U.S. Department of the Interior

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Santa Fe River Canyon Riparian Forest Restoration Project

Environmental Assessment

DOI-BLM-NM-F020-2010-0007-EA

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Chapter 1: Purpose and Need

1.1 Introduction

The U.S. Department of Interior (USDI), Bureau of Land Management (BLM), the U.S. Department of Agriculture (USDA), U.S. Forest Service (FS), and other collaborators plan to undertake a riparian habitat restoration project encompassing approximately 70 acres along 6.6 miles of the lower Santa Fe River (Figure 1). The Santa Fe River Canyon Riparian Forest Restoration Project (Project) is proposed to take place on lands managed by the USDI, BLM Taos Field Office (TFO) and USDA, FS Santa Fe National Forest (SFNF) Española Ranger District (ERD) in Hydrologic Unit Area #1302020103. The USDI, BLM portion of the Project area is located in the La Cienega Area of Critical Environmental Concern (ACEC), is considered a Riparian/Aquatic Special Management Area (USDI, BLM 1988) and is identified as eligible for designation as Wild and Scenic River in the Proposed Taos Resource Management Plan and Final Environmental Impact Statement (USDI, BLM 2011). The USDA, FS portion of the Project area is located in Management Area G of the SFNF (USDA, FS 1987). The USDI, BLM, in conjunction with the USDA, FS, has prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA; 40 CFR, Parts 1500 – 1508 and 36 CFR, Part 222.2), as well as other relevant Federal and State laws and regulations. This EA, tiered off of the Environmental Impact Statement for Riparian and Aquatic Habitat Management in the Taos Field Office – New Mexico (USDI, BLM 2000), discusses and discloses the direct, indirect, and cumulative environmental impacts that would result from the Proposed Action and alternatives.

Actions associated with the Project are applicable to the following Federal guidance/policy objectives:

- Executive Order (EO) 13112 of February 3, 1999 (Federal Register [FR] 1999) instructs Federal agencies to detect, respond rapidly, and control populations of invasive species; minimize the economic, ecological, and human health impacts that invasive species cause; and to provide for the restoration of native species and habitat conditions in ecosystems that have been invaded;
- The Federal Land Policy and Management Act of 1976 (USDI, BLM and Office of the Solicitor, 2001) directs the BLM to manage public lands "in a manner that will protect the quality of scientific, scenic, historic, ecological, environmental, air and atmospheric, water resources and archeological values;"
- The Carlson-Foley Act of 1968 (Public Law [P.L.] 90-583) directs Federal agencies to enter upon lands under their jurisdiction having noxious plants (weeds), and destroy noxious plants growing on such land;
- The Federal Noxious Weed Act of 1974 (P.L. 93-629), later amended in § 1453 of the 1990 Food, Agriculture, Conservation, and Trade Act (P.L. 101-624), directs the Secretaries of Agriculture and the Interior to coordinate programs for control, research, and educational efforts associated with noxious weeds;
- The Plant Protection Act of 2000 (P.L. 106-224) directs Federal agencies to detect, control, eradicate, suppress, prevent, or retard the spread of plant pests or noxious weeds due to the necessity to protect the agriculture, environment, and economy of the United States; and
- The Noxious Weed Control and Eradication Act of 2004 (P.L. 108-412) established a program to provide assistance to Federal, State, local, or, where applicable, Indian Tribe governments, private organizations, individuals, and State-recognized conservation districts or State-recognized weed management districts to control or eradicate harmful, nonnative weeds on public and private lands.

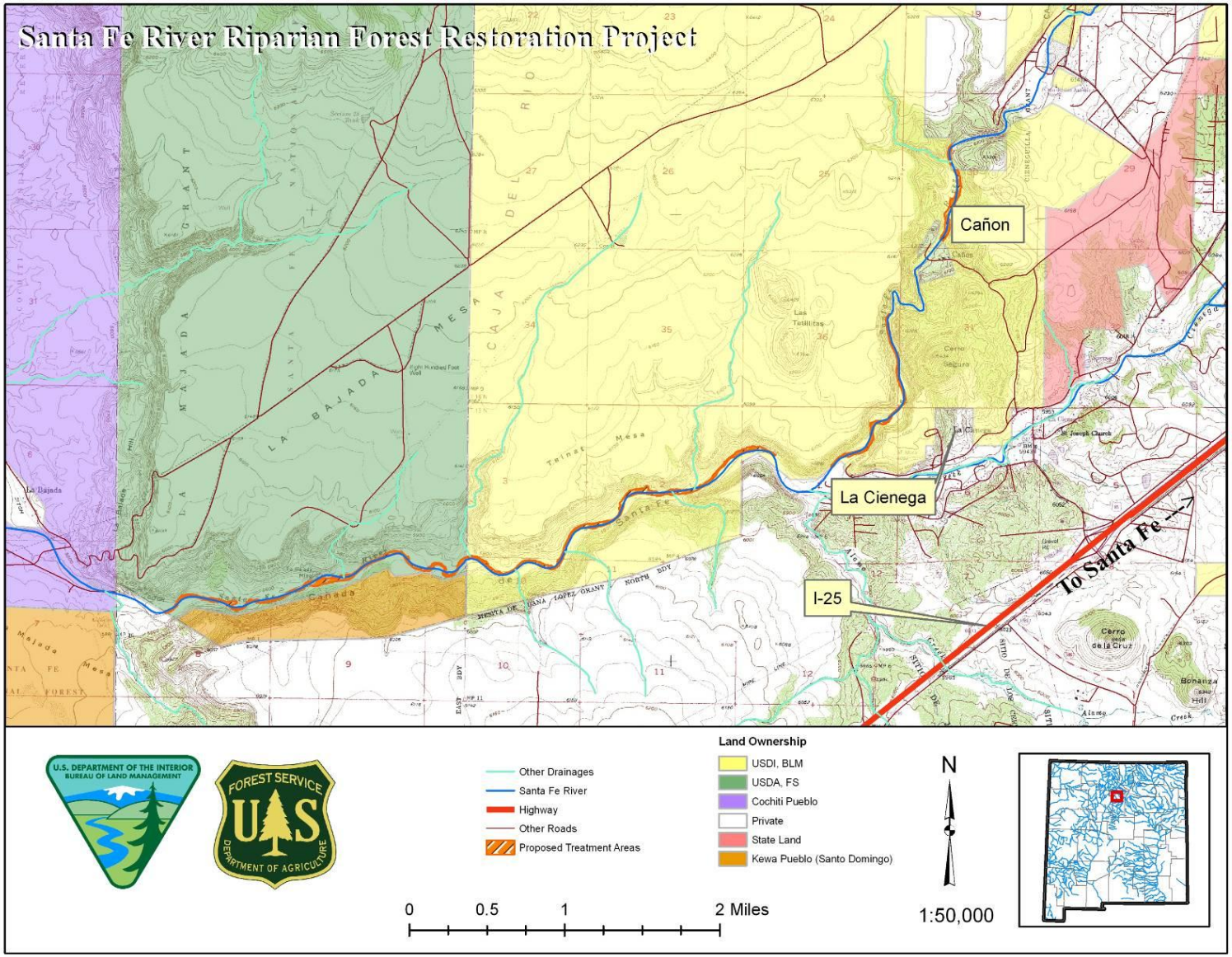


Figure 1. Santa Fe River Canyon Riparian Forest Restoration Project Area.

1.2 Purpose and Need for Action

The purpose of the Project is to enhance water quality, stream and floodplain function, and wildlife and migratory bird habitat along the Santa Fe River via the re-establishment of the native riparian habitat in order to move the Santa Fe River from its current nonfunctional designation (USDI, BLM 2000) toward Proper Functioning Condition (PFC). The Project is needed due to the degradation of water quality and wildlife and migratory bird habitat that has occurred within the Project area site and to expedite the pace of recovery that would otherwise be extremely slow in the absence of human intervention. Project goals include the following activities:

- Controlling and removing invasive, non-native vegetation and subsequently aiding in the re-establishment of native plant cover;
- Promote restoration and maintenance of floodplain functions as measured by agency standards; and
- Improving wildlife and migratory bird habitat for a variety of terrestrial, avian, and aquatic species, especially migratory bird species of concern, by increasing the quality and production of desirable native plant species, species diversity, and riparian forest community vertical and horizontal structure.

Riparian areas are water-dependent lands along streams and lakes where transitions occur between terrestrial and aquatic parts of a watershed. They may be best described as the zone of direct interaction between land and water (Gregory et al. 1991). Their importance cannot be understated, as they are critically important ecosystems in arid and semiarid regions of western North America, sustaining many sensitive native wildlife species (Sanders and Edge 1998). Although riparian areas compose only 0.5-1.0% of the overall landscape of the western United States (Belsky et al. 1999), they have been defined as the most important ecosystem in the State (New Mexico Department of Game and Fish [NMDGF] 2004). A disproportionately large percentage (~70-80%) of all desert, shrub, and grassland plants and animals depend on them (Belsky et al. 1999). At least 80 percent of vertebrate wildlife occurring in New Mexico use riparian areas at some stage of their lives and half are considered riparian obligates (NMDGF 2004). In addition, riparian areas support a greater diversity of breeding birds than all other habitats in the State combined (NMDGF 2004).

In addition to providing important wildlife habitat, riparian vegetation along streams exercises important controls over physical conditions in the stream environment, which is paramount to preserving the quality and quantity of such a limited resource. Some of the important functions that riparian vegetation contributes to the Santa Fe River physical environment follow, all of which the Project aims to enhance:

- Root networks of riparian vegetation increase resistance to soil erosion and promote bank stability (Gregory et al. 1991);
- Aboveground stems of streamside vegetation increase channel roughness during overbank flow, thereby decreasing erosive action of floods and increasing infiltration into the floodplain (later contributing to stabilized base flows via stored groundwater discharge), and retaining material in transport (Lowrance et al. 1986; Hubbard et al. 1990; Naiman et al. 2005);
- Woody debris generated from riparian zones dissipates energy, traps moving materials, and forms aquatic habitat features (Montgomery et al. 1995; Lisle 1995). Riparian vegetation plays a major role in modifying solar inputs and influencing and moderating stream temperatures by blocking solar radiation from reaching the channel, thereby reducing the stream's heat load and diurnal fluctuations of Dissolved Oxygen (Barton et al. 1985; Cole 1994; Naiman and De´camps 1997);
- Riparian vegetation acts as a sink, filtering and storing nutrients transported by groundwater and those originating from sheet flow on upland sources and during periods of overbank flow (Lowrance et al. 1984); and

- Riparian vegetation influences the abundance and composition of macroinvertebrate assemblages, as well as their vertebrate consumers (Gregory et al. 1991).

Altered flood and flow regimes due to the presence of upstream dams, upstream municipal and agricultural water diversion and groundwater pumping, land development, the establishment of invasive plants and animals, trapping/removal of beaver, as well as historical grazing practices have been shown to influence native species loss and subsequently degrade the functionality of riparian areas (Taylor 1986; Knopf et al. 1988; Allan and Flecker 1993; Busch and Smith 1995; Belsky et al. 1999; Taylor et al. 1999; Scott et al. 2003; NMDGF 2004; USDA, FS 2005; Milchanus 2006; Stromberg et al. 2007a; Lovell et al. 2009). Most, if not all of these anthropogenic factors can also be directly attributed to the decline in the Santa Fe River ecosystem function and processes. Prior research in numerous study areas throughout the western United States has shown that these stresses/pressures on the system can allow invasion, establishment, and eventual replacement of native riparian cottonwood-willow (*Populus* spp. – *Salix* spp.) forests by several competitively-advantaged undesirable plant species (Howe and Knopf 1991; Cleverly et al. 1997; Friedman et al. 2005; Stromberg et al. 2007a). In the Project area specifically, saltcedar (*Tamarix ramosissima*) and Russian olive (*Elaeagnus angustifolia*), which are included in a suite of aggressive, undesirable plants that pose a serious threat to public and private lands (Asher & Harmon 1995; USDA, FS 2005; Natural Resource Conservation Service 2007), have become so successfully established that they have displaced many of the native riparian species that have the potential to exist there. Saltcedar and Russian olive's lack of natural predators, their abilities to prevent the occurrence of healthy stream-channel processes (e.g., the development of sandbars and functional floodplains necessary for native plant recruitment), withstand drought and high soil-salinity levels, and reproduce prolifically throughout the entire growing season, give these non-native species a distinct competitive advantage over native riparian species (Olsen and Knopf 1986; Busch and Smith 1995; Merritt and Cooper 2000). These factors, combined with their ability to out-compete native plants for space, water, light, and nutrients has allowed these species to become dominant along many of New Mexico's stream and river systems, including the Santa Fe River (Asher and Harmon 1995; Cleverley et al. 1997; Dudley & DeLoach 2004). This change in riparian woody species composition from native to invasive has been associated in other areas of the western U.S. with a loss of plant and animal diversity, changes in ecosystem community structure, undesirable alterations to ecosystem functions, changes in riparian vegetation successional sequences, degradation of wildlife habitat, decreased channel meandering, exacerbation of flood and fire risk, reduction in floodplain width, and lowered water tables (Kauffman and Krueger 1984; Knopf and Olson 1984; Bayley 1995; Busch and Smith 1995; Ellis 1995; Sala et al. 1996; Di Tomaso 1998; Blossey 1999; Mack et al. 2000; Lesica and Miles 2001; Tickner et al. 2001; Zavaleta et al. 2001; Katz and Shafroth 2003; Milchunas 2006; Durst et al. 2008; Shafroth and Briggs 2008).

In addition to altered riparian community structure and function, water quality within the Santa Fe River watershed is also impaired. The Santa Fe River watershed was identified in New Mexico's Clean Water Action Plan – Unified Watershed Assessment as a Category I watershed; that is, one of the State's watersheds in most urgent need of restoration (New Mexico Environment Department [NMED] 1998). The 2008 – 2010 State of New Mexico Integrated List (NMED 2008) also identifies the Santa Fe River from the Santa Fe Wastewater Treatment Plant downstream to the Cochiti Pueblo boundary (Water Quality Segment 20.6.4.113) as impaired and not fully supporting marginal coldwater aquatic life. The listed causes for impairment include impacts from abandoned mine lands (inactive), municipal (urbanized high density area), municipal point source discharges, and rangeland grazing. These impacts have led to Total Maximum Daily Loads (TMDLs) being established for Nutrient/Eutrophication Biological Indicators, Dissolved Oxygen, and Sedimentation/Siltation (NMED 2008). The listing for Dissolved Oxygen is probably due to algal growth that appears in response to plant nutrients available from the stream bottom (NMED 2008; NMED Undated). The excessive algal growth contributes to severe diurnal swings in both Dissolved Oxygen and pH and is indicative of nutrient overenrichment in the Santa Fe River (NMED Undated). While it is known that the Santa Fe Wastewater Treatment Plant (WWTP)

discharge contains nutrients that contribute to the growth of algae, poor downstream and riparian area conditions exacerbate algal growth and violations in water quality standards (NMED Undated).

Through morphological, physiological, and life-history mechanisms, saltcedar and Russian olive have been able to dominate the Project area's riparian plant communities, subsequently degrading riparian habitat conditions, reducing stream channel and floodplain functionality, exacerbating flood and fire risk, and possibly lowering groundwater tables. This has led the USDI, BLM to classify the Santa Fe River riparian area as nonfunctioning (USDI, BLM 2000). In many areas stands of non-native species have become so dense that colonization by native species is impossible. However, several studies have demonstrated that clearing stands of saltcedar and Russian olive can result in re-colonization by native species, especially in the presence of natural spring runoff cycles or with augmented re-establishment techniques (e.g., planting) (Sher et al 2000; Spregner et al. 2001; Stevens et al. 2001; Tallen-Halsell and Walker 2002; Rood et al. 2003). Due to the economic and ecological costs associated with the prominence of non-native species, controlling the spread of non-native/invasive species is now a regional and national priority for the USDI, BLM and USDA, FS, as well as other land management agencies (USDI, BLM 2000; USDA, FS 2005; USDI, BLM 2007).

1.3 Land Use Plan Conformance

The Proposed Action is consistent with both the current Taos Resource Management Plan (USDI, BLM 1988) and the Proposed Taos Resource Management Plan and Final Environmental Impact Statement (USDI, BLM 2011). These plans consider riparian areas as one of their top management priorities, designate the Riparian/Aquatic Special Management Area, and contain the following goals and objectives relating to the Project:

- Maintaining, improving, and expanding wildlife habitat on the public lands for both game and non-game species (including the protection and recovery of Federal/State proposed, candidate, or listed threatened and endangered plant and animal species);
- Maintaining and enhancing wetlands and other riparian habitat for waterfowl associated with the Central Flyway and suite of species obligate and semi-obligate to these unique ecosystems with the goal of achieving a healthy and productive riparian condition;
- Providing for PFC of vegetative communities by managing for viable and resilient native wildlife species and their associated habitats;
- Moving riparian and wetland communities toward and/or remaining in PFC such that riparian communities would be sustainable, provide physical stability and adequate habitat for a wide range of wildlife species, and support healthy, diverse, and abundant populations of fish and associated aquatic and riparian dependent species;
- Promoting habitat diversity, protection and enhancement of riparian aquatic habitats, increased forage availability, and non-game species considerations;
- Managing riparian areas with an emphasis on protection and restoration, and focusing on treatments that reestablish willows and cottonwoods, as well as other riparian vegetation, to stabilize stream bands and promote sinuosity and width/depth ratios appropriate to the site; and
- Monitoring riparian areas and conducting rangeland health assessments to document progress toward achieving and maintaining PFC.

The Proposed Action is in conformance with the Riparian and Aquatic Habitat Management Plan (USDI, BLM 2000), which has the following goals:

- Maintaining, restoring, improving, protecting, and expanding riparian areas to ensure that they are in Proper Functioning Condition for their productivity, biological diversity, and sustainability as outlined in Technical Reference 1737-9 (USDI, BLM 1993) and Technical Reference 1737-15 (USDI, BLM 1998). Riparian areas are considered to be in PFC when adequate vegetation,

landform, or large woody debris is present to dissipate stream energy associated with high water flow, and to filter sediment, improve flood-water retention and ground-water recharge, and develop root masses that stabilize streambanks; and

- Reestablishing riparian vegetation and historic wetland habitat via the removal of non-native species and the planting of native species, which was identified as one of the most important steps to improving the health of the Santa Fe River.

The Proposed Action is consistent with the La Cienega Area of Critical Environmental Concern – Coordinated Resource Management Plan (USDI, BLM 1995), which contains the following planned actions:

- Reestablishing and/or augmenting native species in historical habitats and control competition from exotic species by reducing or eliminating them;
- Collaborating with the appropriate agencies to maintain the water quality in area streams at current designated use stream standards (for irrigation, livestock and wildlife watering, marginal coldwater fishery, secondary contact recreation, and warmwater fishery); and
- Initiating a vegetative restoration project to eradicate Russian olives and replace them with cottonwoods, willows, and other riparian species native to the area.

The Proposed Action is consistent with the Santa Fe National Forest Plan (USDA, FS 1987), which contains the following goals and objectives relating to the Project:

- Inventorying, evaluating, and improving areas of streams, lakes, and wetlands for cold water fisheries, especially the Rio Grande cutthroat trout, water fowl and other water-related habitats;
- Adjusting riparian plant composition or structure through coordination with other uses or direct manipulation in order to achieve riparian standards;
- Planning and designing activities and management strategies specifically for soil and water resources improvement where watershed condition is unsatisfactory; and
- Emphasizing key wildlife habitat protection and improvement in Management Area G.

The Proposed Action is consistent with the New Mexico Non-native Phreatophyte/Watershed Management Plan (New Mexico Department of Agriculture 2005), which contains the following goals and objectives relating to the Project:

- Provides a path forward for management and implementation of future control practices and rehabilitation efforts in New Mexico's watersheds with special reference to riparian areas; and
- Develops templates and protocols for control, revegetation and rehabilitation, monitoring, and long-term management of non-native invasive plant species in New Mexico's watersheds.

The Proposed Action is in conformance with the Santa Fe River Watershed Restoration Action Strategy (Santa Fe Watershed Association 2002), which contained the following recommendations for the Santa Fe River Canyon:

- Completing river restoration projects centered on slowing storm flows as they move through the system with the desired effect of enhancing infiltration to groundwater and supporting riparian vegetation, which in turn can increase channel stability and help to settle out sediment-laden storm flows.

The Proposed Action is in conformance with Advisory Circular 150/5200-33B – Hazardous Wildlife Attractants on or Near Airports (U.S. Department of Transportation, Federal Aviation Administration 2007), which contains the following recommendations for land use actions near airports:

- Provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near public-use airports;

- Recommends a separation distance of 10,000 feet at airports for any of hazardous wildlife attractants; and
- Recommends a distance of five statute miles between the farthest edge of the airport's AOA and the hazardous wildlife attractant if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace.

1.4 Identification of Issues

The following activities were completed to gather stakeholder and interested parties comments and concerns:

- The USDI, BLM conducted internal scoping for the Project on October 5, 2009;
- The proposed Project was posted in the TFO on-line NEPA log on December 2, 2009, inviting the public to submit comments and concerns related to the scope of the Project;
- A USDA, FS Collaborative Forest Restoration Program (CFRP) Multi-Party Monitoring Team meeting was held December 10, 2009 at WildEarth Guardians' Santa Fe, NM office to gather stakeholder and interested parties comments and concerns about the Project;
- A public scoping meeting was held December 17, 2009 at the La Cienega Community Center in La Cienega, NM; and
- The proposed Project was posted on the SFNF Schedule of Proposed Actions (SOPA) log on January 1, 2010.

Based on public scoping, as well as the internal scoping efforts, the following topics are considered relevant to the analysis of this management action:

1.4.1 Areas of Critical Environmental Concern

- The effect that the Project would have on the La Cienega Area of Critical Environmental Concern.

1.4.2 Cultural Resources

- The effect that the Project would have on sensitive cultural resources located throughout the area.

1.4.3 Wildlife

- The effect that the Project would have on general wildlife, including migratory birds; and
- The effect that wildlife could have on the Santa Fe Municipal Airport.

1.4.4 USDA, FS Management Indicator Species

- The effect that the Project would have on USDA, FS Management Indicator Species (MIS).

1.4.5 USDI, BLM and USDA, FS Sensitive Species

- The effect that the Project would have on USDI, BLM and USDA, FS Sensitive Species.

1.4.6 U.S. Fish and Wildlife Service Threatened and Endangered Species

- The effect that the Project would have on USDI, Fish and Wildlife Service (FWS) Threatened, Endangered, and Candidate species.

1.4.7 Water Quantity and Quality

- The effect that the Project would have would have on water quality;

- The effect that the Project would have on water quantity, specifically regarding the evapotranspiration capacities of a native cottonwood-willow riparian forest versus the non-native community currently present as related to downstream water use and water rights;
- The effect that the Project would have on water quantity, specifically regarding the potential for beaver to inhabit and alter current channel and flow conditions; and
- The effect that the Project would have on floods and flood-induced erosion.

1.4.8 Riparian Vegetation

- The effect that the Project would have on the diversity and structure of the riparian vegetative community; and
- The effect that the Project would have on wildfire within the Project area and its related impacts on neighboring communities.

1.4.9 Riparian Soils

- The effect that the Project would have on erosion within the lower Santa Fe River system; and
- The effect that the Project would have on the riparian area and surrounding uplands.

1.4.10 Visual Resources and Recreation

- The effect that the Project would have on visual resources and recreational opportunities.

1.4.11 Wild and Scenic Rivers

- The effect that the Project would have on a potential Wild and Scenic River designation.

Chapter 2: Description of Alternatives

2.1 Alternative A: Proposed Action

The Proposed Action is that the USDI, BLM and USDA, FS would implement, or authorize other Project partners and contractors to implement, a scientifically sound, strategic, and adaptive plan to move the Santa Fe River from its nonfunctional designation (USDI, BLM 2000) toward Proper Functioning Condition on approximately 70 acres of Federally-managed lands (USDI, BLM and USDA, FS) in the lower Santa Fe River corridor. The Project plan would apply the adaptive management strategies detailed in the Riparian and Aquatic Habitat Management Plan (USDI, BLM 2000), which provides guidance for achieving specific desired future conditions for all riparian habitats that occur within the Taos Field Office.

The following is taken from the Riparian and Aquatic Habitat Management Plan (USDI, BLM 2000) and would be used for implementing Project-related restoration activities (for further definitions reference the Plan):

> *Adaptive management seeks to evaluate the overall public values of riparian areas; to take measures necessary to maintain or improve riparian areas to their desired condition (e.g., Proper Functioning Condition); and to ensure that activities conducted are consistent with the protection of riparian resource values.*
>
> *Implementation of adaptive management practices will involve the following basic procedures:*
>
> *Step 1: Survey and analyze riparian conditions;*
>
> *Step 2: Use survey results to describe a desired future condition and to identify appropriate management actions;*
>
> *Step 3: Implement management actions;*
>
> *Step 4: Monitor the success of the management actions; and*
>
> *Step 5: Modify the management actions, if necessary, on the basis of monitoring results.*

Project implementation began by site visits being conducted by USDI, BLM and USDA, FS interdisciplinary specialists, partners, and interested stakeholders to assess the functioning condition of the Santa Fe River riparian area (Step 1). These parties then defined the desired future condition of the riparian area and the management actions that are required to achieve that condition (Step 2). Implementation of recommended management actions would then commence (Step 3). Project implementation at the Santa Fe River, while adaptable due to specific site conditions, would primarily focus on the targeted removal of some of the existing non-native shrub and tree species (e.g., Russian olive, saltcedar, tree-of-heaven and Siberian elm) while concurrently establishing a native riparian habitat. All non-native vegetation control treatments would follow approved integrated weed management methods outlined in the Vegetation Treatment on BLM Lands in 17 Western States EIS/Record of Decision (USDI, BLM 2007) and would include the use of mechanical equipment (e.g., trackhoe) to excavate the root balls of large shrubs and trees, as well as manual control methods (chainsaws and hand tools) to remove smaller specimens. Removed above-ground vegetation (slash) would be mechanically chipped and scattered on site to help prevent soil erosion, aid in the establishment of seeded areas, and retain soil moisture by reducing soil evaporation. Excavated root balls would be piled outside of the active floodplain. The application of herbicide within the Project area would not be incorporated into the

treatment methods due to the proximity of non-native riparian vegetation to sensitive areas such as surface water and wetlands that could be indirectly impacted.

Before planning treatments, site-specific analysis considered these factors:

1) Land use of the treatment area and proximity of sensitive areas, including cultural resource sites, the Santa Fe Municipal Airport, and sensitive, threatened, and/or endangered species habitat;
2) Hydrology of the treatment area and if there is sufficient overbank flooding or ground water present to support native riparian species;
3) Characteristics of the target plant species (size, distribution, density, and life cycle) and associated non-target plant species in the treatment area; and
4) Accessibility, slope, and soil characteristics (rockiness and erodibility) of the treatment area.

The establishment of native riparian habitat would be completed concurrent to non-native species removal by mechanically augering four- to eight-foot deep holes and planting poles of Rio Grande cottonwood (*Populus deltoides* ssp. *wislizeni*) and Goodding's willow (*Salix gooddingii*) in areas deficient of overstory vegetation and where the base of the poles can come into contact with saturated soils. Coyote willow (*Salix exigua*) whips would also be planted using a mechanical auger. Other native riparian forage/shrub species (e.g., chokecherry (*Prunus virginiana*), New Mexico olive (*Forestiera neomexicana*), wild plum (*Prunus americana*), silver buffaloberry (*Shepherdia argentea*), skunkbrush sumac (*Rhus trilobata*), Utah serviceberry (*Amelanchier utahensis*) and trumpet gooseberry (*Ribes leptanthum*)) would be planted by hand utilizing containerized stock acquired from local sources. Areas of bare soil, whether natural or generated via Project-related disturbance, would be broadcast seeded with a native riparian grass and forb mix and raked into the soil surface.

While the Project area is within the Tetillas Allotment, cattle grazing is currently not permitted within the USDI, BLM portion of the Santa Fe River riparian corridor. However, cattle (or their sign) have been observed during the growing season within the riparian corridor. In addition, cattle use is discouraged, but not restricted within the USDA, FS portion of the project area (i.e., it is within the Caja del Rio grazing allotment). The successful establishment of native riparian plantings is dependent on the exclusion of cattle herbivory and the damage that it can cause to young native riparian vegetation. If it is deemed by either agency (USDI, BLM or USDA, FS) that a commitment to exclude cattle from the Project area cannot be made, independent exclosures around treatment sites would be constructed to protect newly-planted material.

The USDI, BLM and USDA, FS would arrange access to all treatment sites during Project implementation. Designated open roads or routes would be utilized to access all portions of the Project area; hence no road construction would be required. In addition, no structures would be removed during Project implementation. Permission to access the Project area from the downstream end is being negotiated with the Pueblo of Santo Domingo and the Pueblo of Cochiti.

The overriding goal is to prioritize treatment methods based on their likelihood of success, effectiveness, and likelihood to have only temporary and minimal negative impacts on the environment. Treatment priority areas, based on preliminary observations of the Santa Fe River corridor are shown on the maps in Appendix A. Removal and planting areas could deviate from what is displayed in the maps, but are displayed in order to provide the public an idea of the size and scope of the Proposed Action. Deviation from what is displayed in Appendix A would likely be due a more thorough analysis of current riparian conditions and specific management actions to be undertaken, changes in the character of the stream channel and riparian corridor that may occur during the lifetime of the Project, and adaptive management techniques that could be implemented to improve the efficacy of the Project. Photos referenced on the

maps provided in Appendix A are displayed in Appendix B. Individual treatment area descriptions and the techniques used in restoring these areas are described in detail in the sections below.

2.1.1 Treatment Methodology

Treatment areas of highest priority are located in areas where sufficient overbank flooding and/or high groundwater levels would allow for rapid establishment of native riparian vegetation. For the most part, these areas are currently occupied by large closed-canopy Russian-olive stands, mixed Russian-olive and saltcedar stands, large closed-canopy saltcedar stands, or areas that lack any mid- or over-story vegetation. Treatment in these areas would consist of removing between 50 and 75 percent of existing Russian olive cover, and up to 100 percent of saltcedar cover via the use of heavy equipment (e.g., trackhoe) to excavate the root balls of large shrubs and trees, as well as manual control methods (chainsaws and hand tools) to remove smaller specimens. No disturbance (e.g., non-native species removal and/or planting) would take place within a 100-yard buffer around head gates or dams that deliver water to irrigation ditches. Removed above-ground non-native vegetation would be mechanically chipped and scattered on site to help prevent soil erosion, aid in the establishment of seeded areas, and retain soil moisture by reducing evaporation. Immediately following non-native species removal and chipping, comparable amounts of native woody species (approximately equal aerial coverage when mature) would be established. Rio Grande cottonwood, Goodding's willow, and coyote willow would be planted in wetter areas by augering four- to eight-foot deep holes and planting poles and whips of the species. Other containerized species (e.g., chokecherry, New Mexico olive, wild plum, silver buffaloberry, skunkbrush sumac, and trumpet gooseberry) would be planted by hand in areas of more mesic moisture regimes. Non-native vegetation removal and concurrent revegetation efforts would be completed in non-contiguous patches throughout the Project area to avoid large continuous areas of disturbance, thereby dispersing effects throughout the Project area.

2.1.2 Planning, Education & Monitoring

The USDI, BLM, USDA, FS, and/or Project partners would develop an annual Project plan that would identify initial and re-treatment sites, methods utilized, scheduled monitoring activities and results, adaptive management techniques, and educational outreach opportunities. Regional schools and universities would have the opportunity to undertake educational programs on riparian ecology. Students would be assisting in some implementation, monitoring, and conducting further outreach to the community on riparian ecosystems and weed control issues.

Baseline information exists for vegetation, fisheries, breeding birds, and amphibians on USDI, BLM – administered lands. Baseline information for the above would be collected on USDA, FS lands and groundwater levels for the entire Project area would be established before Project implementation. A detailed multi-party monitoring would be implemented before any Project activities take place and monitoring results would be available for public review upon request and at public meetings (Step 4 and Step 5 of the Riparian and Aquatic Habitat Management Plan). Treated sites would be monitored by the USDI, BLM, USDA, FS and/or Project partners and results evaluated and documented to determine effectiveness of the methods used in moving the Project area toward PFC; whether impacts to resources or people were within the scope of the predictions herein; implementation and effectiveness of conservation measures; and whether adaptive management should be incorporated to enhance Project effectiveness. Changes made to treatment prescriptions due to monitoring and evaluation would adhere to all conservation measures and monitoring requirements contained in this EA, and the action and effects must be within the scope of those considered in this analysis. Monitoring components are listed in Table 1 below.

Table 1. Monitoring Components.

Objective	Prospective Indicator(s)	Frequency and Timing of Monitoring Activities
Retention of native riparian species	Stem density (#/m^2 or ac) of native species, % existing canopy of native species pre- and post-restoration activities	Yearly during late summer/early fall
Restore composition of native vegetation	Stem density (#/m^2 or ac) of weedy species; % change from baseline in the # of acres infested with weed species; % canopy of weedy species; # acres treated	Yearly during late summer/early fall
Erosion and deposition of riparian areas	Visual observation of bank sloughing or stability, point bar building	Throughout entire Project duration
Grazing	Evidence of livestock herbivory on re-established native vegetation	Throughout entire Project duration
Water quality	Levels of dissolved oxygen, pH, nitrogen, phosphorus, conductivity, turbidity, temperature, and bacteria pre- and post-restoration	During NMED-scheduled monitoring events
Ground water quantity	Depth to groundwater throughout action and no action areas	Seasonally throughout the year
Enhance wildlife habitat	Southwestern willow flycatcher, breeding and migratory bird, raptor, fish, amphibian, and bat surveys; comparison of wildlife populations pre- and post- restoration activities	Spring, summer, or fall throughout entire project duration and beyond
Beaver activity	Monitor beaver inhabitation and activity, location of dams, and effects to head gates and acequias	Annually during implementation or as needed

2.1.3 Conservation Measures

Specific conservation measures are presented in Appendix C and ensure the proper and safe implementation of all treatment methods. Some of the best management practices include: reasonable and prudent precautionary measures to ensure public health and safety and prevention of the spread of weedy species; tools and techniques to restore native vegetation indigenous to the area; surveys and monitoring for wildlife and special status species; appropriate clearances by biologists and archeologists for threatened and endangered species and cultural resource protection; and public notification of treatments sites and methods.

2.1.4 Timeline

Implementation is expected to take place over the next 10 years, with no more than ten acres treated in any given year. However, there are many factors that would affect the length and size of the Project, including available funds, Project area access, revised land use planning, threatened, endangered or sensitive species conflicts, cultural and visual resource issues, and recreation management concerns. Annual meetings with the public and other interested parties would continue throughout the life of the Project and would provide an opportunity for participation in the planning for initial and re-treatment sites, monitoring, and educational components of the Project.

A proposed timeline for implementation is shown in Table 2 below. The same outline would occur year-to-year until the Project area reaches its potential (est. 10 years), with monitoring and maintenance indefinitely to prevent re-infestation of non-native species.

Table 2. Proposed Timeline for Proposed Action Implementation.

Date	Activity
April – September	Biological surveys, including, breeding birds, raptors, amphibians, and possibly bats. Planning for treatment sites for non-native shrub and tree removal. Gather pre-treatment vegetation data. Monitor beaver populations and impacts to head gates and acequias. Conduct monitoring on previous treatment site(s) and educate community on the Project.
October – March	Implement non-native vegetation treatment on 1-7 acres for weedy tree and shrub species.
March – April	Re-establishment of native shrub and tree species.
Ongoing	Monitor groundwater levels and water quality throughout Project area. Education and public outreach events to further collaborate and provide tools to the region on riparian restoration.

2.2 Alternative B: No Action

2.2.1 USDI, BLM – Administered Land

Management actions (e.g., non-native vegetation control and native species establishment) could still take place on USDI, BLM – administered land under the No Action alternative because management plans and activities have already been identified, analyzed, and approved under NEPA. Specifically, the Riparian and Aquatic Habitat Management Plan Environmental Impact Statement and Record of Decision (USDI, BLM 2000), from which this EA is tiered, identified the need and mechanisms to move the Santa Fe River riparian area toward Proper Functioning Condition. In addition, the Taos Resource Management Plan (USDI, BLM 1988) and the La Cienega Area of Critical Environmental Concern (USDI, BLM 1995) identify management activities intended to improve, enhance, and restore riparian areas to their full potential. While management actions may be taken by the USDI, BLM under the No Action alternative, the pace at which they are implemented would likely be slower as compared to the Proposed Action. Therefore, the No Action alternative would likely not allow the Santa Fe River riparian area to achieve Proper Functioning Condition as quickly.

2.2.2 USDA, FS – Administered Land

The No Action alternative would result in non-native plant species control and native species re-establishment actions not being implemented on the USDA, FS – administered lands within the Project area. The No Action alternative may result in the continued degradation of the riparian/stream ecosystem due to the increase in exotic plant species and a decrease in native riparian vegetation species. In addition, the No Action alternative is not consistent with, or does not conform to, the following land use planning documents:

- Executive Order 13112 (FR 1999);
- The Carlson-Foley Act of 1968 (P.L. 90-583);
- The Federal Noxious Weed Act of 1975 (P.L. 93-629), later amended in the 1990 Food, Agriculture, Conservation, and Trade Act (P.L. 101-624);
- The Plant Protection Act of 2000 (P.L. 106-224);
- The Noxious Weed Control and Eradication Act of 2004 (P.L. 108-412).
- The Santa Fe National Forest Plan (USDA, FS 1987); and
- The Santa Fe River Watershed Restoration Action Strategy (Santa Fe Watershed Association 2002).

2.3 Alternatives Considered but not Analyzed in Detailed

2.3.1 Non-native Removal without Native Species Planting

Non-native Removal without Native Species Planting: The removal of non-native shrub and tree species without concurrent native riparian vegetation establishment was considered, but dismissed from detailed analysis. The removal only alternative would not move the Santa Fe River riparian area towards attainment of Proper Functioning Condition. It would result in increased bank erosion and increased sediment load in the river, which would impact downstream irrigators and aquatic organisms. Downstream water users expressed their concern at the possibility of increased erosion to the Española District Ranger. In addition, while the removal only alternative would meet some Federal policy/guidance objectives, it is not consistent with the Taos Resource Management Plan (USDI, BLM 1988), The Taos Riparian and Aquatic Habitat Management Plan (USDI, BLM 2000), the La Cienega Area of Critical Environmental Concern – Coordinated Resource Management Plan (USDI, BLM 1995), the Santa Fe National Forest Plan (USDA, FS 1987), or the Santa Fe River Watershed Restoration Action Strategy (SFWA 2002).

2.3.2 Use of Herbicide to Control Non-native Species

The removal and control of non-native shrub and tree species with the use of herbicide was considered, but dismissed from detailed analysis. Herbicide use is not favored by many individuals and groups around the project area and would conflict with organic farming that occurs downstream of the treatment area. The methods described in the proposed alternatives should alleviate the need for herbicide treatments.

Chapter 3: Affected Environment

The topics presented in the following sections may have impacts, whether negative or beneficial, on the human environment by the Proposed Action or alternatives and, therefore, would be the subject of this environmental analysis. The following elements are not affected by the Proposed Action or alternatives to the Proposed Action for the reasons stated and would not be discussed further in this document:

- **Prime /Unique Farmlands –** There are no prime/unique farmlands within the Project area;
- **Traditional Agriculture –** No detrimental impacts to water quantity, water quality, or private farmlands is anticipated within the Project area;
- **Hazardous/Solid Waste –** There are no hazardous/solid wastes used in the Project area;
- **Cattle Grazing –** While the Project area is within the Tetillas Grazing Allotment, cattle grazing is currently not permitted within the Santa Fe River riparian area.
- **Wilderness** – The Project is not within or near any designated wilderness areas or wilderness study areas; and
- **Environmental Justice –** The Project would have no effect on low-income or minority persons in the area.

The proposed Project area is located in on USDI, BLM and USDA, FS lands within Santa Fe County in north central New Mexico, as close as 2 mi NW of I-25, along approximately 8 linear miles of the Santa Fe River, near La Cienega, NM. The Project area is bordered by private land to the north, and has two tracts of private land located in the upstream third of the Project area. The Project area is bordered by the Pueblo of Cochiti on its downstream end (see Figure 1). The ecoregion of the Project area is within the North Central New Mexico Valleys and Mesas of the Arizona/New Mexico Plateau (Griffith, et al. 2006). This ecoregion mostly consists of piñon-juniper savannas, mesas, and valleys. This portion of the transitional region lies between the drier shrublands and wooded higher relief tablelands of the Colorado Plateau ecoregion to the north and the lower elevation, less vegetated and hotter Mojave Basin and Range ecoregion to the south. The elevation of the Project area is between 5,600 and 6,100 ft.

3.1 Areas of Critical Environmental Concern

The USDI, BLM portion of the Project area is located within the 3,556 acre La Cienega ACEC, which contains nationally significant cultural resources as well as riparian, wildlife and scenic values (USDI, BLM 1995). The La Cienega ACEC was designated in December 1992. The La Cienega Area of Critical Environmental Concern – Coordinated Resource Management Plan (USDI, BLM 1995) emphasizes the following:

- Reestablishing and/or augmenting native species in historical habitats and control competition from exotic species by reducing or eliminating them;
- Collaborating with the appropriate agencies to maintain the water quality in area streams at current designated use stream standards (for irrigation, livestock and wildlife watering, marginal coldwater fishery, secondary contact recreation, and warmwater fishery); and
- Initiating a vegetative restoration project to eradicate Russian olives and replace them with cottonwoods, willows, and other riparian species native to the area.

3.2 Cultural Resources

A Class III heritage resource inventory of the Project area and surrounding vicinity was conducted between January 15 and May 9, 2010 (Pierce 2010). The survey was conducted to identify, record, and evaluate historic properties that may be affected by the proposed undertaking and to comply with Section 106 of the National Historic Preservation Act. Four new heritage resource sites and nine isolated finds

were recorded during the course of the inventory. Eight previously recorded archaeological sites were also updated during the inventory. Nine of these sites have been recommended as potentially eligible for listing under the National Register of Historic Places.

3.3 Wildlife

3.3.1 General Wildlife

Habitat types in the area are dispersed vertically and horizontally over the landscape in a patchwork pattern that provides large amount of "edge" where one habitat type blends into another. The riparian habitat along the Santa Fe River provides food, cover, and water to a diverse assemblage of wildlife species. Numerous unique, special-feature habitats exist within the area. Several species are "obligate" to these specific features, such as caves or cracks in cliffs or cavities in trees; that is, they cannot survive except where the feature exists. It is possible, due to the dense stands of saltcedar and Russian olive in the Project area, decreased plant diversity may be negatively affecting local wildlife populations (Knopf and Olsen 1984; Stoleson and Finch 2001; Ellis 1995).

The habitat provided in the Project area is likely utilized by many species of mammals, including black bear (*Ursus americanus*), bobcat (*Lynx rufus*), chipmunks (*Tamias* spp.), cottontail rabbit (*Sylvilagus floridanus*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), long-tailed weasel (*Mustela frenata*), mule deer (*Odocoileus hemionus*), muskrat (*Ondatra zibethicus*), porcupine (*Erethizon dorsatum*), raccoon (*Procyon lotor*), rock squirrel (*Spermophilus variegatus*), striped skunk (*Mephitis mephitis*), wood rat (*Neotoma* spp.), and various species of bats (Order Chiroptera). In fisheries surveys conducted by the USDI, BLM (2009) fathead minnow (*Pimephales promelas*), Rio Grande sucker (*Catostomus plebius*), and mosquito fish (*Gambusia affinis*) were observed.

3.3.2 Migratory Birds

The Santa Fe River Canyon is positioned along a major migratory corridor for avian species and provides important stopover, breeding, or permanent habitat for a variety of waterfowl, shorebirds, and migratory songbirds. The Santa Fe River Canyon is also part of the 39,807-acre Caja del Rio Important Bird Area (IBA; National Audubon Society 2010). IBA's are designated sites that provide essential habitat for one or more species of bird, include sites for breeding, wintering, and/or migrating birds, and are usually discrete sites that stand out from the surrounding landscape (National Audubon Society 2010).

Migratory birds are protected by the Migratory Birds Treaty Act of 1918 (16 U.S.C. § 703-712), the Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. §§ 668-668d), the Migratory Bird Conservation Act of 1934 (16 U.S.C. § 715 et seq.), and Executive Order 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds (FR 2001). Furthermore, the USDI, BLM and the USDI, FWS entered into a Memorandum of Understanding (MOU) To Promote the Conservation of Migratory Birds (USDI, BLM and USDI, FWS 2010). This MOU, which became effective during April 2010, is intended "to strengthen migratory bird conservation by identifying and implementing strategies that promote conservation and avoid or minimize adverse impacts on migratory birds through enhanced collaboration between the Parties [USDI, BLM and USDI, FWS], in coordination with state, tribal, and local governments (USDI, BLM and USDI, FWS 2010)." One of the critical elements of the MOU is a requirement that the USDI, BLM evaluate the effects of its actions on migratory birds, with emphasis on species of concern, during the NEPA process, and to identify where take reasonably attributable to agency actions may have a measurable negative effect on migratory bird populations, focusing first on species of concern, priority habitats, and key risk factors. In the MOU (USDI, BLM and USDI, FWS 2010), Species of Concern are defined as the following:

> *"…those species listed in the periodic report Birds of Conservation Concern; priority migratory bird species documented in the comprehensive bird conservation plans (North American Waterbird Conservation Plan [NAWCP], U.S. Shorebird Conservation Plan [USSCP], Partners in Flight Bird Conservation Plans [PIFBCP]); species or populations of waterfowl identified as high, or moderately high, continental priority in the North American Waterfowl Management Plan [NAWMP]; listed threatened and endangered bird species in 50 CFR 17.11: and game birds below desired condition as identified by the USDI, FWS's Division of Migratory Bird Management."*

In addition, the USDI, BLM, in coordination with the USDI, FWS, will develop conservation measures and ensure monitoring relating to the effectiveness of conservation measures to minimize, reduce, or avoid unintentional take. Some of these measures include modifying conservation measures to be more effective in reducing unintentional take, inventorying and monitoring abundance, restoring and enhancing migratory bird habitat, preventing and managing invasive species for the benefit of migratory birds, and supporting management studies and research to identify the habitat conditions needed to conserve migratory birds and to evaluate the effects of management activities on habitats and populations of migratory birds (USDI, BLM and USDI, FWS 2010).

The USDI, BLM TFO established annual breeding bird surveys at various riparian sites in northern New Mexico, including the Santa Fe River within the project area. Hawks Aloft, Inc. began conducting breeding bird surveys at the Santa Fe South site in 1994. The Santa Fe North and La Cienega sites were added in 2000 and 2006, respectively. Each year from 2000-2007, HawkAloft (2007a) consistently recorded the lowest detection rates and species richness for riparian bird species of all the sites at the Santa Fe North and Santa Fe South sites, likely because these corridors were narrow, sparsely vegetated, and subject to grazing pressure. The La Cienega site, which is near the Santa Fe North and South sites, had relatively high detection rates and species richness, which HawksAloft (2007a) attributed to the dense willow patches at the site that are not observed at the two other sites. The La Cienega site contains more cottonwoods and substantial willow patches, providing habitat for several riparian species not typically observed at Santa Fe North or South, including Bullock's Oriole (*Icterus bullockii*) and Yellow-breasted Chat (*Icteria virens*).

Sixteen riparian obligate or dependent bird species, as defined by the USDI, BLM (no date), have been observed in the Project area during breeding bird surveys between 2000 and 2007 (HawksAloft 2007a), including the following: Cooper's Hawk (*Accipiter cooperii*), Black-chinned Hummingbird (*Archilochus alexandri*), Belted Kingfisher (*Ceryle alcyon*), Western Wood-Pewee (*Contopus sordidulus*), Willow Flycatcher (*Empidonax traillii*), Bewick's Wren (*Thryomanes bewickii*), House Wren (*Troglodytes aedon*), Yellow Warbler (*Dendroica petechia*), Common Yellowthroat (*Geothlypis trichas*), Yellow-breasted Chat, Black-headed Grosbeak (*Pheucticus melanocephalus*), Blue Grosbeak (*Passerina caerulea*), Lazuli Bunting (*Passerina amoena*), Indigo Bunting (*Passerina cyanea*), Bullock's Oriole, and Lesser Goldfinch (*Spinus psaltria*). Species are considered riparian obligate if they place >90% of their nests in riparian vegetation or for which >90% of their abundance occurs in riparian vegetation during the breeding season (USDI, BLM no date). Species are considered riparian dependent if they place 60 – 90% of their nests in riparian vegetation or for which 60 – 90% of their abundance occurs in riparian vegetation during the breeding season (USDI, BLM no date).

Other migratory birds (although some may overwinter locally) observed during breeding bird surveys between 2000 and 2007 (HawksAloft 2007a) include the following: Mallard (*Anas platyrhynchos*), Turkey Vulture (*Cathartes aura*), Red-tailed Hawk (*Buteo jamaicensis*), Golden Eagle (*Aquila chrysaetos*), American Kestrel (*Falco sparverius*), Killdeer (*Charadrius vociferus*), Solitary Sandpiper (*Tringa solitaria*), Mourning Dove (*Zenaida macroura*), Common Nighthawk (*Chordeiles minor*), White-thraoted swift (*Aeronautes saxatalis*), Broad-tailed Hummingbird (*Selasphorus platycercus*), Ladder-

backed woodpecker (*Picoides scalaris*), Downy Woodpecker (*Picoides pubescens*), Northern Flicker (*Colaptes auratus*), Gray Flycatcher *(Empidonax wrightii*), Say's Phoebe (*Sayornis saya*), Ash-throated Flycatcher (*Myiarchus cinerascens*), Cassin's Kingbird (*Tyrannus vociferans*), Plumbeous Vireo (*Vireo plumbeus*), Piñon Jay (*Gymnorhinus cyanocephalus*), Horned Lark (*Eremophila alpestris*), Violet-green Swallow (*Tachycineta thalassina*), Northern Rough-winged Swallow (*Stelgidopteryx serripennis*), Cliff Swallow (*Petrochelidon pyrrhonota*), Barn Swallow (*Hirundo rustica*), Rock Wren (*Salpinctes obsoletus*), Canyon Wren (*Catherpes mexicanus*), Blue-gray Gnatcatcher (*Polioptila caerulea*), Western Bluebird (*Sialia mexicana*), Mountain Bluebird (*Sialia currucoides*), Townsend's Solitaire (*Myadestes townsendi*), American Robin (*Turdus migratorius*), American Pipit (*Anthus rubescens*), Black-throated Gray Warbler (*Dendroica nigrescens*), Western Tanager (*Piranga* ludoviciana), Canyon Towhee (*Pipilo fuscus*), Chipping Sparrow (*Spizella passerina*), Lark Sparrow (*Chondestes grammacus*), Red-winged Blackbird (*Agelaius phoeniceus*), Western Meadowlark (*Sturnella neglecta*), and Brown-headed cowbird (*Molothrus ater*).

Three of the species listed above are listed as Birds of Conservation Concern in Bird Conservation Region 16 – Southern Rockies/Colorado Plateau (USDI, FWS 2008), and include the following: Golden Eagle, Piñon Jay, and Willow Flycatcher. These are species, subspecies, and/or populations of all migratory and non-migratory birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973. The concerns may be the result of population declines, naturally small ranges or population sizes, threats to habitat, or other factors. The purpose of identification of Birds of Conservation Concern is to stimulate coordinated and proactive conservation actions among Federal, State, and private partners. The Mallard, another species documented within the Project area, is listed in the Game Birds Below Desired Condition, which is maintained to represent species whose population are below long-term averages or management goals, or for which there is evidence of declining population trends (USDI, FWS 2010). In addition, twelve documented species are contained in the list of Birds of Management Concern (USDI, FWS 2009a), including the Mallard, Cinnamon Teal, Golden Eagle, Solitary Sandpiper, White-winged Dove, Mourning Dove, Willow Flycatcher, Piñon Jay, Horned Lark, Juniper Titmouse, Yellow Warbler, and Common Yellowthroat. The Birds of Management Concern are a subset of the species protected by the Migratory Bird Treaty Act which pose special management challenges because of a variety of factors (e.g., too few, too many, conflicts with human interests, societal demands) (USDI, FWS 2009a).

3.4 USDA, FS Management Indicator Species

The Land and Resource Management Plan for the Santa Fe National Forest identified eight Management Indicator Species (MIS) for the SFNF (USDA, FS 1987). Species were selected based on their association with plant communities or seral stages, which management activities have the potential to affect, their monitoring feasibility, migratory habits, and habitat versatility (Britton and Ferrel 2006). These species include Merriam's Turkey (*Meleagris gallopavo*), Piñon Jay, Hairy Woodpecker (*Picoides villosus*), Mourning Dove, Mexican Spotted Owl (*Strix occidentalis lucida*), Rocky Mountain elk (*Cervis elaphus nelsoni*), Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*), and Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*). Only the Rocky Mountain elk, Mourning Dove, and Piñon Jay will be assessed. Other species will not be considered due to the lack of presence or suitable habitat within the Project area.

Table 3. Potential for MIS Species/MIS-Associated Habitat in or Near the Project area.

Common Name	MIS Associated Habitat
Rocky Mountain Elk (*Cervis elaphus nelsoni*)	Mid elevation grasslands, meadows and forest
Mourning Dove (*Zenaida macroura*)	Mid and low grasslands, woodlands and ponderosa pine
Piñon Jay (*Gymnorhinus cyanocephalus*)	Piñon-juniper habitat

3.4.1 Rocky Mountain Elk

Rocky Mountain elk inhabit most forest types with good forage and cover, utilizing a variety of habitat types during the course of their lives. Certain vegetation types are of limited value to elk due to aspect, elevation, snow depth, lack of water availability and/or vegetation components. During the summer, elk occupy mountain meadows and mountain coniferous forests. In winter, they move to lower piñon-juniper woodland, mixed conifer forest, plains grassland, or even desert scrub (NMDGF 2010a). Elk observed on the east slope of the Jemez Mountains are most commonly associated with shrub-grass mixtures and piñon-juniper woodlands (combined, approximately 65% of records) (NMDGF 2010a). However, elk utilize a variety of habitat types during the course of their lives and appear to be extremely adaptable to both secondary successional and specific successional vegetation types. There are over 1.3 million acres of habitat types available across the SFNF as suitable habitat for the Rocky Mountain elk. The habitat trend is rated as stable in the SFNF, while the population trend is ranked as stable to increasing (Britton and Ferrell 2006). The species could utilize the Project area and surrounding mesas as wintering habitat.

3.4.2 Mourning Dove

The mourning dove is found across North America in a variety of habitats, including most grassland and forest types. It is common to abundant in most New Mexico counties (NMDGF 2010b), and is among the most abundant and widespread terrestrial birds endemic to North and Middle America (Otis et al. 2008). Mourning doves display tremendous adaptability in breeding habitat selection. Generally, it shuns deep woods or extensive forests and selects more open woodlands and edges between forest and prairie biomes for nesting (Otis et al. 2008). In all situations, abundant food and water must be available within 20–30 kilometers. The species feeds almost entirely on the ground, where seeds are the primary food source (Otis et al. 2008; Reynolds et al. 1992).

There are approximately 836,000 acres of vegetative communities represented by the mourning dove throughout the SFNF, and the habitat trend is stable to increasing throughout the entire Forest (Britton and Ferrell 2006). The population trend in the SFNF is ranked as stable based on the statewide trend and Breeding Bird Survey data in and adjacent to the Forest (Britton and Ferrell 2006). The species was commonly observed within the Project area during Breeding Bird Surveys conducted between 2000 and 2007 (HawksAloft 2007a).

3.4.3 Piñon Jay

Piñon Jay is an omnivorous and social inhabitant of open piñon-juniper woodlands, sagebrush, scrub oak, and chaparral communities (Balda 2002). This avian generalist has a wide ranging diet that includes pine seeds, some acorns, juniper berries, other wild berries, cultivated grains, arthropods, lizards, snakes, nestling birds, and small mammals (Balda 2002). Arboreal nests are large, bulky open cup of sticks, with a mid-layer of grasses and an inner cup of fine, powdery materials, such as plant parts, feathers, horsehair, cloth rootlets, or shredded bark (Balda 2002).

Piñon Jays nest mainly in stands of piñon-juniper. It needs open woodlands for nesting and an adequate supply of seeds, especially nuts. They are gregarious and breed in colonies up to 150. They spend the winters in large flocks of 10's or 1,000's moving in search of piñon stands with a successful crop of piñon nuts that are a primary food source along with other seeds, fruits and insects. Stands of piñon-juniper

provide the habitat for the piñon jay on the SFNF. There are some piñon-juniper stands in or adjacent to the Project area, which would provide suitable habitat for this species.

There are approximately 380,000 acres of piñon-juniper woodlands distributed across the SFNF; however the habitat trend for Piñon Jay is ranked as declining, primarily due to the wide scale loss of piñon associated to drought and insect infestation (Britton and Ferrell 2006). In addition, the population trend in the SFNF is ranked as downward based on the statewide trend in Breeding Bird Survey data (Britton and Ferrell 2006). The species was observed twice within the Project area between 2000 and 2007 (HawksAloft 2007a).

3.5 USDI, BLM and USDA, FS Sensitive Species

The likelihood of occurrence for USDI, BLM and USDA, FS sensitive species, or their required habitats, within or adjacent to the Project action area that could be potentially affected by Project activities is summarized in Appendix D (species that have the potential to occur within or adjacent to the Project area are listed in **bold** type). The potential for occurrence of these special-status species was evaluated based on existing information on distribution and qualitative comparisons of the habitat requirements of each species and vegetation communities/landscape features found in the Project area. Only sensitive species, or their habitats, that were determined to have the potential to be affected by the proposed Project in the associated Biological Assessment/Evaluation (BA/E; USDI, BLM 2010) are discussed in this section. For further information on the other sensitive species and impact analyses, see the BA/E.

3.5.1 Botta's Pocket Gopher (*Thomomys bottae aureus*)

Botta's pocket gopher is a USDA, FS Region 3 sensitive species (USDA Forest Service 2007). The species has been documented within Santa Fe County and SFNF-administered lands within the Sangre de Cristo Mountains (NMDGF 2009a). Very little is known about the general habitat associations of this subspecies, but the species itself has been documented in almost every available habitat type where sufficient tuberous roots and plant material are available for forage and soil conditions are suitable for digging tunnels, from almost sea level to 11,000 feet in Arizona (NMDGF 2009a).

3.5.2 Bald Eagle (*Haliaeetus leucocephalus*)

The Bald Eagle is a USDI, BLM and USDA, FS sensitive species (USDI, BLM 1999; USDA, FS 2007), a NMDGF threatened species (NMDGF 2008), and was recently de-listed from the Endangered Species Act (ESA) in August 2007, where it was previously listed as threatened (FR 2007a). The cause of their previous decline was due to pesticide-induced reproductive failure, loss of riparian habitat, and human disturbances, such as shooting, poisoning, and trapping (NMDGF 2009b). The Bald Eagle breeds in forested areas adjacent to large bodies of water, typically at latitudes north of New Mexico (Buehler 2000; NMDGF 2008). However, two breeding territories were occupied in New Mexico during 2007 and four during 2008, including one in Rio Arriba County (NMDGF 2008). In New Mexico, nests are placed in large cottonwoods or ponderosa pines, typically in the vicinity of water and often also in close proximity to concentrations of small mammals such as prairie dogs (NMDGF 2008). While breeding territories may be rare in New Mexico, the number of wintering bald eagles is steadily increasing from an annual average of 220 birds in the late 1970s to 450 by the mid 1990s (NMDGF 2008), where they winter along rivers in the riparian woodlands commonly characterized by cottonwoods (NMDGF 2009b). Cochiti Reservoir (approximately 10 mi west of the Project area) has been identified as key overwintering habitat by the NMDGF (2009b).

3.5.3 Northern Leopard Frog (*Rana pipiens*)

The northern leopard frog is a USDA, FS sensitive species (USDA, FS 2007). The species is distributed from southern Canada south to New Mexico, and from eastern California to Maryland (Hammerson

1999). It is most commonly associated with springs, slow streams, marshes, bogs, ponds, canals, floodplains, reservoirs and lakes; usually permanent water with rooted aquatic vegetation (NatureServe 2009a). Eggs of the species are laid and larvae develop in shallow, still, permanent water, generally in areas well exposed to sunlight, where the eggs are attached to vegetation just below the surface of the water (NatureServe 2009a). This frog has been observed throughout the Project area, with the heaviest detections at the Alamo Creek/Santa Fe River confluence (Besser, personal communication, 2010).

3.5.4 Texas Horned Lizard (*Phrynosoma cornutum*)

The Texas horned lizard is a USDI, BLM and USDA, FS sensitive species (USDI, BLM 1999; USDA, FS 2007) and has been documented as occurring in Santa Fe County (NMDGF 2009d). The species inhabits flat, open, generally dry country with little plant cover except for bunchgrass and cactus (NMDGF 2009d), where it commonly preys upon carpenter ants (*Camponotus* spp.) (NatureServe 2009b). It is strictly terrestrial and can bury itself in loose soil that is sandy, loamy, or rocky (NMDGF 2009d).

3.5.5 Flathead Chub (*Platygobio gracilis*)

The flathead chub is a USDI, BLM sensitive species (USDI, BLM 1999) that is native to the Rio Grande, Pecos, and Canadian River drainages and their tributaries. The distribution of the species is expanding in the Rio Grande drainage and is stable in the other drainages (NMDGF 2009e). The species can be found in turbid alkaline waters in the main channels of large streams and tributaries and occurs in moderate to strong currents where it feeds on invertebrates, algae, and some vascular plants (NMDGF 2009e). The species was not found during fisheries surveys conducted by the BLM during spring 2009 on the Santa Fe River (USDI, BLM 2009). Management practices and developments that adversely impact the species include impoundments, dredging, channelization, irrigation, and livestock grazing in riparian zones (NMDGF 2009e).

3.5.6 Rio Grande Sucker (*Catostomus plebeius*)

The Rio Grande sucker is an endemic fish to the Rio Grande and closed basins of the Pacific coast, and ranges from southern Colorado to Zacatecas, Mexico (Woodling 1985; Page and Burr 1991). This sucker is typically observed near rapidly flowing water in backwater areas (Woodling 1985). The USDI, BLM (2009) recently completed a fish survey in the Santa Fe River and observed several Rio Grande suckers in the Project area. Management practices and developments that adversely impact the species include impoundments, dredging, channelization, irrigation, introductions of and hybridizations with white sucker, predation from game fish, sedimentation of streams, and livestock grazing in riparian zones (CDOW 2003).

3.6 USDI, FWS Threatened and Endangered Species

There are seven USDI, FWS listed threatened, endangered, or candidate for listing species that are known to, or have the potential to occur within Santa Fe County (USDI, FWS 2009b), which are listed in the table in Appendix D. Within the action area, the proposed Project has the potential to impact the Southwestern Willow Flycatcher (*Empidonax traillii extimus*; SWFL).

3.6.1 Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

The Southwestern Willow Flycatcher (SWFL) is listed as endangered by USDI, FWS (FR 1995), is considered a NMDGF endangered species (NMDGF 2008), and is a USDI, BLM sensitive species (USDI, BLM 1999). The SWFL is found along riparian habitats (e.g., rivers, streams, and other wetlands) of the desert southwest where dense groves of willows, boxelder, cottonwoods, and recently, dense mixtures of native broadleaf trees and shrubs mixed with non-native species such as saltcedar or Russian olive exist (Sogge and Marshall 2000). The bird is generally associated with multi-layered vegetation, generally

ranging from four to seven meters or higher, that is in close proximity to open water (NatureServe 2009c; Sogge et al. 1997). The decline of SWFL has been attributed to riparian habitat reduction, fragmentation, degradation, and elimination as a result of agricultural and urban development; brood parasitism; and lack of adequate protective regulations. The historic range of SWFL included riparian areas throughout Arizona, California, Colorado, New Mexico, Texas, Utah, and Mexico. Final critical habitat was designated for the flycatcher in 2005, which consists of four segments along the Middle Rio Grande (all are located outside of the Project area): Taos Junction Bridge to the northern boundary of the Ohkay Owingeh (San Juan Pueblo) (28.5 miles), the southern boundary of Isleta Pueblo to the northern boundary of Sevilleta National Wildlife Refuge (NWR) (44.2 miles), the southern boundary of Sevilleta NWR to the northern boundary of Bosque del Apache NWR (27.3 miles), and the southern boundary of Bosque del Apache NWR to Millagan Gulch at the northern end of Elephant Butte State Park (12.5 miles) (FR 2005).

While the Project area has not been surveyed, due to lack of suitable habitat for the species, Hawks Aloft (2007b) observed eleven willow flycatchers (six in 2005, zero in 2006, and five in 2007) 1.45 miles NNE (upstream) from the most upstream Project area boundary. It was determined that all eleven individuals were not SWFL because they were observed before the third survey period (starts 22 June), which means these individuals were likely migratory and not staying within the survey area for breeding. .

3.7 Water Quantity and Quality

3.7.1 Water Quantity

The Santa Fe River is a tributary to the Rio Grande, with its watershed defined as Hydrologic Unit Area #1302020103. The Santa Fe River forms the central third of Hydrologic Unit Area 13020201 (the Rio Grande/Santa Fe Watershed), which includes the Tesuque Creek watershed to the north and the Galisteo watershed to the south. The Santa Fe River watershed encompasses approximately 285 mi^2 from its headwaters at Santa Fe Lake below Lake Peak to its confluence with the Rio Grande. While agriculture has been a part of the area's history since the 16^{th} century, it is a matter of debate, and without historic record an irresolvable one, as to whether the Santa Fe River was perennial throughout its length prior to settlement. There is considerable evidence that the Santa Fe River was fed by numerous springs throughout the historic Santa Fe Plaza area, at Frenchy's Park in Santa Fe, in Agua Fria, La Cienaguilla, and in the Santa Fe Canyon above La Bajada (SFWA 2002). While storage in headwater reservoirs and groundwater pumping now contribute to the domestic needs of Santa Fe, according to the hydrographic survey of 1914 there were at least 38 ditches diverting water from the river, which was irrigating approximately 1,267 acres. During this survey, acequia ditches were recorded downstream of the Project area at La Bajada, which is still under acequia-fed irrigation (SFWA 2002). Whether perennial or not, the presence of acequias at La Bajada suggests there was generally sufficient flow in the river to warrant the effort to divert it. There still exists today the La Bajada acequia, which is adjacent to the downstream end of the Project area.

The Project area's portion of the Santa Fe River is currently one of only two perennial reaches found throughout the Santa Fe River watershed; however, the perennial nature of this segment is directly related to Santa Fe Wastewater Treatment Plant (WWTP) discharges into the Santa Fe River, except during times of snowmelt and storm runoff. Accelerated runoff due to urban and suburban development (e.g., roads, asphalt, buildings) in and around the City of Santa Fe are commonly experienced. From January 1, 2008 through December 31, 2009 the Santa Fe WWTP discharged an average volume of 3.70 million gallons/day (5.73 cfs). In addition to WWTP effluent, springs in the Santa Fe Canyon are believed to provide approximately 3 cubic feet/second (cfs) to the river within the Project area (SFWA 2002). The record of daily mean discharge at the La Bajada Gage (United States Geological Survey [USGS] Gage # 08317200 – Santa Fe River Above Cochiti Lake, NM) is displayed in Figure 2 (data is only available up

to September 30, 2008). The mean daily discharge for the period between January 1, 2008 and September 30, 2008 is 7.08 cfs. The influence of springs, as well as discharge from Cienega Creek probably account for the increased mean daily discharge observed between the amount released at the Santa Fe WWTP and the La Bajada Gage. The low flow in the summer months can be attributed to evapotranspiration, evaporation, and agricultural diversion, while the peaks can be attributed to storm events.

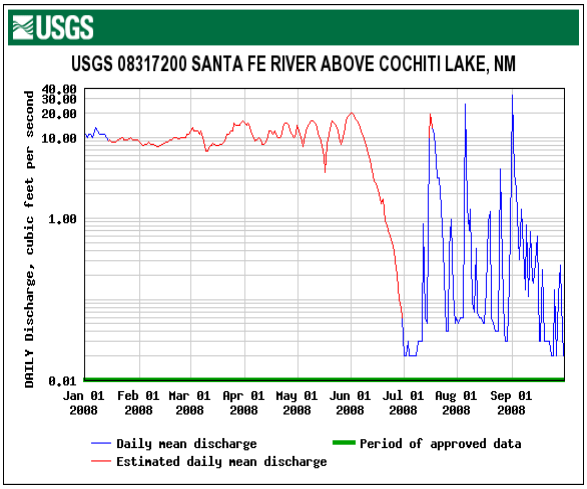


Figure 2. Daily Mean Discharge at USGS Gage 08317200 (January 01, 2008 – September 20, 2008).

Even though the current condition of the Santa Fe River above the Santa Fe WWTP is typically characterized as a dry, dewatered channel, storm runoffs can cause notable spikes in surface water discharge within the Project area. The storm peaks recorded at the La Bajada Gage, which are presented in Figure 3, display the magnitude of some of these events. During the July 26, 1971 event, the gage height was recorded as 9.58 ft with a flow of 11,400 cfs, while the July 10, 1996 had a gage height of 8.43 ft and a flow of 8,170 cfs. All of these annual peaks occurred between May and October. The magnitude of flood peaks and related erosion has probably been exacerbated since European settlement due to a variety of anthropogenic causes, including the following: the increase in impermeable surfaces (e.g., rooftops, pavement, and dirt roads) due to urban and suburban development; commercial sand and gravel mining from the immediate riverbed; and the loss of riparian vegetation concomitant with increased groundwater pumping from riverside wells that effectively cut off the riparian/groundwater connection.

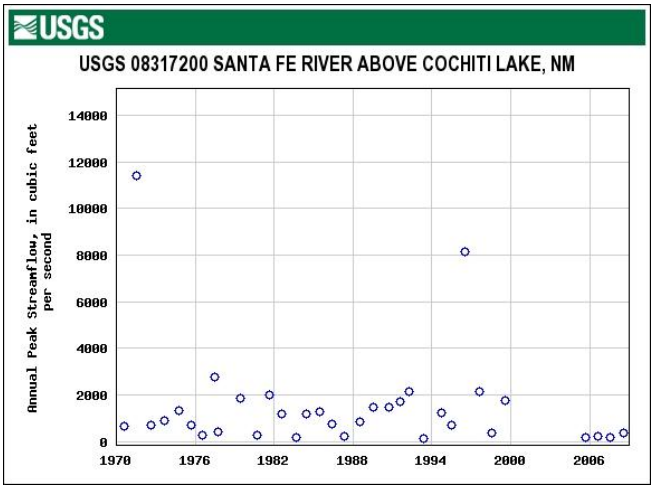


Figure 3. Annual Peak Streamflow at USGS Gage 08317200.

3.7.2 Water Quality

The following water quality standards apply to the Santa Fe River and perennial reaches of its tributaries from Cochiti reservoir upstream to the outfall of the Santa Fe wastewater treatment facility (NMAC 20.6.4.113):

A. Designated Uses: irrigation, livestock watering, wildlife habitat, marginal coldwater aquatic life, secondary contact, and warmwater aquatic life.
B. Criteria:

(l) In any single sample: pH within the range of 6.6 to 9.0, temperature 30°C (86°F) or less and dissolved oxygen 4.0 mg/L or more. Dissolved oxygen 5.0 mg/L or more as a 24-hour average. Values used in the calculation of the 24-hour average for dissolved oxygen shall not exceed the dissolved oxygen saturation value. For a measured value above the dissolved oxygen saturation value, the dissolved oxygen saturation value will be used in calculating the 24-hour average. The dissolved oxygen saturation value shall be determined from the table set out in Subsection N of 20.6.4.900 NMAC. The use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses listed above in Subsection A of this section.

(2) The monthly geometric mean of E. coli bacteria 548 cfu/100 mL or less, single sample 2507 cfu/100 mL or less (see Subsection B of 20.6.4.14 NMAC).

The Santa Fe River below the Santa Fe WWTP is an effluent-dominated system, thus the water quality within the Project area is directly influenced by the discharges of the WWTP. Water quality issues within the segment have prompted the NMED to list this segment of the Santa Fe River (Cochiti Pueblo Boundary upstream to Santa Fe WWTP; Water Quality Segment 20.6.4.113) as impaired and not fully supporting marginal coldwater aquatic life (NMED 2008). NMED (2008) listed impacts from abandoned mine lands (inactive), municipal (urbanized high density area), municipal point source discharges, and rangeland grazing as probable causes for impairment, resulting in Total Maximum Daily Loads (TMDLs) being established for the following water quality parameters:

- Nutrient/Eutrophication Biological Indicators – TMDL established 2009;
- Dissolved Oxygen – TMDL established 2001; and
- Sediment/Siltation – TMDL established 2000.

The listing for Dissolved Oxygen is probably due to algal growth that appears in response to plant nutrients available from the stream bottom (NMED 2008; NMED Undated). The excessive algal growth contributes to severe diurnal swings in both dissolved oxygen and pH and is indicative of nutrient overenrichment in the Santa Fe River (NMED Undated). While it is known that the Santa Fe WWTP discharge contains nutrients that contribute to the growth of algae, poor downstream and riparian area conditions exacerbate excessive algal growth and violations in water quality standards (NMED Undated). Figure 4 below displays a snapshot of the diurnal fluctuations in dissolved oxygen in the Project area. These fluctuations routinely violate the dissolved oxygen criterion of not less than 4 mg/L. The algae reduce the levels of dissolved oxygen in the river during the early hours of the morning as a result of respiration, which can be a limiting factor for aquatic communities in the Santa Fe River. The algae also increase the dissolved oxygen levels above saturation during warm, sunny afternoons.

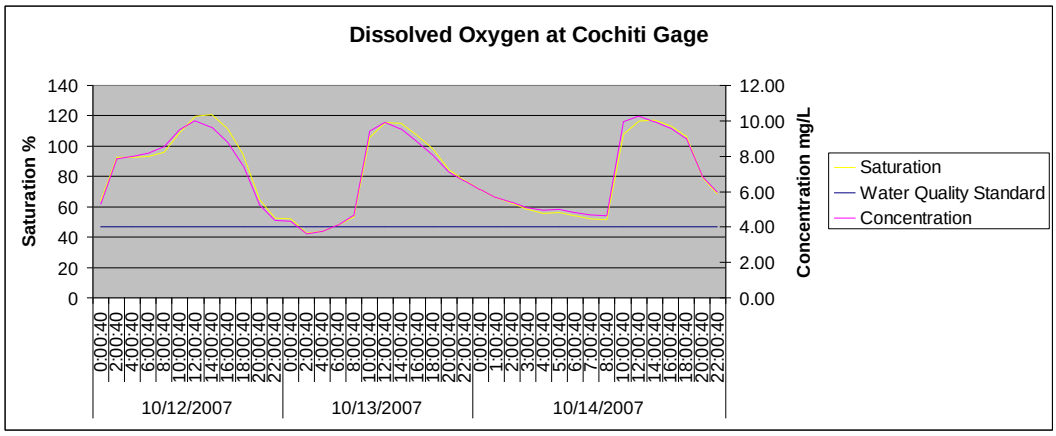


Figure 4. Santa Fe River Dissolved Oxygen Concentrations.

In addition to dissolved oxygen, the Santa Fe River experiences wide diurnal temperature fluctuations, some of which have exceeded water quality standards of 30°C (86°F). As displayed in Figure 5 below, temperature fluctuations of 15°C (27°F) between daytime and nighttime are commonly observed in the Project area. The primary factor influencing the fluctuations is lack of riparian shrubs and trees that effectively shade the river and block solar inputs. Wide temperature fluctuations, especially extremely high temperatures can harm aquatic communities.

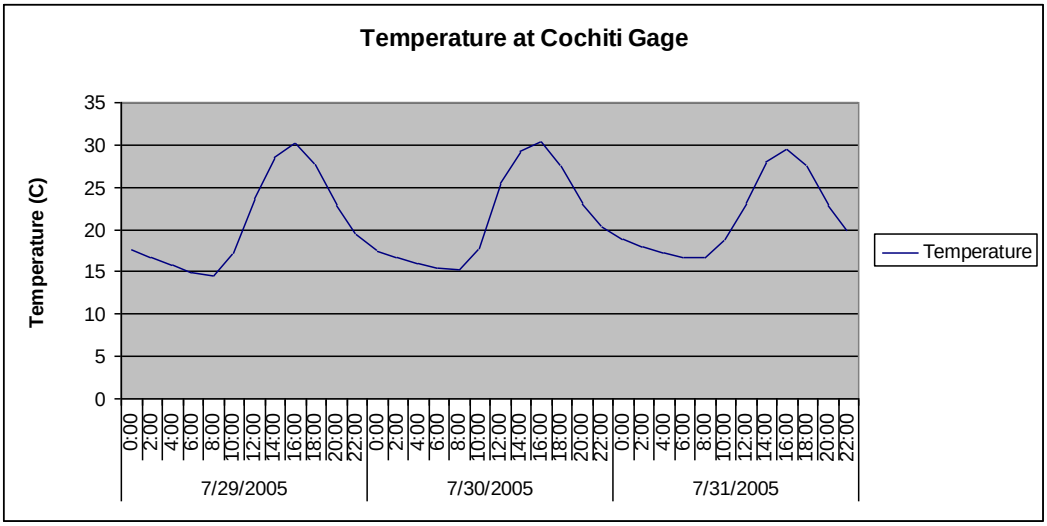


Figure 5. Santa Fe River Temperature.

Current information for the water quality of the Santa Fe River is available from the NMED Surface Water Quality Bureau. The available data for the Santa Fe River are characterized by a high degree of variability depending upon season, temperature, time of day, precipitation, and flow when the sample was taken. Some of this data is represented in Table 4.

Table 4. Water Quality Data by Constituent at the Lower Santa Fe River Preserve (NMED Water Quality Station 30SantaF030.5)

Date	3/23/2005	7/12/2005	9/6/2005	10/5/2005	6/5/2008
Time	1200	1100	1245	1530	1320
Flow (cfs)*	32	0.3	3.2	5.9	14
Alkalinity (mg/l)	96	175	N/A	172	159
Ammonia (mg/l)	0.1	0.1	0.1	0.18	0.1
Calcium (mg/l)	28.7	40.6	36.4	33.3	34.3
Chloride (mg/l)	23.3	72.4	N/A	59.2	65.2
E. coli (Units/100ml)	N/A	140.1	N/A	N/A	N/A
Hardness (mg/l)	89.1	117	102	93.5	105
Nitrate + Nitrite (mg/l)	2.4	0.19	0.51	0.68	5.4
Total Phosphorus (mg/l)	0.79	0.91	1.51	0.7	1
Sulfate (mg/l)	27.6	41	N/A	42.3	39.8
Total Dissolves Solids (mg/l)	268	426	430	428	446
Total Suspended Solids (mg/l)	447	3	31	47	3

*Average daily flow at USGS Gage 08317200

A domestic water well is located adjacent to the Project area, approximately 200 feet from the centerline of the river. This well pipes water underground to serve the community of La Bajada.

3.8 Riparian Vegetation

The upstream portion of the Project area consists of a relatively wide (approximately 100 m) floodplain and terrace complex, with an approximately 30 m-wide strip of obligate riparian vegetation to a somewhat restricted floodplain (40-85 m) with a 25-35 m-wide strip of obligate riparian vegetation. The area currently supports closed-canopy Russian olive patches with little or no understory vegetation and open and frequently flooded areas dominated by non-native herbaceous species such as creeping bentgrass (*Agrostis stolonifera*), as well as native herbaceous species such as knotgrass (*Paspalum distichum*) and alkali muhly (*Mulenbergia asperifolia*), which are present to a lesser extent. The infrequently flooded terraces are dominated by the shrubs rubber rabbitbrush (*Ericameria nauseosa*), one-seed juniper (*Juniperus monosperma*), and Russian olive, with little herbaceous vegetation observed. Very scattered individuals of Gooding's willow and coyote willow exist in this area.

The middle portion of Project area consists of a wide (110-180 m) floodplain and terrace complex, with a strip of obligate riparian vegetation ranging from 40-85 m wide. The floodplain in this reach currently supports areas of closed-canopy Russian olive with little or no understory vegetation, areas of scattered Russian olive with understory vegetation consisting of tall fescue (*Festuca arundinaceae*), and alkali muhly, as well as open and frequently flooded areas dominated by non-native herbaceous species such as creeping bentgrass, as well as native herbaceous species such as knotgrass and common threesquare (*Schoenoplectus pungens*). The infrequently flooded terraces are dominated by the shrubs rubber rabbitbrush, one-seed juniper, Russian olive, and occasional saltcedar, with little herbaceous vegetation observed. Near the USDI, BLM and USDA, FS boundary saltcedar becomes more prevalent, making up approximately one-third of the relative shrub cover.

The vegetation in the downstream potion of the Project area shifts from a Russian olive dominated system to a saltcedar dominated stand, however, young individuals of Goodding's willow, Rio Grande cottonwood, and coyote willow are present in limited numbers.

As is visible with the list of common plant species encountered at the Project area (Table 5), the area contains many non-native/introduced species. This could be an indication frequent disturbance.

Table 5. Common Flora Found in the Riparian Zone and Terraces of the Project Area.

Common Name	Scientific Name	Native/Non-native
Shrubs/Trees		
Apache plume	*Fallugia paradoxa*	Native
Broom snakeweed	*Gutierrezia sarothrae*	Native
Coyote willow	*Salix exigua*	Native
Fourwing saltbush	*Atriplex canescens*	Native
Goodding's willow	*Salix gooddingii*	Native
Oneseed juniper	*Juniperus monosperma*	Native
Rio Grande cottonwood	*Populus deltoides* ssp. *wislizeni*	Native
Rubber rabbitbrush (Chamisa)	*Ericameria nauseosa*	Native
Russian olive	*Elaeagnus angustifolia*	Non-native
Saltcedar	*Tamarix ramosissima*	Non-native
Siberian elm	*Ulmus pumila*	Non-native
Three-leaf sumac	*Rhus trilobata*	Native
Tree of heaven	*Ailanthus altissima*	Non-native
Trumpet gooseberry	*Ribes leptanthum*	Native
Herbaceous plants		
Alkali muhly	*Muhlenbergia asperifolia*	Native
Alkali sacaton	*Sporobolus airoides*	Native
Baltic rush	*Juncus arcticus*	Native
Barnyardgrass	*Echinochloa crus-galli*	Non-native
Bluegrass	*Poa annua*	Non-native
Blue grama	*Bouteloua gracilis*	Native
Bottlebrush squirreltail	*Elymus elymoides*	Native
Cheatgrass	*Bromus tectorum*	Non-native
Common threesquare	*Schoenoplectus pungens*	Native
Common spikerush	*Eleocharis palustris*	Native
Creeping bentgrass	*Agrostis stolonifera*	Non-native
Curly dock	*Rumex crispus*	Non-native
Indian ricegrass	*Achnatherum hymenoides*	Native
Inland saltgrass	*Distichlis spicata*	Native
Japanese brome	*Bromus japonicas*	Non-native
Knotgrass	*Paspalum distuchum*	Native
Kochia	*Bassia prostrate*	Non-native
Puncturevine	*Tribulus terrestris*	Non-native
Rabbitsfoot grass	*Polypogon monspeliensis*	Non-native
Russian thistle	*Salsola kali*	Non-native
Sand dropseed	*Sporobolus cryptandrus*	Native
Sideoats grama	*Bouteloua curtipendula*	Native
Tall fescue	*Festuca arundinaceae*	Non-native
Watercress	*Rorippa nasturtium-aquaticum*	Non-native
Yerba mansa	*Anemopsis californica*	Native

3.9 Riparian Soils

Soils information is taken from the Soil Survey for the Santa Fe County Area, New Mexico (NRCS 2009). The soils in the Project area are defined as Cuyamungue-Riverwash complex, 0 to 2 percent slopes, flooded. These alluvial soils are typically found on the flood plains on valley floors and are derived from granite, gneiss, schist, and granitic sandstone. Cayamungue-Riverwash soils are excessively drained, frequently flooded, and are characterized by sand and gravel throughout their profile. They are commonly found in streambeds, arroyos, and on floodplains. Due to a prolonged history of grazing within the canyon, many areas of bare or minimally covered soils are prevalent throughout the Project area.

In 1915 or 1916 copper deposits were located within the Santa Fe River Canyon. The La Bajada Copper Mining Company formed in 1923 to work these deposits. Data compiled by the New Mexico Bureau of Mines and Mineral Resources indicates that operations at the La Bajada mine site occurred primarily in the years 1928 and 1929, when approximately seventeen tons of ore were extracted. The copper deposits were mined through two shafts located somewhere near the edge of talus slope north of the river. Copper mining at La Bajada was never very profitable and in 1929 the deposits played out and the mining company dissolved.

In 1950, uranium was discovered in waste tailings at the abandoned La Bajada Copper Mine and in 1955 a 160-acre area was leased to mine uranium deposits on unsurveyed lands in the southeast corner of the La Majada Grant. In 1975, a second lease of 448 acres was granted immediately to the south of the first lease. The bulk of uranium extraction at the mine occurred between 1956 and 1966. Approximately 8,700 metric tons of uranium ore was mined during that timeframe. Initially, the uranium ore was mined through underground shafts, but in 1957 the underground operations were declared unsafe and production shifted to open pit mining.

The end of strip-mining operations at the mine in 1966 left vast areas of disturbance in this portion of the canyon, including dangerous open pits and large radioactive tailings piles. In the summer of 1984, the Tesuque Ranger District of the Santa Fe National Forest began a project to reclaim the mine site and mitigate the potential threats to public health. The reclamation plan called for the most severely contaminated mine tailings, along with trash deposits, to be pushed into a depression and capped with less contaminated tailings. A second phase of reclamation in 1986 included the burial of additional contaminated material, re-contouring of the overburden piles, and the plowing and seeding of much of the site. Testing at the site continues currently.

3.10 Visual Resources and Recreation

3.10.1 Visual Resources

The USDI, BLM and USDA, FS have established a Visual Resource Management (VRM) and Visual Quality Objectives (VQO) system, respectively, to inventory and manage visual resources on public lands that fall under their jurisdiction. The primary objective of VRM and VQO systems are to maintain the existing visual quality of public lands and to protect unique and fragile visual resources. The USDI, BLM VRM and USDA, FS VQO systems use four classes to describe the different degrees of modification allowed to the landscape. VRM and VQO classes are visual ratings that describe an area in terms of visual quality, viewer sensitivity to the landscape, and the distance in which a viewer could observe an area. Once an area has been assigned a VRM or VQO class, that class can be used to analyze and determine the visual impacts of proposed activities on the land, and to gauge the amount of disturbance an area can tolerate before it exceeds the visual objectives of its VRM or VQO class.

The USDI, BLM portion of the Project area has been inventoried as a Class II area. The objective of VRM Class II is to retain the existing character of the landscape. While management activities may be seen, they should not attract the attention of the casual observer. Furthermore, any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape (USDI, BLM 1986). The USDA, FS portion of the Project area has been inventoried with a VQO of Partial Retention. The primary objective of this designation is that management activities may be evident, but must remain subordinate to the characteristics of the landscape (USDA, FS 1987).

3.10.2 Recreation

The Santa Fe River Canyon provides access for a variety of activities, including hiking, wildlife viewing, sightseeing, and cultural resource exploration. Besides the private landholdings within the canyon, the river corridor is entirely undeveloped and provides an area for local citizens and tourists to experience outdoor recreation on public lands. While the area is within 10 miles of Santa Fe, its recreational use is somewhat limited, probably due to limited points to access the canyon and river corridor from public lands.

3.11 Wild and Scenic Rivers

Four miles of the lower Santa Fe River (including a portion of the Project area) has been determined eligible for designation under the National Wild and Scenic River (NWSR) System in the Draft Taos Resource Management Plan. A river is "eligible" for inclusion in the NWSR System if the stream is free-flowing and "the related adjacent land area possesses outstandingly scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values" (U.S.C. § 1273 (b)). The USDI, BLM's identification of an eligible river segment reflects the agency's determination that the segment has the potential to be included in the NWSR System, however inclusion in the System requires either congressional or, in some circumstances, Secretarial action.

Once a river segment has been determined 'eligible,' the USDI, BLM shall afford protective management and, where possible, enhance any identified outstandingly remarkable river values, as necessary to ensure that the existing qualities upon which their eligibility is based are not degraded. Per BLM Manual 8351.32C, (USDI, BLM 1992):

> *"When a river segment is determined eligible and given a tentative classification (wild, scenic, and/or recreational), its identified outstandingly remarkable values shall be afforded adequate protection, subject to valid existing rights, and until the eligibility determination is superseded, management activities and authorized uses shall not be allowed to adversely affect either eligibility or the tentative classification…Specific management prescriptions for eligible river segments should provide protection in the following ways:*
>
> 1. *Free-flowing Values. The free-flowing characteristics of eligible river segments cannot be modified to allow stream impoundments, diversions, channelization, and/or rip-rapping to the extent the BLM is authorized under law.*
>
> 2. *River-related Values. Each segment shall be managed to protect identified outstandingly remarkable values (subject to valid existing rights) and, to the extent practicable such values shall be enhanced.*

3. *Classification Impacts. Management and development of the eligible river and its corridor cannot be modified, subject to valid existing rights (see .52 below), to the degree that its eligibility or tentative classification would be affected (i.e., its tentative river area classification cannot be changed from wild to scenic, or from scenic to recreational). Should a nonsuitable determination be made in the RMP process, then the river shall be managed in accordance with management objectives outlined in the plan document."*

The Draft Taos Resource Management Plan designated the segment under the recreational classification and identified its outstandingly remarkable values as recreation, cultural, and fish habitat (USDI, BLM 2010a). Management of recreational river areas focuses on protecting the values which make it outstandingly remarkable while providing river—related outdoor recreation opportunities in a recreational setting. Recreational classification is a determination of the level of development and does not prescribe or assume recreation development or enhancement. The basic distinctions between a "scenic" and a "recreational" river area are the degree of access, extent of shoreline development, historical impoundment or diversion, and types of land use. In general, a variety of agricultural, water management, silvicultural, recreational, and other practices or structures are compatible with recreational river values, providing such practices or structures are carried on in such a way that there is no substantial adverse effect on the river and its immediate environment.

Chapter 4: Environmental Effects

4.1 Direct and Indirect Effects

This chapter describes the anticipated effects on the resource issues if the alternatives are implemented. The general effects of each alternative on resource categories are addressed. Direct effects are caused by an action and occur at the same time and place. Indirect effects are caused by an action and occur later in time or farther removed in distance. Mitigation and/or environmental commitments that would be implemented to offset or reduce impacts to the human environment are contained in Appendix C.

4.1.1 Alternative A: Proposed Action

4.1.1.1 *Areas of Critical Environmental Concern*

The Proposed Action is consistent with the management objectives of the La Cienega ACEC, which includes improving water and wildlife resources by augmenting native species and controlling competition from non-native species by reducing or eliminating them (USDI, BLM 1995). However, the Proposed Action would result in temporary increases in noise levels while construction activities are taking place (October through April) due to the use of chainsaws, chippers, heavy machinery, and vehicular traffic. The presence of workers as well as noise may negatively impact visitors to the La Cienega ACEC. The Proposed Action would also result in temporary visual impacts due to the disturbance associated with non-native shrub and tree removal, and the planting of native riparian species. Once completed, the Project would improve riparian, wildlife, and scenic values of the La Cienega ACEC, as addressed in the following sections.

4.1.1.2 *Cultural Resources*

The management recommendations contained in the Class III heritage resource report (Pierce 2010) will be followed to avoid any disturbance to cultural/historic resources. Boundary flags will be placed around sites that have the potential to be disturbed by project activities to ensure complete avoidance by human or vehicle traffic. With the management recommendations cited in Pierce 2010 implemented the proposed work should have no effect on cultural and heritage resources.

4.1.1.3 *Wildlife*

General Wildlife

Wildlife species inhabiting the immediate action area, such as amphibians, reptiles, and small mammals (e.g., rodents), could be temporarily displaced during the implementation of the Proposed Action. In addition, the Proposed Action would change the current vegetation composition and structure from a Russian olive- and saltcedar-dominated riparian forest to a more diverse assemblage of native riparian species. The removal of non-native species is expected to result in short-term impacts on wildlife species that utilize the area by temporarily reducing cover and forage. Removing patches of Russian olive and saltcedar from the existing riparian community would alter and/or remove some of the vertical and horizontal structure of vegetation currently found along the Santa Fe River. While the Proposed Action would not remove all of the Russian olive within the Project area, the temporary 50-75% reduction in its relative cover would also have short-term impacts on forage resources due to the associated reduction in berry production.

The replacement of non-native species with native riparian species (e.g., cottonwood and willow) has the potential to provide adequate foraging and dam/lodge-building material for North American beaver (beaver; *Castor canadensis*). It is anticipated that beaver will inhabit the Project area, if the Proposed Action results in viable habitat conditions. Beaver live in family groups called colonies that usually consist of an adult pair along with the young of the current and previous years (Olson and Hubert 1994,

Longcore et al. 2007). In situations where beaver are not exploited, densities may average one or two colonies per mile on stream reaches with suitable habitat (Naiman et al. 1986, Olson and Hubert 1994, Müller-Schwarze and Sun 2003). Each colony may create several ponds, which may range in size from small pools up to several hectares (Collen and Gibson 2001).

The potential inhabitation by beaver to the Project area following the Proposed Action would likely result in impacts to the aquatic fish community. Most studies conducted in the western US have found a positive effect of beaver on fisheries (Grasse and Putnam 1950, Rutherford 1964, Collen and Gibson 2001). Importantly, beaver can modify the hydrology and geomorphology of streams to create habitat for fish where no suitable habitat previously existed (Apple et al. 1995). For example, beaver restoration in a stream reach in Wyoming resulted in the colonization of the area by trout and several species of suckers (Apple 1983). Beaver-induced changes on small streams that either increase low flows or make intermittent streams perennial have obvious implications for fish (Finley 1937). Beaver ponds can serve as refugia that maintain fish during drought or allow fish to overwinter (Jakober et al. 1998, Collen and Gibson 2001). On cold-water streams in the western US beaver ponds enhance fish production due increased abundance of aquatic insects (Huey 1956, Neff 1957, Gard 1961, Rutherford 1964, Hodkinson 1975). For example, in New Mexico streams with beaver had four times more trout and the trout averaged larger in size (Huey 1956). In Colorado, brook trout were larger in beaver ponds than in adjacent streams and new beaver ponds produced greater numbers and volume of brook trout as compared to older ponds (Rutherford 1955).off (Collen and Gibson 2001).

Beaver create vital habitat for many species of frogs and toads. For example, in Alberta frogs and toads only bred in streams with beaver activity (Stevens et al. 2007). Juvenile production of wood frogs was ten times higher in beaver ponds than other kinds of pools (Karraker and Gibbs 2009). Older beaver ponds supported more breeding wood frogs (Stevens et al. 2006). Occurrence of mink frogs was strongly associated with presence of beaver and pond size (Popescu and Gibbs 2009). In Maine, presence of beaver wetlands was a key predictor of high diversity of frogs and salamanders (Cunningham et al. 2007). In South Carolina, beaver ponds had more frogs, toads, lizards, and turtles and higher diversity of reptiles than in unimpounded streams (Metts et al. 2001).

Beaver create food for large mammals including raccoon, bears, deer, elk, and moose (Rosell et al. 2005). In forested areas, beaver meadows are important sources of succulent plants used by ungulates and bears (Kay 1994). The beaver-willow mutualism results in abundant riparian willows, which are used as browse by ungulates (Coady , Kay 1994, Kay 1997, Baker et al. 2005). Moose may be more likely to not harm willows than other ungulates because they have lower population densities and they feed high up in the shrubs rather than lower on new shoots (Smith 2007). During fall and winter ungulates make use of bark and branches from trees that have been felled by beaver (Rosell et al. 2005). Beaver ponds can provide a source of drinking water for wildlife during drought. Several species of carnivores have been reported using beaver lodges as dens and utilizing beaver for prey (Rosell et al. 2005).

Beaver enhance habitat for other semi-aquatic mammals including muskrat, mink, and river otter (Leighton 1933, Rutherford 1955, Neff 1957, Dubuc et al. 1990, McKinstry et al. 1997, Rosell et al. 2005). For example, river otters select watersheds with high proportions of beaver wetlands because these provide key habitat factors such as stable water levels, cover, and abundant food (Dubuc et al. 1990). In Idaho, beaver benefitted otters by providing the primary sites for denning and resting, which was primarily in beaver bank dens and lodges (Melquist and Hornocker 1983). There are few quantitative data on the impact of beaver activities on small mammals, although it is expected that beaver would enhance habitat for species associated with riparian habitats. Studies have found higher densities of shrews, voles, and jumping mice at beaver modified areas as compared to unmodified stream researches (Medin and Clary 1991, Suzuki and McComb 2004). In the American Southwest, a dramatic decline in the distribution of the meadow jumping mouse was attributed, in part, to the loss of beaver (Frey and

Malaney 2009). Beaver improve habitat for bats by creating still pools used for drinking, snags used for roosting, and openings used for hunting (Menzel et al. 2001, Brooks and Ford 2005).

The Proposed Action is expected to result in long-term beneficial effects to terrestrial riparian wildlife, such as amphibians, reptiles, and small mammals (e.g., rodents) from improved ecological diversity, increased horizontal and structural diversity, and increased forage diversity. In addition, the Proposed Action is expected to increase the quality of fisheries habitat by increasing stream shading, reducing nutrient loads, and stabilizing streambanks, which is expected to improve water quality (discussed further in Section 4.1.1.7).

Because the Proposed Action would be implemented over at least ten years, work would be completed in non-contiguous patches, and only 50-75% of the non-native shrub and tree relative cover would be removed throughout the Project area, the Proposed Action would not result in a significant reduction in available habitat and/or foraging opportunities. While short-term reductions in available habitat are unavoidable when undertaking the Proposed Action, native vegetation would be actively restored concurrent with non-native shrub and tree removal and when mature, would increase the biological, horizontal, and vertical diversity within the Project area. The short-term effects would be outweighed by the long-term benefits of a healthier and more ecologically diverse riparian ecosystem.

Migratory Birds

The Proposed Action would temporarily alter and/or reduce the composition and structure, as well as the forage capacity that is provided by the existing non-native shrub and tree community. The short-term reduction in horizontal and vertical structure that would occur with the Proposed Action could impact riparian-dependent migratory bird species that utilize the area. Because treatment areas would remain small, are dispersed throughout the Project area, and would only eliminate a portion (50-75%) of the non-native shrubs and trees within the Project area, perch, nesting, and foraging habitat would still be available in the Project area throughout the duration of the Project.

It is important to note that Russian olive does serve important wildlife habitat functions as their berries have been proven to be an important forage source for some birds and mammals (Knopf and Olson 1984; Stoleson and Finch 2001; Stannard et al. 2002), including some of those known to utilize the Santa Fe River riparian corridor. However, the Proposed Action is expected to result in long-term beneficial effects to migratory birds due to improved ecological diversity, increased horizontal and structural diversity, increased forage diversity (e.g., fruits and insects), and increased available habitat niches. When comparing native willow-dominated sites to Russian olive-dominated sites along the Snake River in Idaho, Brown (1990) found that willow sites had higher bird species richness, density, foraging guilds, and nesting guilds than Russian olive sites. Brown (1990) also noticed an absence of insects as one of the characteristics of Russian olive that is implicated in its negative effects on avian diversity. Other studies have also observed a decline in habitat for cavity-nesting and insectivorous avifauna in non-native riparian ecosystems when compared to those dominated by native riparian woody plants (Knopf and Olson 1984; Olson and Knopf 1986). In a study conducted on the Gila River in Grant County, New Mexico, Stoleson and Finch (2001) found that while Mourning Dove (*Zenaida macroura*) and Yellow-breasted Chat (*Icteria virens*) nested at a disproportionately higher rate in Russian olive, only 11 of the 29 bird species observed during the four years of surveys were found to nest in Russian olive; all others nested in native-species dominated stands. In addition, Stoleson and Finch (2001) found that no primary or secondary cavity nesters were located in stands dominated by Russian olive.

Because the Proposed Action would be implemented over at least ten years, work would be completed in non-contiguous patches, and only 50-75% of the non-native shrub and tree relative cover would be removed throughout the Project area, the Proposed Action would not result in a significant reduction in available habitat and/or foraging opportunities for migratory birds. While short-term reductions in

available habitat are unavoidable when undertaking the Proposed Action, native vegetation would be actively restored concurrent with non-native shrub and tree removal and when mature, would increase the biological, horizontal, and vertical diversity within the Project area. Thus, the short-term effects would be outweighed by the long-term benefits of a healthier riparian ecosystem.

To avoid direct impacts to migratory birds, non-native removal and planting activities would be scheduled to take place outside of the migratory bird breeding season (April 15 – September 15). In addition, a Golden Eagle nest is located within the canyon adjacent to the Project area, which could become occupied as early as February. To avoid potential impact to the Golden Eagle, that may occupy and/or utilize the area, monitoring of the nest site for negative Project-related effects (e.g., flushing from the nest or alarm calls) when Project activities would take place within ½ mile from the nest would be implemented. If disturbance is noted, Project-related activities would cease. In addition, if a Golden Eagle, or other bird of prey, are observed within one-quarter mile of active restoration areas in the morning before activity starts, or arrives during breaks in activity, all restoration activities would suspend until the bird leaves on its own volition. If a Golden Eagle or other bird of prey arrive during construction activities, or is observed more than one-quarter mile from the active construction site, restoration activities would not be interrupted.

The upstream end of the Project area is located approximately two miles southwest of the Santa Fe Municipal Airport. Concerns have been raised that implementation of the Proposed Action could result in additional potential wildlife hazards due to increased migratory bird and waterfowl use in the Project area. Specifically, Advisory Circular 150/5200-33B – Hazardous Wildlife Attractants on or Near Airports (U.S. Department of Transportation, Federal Aviation Administration 2007) recommends a separation distance of 10,000 feet at airports for any hazardous wildlife attractants (e.g., additional wetlands); and recommends a distance of five statute miles between the farthest edge of the AOA and the hazardous wildlife attractant if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace. No work associated with the Proposed Action is planned to take place within 10,000 feet of the AOA. However, work is proposed within the five-mile buffer of the AOA. The Proposed Action is not anticipated to result in an increase of hazardous wildlife movement into or across the approach or departure airspace surrounding the Santa Fe Municipal Airport.

The potential inhabitation by beaver to the Project area following the Proposed Action would likely result in impacts to the avian community A number of studies have documented higher bird abundance and diversity associated with beaver activity in comparison with sites without beavers (Medin 1990, Grover and Baldassarre 1995, McKinstry et al. 2001, Bulluck and Rowe 2006, Longcore et al. 2006, Aznar and Desrochers 2008, Cooke and Zack 2008, Chandler et al. 2009). For example, a study in Wyoming found that species richness and abundance of riparian birds was associated with beaver dam density (Cooke and Zack 2008). One study showed that beaver meadows had more species of birds than active ponds (Aznar and Desrochers 2008). Woodpeckers used beaver ponds more frequently than river bottom habitat, perhaps due to the snags created by flooded trees (Lochmiller 1979). Beaver activity was associated with greater diversity and abundance of neotropical migratory birds (Bulluck and Rowe 2006).

Disturbance-dependent birds, such as those that depend on scrub-shrub habitats, have been in decline and are of conservation concern (Hunter et al. 2001, Chandler et al. 2009). Beavers create these scrub-shrub habitats and scrub-shrub bird abundance was shown to increase with both increasing complexity and area of these beaver habitats (Chandler et al. 2009). In a study in Idaho, beaver pond habitat dominated by willows had three times the density and richness of birds in comparison with an unmodified stream reach that lacked willows (Medin 1990). Because beaver promote the growth of willows, they can create habitat suitable for endangered birds such as the southwestern willow flycatchers and least Bell's vireo (Longcore et al. 2007).

In the western US, beaver ponds are especially important habitat for waterfowl (McKinstry et al. 2001) . In the high country of Colorado ducks only used beaver ponds, including for nesting, to the exclusion of all other water types (Rutherford 1955). In Wyoming, there were 7.5 ducks/km on streams with beaver ponds compared to 0.1 ducks/km on streams without beaver (McKinstry et al. 2001). One study found that the vast majority of brood production by water birds was in beaver-created wetlands likely due to greater macroinvertebrate abundance (Longcore et al. 2006).

4.1.1.4 *USDA, FS Management Indicator Species*

Rocky Mountain Elk

The Proposed Action would not result in permanent loss of habitat available for elk and would not impact forest-wide populations. During the Project, there would be disturbance from Project activities and elk would potentially avoid the immediate area of disturbance. The removal of non-native shrubs and trees would not reduce the amount of forage available for elk browsing. In addition, the removal of dense stands of Russian olive and saltcedar could result in more understory grass and forb species being available in the long term. Elk are also known to browse native riparian shrub and tree species, which would increase if the Proposed Action is implemented. The Proposed Action would benefit elk from this enhancement in grazing quality and quantity.

Mourning Dove

The Proposed Action would not result in permanent loss of habitat for the Mourning Dove and would not impact forest-wide populations. The Proposed Action would result in a potential short-term reduction in the availability of nesting/roosting trees within the Project area. However, because treatment areas would remain small, are dispersed throughout the Project area, and would not eliminate all non-native shrubs and trees within the Project area, perch, nesting, and foraging habitat would still be available within the Project area throughout the duration of the Project. Following successful establishment of native shrub and tree species, the Proposed Action would benefit Mourning Dove by increasing habitat availability and diversity.

Piñon Jay

The Proposed Action would have little, if any impact on the Piñon Jay. Only non-native riparian shrub and tree species would be removed, which the Piñon Jay would only infrequently use. The Proposed Action would not impact stands of piñon-juniper, the primary habitat component for the species.

4.1.1.5 *USDI, BLM and USDA, FS Sensitive Species*

Only sensitive species, or their habitats, that were determined in the associated BA/E (USDI, BLM 2010b) to have the potential to be impacted by the proposed Project are discussed in this section. For further information on other potentially occurring species and impact analyses, see the BA/E.

Botta's Pocket Gopher

If Botta's pocket gopher is present within the Project area, non-native shrub and tree removal would be expected to have short-term negative impacts on the species because the removal of non-native streamside vegetation could reduce cover from predators. In addition, the use of equipment during removal of non-native shrub and tree species and subsequent planting of native shrub and tree species (e.g., trackhoe and skidsteer) could cause mortality or injury to individual pocket gophers crushing of hibernating individuals if they are present at the Project site. Temporary fencing around native species planting areas (built to protect newly planted vegetation from grazing/browsing of ungulates) could increase the height and density of herbaceous vegetation (e.g., grasses, sedges, and forbs), which could increase the effectiveness of cover from predation and ultimately increase forage availability.

There would be short-term negative impacts and long-term positive impacts to Botta's pocket gopher associated with the Proposed Action if the species is present, or if the species inhabits the area in the future. To the extent possible, the construction would occur while the gopher is hibernating from September to May. The Proposed Action would not be expected to decrease population viability or cause a trend to federal listing of this species.

Bald Eagle

Due to known wintering populations at Cochiti Reservoir (NMDGF 2009b), it is considered possible that migrating/wintering Bald Eagles could use the Project area for roosting and foraging. No direct or indirect impacts to nesting or breeding habitat would be associated with the Proposed Action; however, roosting and foraging habitat may be impacted in the short-term. If present within the Project area, Bald Eagles would most likely avoid the active restoration area, meaning that roosting and foraging opportunities may be temporarily reduced. In addition, the removal of large Russian olive within the Project area may temporarily decrease available perch sites within the Project area. However, the re-establishment of native riparian species is expected to increase both species diversity and habitat structure within the Santa Fe River riparian area. Over time, this may lead to more perch and roosting opportunities as native riparian species reach maturity.

There could be short-term negative impacts and long-term positive impacts to the Bald Eagle associated with the Proposed Action if the species is present, or if the species inhabits the area in the future. However, Mitigation measures for Golden Eagles discussed in Section 4.1.1.3 will also be applied to Bald Eagles to eliminate impacts. The Proposed Action would not be expected to decrease population viability or cause a trend to federal listing of this species.

Northern Leopard Frog

Non-native shrub and tree removal would be expected to have short-term negative impacts on the northern leopard frog because they rely on dense, streamside vegetation for cover from predators which could be temporarily reduced during construction activities. The use of equipment during removal of non-native shrub and tree species and subsequent planting of native shrub and tree species (e.g., trackhoe and skidsteer) could cause mortality or injury to the northern leopard frog as a result of crushing of hibernating individuals if they are present at the Project site. In addition, the removal of non-native shrub and tree root balls could unearth hibernating individuals.

The Proposed Action is expected to have long-term benefits on the northern leopard frog. In riparian and wetland habitats where these species occur, invasion and spread of non-native plant species typically results in degraded habitat. For example, the invasion of habitat by saltcedar is a threat because it displaces native plant species, such as rushes and sedges, and because salt exudation from saltcedar leaves could reduce the prevalence of a lower canopy flora, on which the northern leopard frog relies upon for its habitat. Treatments that reduce the coverage of non-native plant species and re-establish native species could also increase the suitability of wetland and riparian areas within the range of the northern leopard frog, potentially increasing the available habitat for these species in the future. In addition, temporary fencing around native species planting areas (built to protect newly planted vegetation from grazing/browsing of ungulates) could increase the height and density of herbaceous vegetation (e.g., grasses, sedges, and forbs), which could increase the effectiveness of cover from predation, and could ultimately benefit the northern leopard frog prey base.

There could be short-term negative impacts and long-term positive impacts to the northern leopard frog associated with the Proposed Action if the species is present, or if the species inhabits the area in the future. The Proposed Action would not be expected to decrease population viability or cause a trend to federal listing of this species.

Texas Horned Lizard

The Texas horned lizard could be negatively impacted by the transport of heavy equipment and vehicles over upland terrestrial areas while accessing the riparian area for construction-related activities.

The likelihood of injuring the Texas horned lizard is low, but cannot be eliminated entirely. The Proposed Action would not be expected to decrease population viability or cause a trend to federal listing of this species.

Flathead Chub

While the flathead chub was not observed during fisheries surveys conducted by the USDI, BLM during spring 2009 (USDI, BLM 2009), the potential for its occurrence cannot be eliminated due to its known occurrence within the Rio Grande and its tributaries (NMDGF 2009e). If the species is present, short-term direct and indirect impacts could result from Project implementation due to machinery stream crossings, which could mobilize channel-bottom sediment deposits and temporarily increase localized turbidity levels. In addition, the disturbance of riparian soils associated with machinery transport and removal of non-native shrub and tree root wads could temporarily increase upland-generated sediment inputs into the Santa Fe River until native species become established.

Over time, long-term benefits to the Flathead chub are expected to occur due to moderated stream temperatures that would be provided due to the increase in shade provided once re-established native riparian plants reach maturity. In addition, temporary fencing around native species planting areas (built to protect newly planted vegetation from grazing/browsing of ungulates) could increase the height and density of herbaceous vegetation (e.g., grasses, sedges, and forbs), which could decrease floodwater velocity during large storm events, thereby decreasing erosion and sediment generated during these events. The Proposed Action would not be expected to decrease population viability or cause a trend to federal listing of this species.

Rio Grande Sucker

Short-term direct and indirect impacts could result from Project implementation due to machinery stream crossings, which could mobilize channel-bottom sediment deposits and temporarily increase localized turbidity levels. In addition, the disturbance of riparian soils associated with machinery transport and removal of non-native shrub and tree root wads could temporarily increase upland-generated sediment inputs into the Santa Fe River until native species become established.

Over time, long-term benefits to the Rio Grande sucker are expected to occur due to moderated stream temperatures that would be provided due to the increase in shade provided once re-established native riparian plants reach maturity. Temporary fencing around native species planting areas (built to protect newly planted vegetation from grazing/browsing of ungulates) could increase the height and density of herbaceous vegetation (e.g., grasses, sedges, and forbs), which could decrease floodwater velocity during large storm events, thereby decreasing erosion and sediment generated during these events.

The Proposed Action is expected to provide a net long-term benefit to this species, but also unfavorable short-term sedimentation conditions. The Proposed Action would not be expected to decrease population viability or cause a trend to federal listing of this species.

4.1.1.6 *USDI, FWS Threatened and Endangered Species*

Southwestern Willow Flycatcher

While suitable nesting and breeding habitat does not occur within the Project area, the area is likely used as migratory stopover habitat by the SWFL. The Proposed Action could directly, albeit temporarily affect the amount of stopover habitat available for the SWFL to use during spring and fall migration by altering

the composition and structure of the existing riparian habitat, as well as the insect composition. The use of heavy equipment and machinery to excavate root balls of non-native species and subsequently plant native species would take place between October and early-April (outside of the migratory bird breeding season), which would have no direct effect to the SWFL.

The Proposed Action would be expected to have a long-term positive affect on the SWFL. The re-establishment of native species is expected to increase both species diversity and habitat structure within the Santa Fe River riparian area, and is directly geared toward creating habitat for riparian obligate species such as the SWFL. The outcome of this could positively benefit the SWFL in the future, with one of the ultimate goals being to provide SWFL with the habitat requirements it needs for successful breeding pair establishment. In addition, the re-establishment of native riparian species within the riparian zone is expected to create a more diverse insect (i.e., prey) base than what is currently present, which could also indirectly benefit the SWFL.

Short-term impacts and long-term positive impacts are expected in relation to the SWFL. Non-native removal and native re-establishment would occur outside of the migratory/breeding season for the SWFL. With the inclusion of the environmental commitments listed in the associated BA/E, the Proposed Action was determined that it "may affect – not likely to adversely affect" the SWFL.

The USDI, Fish and Wildlife Service in the consultation process concurred with this determination in a letter dated May 6, 2011 Consultation #22420-2011-I-0047.

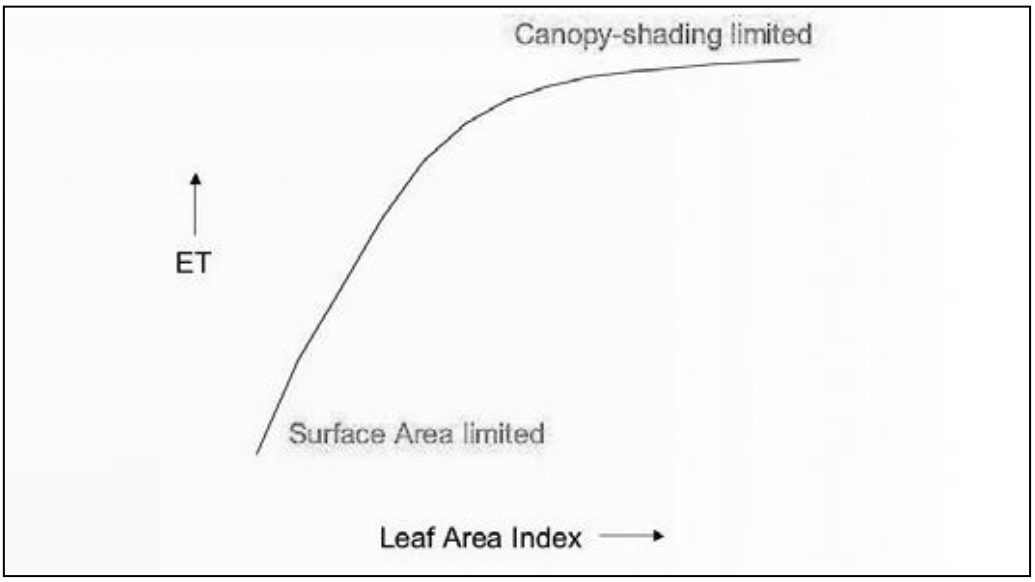
4.1.1.7 *Water Quantity and Quality*

Water Quantity

Changes in water quantity due to the Proposed Action are difficult to quantify, both in the short- and long-term. What is known is that through the process of evapotranspiration (i.e., the process by which roots take up water through roots in contact with the groundwater and evaporation as the leaves pulls water through the plants), riparian plants influence stream-flow rates, ground water levels, and local climates. Rates of evapotranspiration and groundwater use vary widely between plant species depending on factors such as depth to groundwater, rooting depth, leaf area, and ability regulate stomatal conductance (Scott et al. 2000; Dahm et al. 2002; Cleverly et al. 2004). While earlier literature suggested that non-native riparian species, such as saltcedar, consumed larger quantities of water than their native riparian counterparts (Busch & Smith 1995; Cleverly et al. 1997; Smith et al. 1998), more recent literature suggests that evapotranspiration rates among saltcedar, cottonwood, and willow are similar (Nagler et al. 2003; Glenn and Nagler 2005; Cleverly et al. 2004; Shafike et al. 2007). Cleverly et al. (2002) compared saltcedar evapotranspiration rates and found that spatial (e.g., flooded and unflooded sites) and temporal factors (e.g., timing and frequency of floods) caused considerable variability in evapotranspiration rates. This study demonstrates the unpredictability of evapotranspiration due to the dynamics and flux inherent to riparian ecosystems. Dahm et al. (2002) compared evapotranspiration rates on the following vegetation types on the Rio Grande downstream of the Project area: (1) a dense stand of saltcedar; (2) a mature cottonwood stand with an extensive understory of saltcedar and Russian olive; (3) a mature, closed-canopy cottonwood stand; and (4) a less dense saltcedar stand. Dahm et al. (2002) found that the dense saltcedar stand and the mature cottonwood stand with non-native understory had comparable evapotranspiration rates (111-122 cm/yr and 123 cm/yr, respectively), the mature cottonwood stand had intermediate rates of evapotranspiration (98 cm/yr), while the more open saltcedar stand had the lowest rates of evapotranspiration (74-76 cm/yr). Data collection at these sites has continued, and in 2003 a Russian olive-dominated site was added (Shafike et al. 2007). Shafike et al. (2007) found that found that evapotranspiration rates for the Russian olive-dominated community ranged between 107 to 128 cm/yr, which is very similar to the cottonwood- and saltcedar-dominated stands.

While evapotranspiration rates for riparian communities are unpredictable and are influenced by a wide range of factors (e.g., frequency and duration of flooding, depth to groundwater, rooting depth, leaf area,

and stomata regulation), it can be assumed that where vegetation grows in high density – regardless of the species – evapotranspiration is higher (Cleverly et al. 2004). Dahm et al. (2002) also found that leaf area index (i.e., the ratio of total upper leaf surface of vegetation divided by the surface area of the land on which the vegetation grows) was positively correlated with evapotranspiration rates regardless of the species, which proves to be a useful method for estimating total evapotranspiration. However, at higher vegetation (i.e., leaf) densities, self shading limits the amount of net solar radiation that is intercepted by the leaf area, which limits the total amount of evapotranspiration potential (Figure 4).



From: Cleverly et al. (2004)

Figure 6. Evapotranspiration and Leaf Area Index.

Beaver can dramatically alter the hydrology of a stream because dams function to control both surface water and groundwater flow patterns. At its most basic, beaver dams retain water in ponds, which increases the stream width and the area of slow, deep water, and thereby increases the volume and surface area of water. By slowing the velocity of water and widening the stream, beaver ponds increase retention time and dissipate stream energy (Pollock et al. 2003). Transient storage (i.e., short term water retention) is considered a key aspect of the hydrological cycle that influences stream ecosystems because it allows for more time for biogeochemical processes to occur (Jin et al. 2009). For example, a catchment with a beaver pond was capable of retaining all runoff resulting from a rainfall event, whereas a catchment without beaver runoff was a significant contributor to peak flow (Burns and McDonnell 1998). One study found that stream reaches with dams of course woody debris retained water at least 50% longer than stream reaches without debris dams (Ehrman and Lamberti 1992). Transient storage in a stream increases with both increasing numbers of beaver dams and pond volume (Jin et al. 2009).

Reduction in stream energy due to the slowing of water velocity by beaver dams is important in moderating the effects of high stream flows. Beaver dams are resistant to floods, particularly when preferred building materials are available (Smith 2007). Thus, during floods stream energy is dissipated as water becomes impounded in ponds and as water flows through beaver dams and riparian vegetation (Pollock et al. 2003). Beaver dams cause a relatively greater reduction in stream energy on streams with steeper gradient (Hammerson 1994). Willow growth that is stimulated by beaver dams can be particularly effective in causing flow resistance (Smith 2007). Willow carrs protect watersheds by both spreading

flood waters across shrubby floodplains and by retaining debris that can otherwise destabilize downstream areas (Smith 2007). As a consequence, during flooding water will rise more slowly and the flood peak will be dampened on beaver influenced streams (Beedle 1991, Gurnell 1998). A series of beaver dams will have a more profound impact on attenuating flood waters (Gurnell 1998, Smith 2007). For example, simulation models showed that while a single beaver pond would reduce peak flows of a 2-year flood event by 5%, a series of five ponds would dampen the peak flow by 14% (Beedle 1991). One example described the attenuation of a flood wave by 94% when it passed through a beaver wetland complex (Hillman 1998). Thus, well maintained beaver dams dramatically reduce loss of water to runoff (Woo and Waddington 1990).

Beaver dams can influence groundwater hydrology by increasing groundwater recharge and retention (Lowry 1993, Pollock et al. 2003). Beaver activity has been shown to enhance the water table over large areas during the summer months (Westbrook et al. 2006). One consequence of this is that stream flow can increase during the warm-season low-flow period. Structures built in stream channels promote perennial stream flow by trapping sediments which store storm water and then slowly release it (Debano and Schmidt 1990). Although different types of beaver dams influence hydrology differently, some beaver dams can sustain a more uniform downstream flow (Woo and Waddington 1990). A number of studies have reported higher flows on streams influenced by beaver dams as compared to streams without beaver, and some studies have reported that small streams became perennial when beaver activity was present (Stabler 1985, Pollock et al. 2003).

Removal of non-native vegetation associated with the Proposed Action could temporarily affect water flows by altering the magnitude of low flows and frequency and magnitude of peak flows compared to pre-treatment conditions. While each phase of vegetation removal would be dispersed throughout the Project area in non-contiguous patches, removal of mature non-native vegetation could temporarily increase localized groundwater availability by reducing water lost to evapotranspiration until planted, native vegetation matures. In addition, the removal of vegetation could also temporarily decrease floodplain roughness which could result in short-term reductions in flood attenuation capacity. Removal of non-natives in patches scattered sites throughout the Project area, combined with winter native plantings is expected to help mitigate the effect that floods could have, but the impact cannot be entirely eliminated. After implementation of the Proposed Action it is unlikely that water quantities would be affected for the long term.

Water Quality

The Proposed Action is expected to have short-term, localized, negative effects on water quality in the Santa Fe River. Specifically, temporary and localized increases in turbidity and suspended sediments would be expected following construction-related activities, such as machinery crossing the stream. The disturbance of riparian soils and vegetative cover associated with removal of non-native shrub and tree root wads could also temporarily increase upland-generated sediment inputs until native species cover is established.

The removal of non-native shrub and tree species also has the potential to cause short-term impacts to water quality by reducing nutrient uptake by plants, which could result in a localized pulse of nutrients to the Santa Fe River. Soluble nutrients (e.g., nitrogen) would likely enter the stream via groundwater, while nutrients adsorbed to soil particles (e.g., phosphorous) could be carried to surface water via runoff. Streams draining red alder forest in the Pacific Northwest, chaparral in California, and grasslands in California and Arizona have shown increased nitrate concentrations following vegetation disturbance (Binkley and Brown 1993). The Santa Fe River has already been documented as nutrient enriched, and increased nutrient loading could lead to additional algal blooms and eutrophication of the Santa Fe River.

Removal of streamside vegetation could temporarily increase water temperatures resulting from the loss of stream shade and concurrent increase in solar radiation reaching the stream surface. While most of the non-native species within the Project area are not located directly on the stream/land interface (see Project area photos in Appendix B) and do little to provide shade to the stream surface during the summer months (i.e., when stream temperature loading is an issue), removal of non-native shrubs and trees where they do limit solar inputs would be expected to have minimal impacts to temperature fluctuations within the Santa Fe River.

There would be risks to water quality associated with the use of heavy machinery or mechanized equipment used to treat vegetation, as fuel leaks and spills could occur. Releases of fuel would be more likely to affect surface water than groundwater, and would have the greatest effects to water quality if fuel was released directly into the water. All equipment used within the Project area would be equipped with spill kits and personnel would be trained in their use. In addition, all fueling and lubing activities would take place outside of the riparian area to limit risk.

The Proposed Action is expected to have long-term beneficial impacts on water quality. NMED (Undated) cited the poor stream and riparian area conditions as the primary contributors to excessive algal growth and related violations in water quality standards within the Project area. The presence of high levels of algae reduce the levels of dissolved oxygen (which in turn affects pH) in the river during sunlight hours as a result of respiration, which can be a limiting factor on aquatic communities in the Santa Fe River (NMED Undated). The strategic planting of native willows along the streambank throughout the Project area is expected to increase shade to the stream surface, thereby decreasing solar inputs that algae require for survival. With more shade provided to the stream a subsequent decrease in algal growth, and therefore, respiration (i.e., the conversion of oxygen to carbon dioxide) would also decrease. The shade provided by streambank vegetation would result in higher dissolved oxygen levels, stabilized pH, as well as lowered and moderated surface water temperatures. In addition, riparian shrubs have been shown to directly and indirectly mediate many nutrient cycling processes, and, for example, can reduce levels of nitrogen and other minerals from stream or ground water (Schade et al. 2001). No impacts to the Community of La Bajada domestic water well are expected.

Once planted streambank vegetation becomes established, increased vegetation biomass is also expected to aid in the removal of excess nutrients from the surface water and riparian zone, and would serve to stabilize streambanks and decrease sediment discharge (Lowrance et al. 1984; Lowrance et al. 1995). A study in British Columbia, Canada, determined that major bank erosion was 30 times more prevalent on non-forested versus forested meander bends (Beeson and Doyle 1995). In addition, increased riparian zone roughness near the stream channel would help attenuate peak flows (i.e., slow floodwaters), which would allow floodwaters to infiltrate the floodplain soils and recharge groundwater. Forested riverbanks result in slower floodwaters and more stabilized streambanks than herbaceous lined areas, which allow the riparian zone to function as a site of sediment deposition, that builds stream banks and point bars, for which native riparian vegetation requires for its natural establishment (Beeson and Doyle 1995; Geyer et al. 2000; Wynn and Mostaghimi 2006).

The influence of beaver dams on sediments is linked to the role beaver play in enhancing water quality and nutrient cycling. On incised streams in the western US, beaver dams improve water quality both through trapping particles and by reducing water speed which decreases erosive input of pollutants (Maret et al. 1987). Reduction in water turbidity caused by beaver dams could help reduce water temperature because suspended particles absorb heat. Another potential consequence of the reduction in turbidity caused by beaver dams is to increase dissolved oxygen in the water. One mechanism by which this happens is through reduction in water temperature, because cooler water can hold more dissolved oxygen. In addition, by clarifying the water, aquatic plants are able to more efficiently photosynthesize, which releases oxygen as a by-product into the water.

Beaver control erosion both through trapping sediments above dams and through decreased water velocity which otherwise would scour banks (Parker et al. 1985). On one Wyoming creek, silt load was reduced 90% by beaver activity (Brayton 1984). In another case, six years after beaver had colonized a steam, aggradation had raised a stream bed high enough to connect it to formerly abandoned terraces (Pollock et al. 2007). As ponds fill with sediments it promotes the growth of emergent plants, which further accelerate the rate at which sediments are trapped. Through these processes, channel gradients can achieve a stair-stepped profile (Naiman et al. 1988).

Beaver ponds can help clean water of pollutants and toxins from agriculture, human sewage, and livestock, including excess nutrients such as nitrates and phosphates (Collen and Gibson 2001). It has been estimated that the purification capacity of a stream with beaver dams was ten times higher than a similar stream without beaver dams (Collen and Gibson 2001). Sediment particles can attach to pollutants such as nutrients and heavy metals. Beaver dams purify water by trapping and accumulating these sediments. One study found that beaver ponds were more effective in improving water quality during periods of runoff, when more particles are being eroded and contributing to the sediment load (Maret et al. 1987). Another study found that a stream with more beaver ponds had significantly lower numbers of harmful bacteria, including fecal coliform and streptococci (Skinner et al. 1984).

4.1.1.8 *Riparian Vegetation*

The Proposed Action would remove approximately 40 acres of non-native vegetation throughout the 70-acre Project area and concurrently replace it with native species, thus modifying the composition of the vegetation from one that is dominated by non-native species (primarily Russian olive and saltcedar) into one that is composed of a mix of native (primarily Rio Grande cottonwood, Goodding's willow, and coyote willow) and non-native riparian shrub and tree species. The result of the Proposed Action is expected to increase plant species diversity, structural diversity (both horizontal and vertical), and forage diversity. The restoration of native plant species within the Santa Fe River riparian zone would also meet the goals of the following management/policy documents:

- Taos Resource Management Plan (USDI, BLM 1988);
- Riparian and Aquatic Habitat Management Plan (USDI, BLM 2000);
- La Cienega Area of Critical Environmental Concern – Coordinated Resource Management Plan (USDI, BLM 1995);
- Santa Fe National Forest Plan (USDA, FS 1987); and
- Santa Fe River Watershed Restoration Action Strategy (Santa Fe Watershed Association 2002).

The Proposed Action would temporarily affect existing herbaceous riparian vegetation due to disturbance related to machinery maneuvering and the extraction of non-native shrub and tree root wads. The machinery used for removal and planting moves on tracks (e.g., trackhoe, skidsteer, etc) and would maintain a straight line as much as possible to minimize disturbance. However, the turning of machinery has the potential to disturb and relocate topsoil elements, which could result in areas of bare soil. In addition, herbaceous vegetation that is located near non-native species proposed for removal could also be affected when the root wad is extracted. All attempts would be made to relocate affected herbaceous vegetation by replacing it into the affected area. All areas of disturbed and/or bare soil would be seeded with a native certified weed-free seed mix. Seeds would be raked into the top ½ inch of the disturbed soil.

The Proposed Action is expected to have no effect on the threat of wildfire within the Project area. Plants, such as saltcedar, that seasonally develop fine, dry fuel loads increase the probability of fire spread in riparian corridors (Brooks et al., 2004). In addition, the buildup of saltcedar leaf litter on alluvial soils can increase the frequency of devastating wildfire within riparian zones (Busch and Smith 1991).

Native riparian shrubs and trees, especially cottonwoods and willows, exhibit many characteristics that allow them to grow in highly disturbed environments where they are subject to flooding and disturbance through erosion and deposition of sediments. These characteristics include the production of a large number of wind-dispersed seeds, a high growth rate of seedlings, rapid regeneration from fragments, and a high investment in root systems which anchor the plants effectively and bind together unstable substrates (Karrenberg et al. 2002). In addition, Karrenberg et al. (2002) points out that willows have exceptional mechanical properties, such as high bending stability, which enable them to withstand moderate floods; and if they are uprooted, washed away, or fragmented by more powerful floods, these plants also, like their non-native counterparts, are able to re-sprout vigorously. This being said, if native plants are established in the Project area and other non-natural factors (e.g., cattle grazing) are kept under control, native species such as willow and cottonwood should persist within the Project area in perpetuity.

4.1.1.9 *Riparian Soils*

The soils in the riparian area would be temporarily affected by the Proposed Action due to maneuvering of machinery and removal of non-native shrub and tree root wads. The moving of machinery through the riparian zone is expected to disturb soils, especially where turning of machinery is required for planting and non-native removal. These actions could result in soil that is presently covered by vegetation becoming exposed, thus making it more prone to erosion. However, these would be short-term impacts as any area of disturbed soil would be seeded with native herbaceous seed mix. In addition, chipped slash material generated from removed non-native species would be spread over areas of bare soil which would mitigate the loss of herbaceous vegetation cover, help retain soil moisture, and provide cover for native seed establishment.

The abandoned copper and uranium mine is located well outside of the Project area and will not be impacted by Project-related activities.

4.1.1.10 *Visual Resources and Recreation*

Visual Resources

The Proposed Action would have temporary impacts on the area's visual resources. Visual resources would be affected due to the removal of non-native riparian shrub and tree species and the associated "disturbed" appearance. However, all slash material generated during disturbance would be chipped and scattered on areas of bare soil, thus reducing the appearance of recent disturbance. Once planted and seeded areas become established, the Proposed Action would benefit visual resources by creating a more diverse plant assemblage, resulting in a wider array of colors and textures than is currently present. The Proposed Action would meet the USDI, BLM VRM Class II and USDA, FS Partial Retention objectives for the area due to the increase in color and texture that would result in the long-term.

Recreation

The Proposed Action would cause temporary impacts to recreational opportunities within the Project area. These impacts would be most prevalent during the winter and early-spring months when Project activities would be underway. Short-term avoidance would limit use in the small areas that work is being completed in (approximately 7 acres per year). However, the Proposed Action would not result in river access points being blocked or travel throughout the river corridor being restricted.

The removal of impenetrable thickets of Russian olive and saltcedar and the subsequent replacement by native species has the potential to increase the recreational opportunities in the long term. While no new access points to the corridor are included in the Proposed Action, the increase in the diversity of wildlife and plant assemblages could result in increased recreational opportunities or enhanced recreational experiences.

4.1.1.11 *Wild and Scenic Rivers*

Due to the potential designation of the lower Santa Fe River under the NWSR System, the Proposed Action must evaluate impacts to the following three characteristics:

1. Free-flowing Nature: The Proposed Action does not include any activity that would affect the free-flowing character of the proposed river segment. No impoundments or other alterations to the streambed are proposed.

2. Outstandingly Remarkable Values:

    a. Recreational: The impacts to this resource were discussed in Section *4.1.1.10 Visual Resources and Recreation* and would only be summarized here. The Proposed Action would cause minor, short-term impacts to recreation while restoration activities are taking place. Recreational opportunities could increase in the long term.

    b. Cultural: The impacts to this resource were discussed in Section *4.1.1.2 Cultural Resources* and will only be summarized here. The Proposed Action would cause no impacts to Cultural Resources.

    c. Fish Habitat: The impacts to this resource were discussed in Section *4.1.1.5 USDI, BLM and USDA, FS Sensitive Species* and will only be summarized here. The Proposed Action could cause short-term negative impacts to fisheries habitats due to the potential for sedimentation immediately following construction activities. Fisheries habitats are expected to benefit in the long term.

3. Tentative Classification: The Proposed Action would be consistent with the level of activities allowable within a river segment determined eligible as a Recreational segment. In general, a variety of agricultural, water management, silvicultural, recreational, and other practices or structures are compatible with recreational river values, providing such practices or structures are carried on in such a way that there is no substantial adverse effect on the river and its immediate environment. The implementation of the project would not cause a substantial adverse effect on the river or its immediate environment.

4.1.2 Alternative B: No Action

Because environmental impacts for the No Action alternative would be similar to the Proposed Action if already-approved management actions identified in the Riparian and Aquatic Habitat Management Plan (USDI, BLM 2000) are undertaken on USDI, BLM lands their impacts will not be analyzed again in this section. This section will only discuss environmental impacts on USDA, FS lands where no management actions are currently proposed within the Project area.

4.1.2.1 *Areas of Critical Environmental Concern*

Areas of Critical Environmental Concern are only associated with USDI, BLM lands and thus, actions on USDA, FS lands would have no impact to this resource.

4.1.2.2 *Cultural Resources*

The No Action alternative would have no impact on cultural resources on USDA, FS or USDI, BLM lands.

4.1.2.3 *Wildlife*

General Wildlife

Short-term impacts to fish and wildlife resources would not occur under the No Action alternative on USDA, FS or USDI, BLM lands. Long-term adverse effects on breeding and foraging fish, avian species, and mammals, however, are gradual and difficult to quantify. Detrimental impacts to wildlife could result from long-term reduction in riparian ecological processes, encroachment of non-native species, reduced habitat niches and potentially increased fire hazard. These impacts could result in lowered populations of wildlife species, reductions in available habitat, and decreased forage capacity and diversity.

Migratory Birds

The No Action alternative would not result in any short-term impacts to migratory birds on USDA, FS, or USDI, BLM lands. However, long-term impacts could result through continued habitat degradation and the associated decrease of native species within the Project area. This impact could particularly negatively affect insectivorous and cavity-nesting birds, which are already rare within the Project area.

4.1.2.4 *USDA, FS Management Indicator Species*

Rocky Mountain Elk

The No Action alternative would not result in short-term or long-term impacts to elk on USDA, FS or USDI, BLM lands.

Mourning Dove

The No Action alternative would not result in short-term or long-term impacts to the Mourning Dove on USDA, FS or USDI, BLM lands.

Piñon Jay

The No Action alternative would not result in short-term or long-term impacts to the Piñon Jay on USDA, FS or USDI, BLM lands.

4.1.2.5 *USDI, BLM and USDA, FS Sensitive Species*

Botta's pocket gopher

The No Action alternative would not result in short-term or long-term impacts to the Botta's pocket gopher on USDA, FS or USDI, BLM lands.

Bald Eagle

The No Action alternative would not result in short-term impacts to the Bald Eagle on USDA, FS, or USDI, BLM lands. However, as remnant cottonwoods become decadent and are further replaced by non-native species, potential roosting sites could be reduced.

Northern leopard frog

The No Action alternative would not result in short-term impacts to the northern leopard frog on USDA, FS and USDI, BLM lands.

Texas horned lizard

The No Action alternative would not result in short-term or long-term impacts to the Texas horned lizard on USDA, FS or USDI, BLM lands.

Flathead chub

The No Action alternative would not result in short-term or long-term impacts to the flathead chub on USDA, FS or USDI, BLM lands.

Rio Grande sucker

The No Action alternative would not result in short-term or long-term impacts to the Rio Grande sucker on USDA, FS or USDI, BLM lands.

4.1.2.6 *USDI, FWS Threatened and Endangered Species*

Southwestern Willow Flycatcher

The No Action alternative would not result in short-term impacts to the SWFL on USDA, FS, USDI, BLM lands. However, continued degradation of the Santa Fe River riparian corridor could result in a decrease of potential stopover habitat and the area would not trend toward a direction that would provide suitable habitat for nesting and breeding pairs.

4.1.2.7 *Water Quality and Quantity*

Water Quality

The No Action alternative would not result in short-term impacts to water quality on USDA, FS or USDI, BLM lands. However, the No Action alternative would not address chronic NMED-listed impairments (e.g., excessive nutrients, low dissolved oxygen, and sedimentation) that cause the river to not fully support marginal coldwater aquatic life.

Water Quantity

The No Action alternative would not result in short-term impacts to water quality on USDA, FS or USDI, BLM lands.

4.1.2.8 *Riparian Vegetation*

The No Action alternative would not result in short-term impacts to riparian vegetation. However, the continued encroachment of non-native shrubs and trees into existing wetland areas could alter the physical characteristics of the riparian ecosystem by reducing these important areas.

4.1.2.9 *Riparian Soils*

The No Action alternative would not result in short-term or long-term impacts to soils.

4.1.2.10 *Visual Resources and Recreation*

The No Action alternative would not result in short-term or long-term impacts to recreational or visual resources.

4.1.2.11 *Wild and Scenic Rivers*

The No Action alternative would not result in short-term or long-term impacts to the potential classification under the NWSR System.

4.2 Cumulative Effects Analysis

A cumulative impact, as defined in 40 CFR 1508.7, is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such action. Cumulative actions considered include actions that have, are, or will take place within Hydrologic Unit Area 13020201 (the

Rio Grande/Santa Fe Watershed), which includes the Tesuque Creek watershed to the north and the Galisteo watershed to the south.

4.2.1 Cumulative Actions

4.2.1.1 *Past and Present Actions*

WildEarth Guardians' Santa Fe River Bosque Restoration Project
WildEarth Guardians, in cooperation with the City of Santa Fe and the County of Santa Fe, completed a project to enhance the riparian zone vegetation, remove nutrients from the water, and decrease sediment discharge.

Santa Fe-Pojoaque Soil and Water Conservation District Riparian Restoration Projects
The Santa Fe-Pojoaque Soil and Water Conservation District completed riparian restoration projects near La Cieneguilla and La Cienega (including projects on private land). The projects were completed with the purpose of decreasing erosion, sedimentation, and the proliferation of non-native vegetation; restoring riparian vegetation; augmenting surface water; and improving wildlife habitat conditions.

New Mexico State Land Santa Fe River Restoration
The New Mexico State Land Office, in collaboration with the City of Santa Fe and the Santa Fe Watershed Association are conducting work to mechanically improve the currently ephemeral portion of the Santa Fe River above the Santa Fe WWTP. The goal of the Project is to enhance the growth of the riparian area and minimize the erosion and sediment discharge that has occurred in this section of the watershed.

Private Land Riparian Augmentation Projects
Several private landholders upstream of the Project area have removed non-native vegetation along the Santa Fe River between the Santa Fe Municipal Airport and the upstream boundary of the Project. Some landholders have since planted poles of native riparian shrubs and trees.

Santa Fe Municipal Watershed Project
The USDA, FS and the City of Santa Fe completed a forest and watershed health project in the Santa Fe Municipal Watershed which combined strategically thinning small-diameter trees and implementing prescribed burns to reduce the risk of a severe crown fire and to restore sustainable forest and watershed conditions in the Santa Fe Municipal Watershed.

Caja del Rio Range Improvement Project
The USDA, FS completed a project intended to increase vegetation on specific rangelands by drawing cattle away from riparian areas with a pipeline, fencing riparian areas, and burning sagebrush to enhance grasses. The USDA, FS authorized the continuation of year-long grazing of 492 head of cow/calf pairs and 28 bulls (8,305 Animal Unit Months) by reissuing twelve, ten-year term grazing permits. The USDA, FS portion of the Project area is within the allotment.

City of Santa Fe River Restoration
The City of Santa Fe is undertaking a riparian restoration project on the Santa Fe River just below the St. Francis (U.S. Highway 285) crossing. The project goals include removing non-native species (primarily Siberian elm) and re-establishing a diverse mix of native riparian species along the riverbank.

Santa Fe County River Restoration
Santa Fe County has implemented a restoration project on the Santa Fe River aimed at increasing riparian habitat and promoting bank stabilization on the Santa Fe River below the San Ysidro Crossing (Santa Fe County Rd 68). Non-native removal is not a part of this project.

Pueblo of Santa Domingo Galisteo River Non-Native Removal
The Pueblo of Santa Domingo implemented a project to remove and control non-native species (primarily saltcedar) on the portions of the Galisteo River under their jurisdiction.

USDI, BLM River Restoration in La Cieneguilla
The USDI, BLM partially completed a non-native tree removal project in the La Cieneguilla area in early 2010. This project is expected to be completed in early 2011.

4.2.1.2 *Reasonably Foreseeable Actions*

USDI, BLM Old Highway 66 Road Maintenance

The USDI, BLM TFO plans to do maintenance and repair work on old U.S. Highway 66, which traverses the north side of the Santa Fe River Canyon. Part of the maintenance and repair is to decrease road runoff, which could currently contribute sediment to the river.

4.2.2 Cumulative Effects

4.2.2.1 *Areas of Critical Environmental Concern*

The repair of old U.S. Highway 66 could decrease sediment input into the Santa Fe River. No other actions have occurred, or are planned to occur in the La Cienega ACEC. The Project will not add to impacts to the La Cienega ACEC.

4.2.2.2 *Cultural Resources*

There are no actions expected to cause cumulative impacts to cultural resources. The Project will not add to impacts to cultural resources.

4.2.2.3 *Wildlife*

General Wildlife

The riparian restoration and bank stabilization projects taking place within and upstream of the Project area would benefit all forms of wildlife, from aquatic to terrestrial. Increasing herbaceous, shrub, and tree cover would provide for increased forage opportunities and habitat for terrestrial species. However, the removal of large, continuous patches of saltcedar from the Galisteo River basin could reduce available habitat for some terrestrial species that relied on the cover of the dense saltcedar stands.

Bank stabilization projects taking place on the Santa Fe River within and above the Project area could result in improved water quality due to the reduction in sediment discharged into the system during high-volume flow events. Stream-bottom deposits are currently a water quality issue within the Project area, which decrease habitat for fish, as well the aquatic insects they consume. In addition, the maintenance and repair of the old U.S. Highway 66, which runs along the north side of the canyon, could decrease upland-generated sediment inputs to the Santa Fe River.

The Project will temporarily decrease the amount of riparian habitat available to wildlife. However, over the long term the Project will increase the quality of habitat to wildlife species due to the increase in structural diversity, habitat niches, biodiversity, and forage diversity.

Migratory Birds

The riparian forest restoration and enhancement projects that have, are currently, or are planned to take place within and upstream of the Project area could benefit migratory birds by supplying additional habitat diversity, structure, and foraging opportunities. In addition, the establishment of riparian species on currently denuded stretches of the Santa Fe River would increase habitat availability and could

improve migratory corridor conditions. However, the saltcedar removal that is taking place on the Pueblo of Santa Domingo has the potential to decrease available stopover, foraging, nesting, and breeding habitat for migratory birds.

The Project will temporarily add to a decrease in the amount of riparian habitat available to migratory birds. However, over the long term the Project is expected to increase the quality of migratory bird habitat due to the increase in structural diversity, habitat niches, biodiversity, and foraging opportunities.

4.2.2.4 *USDA, FS Management Indicator Species*

Rocky Mountain Elk

The Caja del Rio Range Improvement project could lead to an improvement in overall rangeland health of the Caja del Rio allotment. This project, in combination with the expected increase in herbaceous and native shrub and tree cover associated with the Proposed Action should lead to increased forage productivity for elk.

The Project is not expected to add to impacts, positive or negative, to Rocky Mountain elk.

Mourning Dove

The Caja del Rio Range Improvement project could lead to an improvement in overall rangeland health of the Caja del Rio allotment. The expected increase in herbaceous plant cover could also increase seedhead production, which would benefit the granivorous Mourning Dove. In addition, the expected increase in native riparian shrub and tree cover from riparian restoration projects could increase available nesting habitat.

The Project is not expected to add to impacts, positive or negative, to Mourning Dove.

Piñon Jay

There are no actions expected to cause cumulative impacts to the Piñon Jay.

The Project is not expected to add to impacts, positive or negative, to Piñon Jay.

4.2.2.5 *USDI, BLM and USDA, FS Sensitive Species*

Botta's pocket gopher

The Caja del Rio Range Improvement project could lead to an improvement in overall rangeland health of the Caja del Rio allotment, which could improve habitat conditions for the Botta's pocket gopher.

The Project is not expected to add to impacts, positive or negative, to Botta's pocket gopher.

Bald Eagle

The riparian forest restoration and enhancement projects that have, are currently, or are planned to take place within and upstream of the Project area could benefit the Bald Eagle by supplying additional habitat diversity and structure. In addition, the establishment of riparian species on currently denuded stretches of the Santa Fe River would increase habitat availability, with a potential increase in roosting and/or nesting sites.

Northern leopard frog

The riparian restoration and bank stabilization projects have the potential to benefit the northern leopard frog by increasing the extent of wetland areas, as well as herbaceous cover.

The Project is expected to add to positive impacts to the northern leopard frog by increasing habitat quantity and quality.

Texas horned lizard

There are no actions expected to cause cumulative impacts to the Texas horned lizard.

The Project is not expected to add to impacts, positive or negative, to the Texas horned lizard.

Flathead chub

Bank stabilization projects taking place on the Santa Fe River within and above the Project area could result in improved water quality due to the reduction in sediment discharged into the system during high-volume flow events. Stream-bottom deposits are currently a water quality issue within the Project area, which decrease habitat for fish, as well the aquatic insects they consume. In addition, the maintenance and repair of the old U.S. Highway 66, which runs along the north side of the canyon, could decrease upland-generated sediment inputs to the Santa Fe River.

The Project is expected to add positive impacts to the Flathead chub due to the expected increase in water quality.

Rio Grande sucker

Bank stabilization projects taking place on the Santa Fe River within and above the Project area could result in improved water quality due to the reduction in sediment discharged into the system during high-volume flow events. Stream-bottom deposits are currently a water quality issue within the Project area, which decrease habitat for fish, as well the aquatic insects they consume. In addition, the maintenance and repair of the old U.S. Highway 66, which runs along the north side of the canyon, could decrease upland-generated sediment inputs to the Santa Fe River.

The Project is expected to add positive impacts to the Rio Grande sucker due to the expected increase in water quality.

4.2.2.6 *USDI, FWS Threatened and Endangered Species*

Southwestern Willow Flycatcher

Past, current, or future projects that enhance, restore, establish, and/or protect riparian vegetation would benefit the SWFL, especially when these occur near areas of open water. While no breeding pairs or territorial individuals of SWFL have been documented on the Santa Fe River corridor, migratory individuals of flycatcher (undetermined to be the SWFL subspecies) have been documented during the migratory season (HawksAloft 2007b). Efforts to establish, recreate, or enhance components necessary for SWFL is vital to their recovery.

The Project is expected to add to positive impacts to the SWFL by increasing viable habitat and increasing the insectivorous prey base.

4.2.2.7 *Ground and Surface Water Quantity and Quality*

Water Quantity

Past, current, and/or future projects that increase vegetation cover (i.e., Leaf Area Index) where non-native removal is not occurring could cause reductions in water quantity due to increase evapotranspiration potential. Many of these projects are occurring, or are planned to occur above the Santa Fe WWTP, which is intermittent in nature and should not affect the effluent-dominated system below the WWTP. In addition, the Santa Fe Municipal Watershed project is expected to increase water

yield from the headwater portion of the watershed, which could result in more releases from the City of Santa Fe's reservoir systems. These potential increases in releases could help sustain flows in the dewatered portion of the Santa Fe River (above the Santa Fe WWTP) and ultimately lead to increases in water quantity.

The Project is not expected to add to impacts, positive or negative, to water quantity.

Water Quality

Past, current, and/or future projects that increase bank stabilization, especially in degrading areas like those that occur between U.S. Highway 285 and the Santa Fe WWTP, should reduce sediment inputs into the Santa Fe River system. In addition, the concomitant increase in riparian vegetation along the riverbank should slow floodwaters and filter out sediments and other pollutants.

The Project is expected to add to positive impacts of water quality due to the expected increase in stream shading, nutrient uptake, and decrease in sedimentation.

4.2.2.8 *Riparian Vegetation*

Other projects geared at non-native removal while subsequently establishing native riparian vegetation, or establishing riparian vegetation in currently denuded areas should lead to an increase in riparian species cover, diversity, and structure. Projects that remove non-native vegetation without replacing native vegetation would lead to a reduction in riparian vegetation cover, diversity, and structure.

The Project will temporarily lead to a decrease in undesirable non-native riparian vegetation, but over the long term the Project will lead to an increase in the structural diversity and biodiversity of riparian vegetation.

4.2.2.9 *Riparian Soils*

The Caja del Rio Range Improvement Project could lead to healthier soils by detracting cattle away from the riparian area. This could lead to more vegetation being present, which would be more effective at binding soils and reducing erosion. In addition, less soil compaction would result in the riparian zone if the use was moderated.

The Project is not expected to add to impacts, positive or negative, of riparian soils.

4.2.2.10 *Visual Resources and Recreation*

There are no other actions expected to cause cumulative impacts to visual resources and/or recreation.

4.2.2.11 *Wild and Scenic Rivers*

There are no actions expected to cause cumulative impacts to the eligibility determination for the NWSR System designation.

Chapter 5: Consultation and Coordination

5.1 Summary of Consultation and Coordination

The USDI, BLM TFO and USDA, FS ERD sent a letter to the U.S. Fish and Wildlife Service, *Request for Concurrence Pursuant to Section 7 of the Endangered Species Act and 50 CFR 402.14 for the Santa Fe Riparian Forest Restoration Project*. The USDI, Fish and Wildlife Service in the consultation process concurred with this determination in a letter dated May 6, 2011 Consultation #22420-2011-I-0047.

5.2 Summary of Public Participation to Date

A public scoping meeting was held December 17, 2009 at the La Cienega Community Center in La Cienega, NM and presented a summary of the purpose and need, Project objectives, and a Proposed Action. The public scoping comment period for this Project opened on December 17th, 2009 and closed on January 31, 2010. Relevant comments received from the public scoping comment period were dealt with in a number of ways. This information was either: 1) incorporated into the document; 2) identified as *Other Alternatives Considered*; or 3) used to identify relevant issues to be addressed in the effects analysis. During the initial scoping comment period members of the public provided constructive comments for the proposed action.

A public meeting was held November 29, 2010 at the Santa Fe National Forest Administrative Office in Santa Fe, NM following the release of the "Proposed Action, Alternatives, and Preliminary Effects Analysis" public review document. The public comment period for the public review document opened on November 5th, 2010 and closed December 6th, 2010.

5.2.1 Public Comments Analysis

Comments were received from a variety of stakeholders, including citizens, governmental organizations, business organizations, and non-governmental organizations. Table 6 represents a summary of the public comment analysis grouped by comment topic and individual comment, and the response. Many of the comments received were similar in nature and only one response will be provided.

Table 6. Comment Summary and Responses.

Comment Topic	Individual Comment	Response
Water Quantity	Reduced Santa Fe River flow from implementation of Proposed Action and the effect on downstream water users.	This comment was previously addressed in Section 4.1.1.7. The Proposed Action is not anticipated to result in diminished water supply in the Santa Fe River or have affect downstream users.
	Reduced flow has resulted from previous restoration efforts upstream of the Proposed Action. The upstream restoration efforts were "over-planted" and have resulted in the taking of water rights.	This comment is considered outside the scope of this analysis.
	Native species consume more water than non-native species.	This comment was previously addressed in Section 4.1.1.7. Best available science indicates that water use is a function of leaf area and is not necessarily species dependent. The Proposed Action aims to replicate the existing leaf area index and is not expected to result in increased water consumption.
	The Proposed Action should result in an improvement of stream flow.	This comment was previously addressed in Section 4.1.1.7. One of the goals of the Proposed Action is to improve riverine and riparian conditions, allowing the system to store more water, release it

Comment Topic	Individual Comment	Response
		during times of drought, and attenuate floods.
	Request that project implementation wait for results of local research on impacts of native species on water quantity.	This comment is considered outside the scope of this analysis. Best available science was incorporated into the document to formulate the effects analysis. The results of future, local scientific research will be incorporated into future documents when data becomes available.
	Beaver reduce in-stream flows.	The impact of beaver on water quantity has been updated throughout the document in the following Sections: 1.4.7, 2.1.2, 4.1.1.3, 4.1.1.7, and 4.1.1.8. Best available science indicates the beaver dams have been shown to help maintain flows during drought and reduce flood effects by attenuating stormwater.
Water Quantity (cont.)	The project assumes that the City of Santa Fe will continue to discharge effluent to keep the Santa Fe River flowing, and a 'living river'. The project plan should identify ways to assure this long-term commitment.	This comment is considered outside the scope of this analysis. While the success of the Proposed Action depends on continued water flow, the USDI, BLM and the USDI, FS cannot make decisions that are under the jurisdiction of the City of Santa Fe.
	There is a reference that the Santa Fe River is "free-flowing." The Santa Fe River is not free-flowing, but instead is totally dependent upon the deposit of effluent into the River upstream by the City of Santa Fe.	The USDI, BLM has listed this segment of the Santa Fe River as "eligible" for inclusion into the Wild and Scenic Rivers system. One characteristic of an "eligible" river is that it is "free-flowing." The term "free-flowing" does not consider the source of surface water, but instead considers the lack of impoundments, diversions, etc. The USDI, BLM and USDA, FS acknowledge that the primary source of surface water is derived from the City of Santa Fe Wastewater Treatment Plant throughout the document.
	In section 3.7, sub-section 3.7.1, paragraph 2, page 21, it is stated that "...the perennial nature of this segment is directly related to Santa Fe Wastewater Treatment Plant (WWTP) discharges into the Santa Fe River...". It should be stated that area springs and creeks were the original source of water for this stretch of historically perennial river, and continue to contribute to its daily	Section 3.7.1 describes current conditions. It is disclosed that springs contribute to daily flow.

Comment Topic	Individual Comment	Response
	flow rates.	
Water Quality	On page 24, under figure 4, the text reads in part, "The primary factor influencing the fluctuations is lack of riparian shrubs and trees that effectively shade the river and block solar inputs.", referring to dissolved oxygen concentrations. It is important to note that the temperature of the water leaving the WWTP is the primary cause of water quality impairment along the river. While riparian vegetation can block solar inputs, thereby decreasing temperature fluctuations, the vegetation is only a means of addressing the underlying issue of effluent temperatures, not the cause.	The text in this paragraph is referencing the wide temperature fluctuations. The lack of shade on the Santa Fe River contributes to these wide temperature fluctuations.
Water Quality (cont.)	Mechanical removal of non-native species will result in decreased channel stability and increased silt and sediment in the Santa Fe River.	This comment and the effects of the Proposed Action on water quality were previously addressed in Section 4.1.1.7. The potential for short-term increases in sediment as a result of the Proposed Action was disclosed in the document.
Agriculture and Farmlands	Farming will be impacted by the Proposed Action.	This comment and the impact of the Proposed Action on water quantity were previously addressed in Section 4.1.1.7. It is anticipated that the Proposed Action will not impact the long-term availability of water for irrigation purposes. In addition, no element of the Proposed Action will take place on private farm property.
	Assurance that head gates, dams, and acequias will not be impacted by heavy equipment needs to be given and agencies will be responsible for repair if damage occurs.	Section 2.1 and Appendix C were updated to reflect that non-native removal will not occur within a 100-yard buffer around head gates to mitigate the potential effects of heavy equipment damage to head gates.
	Farmlands adjacent to and downstream of the Project area are not deemed prime or unique.	Prime and unique farmlands are designations assigned by the U.S. Department of Agriculture. No farmlands adjacent to or downstream of the Project area have been assigned this designation.

Comment Topic	Individual Comment	Response
	Agriculture was being achieved when the Rael/Gallegos family settled the Tres Rios ranch area in the 1500's and has been a main stay of the area since such time. It would seem important to recognize agriculture.	This information was incorporated into Section 3.7.1.
	The draft report fails to mention or address potential impacts to the historical agricultural uses of water in La Cieneguilla, El Canon, La Cienega and La Bajada.	This comment and the impacts of water quantity as related to the Proposed Action were previously addressed in Section 4.1.1.7. The Proposed Action is not anticipated to have detrimental effects on water quantity or the availability of water for agricultural uses.
Agriculture and Farmlands (cont.)	Beaver dams could obstruct water flow at acequia head gates.	While acequias head gates are located on USDI, BLM and USDA, FS lands, they are considered private infrastructure. Non-native removal and concurrent native species planting will not take place within a 100-yard buffer around head gates to limit the amount of dam-building material available to beaver adjacent to head gates. If beaver move in to areas around head gates, the USDI, BLM and/or USDI, FS will work with individuals to identify methods to mitigate the impact of beaver dams.
Grazing	The Proposed Action will result in impacts to cattle grazing on the Tetillas Grazing Allotment.	The Project area is within the Tetillas Grazing Allotment. However, grazing is not currently permitted within the Santa Fe River riparian corridor. Thus, the Proposed Action will not impact cattle grazing on the Tetillas Grazing Allotment. A sentence was added to both Section 2.1 and the Chapter 3 introduction to reflect this.
	Recommend that the Proposed Action not exclude areas currently available for grazing.	Grazing is currently not permitted within the Project area and will not impact grazing permit lease holders.
	Recommend excluding cattle or fencing treated areas, at least in the short-term, to promote success of the planted vegetation.	This comment was previously addressed in Section 2.1 and Chapter 3. Cattle grazing is currently not permitted within the Santa Fe River riparian corridor. If non-permitted cattle cause damage to planted native vegetation, adaptive management techniques, such as building fencing exclosures around treatment areas may be implemented.
	Impacts of cattle grazing are	Objective statements about the impacts of

Comment Topic	Individual Comment	Response
	overstated in the document.	cattle grazing have been removed from Sections 3.8 and 4.1.1.8.
Wildfire	Without grazing wildfires will be unmanageable	This comment and the impact of the Proposed Action on wildfire were previously addressed in Section 4.1.1.8. The Proposed Action is not anticipated to increase wildfire potential, but is instead anticipated to decrease fine fuels. In addition, cattle grazing is not currently permitted within the Santa Fe River riparian corridor. Grazing within the Santa Fe River riparian corridor was analyzed in a separate Environmental Assessment.
Wildlife (cont.)	No work should be completed within 10,000 feet of the Santa Fe Municipal Airport Area of Operations (AOA) to limit actions that could potentially attract hazardous wildlife. In addition, work should not be completed within a 5-mile buffer around the AOA until a Wildlife Hazard Assessment is completed	The following Sections were updated to provide additional information: 1.3, 1.4.3, 2.1.4, 3.3.2, 4.1.1.3, and Appendix C. The Project area is not located within 10,000 feet of the Santa Fe Municipal Airport AOA and will not affect this zone. However, the Project area is located within the 5-mile buffer of the AOA. The Proposed Action is not expected to cause additional hazardous wildlife movement into or across the approach or departure airspace. The USDI, BLM and USDA, FS will incorporate the findings of the Wildlife Hazard Assessment into the adaptive management techniques.
	Removal of invasive species and planting of native species will decrease habitat for wildlife.	This comment and the impact of the Proposed Action to wildlife were previously addressed in Section 4.1.1.3. The document disclosed anticipated short-term negative effects and long-term positive effects to wildlife habitat.
	The Proposed Action could negatively impact migratory birds.	This comment and the Proposed Action's impact to migratory birds were previously discussed in Section 4.1.1.3. Anticipated negative short-term and positive long-term effects to migratory bird habitat were disclosed in the document. Non-native vegetation removal will take place outside of the migratory bird nesting and breeding season, therefore no direct take (e.g., mortality) of migratory birds is expected as a result of the Proposed Action.

Comment Topic	Individual Comment	Response
	The NMDGF does not anticipate significant negative impacts to wildlife or sensitive habitats. The proposed project will provide long-term benefits for numerous species while minimizing short-term negative impacts.	No response required.
	The report fails to mention that the Russian Olive is a major food source and/or habitat to all wildlife species, endangered and non-endangered.	This comment was previously addressed in Section 4.1.1.3 in both the General Wildlife and Migratory Birds subsections. The document disclosed that Russian olive is an important food source to wildlife.
Wildlife (cont.)	With reference to wildlife, in section 3.3 of the document, pages 15-17, it should be noted that there are heron and several owl species along the riparian corridor in the proposed project area.	The species included in Section 3.3 includes those that were observed during migratory bird surveys conducted by HawksAloft. The list of species is not intended to be all inclusive and the potential exists for numerous other species to inhabit the area.
Vegetation	Recommend herbicide use to control non-native species.	This alternative was considered, but not analyzed in detail because of the use of Santa Fe River water for farming and domestic water supply and the inherent risks of herbicide contamination. Mechanical removal of non-native species has been proven effective at several projects throughout New Mexico.
	Removal of non-native species is consistent with the New Mexico Non-native Phreatophyte/Watershed Management Plan.	This information has been added to Section 1.3.
	The report fails to mention that the proposed reintroduction of the native tree species contradicts what has already been established many years ago by the Soil Conservation in the 1940's. The root system of the native tree species proved to be too weak to withstand the floods and sustain the river beds. The Soil Conservation used the Russian Olive and Salt Cedar because their strong root system is able to withstand the massive force of water during flooding and ability to keep the river banks intact and preventing further erosion.	This comment was previously addressed in Section 4.1.1.8. The replacement of non-native species with native species is not expected to reduce long-term bank stabilization properties that the current non-native vegetation provides. Native species, such as willow, have been shown to have remarkable soil-stabilizing properties. The document does not discount the ability of non-native species to stabilize stream banks.

Comment Topic	Individual Comment	Response
	Approve of the plans to remove the non-native plants and replace them with native species ecosystem.	No response required.
	Vegetation removal should be completed by hand near the northernmost acequia to prevent damage to the acequia.	Vegetation removal by hand will not result in successful removal of non-native species. The USDI, BLM will provide acequia-holder consultations prior to commencing work to identify areas that could be damaged by mechanical non-native species removal.
Vegetation (cont.)	In chapter 4, section 4.1.1, sub-section 4.1.1.3, page 31, paragraph 1, it is contemplated that "only 50-75% of the non-native shrub and tree relative cover would be removed throughout the project area,...". While such an action may be desirable in the short-term, the District does not believe that this action would be a beneficial long-term outcome. It is well documented that non-native species out-compete native trees and shrubs, so without eradicating the non-native seed source in favor of native forage and habitat species the healthy riparian ecosystem that is the desired outcome of the proposed project will ultimately revert to the system that currently exists.	Best available science does indicate that non-native species have the potential to out-compete native riparian species establishment. However, it is the experience of the USDI, BLM and project partners that selective thinning and physical reestablishment of native riparian species has resulted in the long-term sustainability of native riparian species, provided a native seed source and hydrological conditions that support recruitment of native species is present.
	On page 26, paragraph 2, it is suggested that livestock grazing is the probable cause for the lack of native tree and shrub species, and by inference, the cause of the non-native species. The potential exists for this scenario to be plausible. However, it is also reasonable that low daily stream flows, a confined riparian zone, lack of native seed source and extreme flood events have also been relevant factors affecting the existing vegetation system.	Objective statements related to cattle grazing, or other conditions influencing the existing vegetation composition within the Santa Fe River have been removed from this section.

Comment Topic	Individual Comment	Response
	Sub-section 4.1.1.8, riparian vegetation, page 38, states that the proposed action would remove approximately 40 acres of vegetation. Page 1 of the EA document states in the introduction that 70 acres are encompassed in the project. The District is not certain if the acreages are intended to refer to different aspects of the project or not.	The Proposed Action would remove approximately 40 acres of non-native vegetation throughout the entire 70 acre Project area. Section 4.1.1.8 has been changed to make it easier to understand.
Vegetation (cont.)	Reseed native grasses and forbs to ensure a native-dominated vegetation community since many non-native grasses and forbs are currently present at the project site.	This comment was addressed in Sections 2.1 and 2.1.1. While the primary goal of the Proposed Action is to remove non-native woody species, native grass and forb seed will be spread throughout the Project area.
Cumulative Actions	Cumulative Actions, section 4.2.1, sub-section 4.2.1.1 on pages 42 and 43 does not reflect projects that have been undertaken by Santa Fe-Pojoaque Soil and Water Conservation District. The District, in collaboration with Santa Fe County and the New Mexico State Land Office has completed two riparian restoration projects, one in La Cieneguilla and the other in La Cienega. These recent projects were implemented for the purposes of decreasing erosion, sedimentation and the proliferation of non-native vegetation. The goals were also aimed at riparian restoration, surface water augmentation and improved wildlife habitat conditions. Several other riparian restoration projects were also undertaken on private lands by the District in the La Cienega area during the last 10 years.	Sections 4.2.1.1, 4.2.2.3, and 4.2.2.5 were updated to reflect this information.

Comment Topic	Individual Comment	Response
Public Participation	The mailing list is inadequate and information was not provided about the Project in a timely fashion.	The USDI, BLM and USDA, FS maintain mailing lists to the best of the agencies' abilities. Parties that submitted comments in association with this action will be added to appropriate mailing lists and notified of future actions. Information about this action was disseminated to the public in various formats as required by NEPA, including mailing letters to known interested parties, posting flyers in the community, posting notices in local newspapers, and posting notices on agency websites.
	Native American Tribes were not consulted.	Native American Tribes, including the Pueblo of Santo Domingo and the Pueblo of Cochiti, were consulted during the development of this document.
Public Participation (cont.)	The La Bajada community is 98% Hispanic and feels that we have been discriminated against by not being included as a partner to be a part of the planning and proposals as we would be impacted the most by the outcome of this proposed project.	This comment is considered out of the scope of this analysis. All parties were given equal opportunity to provide input throughout the NEPA process. Comments received from La Bajada community members were incorporated into this document.
	A tour of the site wasn't offered.	This comment is considered outside the scope of this analysis. A tour of the site is not required under NEPA. In addition, maps of the Project area were supplied in public scoping document, public meetings, and in the document.
Environmental Justice	The Proposed Action will disproportionately affect low-income or minority populations.	It has been determined that the Proposed Action is not anticipated to have detrimental effects to water quantity, water quality, cattle grazing, or farming on private lands within or downstream of the Project area. Therefore, a "no effect" determination was made in regard to Environmental Justice.
Project Location	In chapter 3, paragraph 2, page 14, the proposed project is referred to as being located NE of I-25. It is actually NW of I-25.	The Chapter introduction has been changed to reflect the correct direction.
Other	Beavers will result in West Mile virus.	Best available science has not linked the presence of beaver ponds with West Nile virus.

5.3 List of Preparers

5.3.1 Non-Agency Preparers

Name	Affiliation	Responsibilities
Jeffrey Ham	Smith Environmental and Engineering	Lead Author, Proposed Action, Alternatives Development, Existing Environment, Impact Analysis, Environmental Commitments
Brandon Marette	Smith Environmental and Engineering	Contributing Author, Wildlife, Migratory Birds, and Threatened and Endangered Species
Kina Murphy	Global Conservation Assistance	Public Participation Coordinator, Scoping, Comment Analysis
Steve Townsend	Townsend Archaeological Consulting	Cultural Resources Administrator
Jim Matison	WildEarth Guardians	Document Review and Planning
Bryan Bird	WildEarth Guardians	Document Review and Planning

5.3.2 USDI, BLM and USDA, FS Preparers

Name	Affiliation	Responsibilities
Greg Gustina	USDI, BLM	Fisheries, Soil, Water, Air and HazMat review
Valerie Williams	USDI, BLM	Wildlife, Migratory Birds, Threatened and Endangered Species Review
Sam DesGeorges	USDI, BLM	Responsible Official
Brad Higdon	USDI, BLM	NEPA Compliance
Sandy Herlocker	USDA, FS	District Ranger
Mary V. Orr	USDA, FS	Zone Biologist

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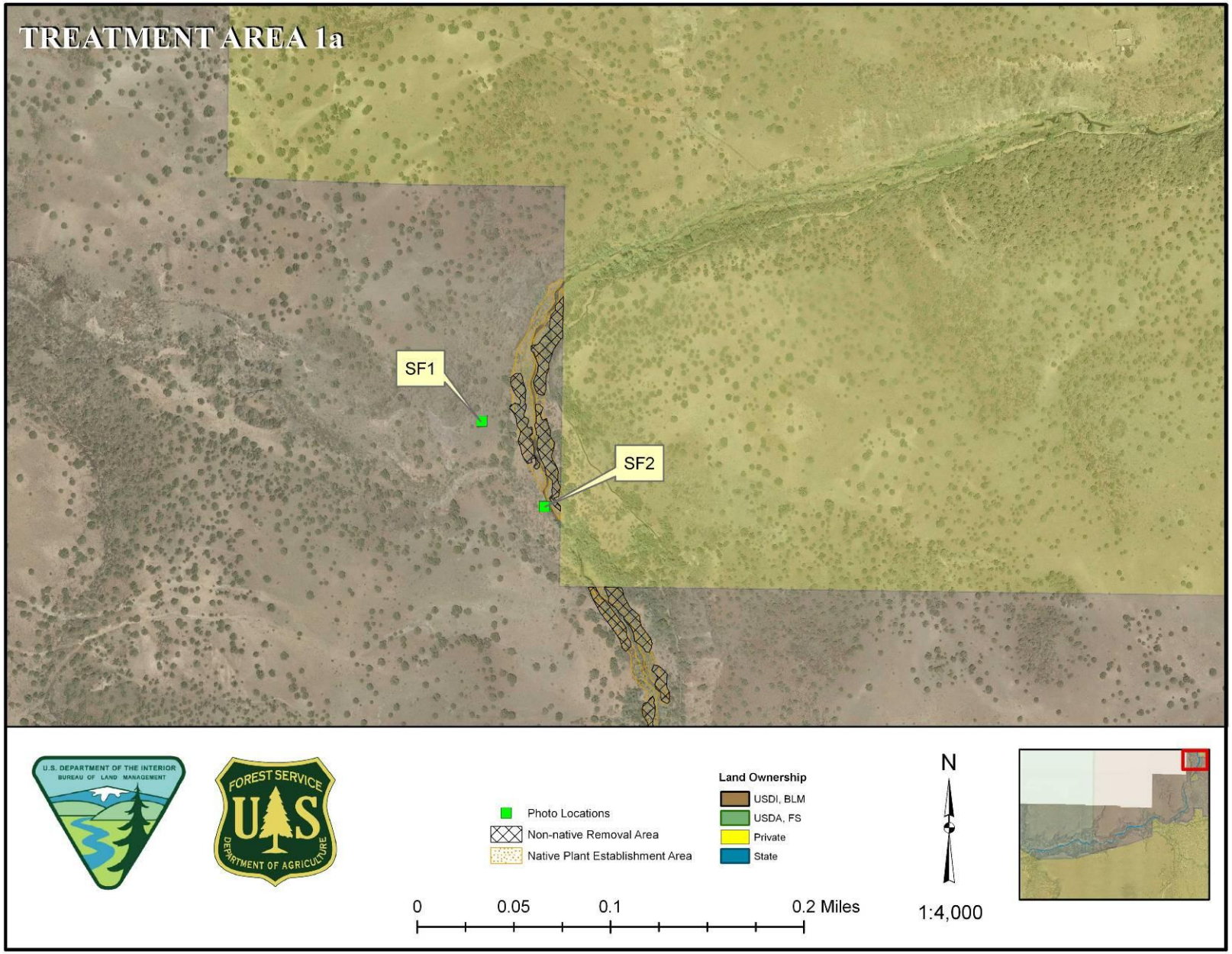
Appendix A

Treatment Area Maps


TREATMENT AREA 1a
SF1
SF2
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE
Photo Locations
Non-native Removal Area
Native Plant Establishment Area
Land Ownership
USDI, BLM
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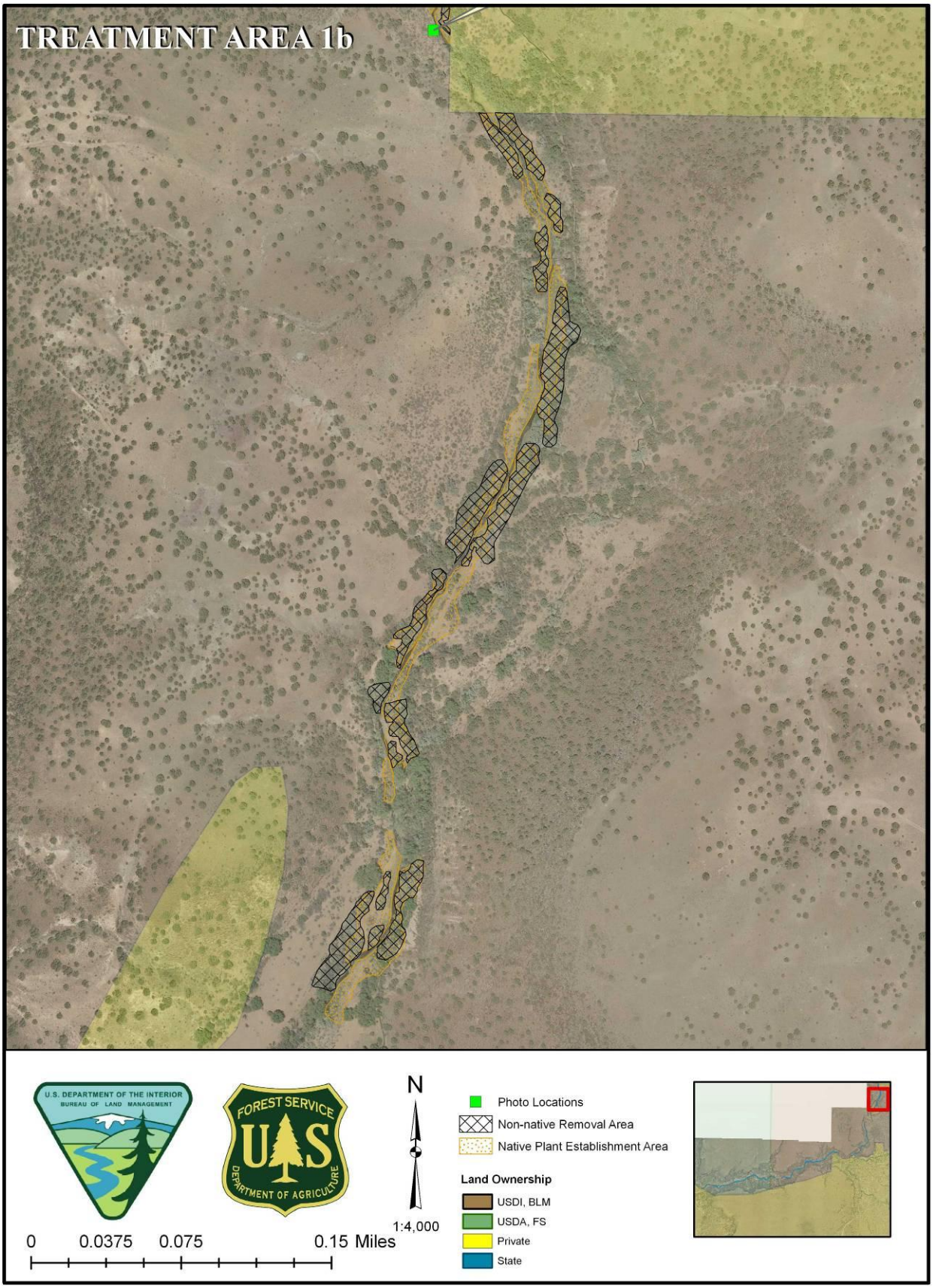
TREATMENT AREA 1b
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
FOREST SERVICE
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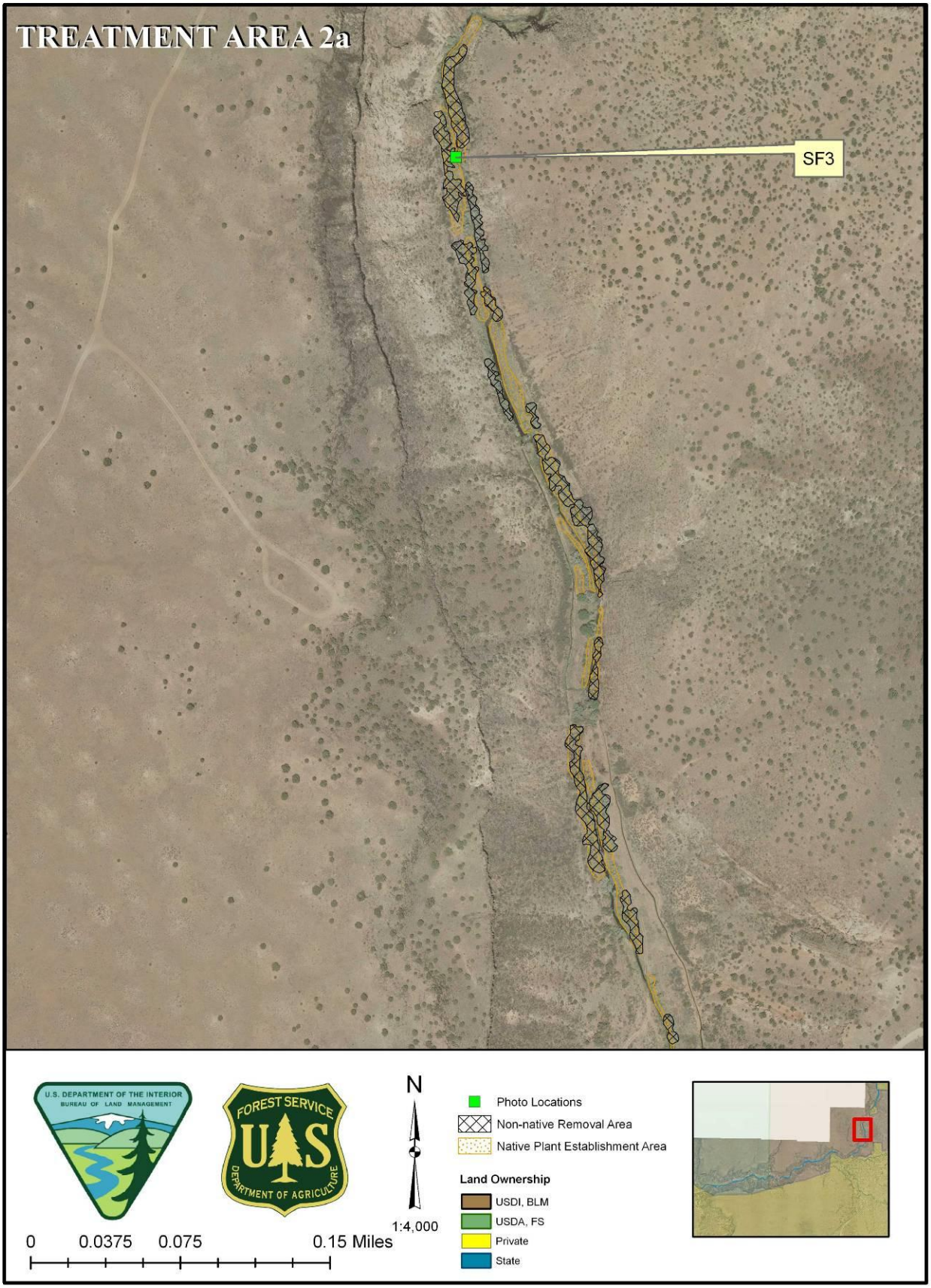
Photo Locations
Non-native Removal Area
Native Plant Establishment Area
Land Ownership
USDI, BLM
USDA, FS
Private
State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DEPARTMENT OF AGRICULTURE
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Photo Locations
Non-native Removal Area
Native Plant Establishment Area
Land Ownership
USDI, BLM
USDA, FS
Private
State


TREATMENT AREA 2b
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BUREAU OF LAND MANAGEMENT
FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE
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Non-native Removal Area
Native Plant Establishment Area
Land Ownership
USDI, BLM
USDA, FS
Private
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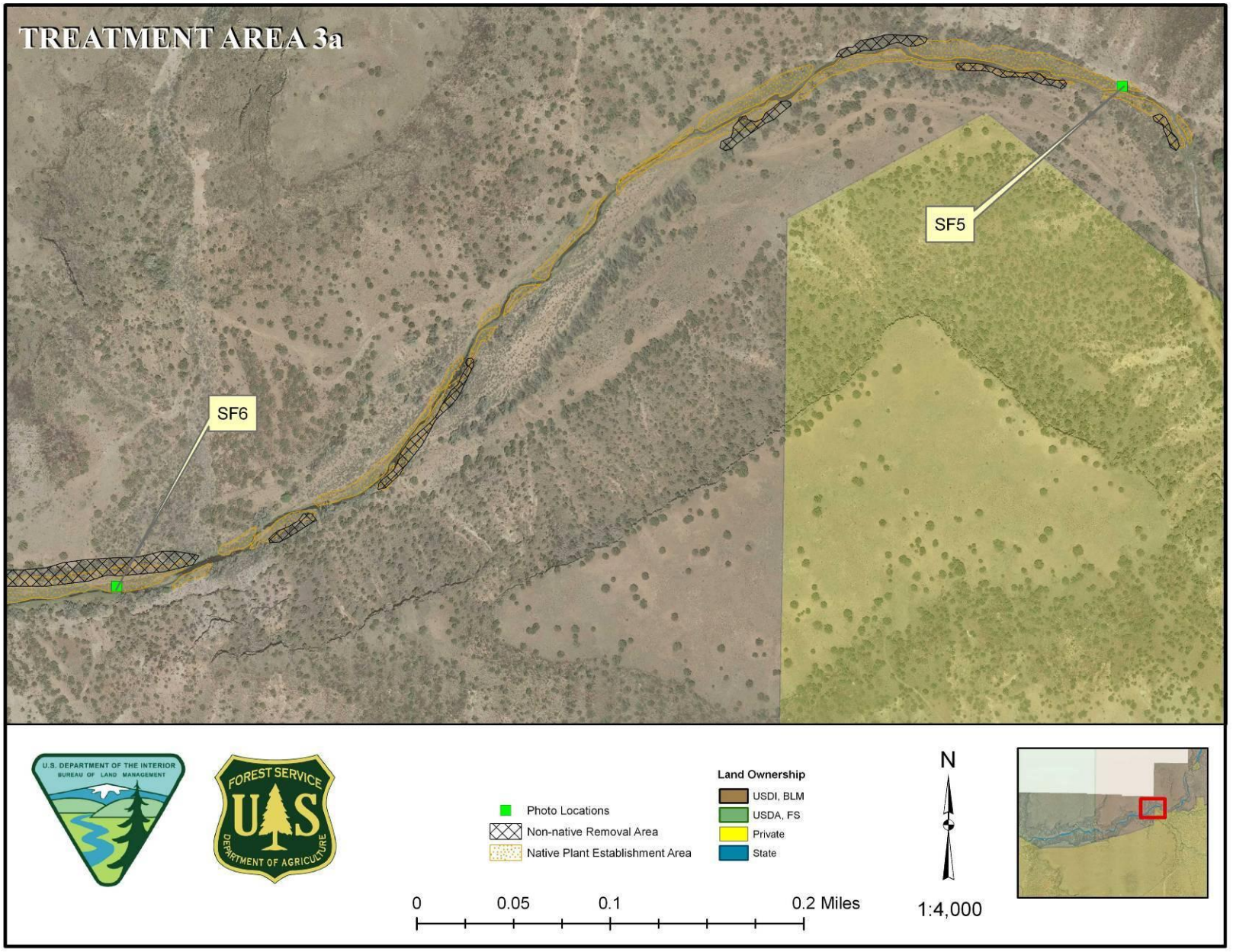
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SF6
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Photo Locations
Non-native Removal Area
Native Plant Establishment Area
Land Ownership
USDI, BLM
USDA, FS
Private
State
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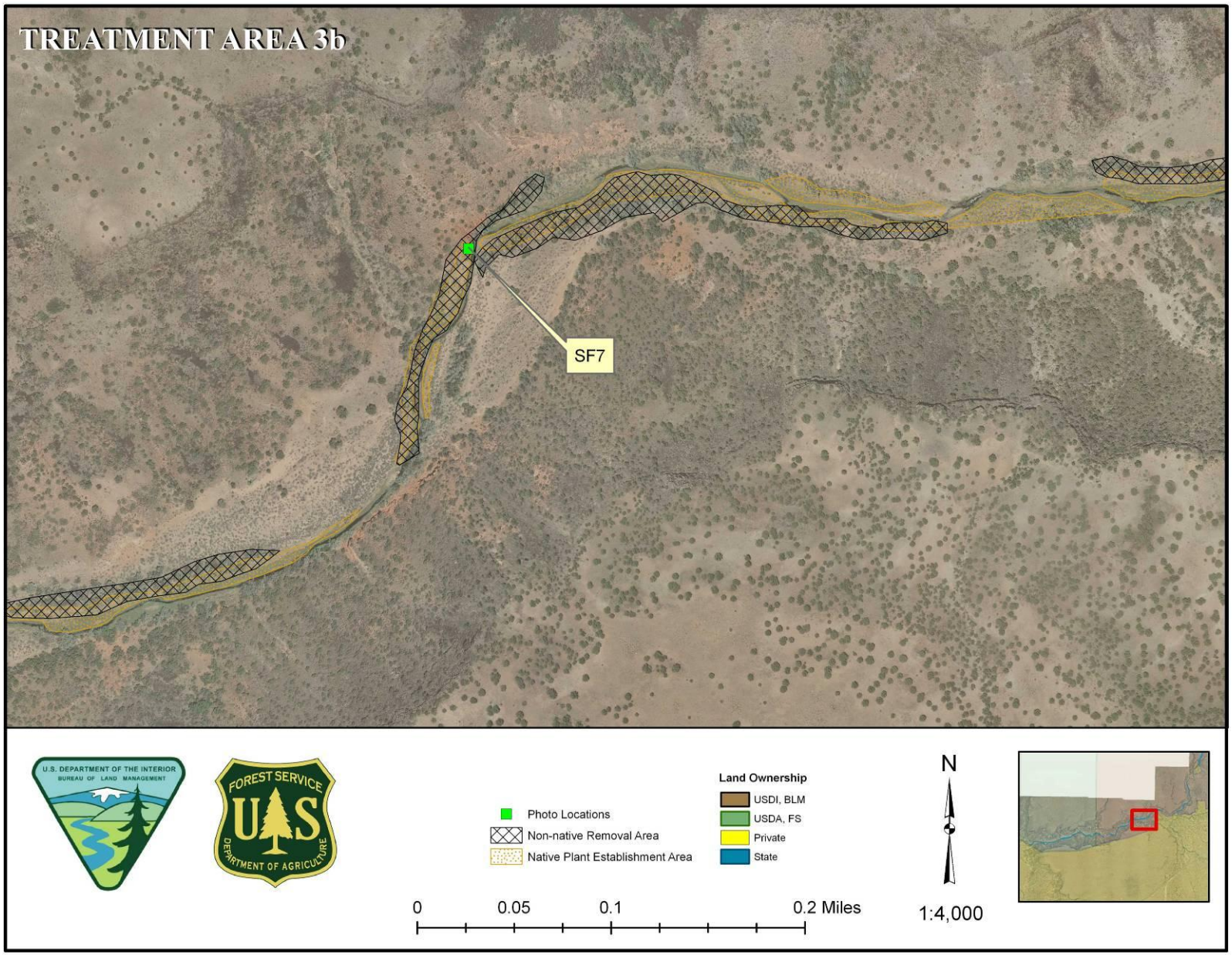
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Non-native Removal Area
Native Plant Establishment Area
Land Ownership
USDI, BLM
USDA, FS
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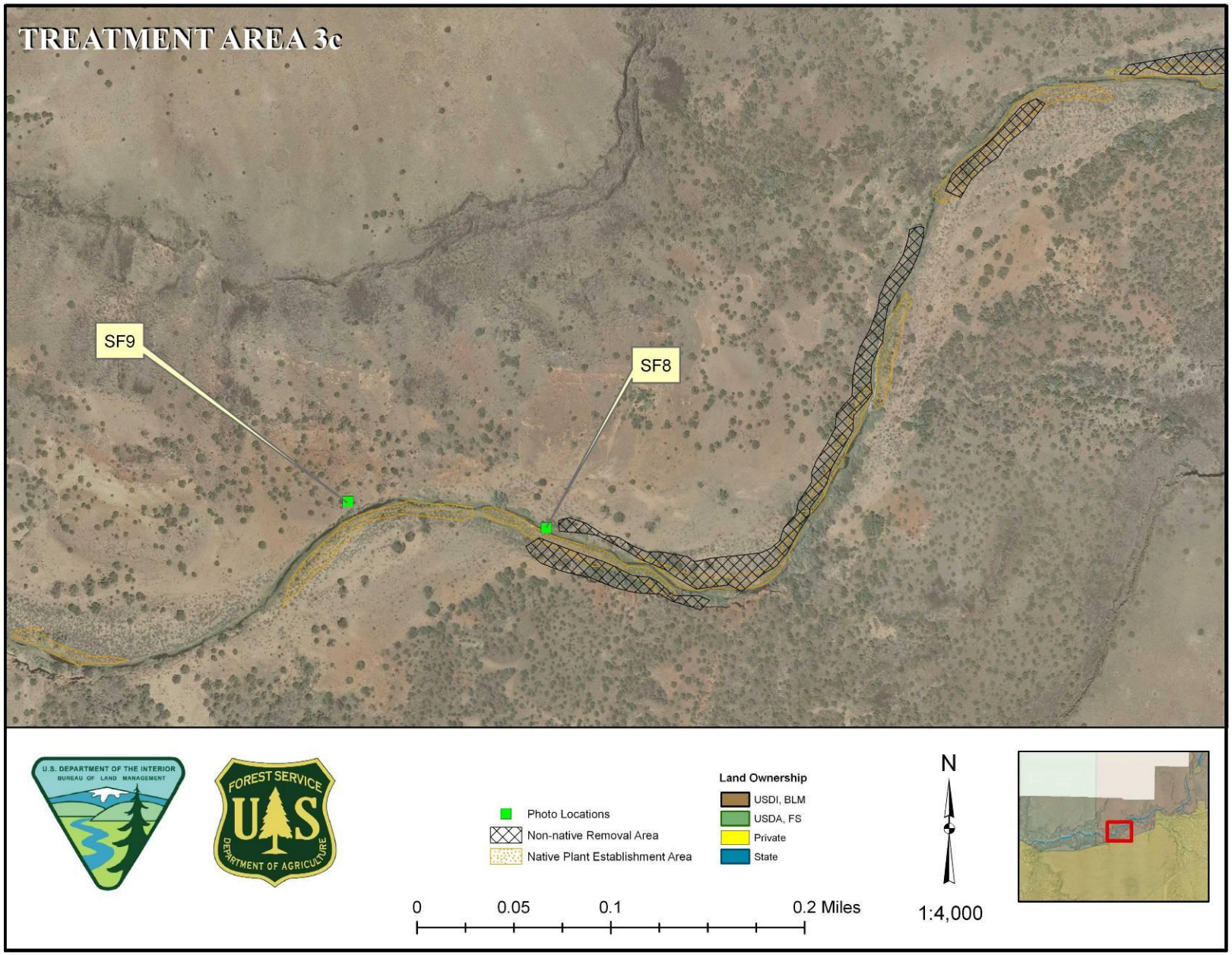
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BUREAU OF LAND MANAGEMENT
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DEPARTMENT OF AGRICULTURE
Photo Locations
Non-native Removal Area
Native Plant Establishment Area
Land Ownership
USDI, BLM
USDA, FS
Private
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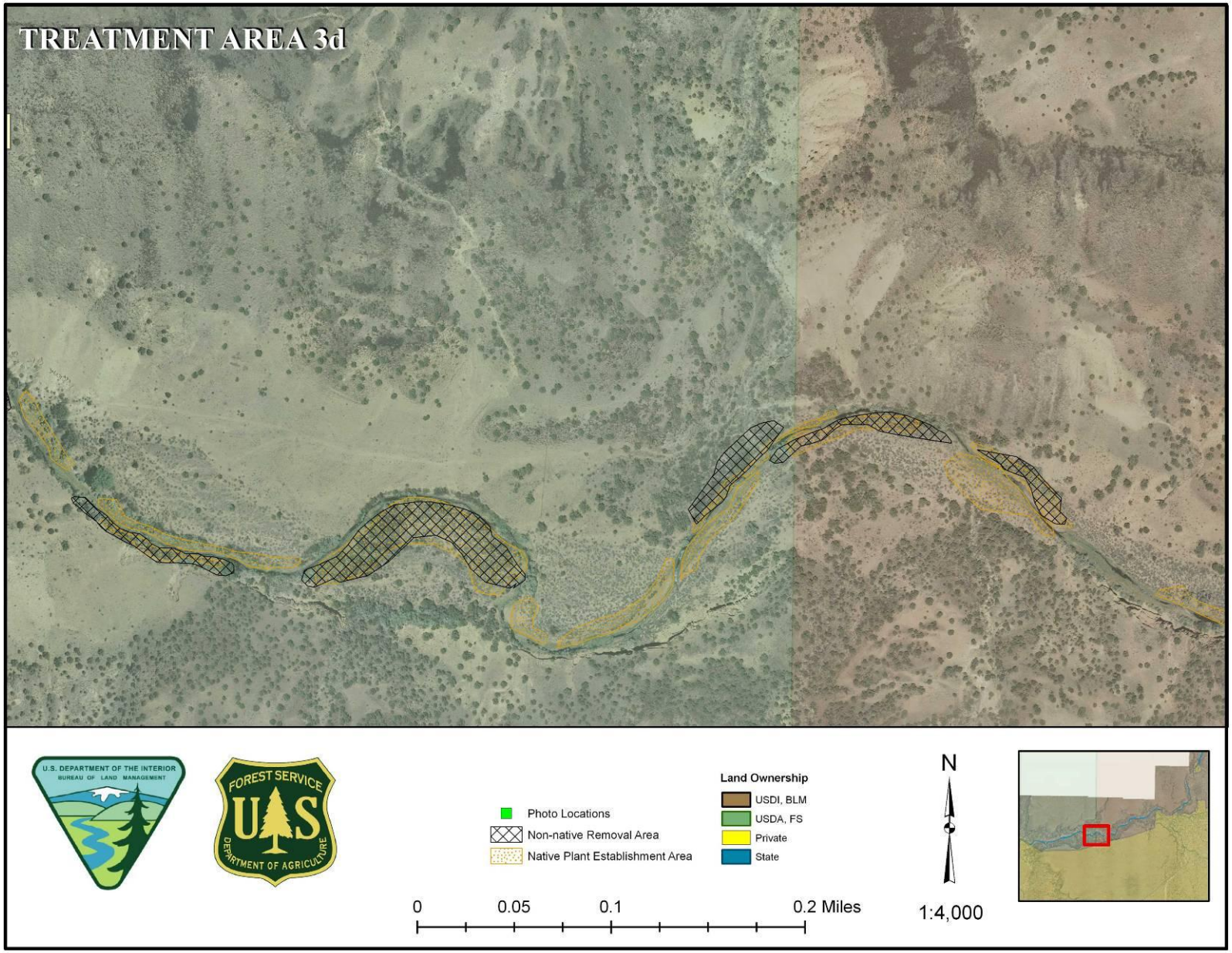
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Photo Locations
Non-native Removal Area
Native Plant Establishment Area
Land Ownership
USDI, BLM
USDA, FS
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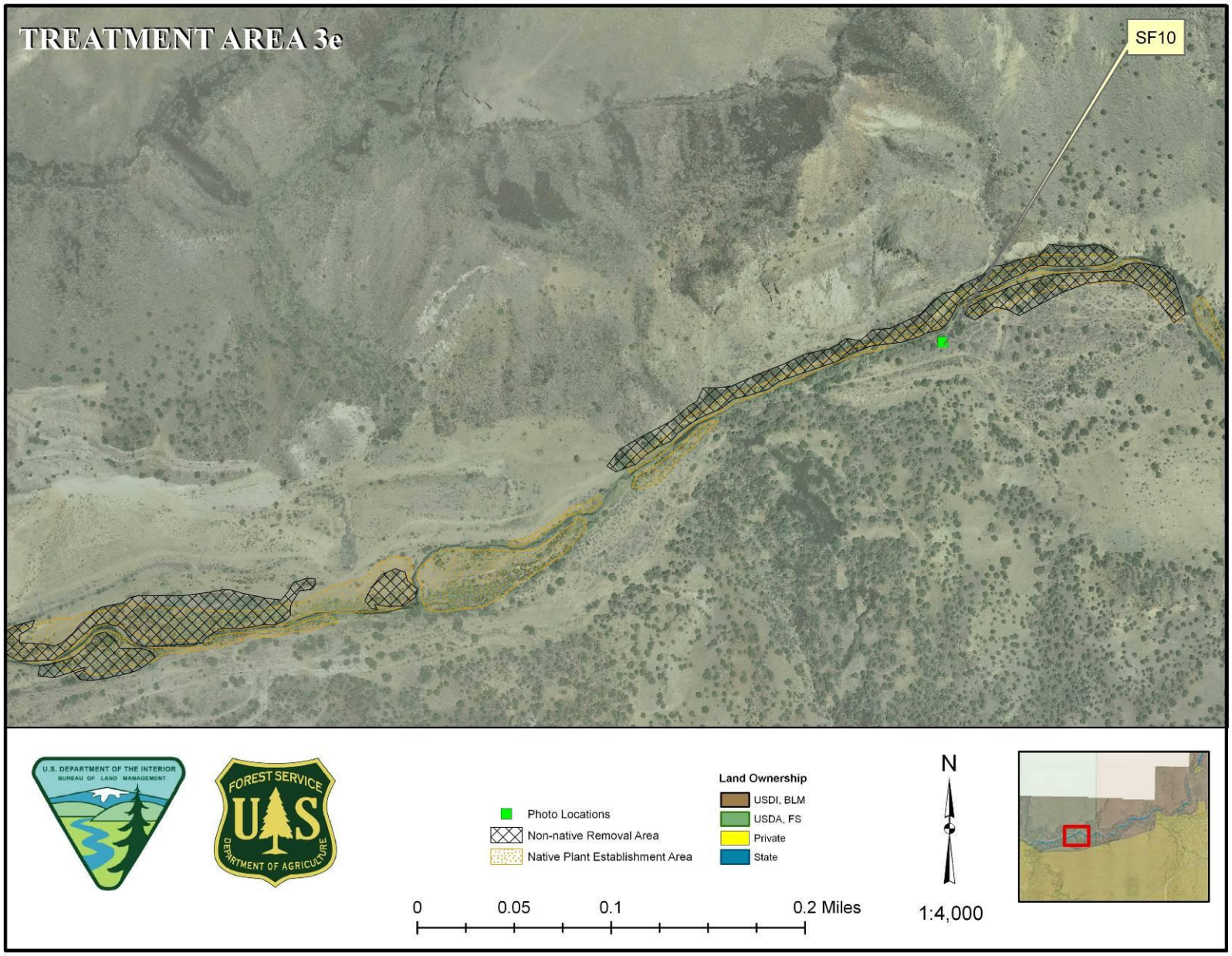
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Photo Locations
Non-native Removal Area
Native Plant Establishment Area
Land Ownership
USDI, BLM
USDA, FS
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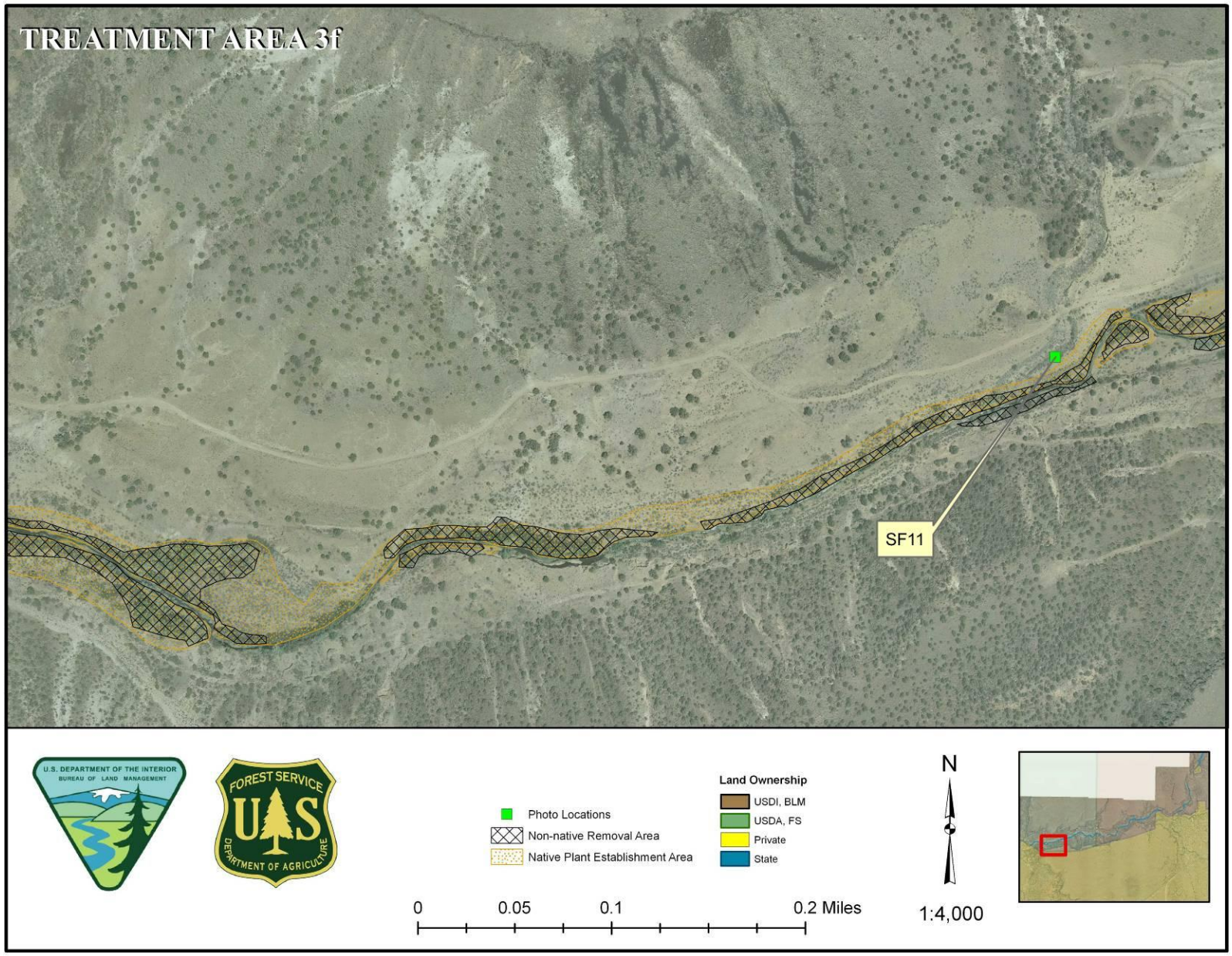
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DEPARTMENT OF AGRICULTURE
Photo Locations
Non-native Removal Area
Native Plant Establishment Area
Land Ownership
USDI, BLM
USDA, FS
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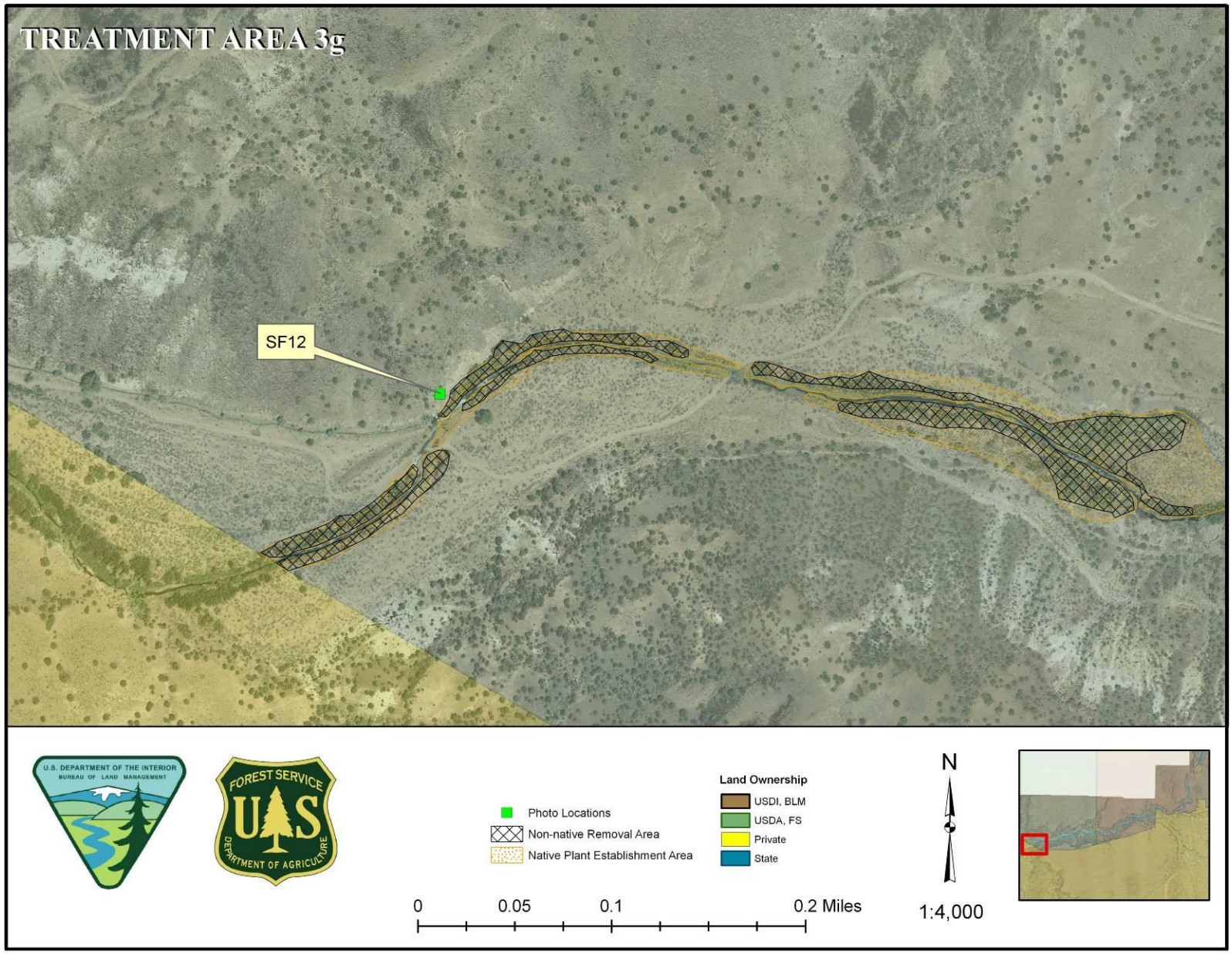
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BUREAU OF LAND MANAGEMENT
FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE
Photo Locations
Non-native Removal Area
Native Plant Establishment Area
Land Ownership
USDI, BLM
USDA, FS
Private
State
N
0
0.05
0.1
0.2 Miles
1:4,000

Appendix B

Project Area Photos

Photo No. SF1 - 143^{O} SE

Photo No. SF2 -350 ^{O} N

Photo No. SF3 - 178 ^{O} S

Photo No. SF4 - 210 ^{O} SW

Photo No. SF5 - 285 ^{O} WNW

Photo No. SF6 - 265 ^{O} W

Photo No. SF7 - 55 ^{O} NE

Photo No. SF8 - 112 ^{O} ESE

Photo No. SF9 - 98 ^{O} E

Photo No. SF10 - 270 ^{O} W

Photo No. SF11 - 90 ^{O} E

Photo No. SF12 - 80 ^{O} E

Appendix C

Environmental Commitments/Mitigation Measures

The following environmental commitments would be undertaken to minimize or eliminate potential environmental impacts associated with the Proposed Action:

1. Impacts to terrestrial upland habitats would be minimized by using existing roads and cleared staging areas. In general, equipment operation would take place in the most open area available, and all efforts would be made to minimize damage to native vegetation outside of the designated Santa Fe River riparian corridor (i.e., Project area).
2. All vehicles and heavy machinery would be free of noxious weed seed and reproductive vegetative plant parts prior to use of that equipment in the Project area. Vehicles and machinery would be cleaned by thoroughly power-washing the entire exterior and vacuuming the interior before entering the Project area. In addition, vehicles and machinery would avoid traveling through or parking in areas infested with noxious weeds.
3. All fueling, lubing, and maintenance of vehicles and machinery would occur in upland areas (i.e., staging areas). At a minimum, such staging areas and materials shall not be located within 50 horizontal feet of the ordinary high water mark. All oil/gas/fluid containers would be kept in spill moats.
4. All vehicles and machinery would be maintained in proper working condition and fluid leak inspections would occur at least daily. In addition, spill abatement materials (e.g., spill booms and/or absorbent material) would be required to be kept in each individual machine and operators and technicians would be trained in their use.
5. All practicable efforts shall be made to avoid and minimize instream work. Where practical, equipment shall be operated from banks or shoulders above riparian and wetland areas. In those instances where instream work is required, such work would be performed during low- or no-flow periods, and the use of heavy equipment in streambeds, especially in live or flowing water, shall be minimized.
6. Fording streams with equipment would be limited to four times per day. Whenever fording streams more than four times is necessary, a temporary bridge or structure shall be used.
7. Vehicular and heavy equipment travel would be suspended when conditions are such that damage to access roads cannot be avoided.
8. During the construction phase of the Project, all practicable measures shall be taken to avoid disturbance to existing vegetation (except for those species targeted for removal). The length of time that disturbed areas are left exposed shall be as short as practicable and the extent of such disturbed areas shall be as small as possible. Once earthwork has begun on a section, it shall be pursued until complete. Within seven days, completed areas should be stabilized.
9. All disturbed areas above the ordinary high water mark shall be revegetated with appropriate native plant species to provide bank stabilization, erosion control, and habitat replacement.
10. The following mitigation components would be incorporated into the Project plan to reduce and/or eliminate potential impacts to the SWFL and other migratory birds:
    a. No non-native shrubs and trees would be removed unless the re-establishment of native shrub and tree species is deemed feasible; instead, these areas would be avoided and allowed to co-exist within the future riparian area;
    b. Non-native removal would only take place outside of the migratory bird season, which is April 15 through September 15; and
    c. Non-native vegetation removal would occur on small, non-contiguous treatment sites scattered throughout the Project area, which would ensure that sufficient non-disturbed areas are available for SWFL stopover sites.
11. The following mitigation components would be incorporated into the Project plan to reduce and/or eliminate potential impacts to the Bald Eagle, American Peregrine Falcon, Golden Eagle, and other birds of prey:

a. No non-native shrubs and trees would be removed unless the re-establishment of native shrub and tree species is deemed feasible; instead, these areas would be avoided and allowed to co-exist within the future riparian area;
b. If a Bald Eagle, Golden Eagle, American Peregrine Falcon, or other birds of prey are observed within one-quarter mile of active restoration areas in the morning before activity starts, or arrives during breaks in activity, all restoration activities would suspend until the bird leaves on its own volition. If a Bald Eagle, Golden Eagle, American Peregrine Falcon, or other birds of prey arrive during construction activities, or is observed more than one-quarter mile from the active construction site, restoration activities would not be interrupted;
c. Non-native vegetation removal would occur on small, non-contiguous treatment sites scattered throughout the Project area, which would ensure that sufficient non-disturbed areas are available for raptor roosting and foraging.

12. The following mitigation components would be incorporated into the Project plan to reduce and/or eliminate potential impacts to the flathead chub, Rio Grande sucker, and other aquatic organisms:
    a. Best Management Practices (BMPs) would be implemented to reduce, to the amount practicable, upland-generated sediment inputs from construction-related activities, including the following:
        i. Installing manufactured erosion-control products (e.g., erosion-control blankets, silt fencing, straw wattles, etc.);
        ii. Seeding affected areas with a native seed mix; and
        iii. All slash generated from non-native shrub and tree removal would be chipped, spread and raked onto areas of bare soil to help incorporate organic matter into the soils and retain soil moisture.
    b. Machinery would be limited to crossing the stream only when obstacles such as steep riverbanks, boulders, and cliff faces stop its upstream or downstream advance.
13. If individuals or populations of any other USDA, FS or USDI, BLM sensitive species are encountered during pre-construction environmental surveys or during restoration activities, the appropriate agency authority (USDI, BLM or USDA, FS) would be notified immediately, and consultation would commence to identify proper mitigation measures that would reduce and/or eliminate harm to the selected species.
14. Work would be stopped immediately and the USDA, FS, USDI, BLM, and the New Mexico State Historic Preservation Officer would be notified if prehistoric or historic remains, human burials, or other archaeological resources are discovered during construction and/or monitoring.
15. Allotment fence management would meet wildlife standards that allow easy migration and passage. All fences should be built to wildlife specifications:
    - The height of fences would be 40-42 inches;
    - The spacing between top wire and second wire would be at least 12 inches;
    - The bottom wire would be 16 inches from the ground;
    - All new fence sections would be marked with flagging to alert wildlife of new barrier; and
    - Fences and loose wires would be removed as they are abandoned.
16. To reduce potential impacts to head gates, dams, and irrigation ditches, the following mitigation components will be implemented:

- Non-native vegetation removal will not be completed within a 100-yard buffer around head gates and dams to reduce potential damage to these structures by heavy equipment operations; and
- Native species will not be planted within a 100-yard buffer around head gates and dams to reduce the potential of beaver to inhabit these areas.

Appendix D

Special Status Species

Common Name (Scientific Name)	Status*			General Habitat	Likelihood of Occurrence in Project Area
	FWS	BLM	FS		
Mammals					
American marten (*Martes americana origenes*)			S	Spruce-fir forests	Occurrence unlikely; no suitable habitat at the Project location
Big free-tailed bat (*Nyctinomops macrotis*)		**S**		**Rocky cliffs with crevices and fissures throughout the southwestern deserts of the United States and Mexico rarely above 8,000 ft**	**Occurrence possible; potentially suitable roosting and foraging habitat at the Project location**
Black-footed ferret (*Mustella nigripes*)	E	S		Grasslands/ herbaceous burrows, open habitat, commonly associated with prairie dog colonies	Occurrence unlikely; no suitable habitat at the Project location
Botta's pocket gopher (*Thomomys bottae aureus*)			**S**	**Inhabits nearly every habitat within New Mexico so long as sufficient tuberous roots and plant material are available for digging tunnels**	**Occurrence possible; potential suitable habitat at the Project location**
Cinerus (masked) shrew (*Sorex cinereus cinereus*)			S	Confined to the Sangre de Cristo, Jemez, and San Juan Mountains, where the animals seem to be restricted to hydrosere communities, usually above 9,500 feet	Occurrence unlikely; no suitable habitat at the Project location
Dwarf shrew (*Sorex nanus*)			S	Talus and other rocky areas primarily in subalpine coniferous forest	Occurrence unlikely; no suitable habitat at the Project location
Ermine (*Mustela ermine murices*)			S	Forest-edge or successional habitats, including grassland and shrub, wet meadows, riparian woodlands, and rocky areas typically above 7,500 ft	Occurrence unlikely; no suitable habitat at the Project location
Fringed myotis bat (*Myotis thysanodes thysanodes*)		**S**		**Desert grassland to ponderosa pine forest frequently roosting in caves, buildings, and ponderosa pine snags**	**Occurrence possible; potentially suitable roosting and foraging habitat at the Project location**
Goat Peak pika (*Ochotona princeps nigrescens*)		S	S	Steep, rocky banks and hillsides in alpine and subalpine habitats	Occurrence unlikely; no suitable habitat at the Project location
Gunnison's prairie dog (*Cynomys gunnisoni*)			S	Shortgrass and midgrass prairies and grass-shrub habitats	Occurrence unlikely; no suitable habitat at the Project location
Long-eared myotis bat (*Myotis evotis*)		**S**		**Inhabits piñon-juniper, Ponderosa pine and spruce/fir habitats roosting in mines and buildings**	**Occurrence possible; potentially suitable roosting and foraging habitat at the Project location**
Long-legged myotis bat (*Myotis volans interior*)		**S**		**Inhabits desert-scrub, oak-woodland, oak-juniper, piñon-juniper, ponderosa pine, spruce-fir, deciduous riparian, and coniferous riparian habitat types roosting in buildings, rock crevices, and trees**	**Occurrence possible; potentially suitable roosting and foraging habitat at the Project location**

Common Name (Scientific Name)	Status*			General Habitat	Likelihood of Occurrence in Project Area
	FWS	BLM	FS		
Mammals, continued					
Long-tailed vole (*microtus longicaudus*)			S	Mixed forest on sheltered slopes and in riparian spruce, willow, and alder communities	Occurrence unlikely; no suitable habitat at the Project location
Mink (*Mustela vison energumenos*)			S	Obligate riparian animals found near permanent streams, wetlands, or other surface waters. Requires permanent wetland/riparian habitat with abundant cover such as fallen logs and debris. Presence and density affected by availability of den sites, shoreline vegetation, vertebrate prey (muskrats), and winter hunting sites.	Occurrence unlikely; no suitable habitat at the Project location
New Mexico banner-tailed kangaroo rat (*Dipodomys spectabilis baileyi*)			S	Inhabits well-developed grasslands, seeming to prefer heavier soils, while avoiding basins where basal cover of grass is low	Occurrence unlikely; no suitable habitat at the Project location
New Mexico meadow jumping mouse (*Zapus hudsonius luteus*)		S	S	Dense herbaceous grasses a minimum of two feet tall, wetland, moist lowland habitats, riparian, old field	Occurrence unlikely; no suitable habitat at the Project location
Pika (*Ochotona princeps*)			S	Talus slides and boulder fields in alpine and subalpine areas	Occurrence unlikely; no suitable habitat at the Project location
Preble's shrew (*Sorex preblei*)			S	Shrub-grasslands or sites dominated by sagebrush, including openings in coniferous forests	Occurrence unlikely; no suitable habitat at the Project location
Rocky Mountain bighorn sheep (*Ovis canadensis Canadensis*)			S	Rugged cliffs and crags or other extremely rocky areas adjacent to suitable feeding sites, which include grass as well as browse plants	Occurrence unlikely; no suitable habitat at the Project location
Snowshoe hare (*Lepus americanus*)			S	Subalpine coniferous habitats	Occurrence unlikely; no suitable habitat at the Project location
Southern red-backed vole (*Clethrionomys gapperi*)			S	Cool, mesic sites within high-elevation spruce-fir forests	Occurrence unlikely; no suitable habitat at the Project location
Southwestern river otter (*Lontra canadensis sonorae*)		S		Permanent flowing water or ponds, overhanging bank vegetation, and haul-out sites suitable for leaving and entering water	Occurrence unlikely; no suitable habitat at the Project location
Spotted bat (*Euderma maculatum*)		**S**	**S**	**Herbaceous wetland, riparian, bare rock/talus/ scree, cliff, desert, grassland, shrubland/ chaparral, conifer woodland**	**Occurrence possible; potential suitable habitat at the Project location**

Common Name (Scientific Name)	Status*			General Habitat	Likelihood of Occurrence in Project Area
	FWS	BLM	FS		
Mammals, continued					
Pale Townsend's big-eared bat (Corynorhinus townsendia pallescens)		**S**	**S**	**Caves and rocky outcroppings in scrub deserts, piñon-juniper woodlands, and coniferous forests**	**Occurrence possible; potential suitable habitat at the Project location**
Water shrew (*Sorex palustris navigator*)			S	Confined to the Sangre de Cristo, San Juan, and Jemez Mountains where they occur in the vicinity of permanent streams with dense streamside vegetation, seldom descending below 8,000 feet in altitude	Occurrence unlikely; no suitable habitat at the Project location
Western heather vole (*Phenacomys intermedius intermedius*)			S	Open coniferous forests with an understory of heaths or areas of shrubby vegetation on forest borders or in meadows	Occurrence unlikely; no suitable habitat at the Project location
Small-footed myotis (*Myotis ciliolabrum*)		**S**		**Canyons, foothills, coniferous and mixed-woodland forests roosting in rock crevices, caves, dwellings, burrows, among rocks, under bark, and beneath rocks**	**Occurrence possible; potentially suitable roosting and foraging habitat at the Project location**
Yellow-bellied marmot (*Marmota flaviventris*)			S	Meadows in the spruce-fir forest from approximately 11,000 feet to rock slides and boulder piles above timberline	Occurrence unlikely; no suitable habitat at the Project location
Yuma myotis (*Myotis yumanensis*)		**S**		**Riparian, shrubland, deserts, and forests habitats associated with rivers and streams, typically roosting in bridges, buildings, cliff crevices, caves, mines, swallows nests, and trees**	**Occurrence possible; potentially suitable roosting and foraging habitat at the Project location**
Birds					
American Peregrine Falcon (*Falco peregrinus anatum)*			**S**	**Bare rock/talus/scree, cliff, shrubland/chaparral, urban, conifer woodland, hardwood woodland, mixed woodland**	**Occurrence possible; possible breeding habitat and foraging habitat at the Project location**
Baird's Sparrow (*Ammodramus bairdii*)		S		Grassland, ungrazed or lightly grazed mixed-grass prairie, wet meadows of eastern Montana, North Dakota, and lower central Canada	Occurrence unlikely; no suitable habitat at the Project location
Bald Eagle (*Haliaeetus leucocephalus*)		**S**	**S**	**Cliff, conifer forest, hardwood forest, mixed woodland, conifer woodland, hardwood woodland with standing snag/hollow tree**	**Occurrence possible; potentially suitable transient roosting habitat during migration**
Boreal Owl (*Aegolius funereus*)			S	Dense northern forests and muskeg	Occurrence unlikely; no suitable habitat at the Project location

Common Name (Scientific Name)	Status*			General Habitat	Likelihood of Occurrence in Project Area
	FWS	BLM	FS		
Birds, continued					
Ferruginous Hawk (*Buteo regalis*)		S		Grasslands, shrub steppes, and deserts including sparse riparian forests, canyon areas with cliffs and rock outcrops, and isolated trees and small groves of trees in grasslands	Occurrence unlikely; no suitable habitat at the Project locations
Gray Vireo (*Vireo vicinior*)			**S**	**Desert, shrubland/ chaparral, conifer woodland, mixed woodland**	**Occurrence possible; suitable habitat surrounds Project area**
Loggerhead Shrike (*Lanius ludovicianus*)		S		Open country with short vegetation: pastures with fence rows, old orchards, mowed roadsides, cemeteries, golf courses, agricultural fields, riparian areas, and open woodlands	Occurrence possible; suitable habitat surrounds Project area
Mexican Spotted Owl (Strix occidentalis lucida) w/critical habitat	T	S		Cliff, conifer forest, hardwood forest, mixed forest with standing snag/hollow tree	Occurrence unlikely; no suitable habitat at the Project location. Critical habitat does not occur adjacent to Project location.
Northern Goshawk (*Accipiter gentilis*)		S	S	Coniferous, deciduous, and mixed forests including ponderosa pine, mixed conifer, and spruce-fir	Occurrence unlikely; no suitable habitat at the Project location
Southwestern Willow Flycatcher (*Empidonax traillii extimus*)	**E**	**S**		**Forested wetland, riparian, old field, shrubland/ chaparral, hardwood woodland, mixed woodland with thickets, and scrubby/brushy areas; all near open water**	**Occurrence possible; documented occurrence on BLM lands during the spring migratory season**
Western Burrowing Owl (*Athene cunicularia hypugaea*)		S	S	Semi-arid grasslands and prairies, often associated with prairie dog towns or mammal burrows	Occurrence unlikely; no suitable habitat at the Project location
Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)		S	S	Riparian, hardwood forest, mixed forest, old-field, shrubland/ chaparral, suburban/ orchard, hardwood woodland, mixed woodland	Occurrence unlikely; no suitable habitat at the Project location
White-faced Ibis (*Pelgadis chihi*)		S		Commonly associated with shoreline and marsh habitats that bordered open water	Occurrence unlikely; no suitable habitat at the Project location
White-tailed Ptarmigan (*Lagopus leucurus*)			S	Rocky alpine slopes and high mountain meadows	Occurrence unlikely; no suitable habitat at the Project location
Reptiles and Amphibians					
Jemez Mountain salamander (*Plethodon newmexicanus*)		S	S	Shady, wooded montane litter	Occurrence unlikely; no suitable habitat at the Project location
Northern leopard frog (*Rana pipiens*)			**S**	**Aquatic habitats, including marshes, streams, ponds, irrigation ditches, wet meadows, and shallow portions of reservoirs**	**Occurrence likely; suitable habitat and documented presence at the Project location**

Common Name (Scientific Name)	Status*			General Habitat	Likelihood of Occurrence in Project Area
	FWS	BLM	FS		
Reptiles and Amphibians, continued					
Texas horned lizard (*Phrynosoma cornutum*)		**S**		**Inhabits flat, open, generally sandy and dry country with little plant cover, except for bunchgrass and cactus**	**Occurrence possible; potential suitable habitat at or near the Project location**
Fishes					
Flathead chub (*Platygobio gracilis*)		**S**		**Inhabits moderate to strong current in rivers and larger streams, including the Rio Grande, Pecos, and Canadian River basins, typically above shifting sand substrates, in water that is usually highly turbid and with high levels of dissolved solids**	**Occurrence possible; potential suitable habitat at the Project location**
Rio Grande chub (*Gila pandora*)			S	Coolwater reaches of the Rio Grande and Pecos River (including tributaries) in northern New Mexico	Occurrence possible; potential suitable habitat at the Project location
Rio Grande cutthroat trout (*Oncorynchus clarki virginalis*)		S	S	Cool, high-gradient, high-elevation streams	Occurrence unlikely; no suitable habitat at the Project location
Rio Grande silvery minnow (*Hybognathus amarus*)	E	S		Medium to large-sized rivers of New Mexico and Texas	Occurrence unlikely; no suitable habitat at the Project location
Rio Grande sucker (*Catostomus plebeius*)	**SOC**		**S**	**Cool, mid-elevation streams with rocky substrates**	**Occurrence likely; suitable habitat and documented presence at the Project location**
Clams					
Lilljeborg's peaclam (*Pisidium lilljeborgi*)			S	Found only in Nambe Lake, Santa Fe County, New Mexico	Occurrence unlikely; no known occurrence outside of Nambe Lake
Plants					
Arizona willow (*Salix arizonica*)			S	Sedge meadows and wet drainage ways in subalpine coniferous forest	Occurrence unlikely; no suitable habitat at the Project location
Chaco milkvetch (*Astragalus micromerius*)			S	Sandstone outcrops blended with Todilto gypsum or limestone	Occurrence unlikely; no suitable habitat at the Project location
Chama blazing star (*Mentzelia conspicua*)			S	Road cuts and barren hillsides, on gray to red shales and clays of the Mancos and Chinle formations in piñon-juniper woodland	Occurrence unlikely; no suitable habitat at the Project location

Common Name (Scientific Name)	**Status***			**General Habitat**	**Likelihood of Occurrence in Project Area**
	FWS	BLM	FS		
Plants, continued					
Greene milkweed (*Asclepia uncialis uncialis*)			S	Stable climax or newer climax plains grasslands communities	Occurrence unlikely; no suitable habitat at the Project location
Knights milkvetch (*Astragalus knightii*)		S		Dakota sandstone rimrock ledges in piñon-juniper woodlands; known from only one location in Sandoval County, NM	Occurrence unlikely; no suitable habitat at the Project location
Pecos fleabane (*Erigeron sublaber*)			S	Rocky, open meadows in subalpine coniferous forest	Occurrence unlikely; no suitable habitat at the Project location
Pecos mariposa lily (*Calochortus gunnisonii* var. *perpulcher*)			S	Meadows and aspen glades in upper montane coniferous forest	Occurrence unlikely; no suitable habitat at the Project location
Robust larkspur (*Delphinium robustum*)			S	Canyon bottoms and aspen groves in lower and upper montane coniferous forest	Occurrence unlikely; no suitable habitat at the Project location
Santa Fe cholla (*Opuntia viridiflora*)		**S**		**Gravelly rolling hills in piñon-juniper woodland between 5,800 and 7,200 ft in Santa Fe County, NM; only three populations known to exist, none near the Project area.**	**Occurrence unlikely; no suitable habitat at the Project location**
Springer's blazingstar (*Mentzelia springeri*)			S	Volcanic and unconsolidated pyroclastic ash in piñon-juniper woodland and lower montane coniferous forest	Occurrence unlikely; no suitable habitat at the Project location
Tufted sand verbena (*Abronia bigelovii*)			S	Hills and ridges of hypsum in the Toilto Formation, 5,700–7,400 ft	Occurrence unlikely; no suitable habitat at the Project location
Wood lily (*Lilium philadelphicum*)			S	Wetland obligate found in high-mountain meadows in NM and other Rocky Mountain states	Occurrence unlikely; no suitable habitat at the Project location
Yellow lady's-slipper (*Cypripedium parvifolium* var. *pubescens*)			S	Moist grasslands to coniferous bogs in acidic soils	Occurrence unlikely; no suitable habitat at the Project location