accesses USFS land west of the Biedell Creek site. Russell Lakes State Wildlife Area supports hiking, birding, natural history education opportunities, photography, hunting, and limited camping in self-contained units in an open water, wetland, and riparian habitat setting. Except for Johnson Trail, this 793 acre site is closed seasonally from February 15 to July 15 to avoid disturbing nesting birds. To the northeast are the Hot Springs Canyon and Crestone areas. Hot Springs Canyon provides trailhead access to the canyon and to Major Creek to the east; recreation opportunities include hiking and birding in addition to access into USFS lands. The North Crestone Creek Campground provides seasonal camping, hiking, and birding recreation and accesses North Crestone Lake and USFS land.

South of the Biedell Creek site (parcel 13) and Carnero Creek is Penitente Canyon Special Recreational Management Area. Penitente Canyon and its Hellgate rock formation exposures provide rock climbing opportunities. Other CDOW leases in the vicinity of the Biedell Creek site include Burro Springs 1 and 2 (6,175 acres), Mogatas Arroyo (320 acres), and Sanderson Gulch (1,898 acres) to provide seasonal hunting access.

The La Jara Reservoir parcels proposed for exchange lie within a matrix of private, SLB, and CDOW lands primarily, in the area north of La Jara Creek. Parcels 16 and 21 each abut USFS land along one boundary, but their small size does not make them very attractive for motorized and nonmotorized recreation. The primary recreation use of these parcels includes hunting,

horseback riding, and dispersed camping. Public access to adjacent SLB and CDOW land is limited by the restrictions placed by SLB lessees and CDOW hunting leases in the PAP or is open year-around on some state wildlife areas (i.e., La Jara Reservoir for fishing).

All of the proposed BLM exchange parcels would likely be included in the SLB/CDOW PAP with seasonal public access for hunting by foot or horseback. Access would occur between September 1 through February 28 for big game wildlife (American elk, mule deer, and black bear) hunting.

Recreation opportunities in the La Jara Reservoir area include those generally of the San Luis Valley described below, but more specifically include sites in closer proximity such as La Jara Reservoir, La Jara, Ra Jadero Canyon, Vincente Canyon, Hot Creek, Piñon Hills (San Luis Hills), and Conejos County Ponds. The La Jara Reservoir site occupies approximately 635 acres and provides fishing, hunting (waterfowl and big game), boating, camping, wildlife observation opportunities, and trapping. Similar recreation pursuits are offered at Hot Creek and La Jara state wildlife areas (3,494 and 2,808 acres, respectively), but the fishing is centered on coldwater streams rather than a reservoir and there is no boating. Motorized vehicles including snowmobiles are not allowed between December 1 and April 30. Primitive camping is also allowed at La Jara. Vincente Canyon offers fishing, hunting, and wildlife viewing recreation on La Jara Creek. Conejos County Ponds State Wildlife Area provides wildlife viewing opportunities, particularly for waterfowl.

Proposed San Luis Valley SLB Exchange Parcels

The SLB parcels proposed for exchange predominantly provide recreation in the form of hunting leased by CDOW and wildlife viewing where they are bisected by or abut public roadways. Proposed SLB exchange parcels 26, 27, 30, 32, and 39 are leased by CDOW under the PAP to provide hunting opportunities between the months of September through February (CDOW 2007). These lands are leased under the titles (1) Baca State Trust Land (parcel 26), (2) Mishak Lakes and Saguache Creek San Luis Creek II State Trust Land (parcel 32), and (3) Medano State Trust Land (parcels 26, 27, 30, and 39).

Part of the hunting recreation opportunity is a limited dispersal cow elk hunt in an effort to reduce herd size in the San Luis Valley. Potential hunters enter their names on a waiting list and are notified when American elk enter the hunt area. BNWR recognizes this CDOW dispersal hunt as an existing public hunting opportunity and would address it in an interim compatibility determination for lands potentially entering the National Wildlife Refuge System where public uses have been documented. The interim compatibility determination concluded that CDOW dispersal hunt would be allowed to continue when SLB parcels become part of BNWR and the interim compatibility determination is held valid until a formal hunting plan has been created and approved for BNWR.

The proposed exchange parcels are nearly central to the recreation opportunities discussed for the Biedell Creek and La Jara Reservoir sites, and also include the San Luis Lakes State Park, GRSA, Medano-Zapata Ranch, Blanca Wetlands, ANWR, and Zapata Falls. San Luis Lakes State Park has annual visitation of about 20,000 and this area provides overflow camping on

holiday weekends and during June for GRSA. The park facilities include entry station, parking areas, picnic areas (25 sheltered sites), boat ramp and dock, swimming area, campgrounds (51 spots), water and sewer – plus showers/bathhouse, roads, and trails.

The Great Sand Dunes are attractive, inviting, and approachable with an annual visitation of more than 250,000. These qualities and recreational opportunities are managed to maintain the GRSA purpose and significance criteria, as follows:

- Climbing and descending the high dunes
- Experiencing surge flow, playing in Medano Creek near the foot of the dunes
- Seeing "the heavens" (e.g., Milky Way, stars, planets, comets) at night; dark night skies must be protected
- Viewing the dune mass with backdrop of the high peaks and from the mountains
- Key elements: views from west and south, viewing the dunes from the mountains, changing light conditions shadow and contrast especially impressive in early morning, and evening air quality and undeveloped mountain slopes must be protected
- Viewing wildlife in its natural setting (e.g., elk, pronghorn, deer) important habitat must be protected
- Learning about the dunes system — its components and dynamic nature include research, education, and stewardship opportunities
- Experiencing quiet, solitude, isolation in a wilderness environment
- Driving in sand on the Medano Pass backcountry road.

The recreation opportunities within GRSA include photography, sightseeing, hiking, camping, sandboarding and skiing on the dunes, wading in Medano Creek, four-wheel drive vehicle operation through sand at selected sites, and concessionaire and private horseback/vehicle riding/tours (CNHP 1999a). Hunting and fishing opportunities are available within the preserve portion of GRSA, under the regulations of the NPS and CDOW.

The world-class surge flow of Medano Creek provides recreation values, in that the waves create a beach-like environment for GRSA visitors. During spring and summer season run-off events, thousands of visitors derive enjoyment from playing in the surging water. Recreationists also use the GRSA backcountry for a more remote experience in solitude, primarily for hiking, camping, and landscape and wildlife viewing.

The proposed SLB parcels that would be managed by the NPS would lie in the Designated and Proposed Wilderness, Backcountry Adventure, and Guided Learning Management Zones (NPS 2007). There would be little or no roadway access, rather hiking and horseback riding would be allowed. An NPS employee would lead all visitors in the Guided Learning Zone.

TNC's Medano-Zapata Ranch provides wildlife viewing opportunities, but has limited public access. Although the Blanca Wetlands area is closed to the public from February 15th to July 15th annually, it is a popular birding, photography, and hiking area. Likewise, ANWR is popular for birding and also provides hunting recreation in season. Zapata Falls lies southeast

of GRSA and provides hiking, birding, and wildlife photography opportunities for visitors to the falls and also provides access to the South Zapata Lake Trail.

3.4.9.2 Environmental Consequences/Mitigation

The BLM parcels proposed for exchange are managed to provide broad opportunities for many different types of recreation uses and users. Typical dispersed recreation uses on lands proposed for exchange include hunting, fishing, and hiking. Also, unauthorized casual off-highway vehicle use occurs on these lands. Recreation use for SLB parcels proposed for exchange is limited to hunting access using leases acquired by CDOW under the PAP. An effect on recreation would be considered (1) insignificant if it does not change the current level and type of recreation use occurring on parcels, (2) low if it modifies entry/permitting requirements but allows the current level of recreation use and type, (3) moderate if it eliminates some forms of recreation use from formerly accessible parcels or if it provides different recreation opportunities, and (4) high if it eliminates recreation use from formerly accessible parcels or if it provides diverse recreation opportunities.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. Recreation on Federal parcels proposed for exchange would be addressed according to the RMP management directives resulting in long-term, insignificant effects on recreation type and intensity. Recreation on SLB parcels proposed for exchange would remain under the PAP, related to CDOW hunting access leases and their concurrent timing restrictions resulting in long-term, insignificant effects on hunting recreation.

Proposed Action

Under the Proposed Action, the BLM parcels would be exchanged to SLB for recreation management, and SLB parcels would be exchanged for recreation management by the BLM, USFWS, and NPS. The SLB would focus recreation access to parcels where CDOW hunting leases would be obtained under the PAP, which would frame access to specified times during hunting seasons resulting in long-term, insignificant to low, adverse effects on recreation type and intensity.

The SLB parcel exchanged to the BLM, although small, might have recreational values that would be assessed under the RMP resulting in long-term, insignificant effects on recreation type and intensity.

The SLB parcels exchanged to the USFWS would be evaluated for importance as habitat and for recreational potential during in-depth BNWR-CCP development. Dispersal hunting recreation for American elk and other wildlife species would likely occur resulting in short- and long-term, insignificant to low, beneficial effects on hunting recreation. Following completion of the BNWR-CCP, wildlife observation and photography, environmental education, and

interpretation would likely become available to recreationists resulting in long-term, low to moderate, beneficial effects on diverse outdoor recreation pursuits.

The SLB parcels exchanged to the NPS would be evaluated for resource type and sensitivity to passive recreation pursuits including hiking, wildlife viewing, and environmental education programs resulting in long-term, insignificant to moderate, beneficial effects on diverse outdoor recreation pursuits. Hunting would likely not be allowed on GRSA per the GMP resulting in long-term, insignificant to low, adverse effects on hunting recreation. The potentially more diverse outdoor recreation experience that would include higher numbers of recreationists year-round would mitigate the loss of seasonal hunting recreation, in part, resulting in long-term, insignificant to low, beneficial effects on San Luis Valley outdoor recreation opportunities.

In terms of mitigation, BNWR staff would assemble visitor services information and needs to develop the visitor services program and develop a public use plan (USFWS 2005). Public use would consider hunting, fishing, wildlife observation and photography, environmental education, and interpretation, i.e., the six priority-public uses set forth as guiding principles in the Refuge Improvement Act of 1997. Special dispersal hunts for American elk, if continued, would be managed with CDOW resulting in short- and long-term, low, beneficial effects on hunting recreation.

3.4.10 Access

Public access to the Federal and state parcels proposed for exchange ranges from paved Federal and state highways to gravel county roads and two-track trails. Access roads within parcels may be quite open and unrestricted to travel as are many BLM roads, or they may be closed to public use by lessees as are many SLB roads. This section describes the principal access routes for each group of BLM parcels proposed for exchange at the Table Mountain and Gribbles Park sites in Fremont County and the Biedell Creek, and La Jara Reservoir BLM exchange sites and the SLB parcels proposed for exchange in the San Luis Valley.

3.4.10.1 Affected Environment

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

The Table Mountain exchange parcels are in eastern Fremont County, about midway between Canon City, to the southwest, and Colorado Springs to the northeast. The parcels are at a distance of about 25 miles from each city (see Figure 3-24). Principal access routes include US Hwy 50 and SH 115. US Hwy 50 is a major east-west route from the Kansas border to Grand Junction, Colorado. SH 115 carries traffic locally from Colorado Springs southwest to US Hwy 50, intersecting near Penrose. Several county roads and Federal, state, and private trails also provide access.

The Table Mountain exchange parcels lay west of SH 115 where it intersects the county line delineating El Paso and Fremont counties. Public access into these parcels is extremely limited because they are completely surrounded by state and private lands and none of the roads in the

area are available to the public for motorized uses, except limited use during hunting seasons (permitted from September 1 to May 31). At that time, entry is limited to foot and horse access. The existing roads on these parcels are used intermittently for monitoring research and to provide access for fire suppression and other administrative uses. Roads to active quarries are used more extensively and by larger vehicles.

Proposed BLM exchange parcel 1 can be accessed by traveling west from SH 115 on Barrett Road (T17S, R68W, Sec. 8) to the north edge of the parcel (see Figure 3-24). Parcels 2, 45, and 46 can be accessed from Upper Beaver Creek Road, reached by traveling west from SH 115 (T17S, R68W, Sec. 24 or 26). Parcel 4 has no direct access; the nearest access is from the terminus of Kodiak Road, which is reached by traveling north from SH 115 on Wild Ridge Road (T18S, R68W, Sec. 14).

The Gribbles Park tract is northwest of Canon City and northeast of Salida in northern Fremont County, adjacent to and south of the Park County line. The primary highway access through this area is via SH 9, which connects with US 50 approximately 10 mi west of Canon City and carries traffic northwest through north-central Fremont County into Park County. The access to proposed BLM exchange parcels from SH 9 is provided by several county roads including Fremont County Road 2 that runs from SH 9 west through the Gribbles Park parcels (see Figure 3-24). A network of USFS roads in the Pike and San Isabel NFs are in extreme northwestern Fremont County and southern Park County and could provide indirect access. Several private roads serving individual properties and several nearby subdivisions provide additional access to various parts of the Gribbles Park site, although some of these private roads have locked gates.

Access to the proposed Gribbles Park exchange parcels is principally via Fremont CR 2, which runs along the site's southern boundary (see Figure 3-25). No other roads extend onto the public lands; therefore, access is limited to foot and horseback. Proposed exchange parcel 5 has no direct access, but is close to Fremont CR F6, which is accessed by traveling north from Fremont CR 2 (T51N, R11E, Sec. 20). Fremont CR 2 also crosses the northwestern corner of parcel 7 (T51N, R11E, Sec. 19) and abuts the southwestern corner of parcel 6.

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

The primary highway access to and through the San Luis Valley is via US 285 and US 160 that are generally aligned north-south and east-west, respectively. Within the expanse of the San Luis Valley, SHs 17, 112, 114, 142, 150, and 159 provide additional access. SHs 17 and 114 also connect to other highways outside the San Luis Valley.

The Biedell Creek site lies west of US 285 and north of Saguache CR G (see Figure 3-26). Proposed exchange parcel 8 is accessed by Saguache CR 44.8, which passes through the parcel near its center (T43N, R6E, Sec. 15). Proposed parcel 9 is accessed via Saguache CR 42 (T43N, R6E, Sec. 29) and is within 0.25 mi of Saguache CR P. Saguache CR P adjoins the northern boundary of proposed exchange parcel 10 (T43N, R6E, Sec. 27). Proposed parcel 11 is bisected by Saguache CR 39M (T43N, R6E, Sec. 9). Proposed exchange parcels 12 and 13 have no direct access, but proposed parcel 12 lies near a spur road off Saguache CR 39M (T42N, R6E, Sec. 17) and proposed parcel 13 lies near the junction of Saguache CRs 36 and

41G (T42N, R6E, Sec. 30). Proposed parcel 14 is traversed by Saguache CR 42 and 2K and can also be accessed from Saguache CR M and 42K.

The La Jara Reservoir site lies west of SH 285 at its junction with SH 15 (see Figure 3-26). Proposed exchange parcel 15 is bisected by a spur from Forest Road (FR) 248, which passes through the center of the parcel (T35N, R5E, Sec. 25). Proposed parcel 16 is accessed via a spur from FR 240 (T35N, R5E, Sec. 21), the latter connecting to SH 15. Proposed exchange parcel 17 has no direct access, but lies within 0.5 mi of FR 240 (T35N, R5E, Sec. 27). Proposed parcel 18 is crossed by several spur roads from FR 240. Proposed exchange parcels 19, 22, 23, and 24 have no direct access, although a spur of FR 240 passes near proposed parcel 19 and a spur of Conejos CR 8 is near proposed parcel 23. Proposed parcel 20 is at the terminus of a spur of FR 240 (T34N, R6E, Sec. 21) and proposed parcel 21 is adjacent to FR 101 at its southwestern corner (T34N, R6E, Sec. 27).

Proposed San Luis Valley SLB Exchange Parcels

The primary highway access to and through the San Luis Valley is via US 285 and US 160 that are generally aligned north-to-south and east-to-west, respectively. Within the expanse of the San Luis Valley, SHs 17, 112, 114, 142, 150, and 159 provide additional access. SHs 17 and 114 also connect to other highways outside the San Luis Valley. The SLB parcels proposed for exchange lie adjacent to and east of SH 17 and the parcels are accessed by a variety of Alamosa and Saguache county roads (see Figure 3-27).

The very large exchange parcel 26 can be accessed by many county and ranch roads that intersect with SH 17, and it is crossed by the highway for a short distance north of the town of Hooper. In the northern portion, access from SH 17 into parcel 26 occurs at Saguache CR N by traveling east to the trail that runs south to Weisman Lake then proceeds into the parcel. Additional access into parcel 26 occurs north of Hooper on ranch roads at T42N, R10E, Sec. 5 and T42N, R10E, Sec. 17. In the center portion of parcel 26, access from SH 17 occurs on a ranch road extension of Saguache CR G traveling to the east and also along Gibson Canal. Near Hooper, parcel 26 can be accessed by traveling east from SH 17 on Saguache CRs D, B, and A, and on Saguache CR 63, traveling north from SH 112. The Central Lateral Canal also accesses parcel 26 from SH 17. Parcels 27 and 30 are bounded on their southern boundaries by Alamosa CR 6N Lane, which provides the principal access to ranch roads north into the parcels. The northwestern corner of parcel 31 abuts SH 150 just south of the GRSA boundary. Parcel 32 is crossed by Saguache CR 60, which travels through its southwestern corner (T43N, R10E, Sec. 16); CR 60 connects with SH 17 near Moffat. Proposed exchange parcel 39 can be accessed from Saguache CR A, which forms a portion of its northern boundary and also the boundary with Alamosa County. Parcel 39 can also be accessed from Alamosa CRs 12N Lane, 11N Lane, and 10N Lane, which all travel through the parcel.

Parcels 28, 29, and 35 can only be accessed by ranch roads, of which there are several that originate from the principal roads and highways described in the above paragraphs. This network of two-track trails would be managed by GRSA should this land exchange occur.

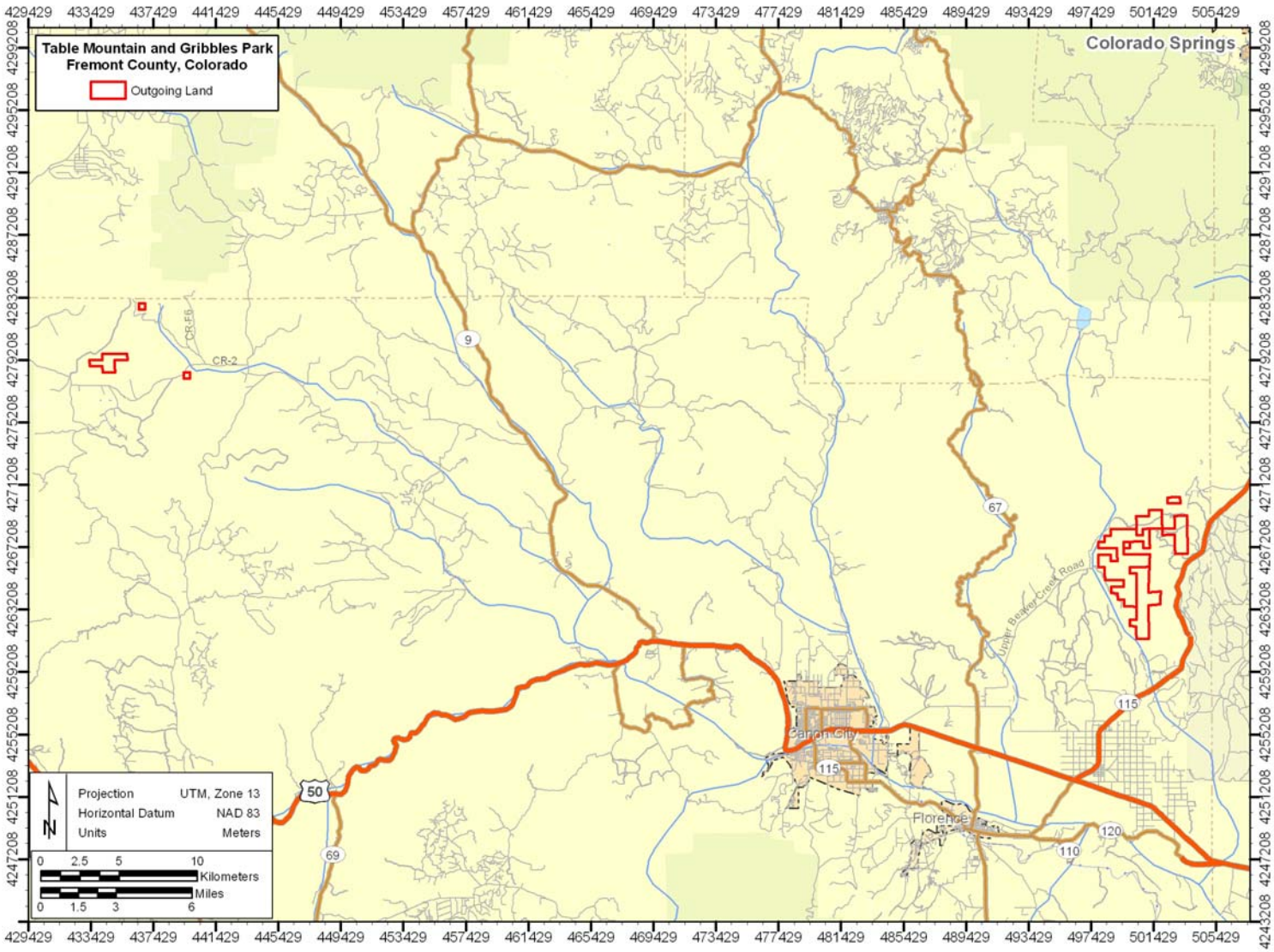

FIGURE 3-25. ACCESS ROUTES IN THE VICINITY OF THE TABLE MOUNTAIN AND GRIBBLES PARK SITES

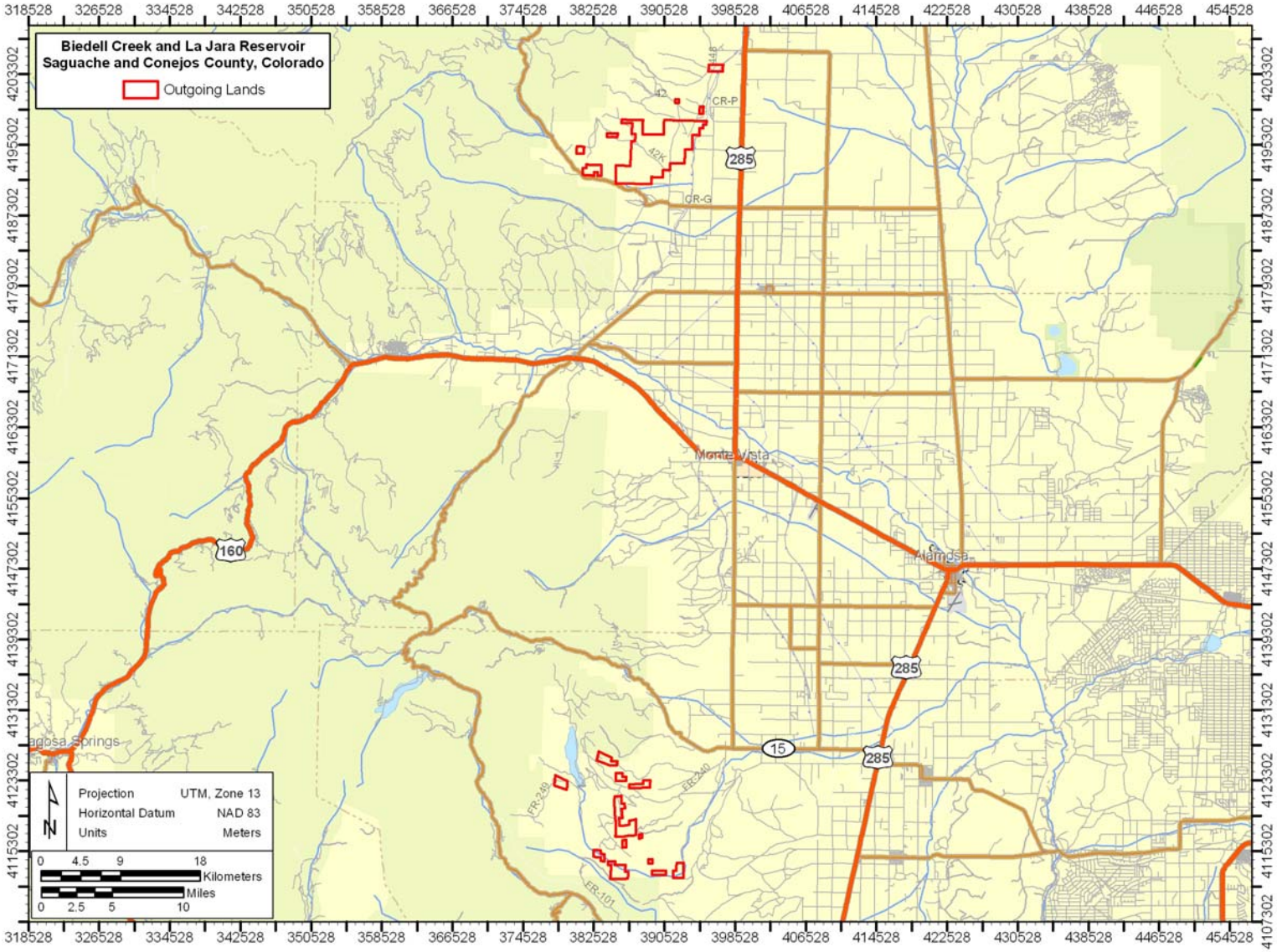

FIGURE 3-26. ACCESS ROUTES IN THE VICINITY OF BIEDELL CREEK AND LA JARA RESERVOIR

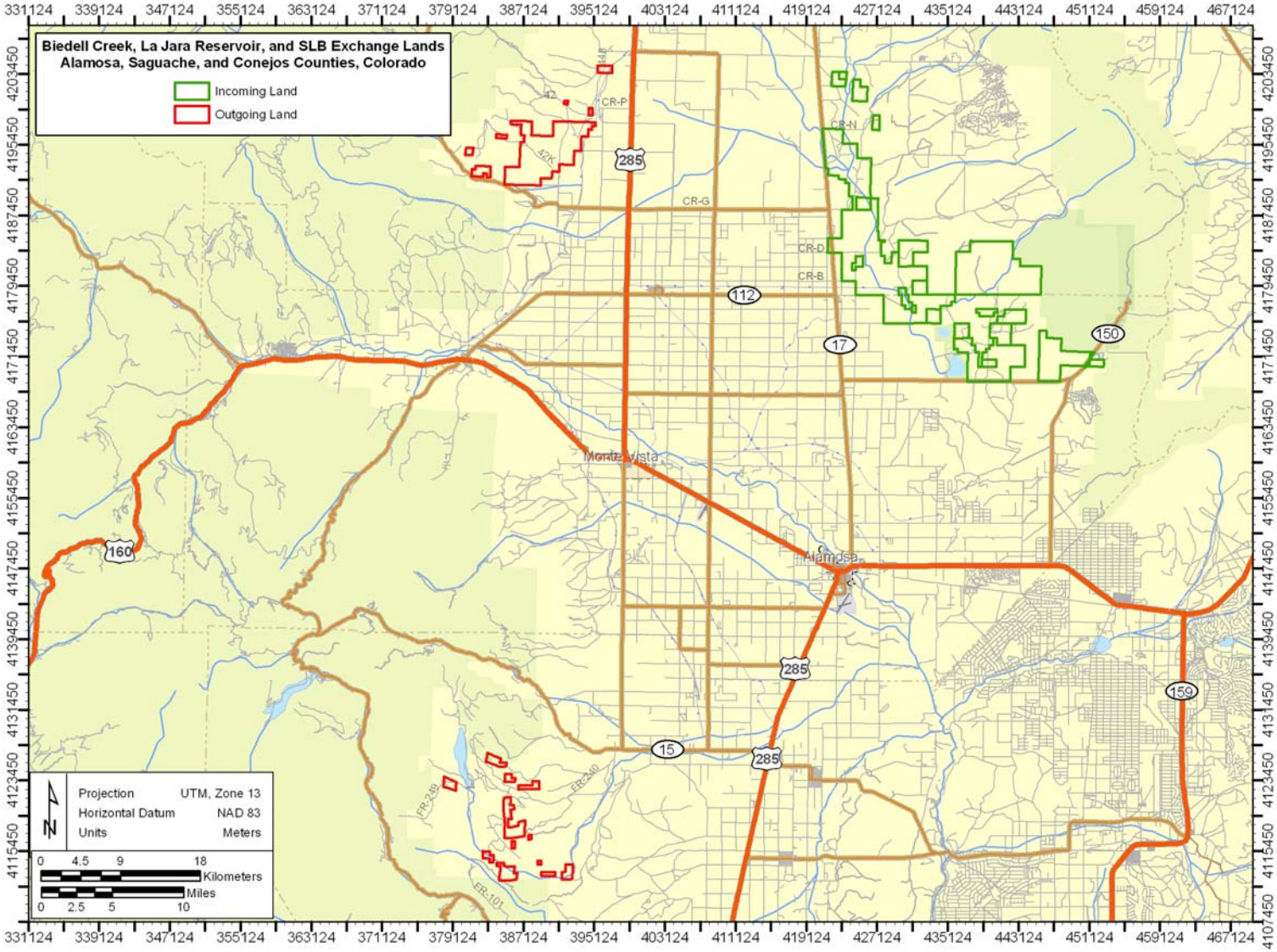

FIGURE 3-27. ACCESS ROUTES IN THE VICINITY OF SLB EXCHANGE LANDS

3.4.10.2 Environmental Consequences/Mitigation

Access to the proposed exchange parcels evaluated in this EA ranges from rural two-tracks and ranch roads to county gravel roads and state and Federal paved highways. In general, public access to Federal lands is available while access to SLB parcels is typically restricted by the lessee. An effect on parcel access would be considered (1) insignificant if there is no change to the existing public access, (2) low if there is a minor public access closure, (3) moderate if there is seasonal closure of principal public access, and (4) high if there is complete closure of principal public access.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. There would be no change in access to or within the parcels and normal maintenance activities would occur resulting in long-term, insignificant, beneficial effects on parcel access.

Proposed Action

Under the Proposed Action, the selected BLM parcels would be exchanged to SLB management, and SLB parcels would be exchanged for management by the BLM, USFWS, and NPS. The former BLM exchange parcels would have no physical change in roadway access or proposed maintenance; however, public access to the parcels would become the responsibility of the SLB lessee resulting in long-term, insignificant, beneficial effects on parcel access and continued maintenance and long-term, insignificant to low, adverse effects due to loss of public access. As a form of mitigation, seasonal access to selected SLB parcels for hunters on foot or by horseback would be regulated under CDOW/SLB PAP.

Proposed SLB parcels would be exchanged into Federal management by three agencies. The small parcel proposed to be managed by the BLM would have no changes to existing physical access, the roads would be subject to normal maintenance, and the public would be allowed to use the roads based on guidance within the RMP resulting in long-term, insignificant, beneficial effects to the existing access, continued maintenance, and new public access availability. Proposed SLB parcels exchanged to the USFWS would likely have some roadway upgrades, some roadway closures, possible introduction of new access roads to support management needs, and managed public access resulting in long-term, low to moderate, beneficial effects on the roadway location, maintenance, and managed public use. Proposed SLB parcels exchanged to the NPS would likely have roadway closures and restoration to support GRSA GMP provisions to restore native plant communities resulting in long-term, insignificant to low, adverse effects to access roadways and public access.

In terms of mitigation, the USFWS would inventory real property assets including roads, structures, windmills, and fences (USFWS 2005). Based on the inventory, long-term accessibility planning would result in low, beneficial effects on roadway location, maintenance, and public access.

3.4.11 Transportation

Transportation represents the movement of commodities, goods, and humans and is directly related to areas of production and habitation and to the system of vehicle access roads and alternative forms of travel. As of 2005, the statewide transportation network included approximately 85,000 mi of local, state, and Federal roadways; 3,600 mi of rail freight lines; 78 public-use airports; and 16 mi of light rail in the Denver area.

CDOT created a statewide transportation plan encompassing approximately 25 years, to 2030, titled "Moving Colorado: Vision for the Future" (CDOT 2005). As part of the regional and statewide planning process, 15 transportation planning regions were created. The Federal and state exchange parcels proposed in this land exchange lie in the Central Front Range region that includes Fremont County, and the San Luis Valley region, which includes Alamosa, Conejos, and Saguache counties. The vision presented by CDOT is:

> *"Coloradans envision a transportation system that is well-maintained, provides for travel choices, and allows commerce to thrive. They expect safe, reliable, and efficient travel on a system that meets anticipated population growth, supports an expanded economy, and respects the natural environment."*

3.4.11.1 Affected Environment

Within the project area, goods and commodities are commonly transported by truck and residents commonly use passenger vehicles to provide local transportation, and regionally passenger vehicles and trucks are common. The parcels proposed for exchange are undeveloped and access to them is generally limited to the land management agencies, lessees, and recreationists, primarily hunters. Principal roadways discussed herein include US 50 and SH 115 in relation to Table Mountain and Gribbles Park exchange parcels; US 285 in relation to Biedell Creek and La Jara Reservoir exchange parcels; and US 160, US 285, SH 17, SH 112, and SH 150 in relation to SLB exchange parcels.

Proposed Table Mountain and Gribbles Park BLM Exchange Parcels

A transportation system inventory prepared by Central Front Range Regional Planning Commission (CFRRPC 2004) included the highway system, public transportation, bicycle, pedestrian, rail, and aviation systems. In the project area, US 50 is part of the national highway system (principal arterials considered significant components of a nationwide network linking major ports, commercial, and industrial centers) while SH 115 is part of the state highway system. US 50 is further classified under the category of "Other Principal Arterials" and SH 115 is classified as a "Minor Arterial." Both roadways are also considered hazardous materials routes by the Colorado State Patrol. The remaining accesses to proposed exchange parcels are classified as "Local Rural Roads."

More than 5,000 vehicles per day travel each of SH 115 and US 50 based on average annual daily traffic data. Congestion can become noticeable in rural areas at about 60 percent of

capacity; SH 115 ranges from 20 percent to 40 percent and US 50 ranges from 40 percent to 60 percent. Roadway surface conditions range from poor to good and three bridges in the vicinity are considered structurally deficient or functionally obsolete.

Commercial truck use, in terms of average annual daily traffic, exceeds 150 trips per day on both SH 115 and US 50 (CFRRPC 2004). A truck terminal is in Penrose near the intersection of US 50 and SH 115.

A general aviation airport is in Canon City (Fremont County Airport) with 12,550 annual operations and 70 based aircraft. Aviation services include fixed-base operators, flight instruction, fueling, aircraft repair and maintenance, air taxi/charter, and administration. Commercial air service is available in Colorado Springs and Pueblo.

There is limited freight rail transportation in the project area with the Union Pacific Railroad constructed alongside US 50. This rail line is not currently operating and is being evaluated for abandonment (CFRRPC 2004).

Both US 50 and SH 115 have paved highway shoulders greater than 4 feet wide to support walking and bicycling (CFRRPC 2004). CDOT maintains a policy to incorporate necessary shoulder improvements to enhance safety for both motoring and bicycling public on state highways when feasible during roadway upgrade projects.

The transportation plan for SH 115 and US 50 includes both roadways in the primary investment category of “Mobility.” The applied vision is to increase mobility, maintain system quality, and improve safety. The stated goals are to (1) support commuter travel, (2) accommodate growth in freight transport, (3) provide for tourist-friendly travel, (4) rehabilitate or replace deficient bridges, and (5) maintain airport facilities in good condition.

Proposed Biedell Creek and La Jara Reservoir BLM Exchange Parcels

A transportation system inventory was also prepared by San Luis Valley Regional Planning Commission (SLVRPC 2004). In the project area, US 285 is part of the national highway system classified under the category of “Other Principal Arterials.” The remaining accesses to proposed exchange parcels are classified as “Local Rural Roads.”

Up to 3,000 vehicles per day travel US 285 based on average annual daily traffic data (SLVRPC 2004). US 285 ranges between 20 percent and 40 percent in terms of volume to capacity. Roadway surface conditions range from poor to fair and one bridge in the vicinity is considered structurally deficient or functionally obsolete. Commercial truck use, in terms of average annual daily traffic, exceeds 150 trips per day on US 285 and it is considered a hazardous materials route by the Colorado State Patrol.

Small general aviation airports are in Center (Leach Airport) and Saguache (Saguache Municipal Airport) with 5,600 and 100 annual operations, respectively; there are a total of nine based aircraft at both facilities. Aviation services provided include fixed-base operators, flight

instruction, fueling, aircraft repair and maintenance, air taxi/charter, and administration. Commercial air passenger service is available locally in Alamosa.

There is limited freight rail transportation in the project area with the San Luis Central Railroad operating between Center and Monte Vista east of US 285 (SLVRPC 2004). This rail line connects to the national rail network, carrying a significant volume of agricultural products for shipment beyond the San Luis Valley.

US 285 has paved highway shoulders greater than 4 feet wide to support walking and bicycling (SLVRPC 2004). CDOT maintains a policy to incorporate necessary shoulder improvements to enhance safety for both motoring and bicycling public on state highways when feasible during roadway upgrade projects.

The transportation plan for US 285 includes this roadway in the primary investment category of "System Quality." The applied vision is primarily to increase mobility, maintain system quality, and improve safety. The stated goals are to (1) eliminate shoulder deficiencies; (2) support recreation travel; (3) provide for safe movement of bicycles, pedestrians, and non-motorized vehicles; (4) support and expand transit usage; (5) maintain or improve pavement to optimal condition; and (6) maintain responsible water quality procedures.

Proposed San Luis Valley SLB Exchange Parcels

The SLB exchange parcels are also included in the San Luis Valley transportation system inventory (SLVRPC 2004). In the project area, US 160 and US 285 are part of the national highway system (principal arterials considered significant components of a nationwide network) and SH 17, SH 112, and SH 150 are important local accesses. US 160, US 285, and SH 17 are classified under the category of "Other Principal Arterials," SH 112 is classified a "Minor Arterial," and SH 150 is classified a "Collector." The remaining county road and lesser accesses to proposed exchange parcels are classified as "Major Collector and Above" and "Local Rural Roads." Portions of US 160 and SH 150 in the project area contribute to the Los Caminos Antiguos Scenic and Historic Byway.

Up to 5,000 vehicles per day travel US 160, up to 3,000 vehicles per day typically travel US 285 and SH 17, and up to 1,500 vehicles per day travel SH 112 and SH 150 based on average annual daily traffic data (SLVRPC 2004). In terms of capacity, US 160 ranges from 40 percent to 60 percent; US 285 ranges from 20 percent to 40 percent; and SH 17, SH 112, and SH 150 generally range from 0 percent–20 percent. Roadway surface conditions range from poor to good and one bridge in the vicinity is considered structurally deficient or functionally obsolete.

The primary transportation accesses to GRSA are via SH 150, which connects to US 160 from the south, and via Alamosa CR 6N, which connects to SH 17 to the west (NPS 2007). The average annual daily traffic on SH 150 is 670 vehicles (includes 60 trucks per day) from a volume of 4,100 vehicles (includes 630 trucks per day) traveling US 160 at the SH 150 junction and a volume of 2,800 vehicles (includes 210 trucks per day) traveling SH 17 at the Alamosa CR 6N junction. Average annual daily traffic into GRSA is estimated at about 450 vehicles, approximately 6.5 percent of the combined traffic of US 160 and SH 17 near their respective

intersections with SH 150 and Alamosa CR 6N. Northern access to GRSA in the Baca Grande subdivision is via Saguache CR T, a paved road that extends east from SH 17.

Commercial truck use, in terms of average annual daily traffic, exceeds 150 trips per day on US 160 and US 285, up to 150 on SH 17, and up to 50 on SH 112 and SH 150. US 160, US 285, SH 17, and SH 112 are all considered hazardous materials routes by the Colorado State Patrol. There are commercial truck terminals in Alamosa and Del Norte.

General aviation airports are in Center (Leach Airport), Monte Vista (Monte Vista Municipal Airport), and Saguache (Saguache Municipal Airport) with 5,600, 7,030, and 100 annual operations, respectively; there are a total of 38 based aircraft at these facilities. Aviation services include fixed-base operators, flight instruction, fueling, aircraft repair and maintenance, air taxi/charter, and administration. Commercial air service is available in Alamosa.

There is limited freight rail transportation in the project area. The San Luis Central Railroad operates between Center and Monte Vista east of US 285, connecting to the national rail network and carrying a significant volume of agricultural products for shipment beyond the San Luis Valley. Two rail lines, San Luis and Rio Grande, RailAmerica and the Union Pacific Railroad operate along US 160. Intercity bus service operates on US 160.

US 160 and US 285 have paved highway shoulders greater than 4 feet wide to support walking and bicycling, while SH 17, SH 112, and SH 150 have paved highway shoulders that are less than the optimal 4-foot wide width (SLVRPC 2004). A few segments of SH 17 have either unpaved shoulders or no shoulders are present. CDOT maintains a policy to incorporate necessary shoulder improvements to enhance safety for the motoring and bicycling public on state highways, when feasible, during roadway upgrade projects.

The transportation plan vision for US 160 includes this roadway in the primary investment category of “Mobility,” US 285, SH 17, and SH 150 are designated “System Quality,” and SH 112 is designated “Safety.” The applied vision is to increase mobility, maintain system quality, and improve safety. The stated goals are to (1) eliminate shoulder deficiencies; (2) support recreation travel; (3) provide for safe movement of bicycles, pedestrians, and nonmotorized vehicles; (4) support and expand transit usage; (5) maintain or improve pavement to optimal condition; and (6) maintain responsible water quality procedures.

3.4.11.2 Environmental Consequences/Mitigation

The Federal and state parcels proposed for exchange are uninhabited, rural, and typically connected to major transportation corridors by county or ranch roads. An effect on transportation from proposed exchange of parcels would be considered (1) insignificant if the route remains open, congestion remains under 60 percent of capacity, and normal maintenance activities occur; (2) low if the route remains open but there are seasonal exceedances of congestion greater than 60 percent of capacity, or if maintenance beyond normal levels occurs to address safety issues; (3) moderate if the action resulted in temporary route closures, congestion exceeding 60 percent of capacity seasonally, and road-widening maintenance and

construction is required to address safety issues; and (4) high if the action resulted in permanent route closures, congestion exceeding 60 percent of capacity nearly year-around, and road widening maintenance and construction was required to address safety issues.

No Action Alternative

Under the No Action Alternative, there would be no land exchange, parcels would continue to be managed by the BLM and SLB as decreed under existing leases and plans, and future exchange or sale of these parcels could occur. There would be no change in current use and hence current traffic volumes, access, or transportation to and from the parcels and only normal maintenance activities would occur resulting in long-term, insignificant, beneficial effects on transportation of commodities or human transport. Transportation plans would continue to be developed that influence future flow accounting for volume and safety on the existing roadways and other accesses. Federal and state agencies would contribute to the transportation planning process on a local and regional level.

Proposed Action

Under the Proposed Action, the selected BLM parcels would be exchanged to SLB management, and SLB parcels would be exchanged for management by the BLM, USFWS, and NPS. The former BLM exchange parcels would have no change in local access, transportation needs or standards, or maintenance resulting in short- and long-term, insignificant, beneficial effects on parcel access due to continued maintenance activities. Transportation of rock, gravel, and sand by dump truck from Table Mountain quarries would continue to contribute to the volume on SH 115; however, the number of trips per day by trucks would remain relatively unaffected. Ingress/egress lanes to/from SH 115 that provide safe transport of mined materials have already been constructed and are maintained by CDOT resulting in short- and long-term, insignificant to low, beneficial effects on safety for the traveling public.

Proposed SLB parcels in the San Luis Valley would be exchanged into Federal management by three agencies. The small parcel proposed to be managed by the BLM would have no changes in transportation needs, standards, or maintenance.

Proposed SLB parcels exchanged to the USFWS could have adverse effects on traffic volume on SH 17 depending on the location of visitor facilities. Facility location and traffic volume issues related to BNWR and the potential need for ingress/egress lanes to safely exit/merge SH 17 would be addressed in the CCP process scheduled to begin in 2011. However, primary access to the BNWR could also be developed from Saguache CR T. Because transportation planning would be carried out with consultation from Federal, state, and local transportation authorities, long-term, insignificant, beneficial effects would occur at BNWR due to consideration of ingress/egress lanes for safety, roadway safety upgrades, and closures of ranch road access to SH 17. Development of the CCP would define long-term access needs and transportation planning within the refuge resulting in long-term, insignificant effects on public transportation.

Proposed SLB parcels exchanged to the NPS have been addressed relative to transportation use and planning in the GRSA GMP (NPS 2007). Motorized public access to the parcels is not foreseen. Future actions affecting transportation within GRSA would be assessed under NEPA and NPS guidelines resulting in long-term, insignificant, adverse effects on traffic volume on SHs 150 and 17 and US 160.

Following the land exchange, traffic volumes in the areas surrounding the BNWR and GRSA could rise due to increased visitor use, particularly on weekends, during the summer months, and during hunting seasons. Traffic volume increase would result in a long-term, insignificant to low, adverse effects on transportation due to congestion; however, levels would be expected to remain below the 60 percent volume to capacity ratio that defines congestion in rural areas. Traffic volume, movement, and vehicle parking would be addressed in management plans and subsequent NEPA evaluations prepared by the USFWS and NPS to reduce adverse effects on the extent possible.

3.5 CUMULATIVE EFFECTS

Cumulative effects are defined as the "impact on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person takes such other actions" (40 CFR 1508.7). They are considered for both the no action and the action alternatives. The effects are determined by combining the impacts of other past, present, and reasonably foreseeable future actions. The geographic area for analyzing cumulative effects of the No Action and Proposed Action alternatives is Fremont County and the San Luis Valley counties of Alamosa, Conejos, and Saguache.

The current land exchange would fulfill the intent of PPA-2000 by expanding the boundaries of BNWR and GRSA while improving management of public lands through consolidation of ownership. The land exchange intent is to comply with Federal law, improve management effectiveness through consolidation of land ownership patterns, increase public recreational and outdoor education opportunities, acquire and protect important wildlife habitat, and preserve functioning earth processes. The reconfiguration of Federal and state land ownership enables more efficient management because several Federal and state parcels involved in this exchange have common, unfenced boundaries. Future land exchanges between the BLM and SLB are not dependent on this exchange.

Cumulative effects would also be evaluated in the future CCP process undertaken by the USFWS (beginning in 2011) and BLM (RMP revisions, dates unspecified). Planning for the new USFS Rio Grande NF lands, e.g., the Kit Carson Peak area, would occur several years in the future. The following actions or projects were identified for the purpose of conducting the cumulative effects analyses in the San Luis Valley (NPS 2007):

- In the fall of 2005, cattle grazing was discontinued on former Baca Ranch lands lying within GRSA.

- The Greater Sand Dunes Interagency Fire Management Plan was completed in 2005 and it outlines prescribed fires, fire suppression, and fuel reduction/management activities for approximately 275,000 acres in GRSA, BNWR, and on TNC's Medano-Zapata Ranch.
- Population growth in the San Luis Valley includes past and ongoing development of spiritual and religious retreat centers and other residential development in the Baca Grande/Crestone area near both BNWR and GRSA boundaries.
- Continuation of oil and gas exploration activities (exploratory drilling and seismic testing with "thumper trucks") by Lexam Explorations, Inc., who retain the subsurface mineral rights to most of the former Baca Ranch.
- NPS filing for a water right in state water court to appropriate water for maintaining groundwater levels, surface water levels, and stream flows on, across, and under GRSA.
- Sale and development of a private, 40-acre parcel near the GRSA entrance along SH 150 that is currently zoned rural (agriculture and single-family residence construction is allowed).
- Reduction of the elk herd that presently numbers approximately 6,000 head—well above the 1,500-head herd size objective established by CDOW.

Implementation of either the No Action Alternative or the Proposed Action Alternative in conjunction with past, present and future actions within the area of analysis would not be expected to result in significant, long-term, cumulative effects. Impacts to resources evaluated in this EA are discussed throughout Section 3 and the cumulative effects for each resource area would be expected to be the same as those described.

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