

**Restoration Plan and Environmental Assessment
for Natural Resource Damages Settlement,
Freeport-McMoRan Morenci Mine**

March 17, 2017

Prepared by:

**Arizona Game and Fish Department
Arizona Department of Environmental Quality
on behalf of the
State of Arizona**

and

**The United States Fish and Wildlife Service
on behalf of the
U.S. Department of the Interior**

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1.0 Introduction

In 2012, the U.S. Department of the Interior (DOI) and the State of Arizona, acting as natural resource trustees on behalf of the public (collectively the “Trustees”), and Freeport-McMoRan Morenci Inc. (FMI) entered into a voluntary settlement of the Trustees’ claim for alleged injuries to natural resources incurred at the Morenci Mine Site (the “Site”) owned and operated by FMI in southeastern Arizona. Authority to pursue a claim for natural resource damages is found in the following federal statutes: the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) [42 USC § 9601 et seq.] and the Clean Water Act (CWA) [33 USC § 1251 et seq.]. Under these authorities, the Trustees are responsible for assessing natural resource damages, and identifying and implementing actions to restore, replace, or acquire natural resources equivalent to those injured or destroyed as means of compensating the public.

In accordance with Natural Resource Damage and Restoration [NRDAR] regulations, 43 Code of Federal Regulations (CFR) Part 11, the Trustees have prepared this Draft Restoration Plan and Environmental Assessment (RP/EA). The Draft Environmental Assessment [EA] describes the restoration alternatives selected by the Trustees. The Draft Restoration Plan [RP] describes how the settlement will be used to fund restoration actions designed to restore, replace, or acquire the equivalent of injured natural resources, particularly migratory birds, which resulted from hazardous substance releases from the Site.

The natural resource trustee agencies involved in developing this Draft RP/EA are the DOI represented by the U.S. Fish and Wildlife Service (USFWS), and the State of Arizona represented by the Arizona Department of Environmental Quality (ADEQ) and the Arizona Game and Fish Department (AGFD). Under CERCLA, the Trustees are responsible for selecting and implementing appropriate restoration projects to compensate the public for natural resource injuries identified during the NRDAR process. The restoration actions presented in this Draft RP/EA by the Trustees were identified through public meetings with local, state, and federal agencies, nonprofit organizations, stakeholder groups, and private citizens. The Trustees evaluated all proposed restoration actions according to the extent to which the actions addressed the injuries and would serve to restore or replace the injured resources. The restoration projects selected by the Trustees will be paid for with funds received from FMI through the settlement.

This introductory chapter explains the responsibilities and the legal authority of the Trustees to develop this plan, summarizes the settlement between FMI and the Trustees, describes the role of public involvement in developing this Draft RP/EA, discusses the responsible party involvement and the Administrative Record, and provides an overview of the remainder of this document.

1.1 Trustee Responsibilities under CERCLA and the National Environmental Policy Act

The purpose of this Draft RP/EA is to inform the public of the restoration actions selected by the Trustees to compensate for natural resource injuries and associated lost services resulting from releases of hazardous substances at the Site. This document serves as an EA pursuant to the National Environmental Policy Act (NEPA) [42 USC 4321 et seq.] and the regulations guiding

its implementation at 40 CFR 1500 et seq. This plan describes the purpose and need for the chosen restoration actions, the restoration alternatives considered, including a no-action alternative, and the potential individual and cumulative impacts of restoration actions on the quality of the physical, biological, and cultural environment.

This document also serves as an RP for implementing the selected restoration alternative, pursuant to NRDAR regulations [43 CFR Part 11] issued by the DOI. Under these regulations, the alternatives selected in the RP should ensure that damages recovered from the responsible parties are used to undertake feasible, safe, and cost-effective projects that address injured natural resources, consider actual and anticipated conditions, and are consistent with applicable laws and policies. This RP presents the selected alternatives and describes how settlement monies received will be spent to achieve restoration goals.

1.2 Summary of Settlement

As part of the Trustees' NRDAR responsibilities, the Trustees assessed injuries to natural resources at the Site, and cooperatively reached a natural resource damage settlement with FMI in June 2012 in the amount of \$6.8 million. The terms of the settlement are set forth in the Consent Decree (CD) entered with the United States District Court for the District of Arizona (Case No. CV-12-0307-TUC-CKJ). In voluntarily settling the Trustees' claim, FMI did not make any admission of liability or responsibility for injury to or loss of natural resources at the Site.

A Memorandum of Agreement (MOA) implemented by the Arizona Freeport Settlement Restoration Council (the "Council") stipulates that NRDAR funds received, including any accrued interest, may only be used to plan and implement appropriate actions to restore, rehabilitate, or acquire the equivalent of natural resources or resource services injured, destroyed, or lost as a result of releases from the Site. As specified in the MOA, such actions will be in accordance with a draft RP presented here. Trustee agencies that comprise the Council include the USFWS representing the DOI, and the ADEQ and AGFD representing the State of Arizona. Each of the participating Trustee agencies has one primary representative on the Council. The Council, through its members acting on behalf of each Trustee agency, is responsible for all aspects of the restoration process, including developing and selecting final projects, implementing and overseeing the implementation of those projects, and monitoring and evaluating project effectiveness. All actions approved by the Council are by unanimous agreement.

1.3 Public Involvement

During the development of the Draft RP/EA, the Trustees held an informal public meeting on April 9, 2013 in Thatcher, Arizona to inform the public about the restoration planning process and to request suggestions for potential restoration projects for the Trustees' consideration. The Trustees also contacted relevant agencies, organizations, and stakeholder groups to learn more about potential restoration project opportunities.

Public review of the Draft RP/EA is an integral component of the restoration planning process. In accordance with NRDAR regulations (43 CFR 11.81 [d]), the Trustees are required to solicit

public comment on a Draft RP and consider and respond to comments during the preparation of a Final RP. In addition, public review of the RP, which also serves as an EA, is consistent with NEPA (42 U. S.C. 4321 *et seq.*) and its implementing regulations (40 CFR Parts 1500- 1508).

During the public comment period on the Draft RP/EA, an additional public meeting will be held where the Trustees will answer questions as well as present information about the restoration process, the projects described in the Draft RP/EA, and how the selected projects were evaluated and selected.

1.4 Responsible Party Involvement

The assessment process for the Site was conducted as a cooperative assessment with FMI and the Trustees. Cooperative assessments (such as this one) can increase the cost-effectiveness of the process by facilitating the sharing of information and avoiding duplication of study efforts. Input from FMI was sought and considered throughout the assessment process. The Trustees have the final authority to make determinations regarding restoration actions for wildlife and wildlife habitat resources.

1.5 Administrative Record

The administrative record contains the official documents pertaining to the NRDAR activities at the Site, and is housed at the USFWS Arizona Ecological Services Field Office, 9828 North 31st Avenue #C3, Phoenix, Arizona 85051.

1.6 Document Organization

The remainder of this document is organized as follows: Chapter 2.0 describes the purpose and need for restoration, including an overview of injuries to wildlife at the Site. Chapter 3.0 describes the process used to evaluate proposed restoration projects, as well as the selected restoration alternative and the projects that make up this alternative. A description of the no-action alternative is also included in Chapter 3.0. Chapter 4.0 describes the affected environment, and presents the environmental, cultural, and socioeconomic impacts of the selected restoration alternatives. Chapter 5.0 summarizes impacts by alternative and presents conclusions. Chapter 6.0 provides a list of agencies, organizations, and parties who assisted in the preparation of this document.

2.0 Purpose and Need for Restoration

This chapter provides a description of the Site (Section 2.1) and summarizes sources of hazardous substances at the Site, pathways to natural resources, and resulting injuries to natural resources (Section 2.2). The purpose and need for restoration is described in Section 2.3.

2.1 Site Description

The Site is located in Greenlee County, Arizona, approximately 72 kilometers (45 miles) northeast of Safford and near the towns of Clifton and Morenci on U.S. Highway 191 (Figure 2.1). Perennial drainages near the Site include the Gila River, San Francisco River, and Eagle Creek. Mean annual rainfall in the area is 320 millimeters (12.6 inches) and is bimodal, with peaks occurring during summer thunderstorms and winter rains. Elevations range from approximately 1,036-2,103 meters (3,400-6,900 feet) above sea level. Vegetation community types in the area include interior chaparral, semi-desert grassland, Great Basin conifer woodland, post-climax conifer woodland, xero-riparian mixed scrub, maple-oak meso-riparian habitat, *Baccharhis*-cottonwood meso-riparian habitat, and herbaceous wetland (PDMI 2002).

Freeport-McMoRan Corporation, formerly known as Phelps Dodge Corporation, is the parent corporation of FMI and currently owns and operates the Site, which is the largest producing copper mine in North America (Securities and Exchange Commission 2002). The Site includes a large complex of open pits, numerous leach rock and development rock stockpiles, beneficiation plants, tailings impoundments, and uncovered ponds. Mining processes at the Site include crush and convey systems, an agglomerating facility, solution-extraction plants, electrowinning tank houses, and a copper concentrator facility. The open pit mining area is located in the Middle Chase Creek watershed, in the northern part of the Site (Figure 2.2). The tailings impoundments and most of the ore and solution beneficiation facilities are located in the southern part of the Site near the San Francisco River (Figure 2.3). Historically, six smelters were operated at the Site (Figures 2.4-2.5).

2.2 Summary of Natural Resource Injuries

Pursuant to NRDAR regulations [43 CFR Part 11], the cooperative assessment of natural resource injuries conducted by the Trustees and FMI concluded that releases of hazardous substances occurred at the Site and these releases caused injuries to natural resources. The Trustees identified migratory birds and terrestrial wildlife habitat as the primary natural resource injuries addressed by this NRDAR settlement.

2.2.1 Sources of Hazardous Substances and Pathways to Natural Resources

Ponded fresh slurry water on top of mine tailings at the Site attracted migratory waterfowl and other birds. When the Site converted mine operations to solvent extraction-electrowinning, fresh water was no longer deposited on the tailings ponds. As the ponded water evaporated, the water acidified and became toxic to birds through exposure and ingestion. The Site historically operated six smelter smokestacks, the emissions of which potentially deposited contaminants through wind dispersion to wildlife habitat surrounding the Site.

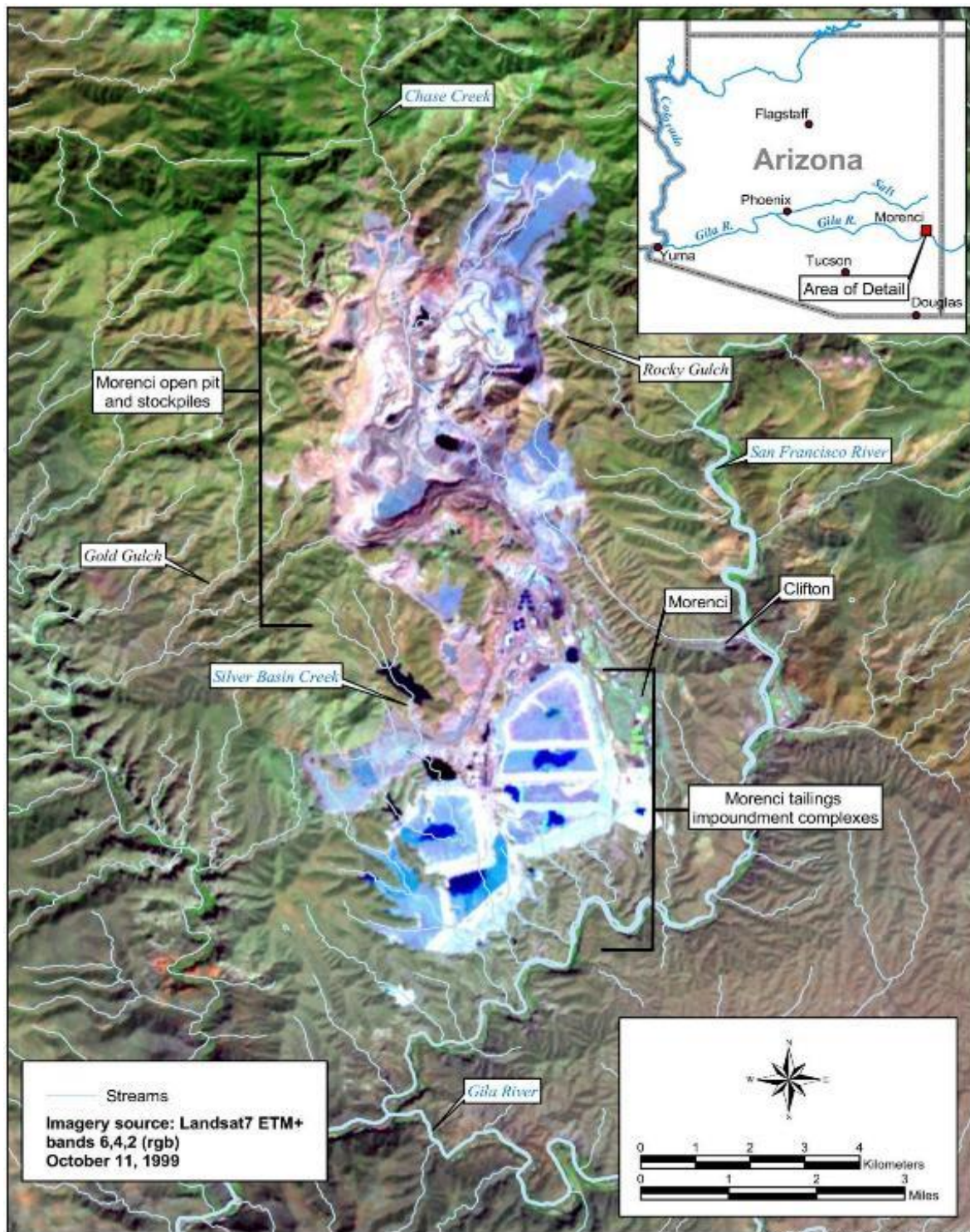


Figure 2.1. Morenci Mine in southeastern Arizona (Map Source: Stratus Consulting Inc. 2003).

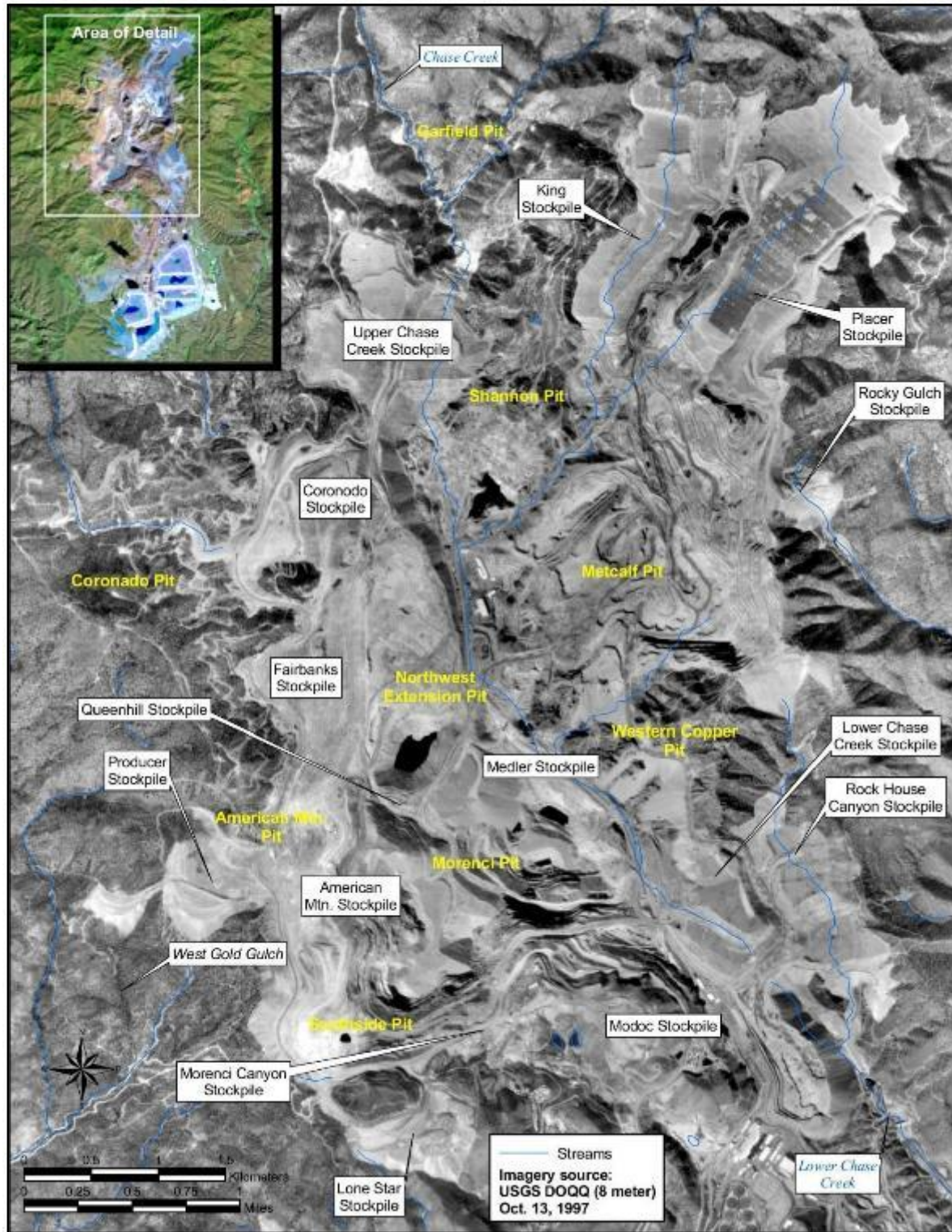


Figure 2.2. Northern portion of the Morenci Mine, including the open pits and stockpiles (Map Source: Stratus Consulting Inc. 2003; Image Source: USGS 1997).

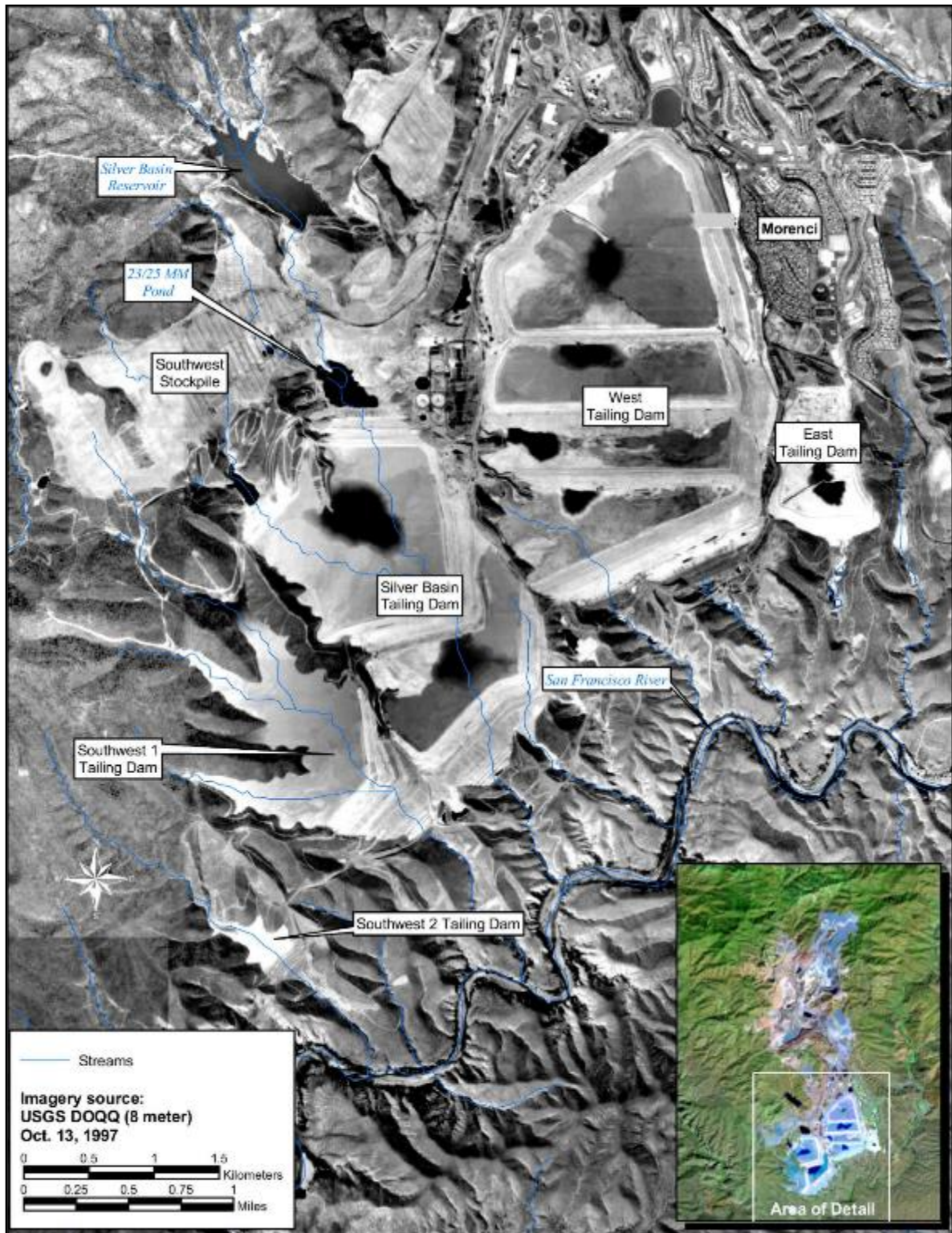


Figure 2.3. Southern portion of the Morenci Mine, including Silver Basin Reservoir and the tailings dams (Map Source: Stratus Consulting Inc. 2003; Image Source: USGS 1997).

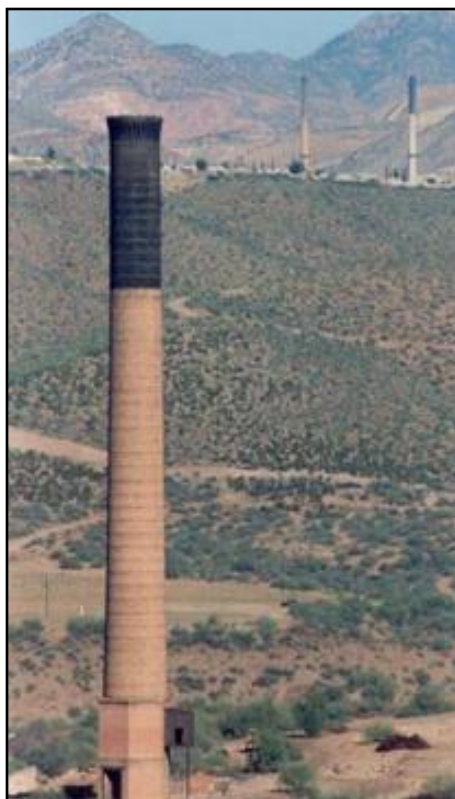


Figure 2.4. Photograph of a historic smelter stack at the Site.

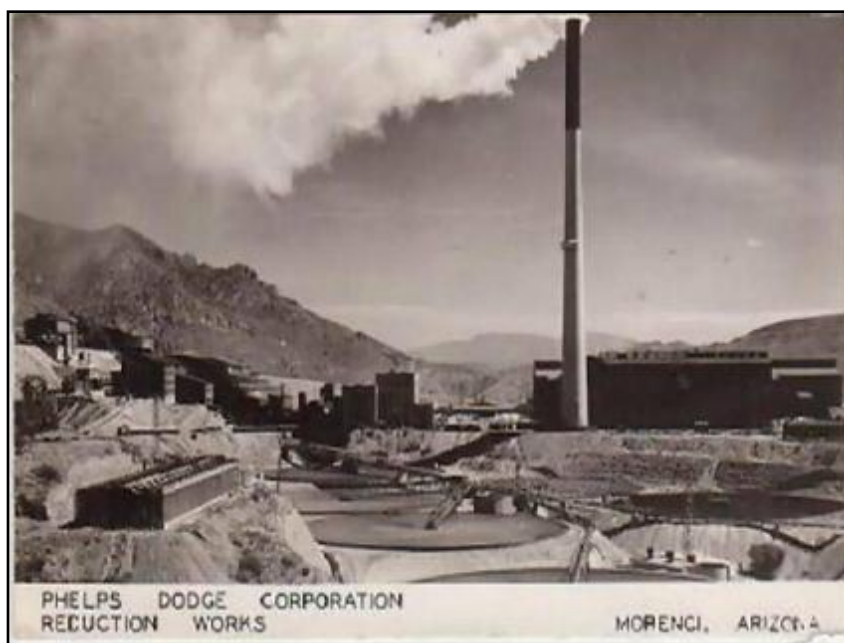


Figure 2.5. Photograph of a historic smelter at the Site.

2.2.2. Injuries to Migratory Birds

In the arid environments of the Southwest, areas of open water are critical resources for wildlife, particularly for migrating passerine and waterfowl species that seek open water for resting and drinking. Mine tailings ponds at other mine sites have been documented to contain high concentrations of sulfuric acid (resulting in low pH levels) and metals (Stratus Consulting Inc 2003). Laboratory studies have demonstrated that ingestion of sulfuric acid and copper solutions is lethal to migratory birds (Isanhart et al. 2011). Exposure or ingestion of the contaminated water at the Site resulted in death and other injuries to migratory birds.

In 2000, dead migratory birds were found in the vicinity of tailings ponds and pregnant leach solution (PLS) ponds at the Site (Figures 2.6-2.7; Stratus Consulting, Inc. 2003). Following the discovery of bird carcasses, FMI initiated a corrective action plan to prevent future bird mortalities. Corrective actions included pumping visible surface water from ponds, minimizing the amount of time visible water was present at ponds, a bird hazing program to discourage birds from landing or staying on ponds, and a monitoring and reporting program for dead and injured birds.



Figure 2.6. Dead passerine bird found at the Site in 2000.

As part of the NRDAR assessment activities, the Trustees and FMI cooperatively attempted to estimate the number of birds injured from exposure to acidified and metalliferous waters at the Site, as well as the number of years of “lost bird life” associated with any premature mortalities. The Trustees and FMI reviewed observations made by bird hazers at the Site regarding the number and types of birds trying to land on the tailings ponds, and the level of bird mortality and sub-lethal injuries that likely occurred at the ponds based on the assumed length of time that birds were exposed to hazardous substances and low pH water. Ultimately, no consensus was reached during the cooperative assessment on the number of waterfowl and other birds potentially injured at the Site.



Figure 2.7. Dead waterfowl found at the Site near a tailings impoundment in 2002.

2.2.3 Injuries to Terrestrial Resources

Aerial transport of historic smelter emissions, in addition to windblown erosion of materials from un-vegetated waste rock, leach rock, and tailings piles may have adversely impacted surrounding terrestrial vegetation and soils. The Site and surrounding area are habitat for bighorn sheep and other wildlife.

As part of the NRDAR assessment activities, data from the FMI Hurley smelter at the Chino Mine in southwestern New Mexico were reviewed as an analog for estimating the area impacted by smelter emissions at the Site and injuries to natural resources. Surface soils at sampling locations downwind from the Hurley smelter had high acidity and metals concentrations, resulting in toxicity to vegetation, and reduced canopy cover and plant species richness. Soil copper concentrations were most elevated near the smelter and decreased with increasing distance from the smelter (MFG 2003). For NRDAR assessment purposes, the Trustees assumed that soil copper concentrations at the Site followed the same general pattern with distance from the smelter stacks as at Hurley. Following additional analyses and comparison of wind patterns between the Chino Mine Hurley smelter and the Site, the Trustees estimated that the area impacted by emissions deposition at the Site was approximately 3,968 hectares (9,800 acres) divided among three deposition zones. The Trustees based estimations of terrestrial ecosystem service loss on the direct relationship between vegetation canopy cover and soil copper concentrations observed at the Hurley smelter. Reductions in vegetation canopy cover (i.e., terrestrial ecosystem service loss) ranged from 14-37% for the three deposition zones at the Site. FMI did not concur with these calculations.

2.3 Need for Restoration under CERCLA

The objective of the NRDAR process under CERCLA is to compensate the public for natural resources and the services provided by these resources that have been injured, destroyed, or lost as a result of hazardous substance releases at the Site. Given the injuries to wildlife and wildlife habitat described above, as defined in CERCLA [43 CFR § 11.82a], the Trustees are required to evaluate and implement actions to: (1) restore injured natural resources back to baseline conditions (i.e., conditions that would have occurred if the hazardous substance releases did not occur), and (2) replace or acquire natural resources equivalent to those injured, destroyed, or lost from the releases of hazardous substances. Notwithstanding the difficulties presented in estimating potential resource injuries at the Site, the Trustees and FMI cooperatively reached a natural resource damage settlement in the amount of \$6.8 million without any admission of liability by FMI. Settlement funds for NRDAR resource restoration can only be used to restore, rehabilitate, replace, or acquire the equivalent of these injured natural resources and the services provided by them.

3.0 Restoration Project Evaluation and Alternatives

The purpose of this Draft RP/EA is to inform the public of the restoration actions chosen by the Trustees to compensate for natural resource injuries and associated lost services resulting from releases of hazardous substances at the Site. Any selected alternative must be feasible, safe, and cost-effective, address injured natural resources, consider actual and anticipated conditions, have a reasonable likelihood of success, and be consistent with applicable laws and policies.

The Trustees considered a diverse set of potential restoration alternatives for this Draft RP/EA, including a “no action” or “natural recovery” alternative. The alternative selected by the Trustees is a suite of restoration projects that cumulatively aim to compensate for injuries to migratory birds and terrestrial resources. The projects were identified by the Trustee agencies, based on their knowledge of restoration opportunities in the area, and also through outreach to a broad range of local, state, and federal agencies, organizations, and stakeholder groups. This chapter describes the criteria for identifying and selecting restoration alternatives (Section 3.1), explains how priority tiers for funding projects were developed (Section 3.2), describes the no-action alternative (Section 3.3), and presents detailed descriptions of each project included in the selected alternative (Sections 3.4-3.5). A more detailed discussion of impacts, including environmental, cultural and socioeconomic impacts, as well as cumulative impacts, from implementing the full suite of restoration projects can be found in Chapters 4.0 and 5.0.

3.1 Criteria for Identifying and Selecting the Restoration Projects

The Trustees preferred a diverse range of wildlife-focused restoration projects that would provide the maximum benefit to regional wildlife resources, including projects that focused on wildlife habitat protection and restoration as well as population enhancements of wildlife species. This approach is consistent with current regional planning efforts in the area and will meet the Trustees’ goals of restoring, replacing, or acquiring natural resources equivalent to those lost at the Site.

The Trustees based their process for evaluating restoration projects on the guidance for restoration project selection provided by NRDAR regulations [43 CFR § 11.82]. First, the Trustees developed criteria for screening proposed restoration projects (Table 3.1). Each project was evaluated with these criteria to determine if the project met minimum standards for acceptability. Projects that failed to meet all of the criteria were not considered further by the Trustees. Projects that met the initial screening criteria were then evaluated using the project evaluation criteria and assigned a weighted score (Table 3.1). Project ratings were weighted more heavily for high-priority criteria and less heavily for lower priority criteria.

Table 3.1. Project screening and evaluation criteria used by Trustees to select restoration projects for funding.

<p><u>PROJECT SCREENING CRITERIA</u></p> <p>Package Complete</p> <p>Financial Oversight</p> <p>Proposal Addresses Injury</p> <p>Geographic Relevance</p>
<p><u>PROJECT EVALUATION CRITERIA</u></p> <p><u>Budget</u></p> <p>Cost Effective (e.g., acres restored)</p> <p>Permit Acquisition Costs Addressed</p> <p>Cost Sharing Partnerships</p> <p>Budgetary Feasibility</p> <p><u>Personal Qualifications</u></p> <p>Project Proponents Qualified to Perform Tasks</p> <p><u>Technical Feasibility</u></p> <p>Services Restored</p> <p>Monitoring Sufficiency and Adaptive Management</p> <p>Address Operations and Management Costs</p> <p>Technical Feasibility</p> <p>Project Risk</p> <p>Human Health and Safety</p> <p>Short Term/Long Term Adverse Environmental Impacts</p> <p><u>Address Restoration Goals and Objectives</u></p> <p>Project Lifespan</p> <p>Time to Restoration/Project Completion</p> <p>Outreach Potential</p>
<p><u>WEIGHTED SCORES</u></p> <p><i>Budget (15%); Personal Qualifications (25%); Technical Feasibility (30%);</i></p> <p><i>Address Restoration Goals and Objectives (30%)</i></p>

3.2 Development of a Preferred Restoration Alternative and Priority Tiers for Funding

After conducting the screening and evaluation process, the Trustees developed a preferred restoration alternative that included all proposed projects that met the screening criteria. However, the funding available to the Trustees from the settlement was insufficient to fund all of these projects. Therefore, the Trustees placed projects into two funding priority tiers according to how each project scored against the evaluation criteria and on the total cost of different combinations of projects. These tiers reflect the Trustees' best efforts to select projects that will most effectively compensate the public for the loss of wildlife, especially migratory birds, and the loss of wildlife habitat that resulted from releases of hazardous substances at the Site.

Projects in Tier 1 will have top priority for funding and the Trustees expect to fund these projects with the available settlement funding. Projects in Tier 2 may be implemented if funds are available or if a Tier 1 project cannot be implemented. At this time, no Tier 2 projects have been identified for implementation.

3.3 No-Action/Natural Recovery Alternative

Evaluation of a no-action alternative is required under NEPA [40 CFR § 1502.14(d)]. The selection of this alternative by the Trustees would mean that no actions would be taken by the Trustees to restore injured wildlife and wildlife habitat resources, and that the public would not receive compensation for past or ongoing losses. This alternative may be used as a benchmark to evaluate the comparative benefit of other actions. Because no action is taken, this alternative also has no cost.

3.4 Summary of Preferred Restoration Alternative

The selected restoration alternative is the one that the Trustees agree would best compensate the public for injuries to wildlife and wildlife habitat resources resulting from releases of hazardous substances at the Site. This alternative consists of three wildlife habitat protection and restoration projects as well as one population enhancement project. As described above, Tier 1 projects best met the evaluation criteria and will be funded immediately by the Trustees following approval of this Draft RP/EA. Figure 3.1 provides a map of approximate locations for all projects in the preferred alternative. Descriptions of each of the projects included in the preferred restoration alternative are provided in Sections 3.5.1-3.5.4. For each project, there is a brief description of the project including goals and objectives, an explanation of the expected benefits from the project, and an overview of maintenance and monitoring requirements for the project so that the Trustees can determine if the desired benefits are being achieved and take corrective actions if necessary. The Trustees will work closely with project proponents (AGFD and the Bureau of Land Management; BLM) as they develop more detailed project implementation plans and budgets, including long-term monitoring and maintenance commitments, to ensure that the suite of projects remains cost-effective.

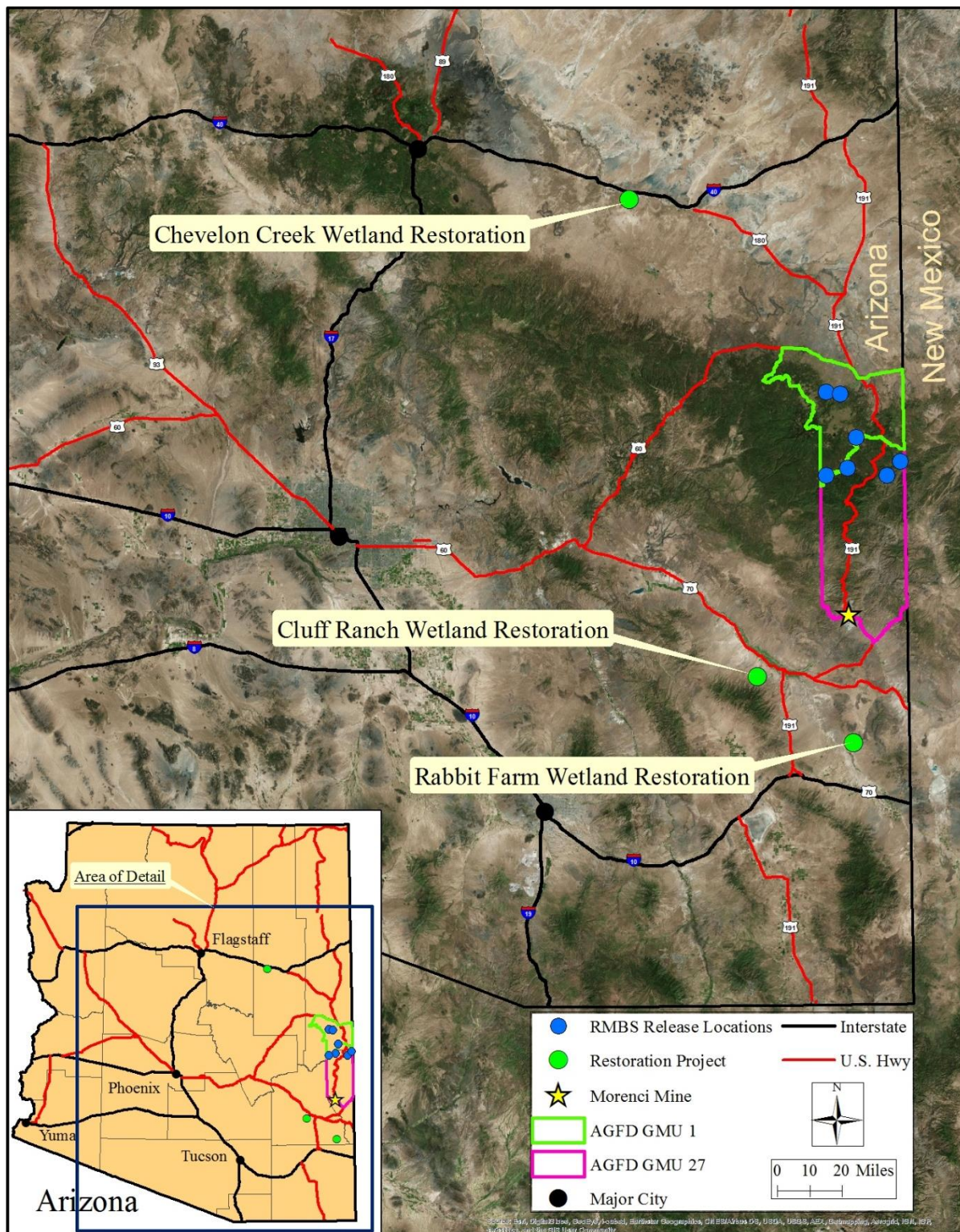


Figure 3.1. Location of Tier 1 restoration projects included in the preferred alternative.

3.5 Tier 1 Restoration Projects

The four projects in this tier (Figure 3.1), including three habitat restoration and improvement projects and one wildlife population enhancement project, were ranked high by the Trustees using the evaluation criteria. These projects are expected to significantly benefit regional wildlife and wildlife habitat. Each of the Tier 1 projects is described in detail below: Cluff Ranch Wetland Restoration, Chevelon Creek Wetland Restoration, Rocky Mountain Bighorn Sheep Population Enhancements, and Rabbit Farm Wetland Restoration.

3.5.1 Wetland Restoration at Cluff Ranch Wildlife Area

Project objectives

1. Repair or re-construct water delivery system to support emergent wetlands, moist soil units, and native woody vegetation;
2. Excavate depressions, re-grade fallow agricultural fields, and construct berms to create emergent wetlands and seasonally flooded moist-soil units for waterfowl, wading birds, and other wildlife;
3. Clear and grub areas to establish native woody vegetation in suitable areas, and;
4. Develop monitoring and long-term management plans to ensure that ecologically-based performance standards are being met and the area perpetually remains in its restored state.

Project area

The project is located on the Cluff Ranch Wildlife Area (CRWA), approximately 11 kilometers (7 miles) from the town of Safford, Arizona and 55 kilometers (34 miles) from the Site. The CRWA lies in Graham County on the north aspect of the Pinaleno Mountains, at about 914 meters (3,000 feet) in elevation (Figure 3.2). The landscape varies from low-lying desert hills extending from the mountain slope to generally flat desert plains below. Ash Creek flows through the property with adjacent well-developed riparian woodland habitat. Small wetlands and ponds are also present. The 319-hectare (788 acre) property was purchased by AGFD for the conservation of wildlife habitat, particularly for waterfowl nesting and feeding habitat.

Project description

In its current state, CRWA provides little habitat for wetland-associated species primarily due to deterioration of the original water delivery system. However, there exists large potential at CRWA to create and enhance wetland habitat for waterfowl, wading birds, and other wildlife. In particular, opportunities exist to enhance habitats of the least bittern (*Ixobrychus exilis*), a state species of special concern that nests in emergent wetlands at nearby Roper Lake.

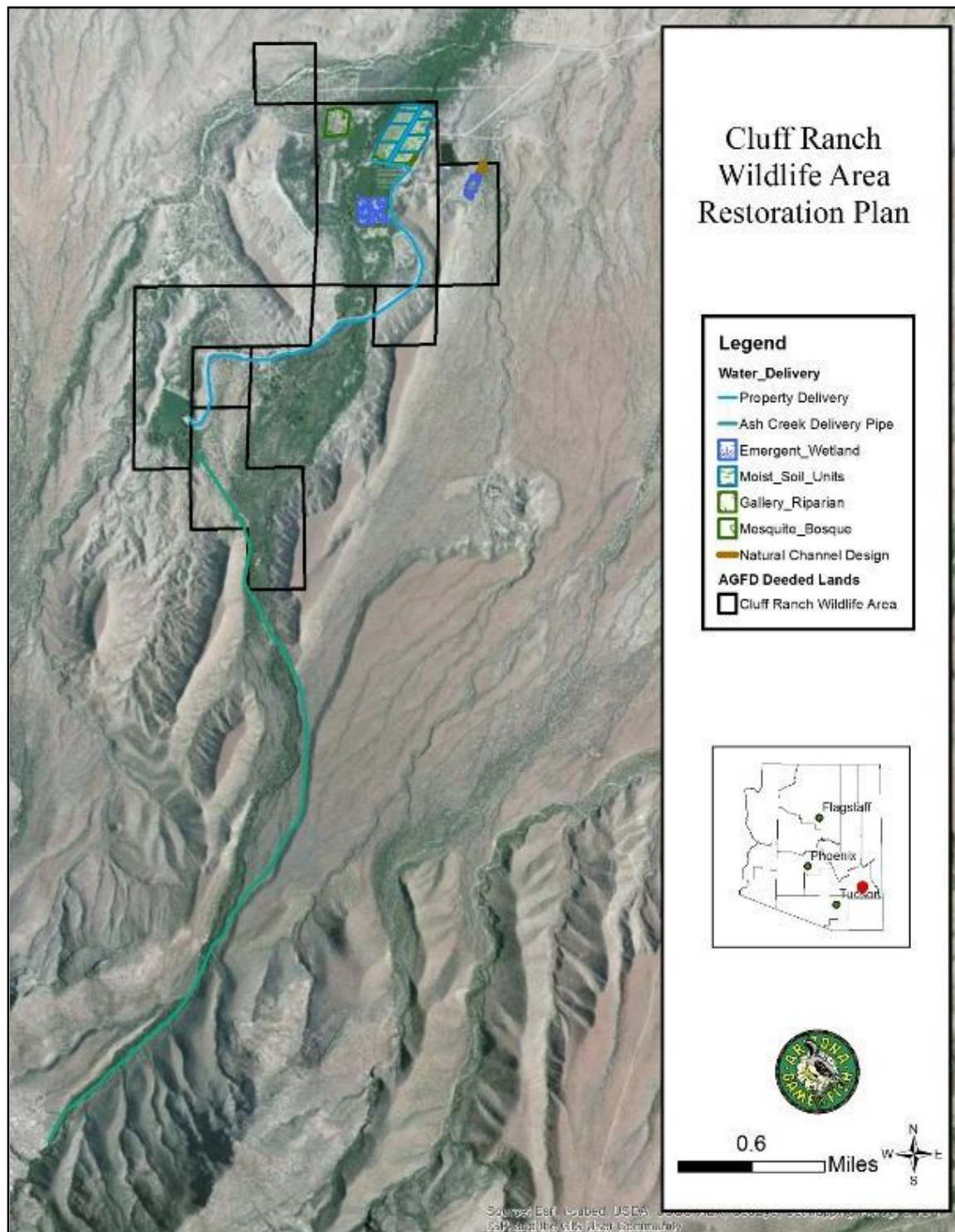


Figure 3.2. Cluff Ranch Wildlife Area wetland restoration.

Common plant species on the project area include saltbush (*Atriplex* spp.) and white bursage (*Ambrosia dumosa*). Upland birds and small game species including mourning doves (*Zenaida macroura*) and white-winged (*Zenaida asiatica*) doves, Gambel's quail (*Callipepla gambelii*) and desert cottontail rabbits (*Sylvilagus audubonii*) are abundant. White-tailed deer (*Odocoileus virginianus*) are also found at CRWA.

Restoration actions will include creating and enhancing a diversity of wetland habitats on CRWA (Figure 3.3). Fallow agricultural fields will be re-graded and modified to create approximately 16 hectares (40 acres) of emergent wetlands and seasonally-flooded moist soil management units. These created wetlands will be bordered by native riparian vegetation such as Fremont cottonwood (*Populus fremontii*), willows (*Salix* spp.), and velvet ash (*Fraxinus velutina*). In addition, soil and hydrological conditions are appropriate for the establishment of at least 3.6 hectares (9 acres) of mesquite (*Prosopis* spp.) bosque and netleaf hackberry (*Celtis reticulata*). Restored areas will be surrounded by fencing to exclude cattle and other domestic livestock.

The portions of CRWA that will be restored through this effort are at present comprised of fallow agricultural fields and dry ponds. These areas have become degraded largely because of the lack of water. The original water delivery system consisted of approximately 3.2 kilometers (2 miles) of concrete-lined ditch originating at a storage pond in the southwest corner of the property. The original ditch is currently in a state of disrepair and unable to transport water from the storage pond. Restoration actions will include replacing the existing weir and collection box at the pond, sealing the storage pond, and the water delivery system in its entirety with high density polyethylene piping. This piping will feed the created emergent wetlands and moist soil units through a series of valves, turnouts, and weirs. The purchase of water delivery easement lands may occur if needed.

Created moist soil units will be planted with grains (e.g., millet) in the summer and flooded prior to the fall. These areas will remain flooded for six months each year (September-February) when they will be heavily used by migratory waterfowl and other wildlife. Created emergent wetlands will be planted with native aquatic vegetation (e.g., cattails [*Typha* spp.], sedges [*Carex* spp.], spikerushes [*Juncus* spp.]) procured from surrounding native stock. Ample water resources exist through deeded water rights to maintain the created wetlands in perpetuity.

Following two growing seasons, plantings of native woody vegetation will be initiated. Project proponents may work with Northern Arizona University's Cottonwood Laboratory or nearby nurseries to procure cottonwood, willow, or velvet ash plantings. These species will be established adjacent to the moist soil units and elsewhere where appropriate. If necessary, these plantings will be irrigated by the reconstructed water delivery system.

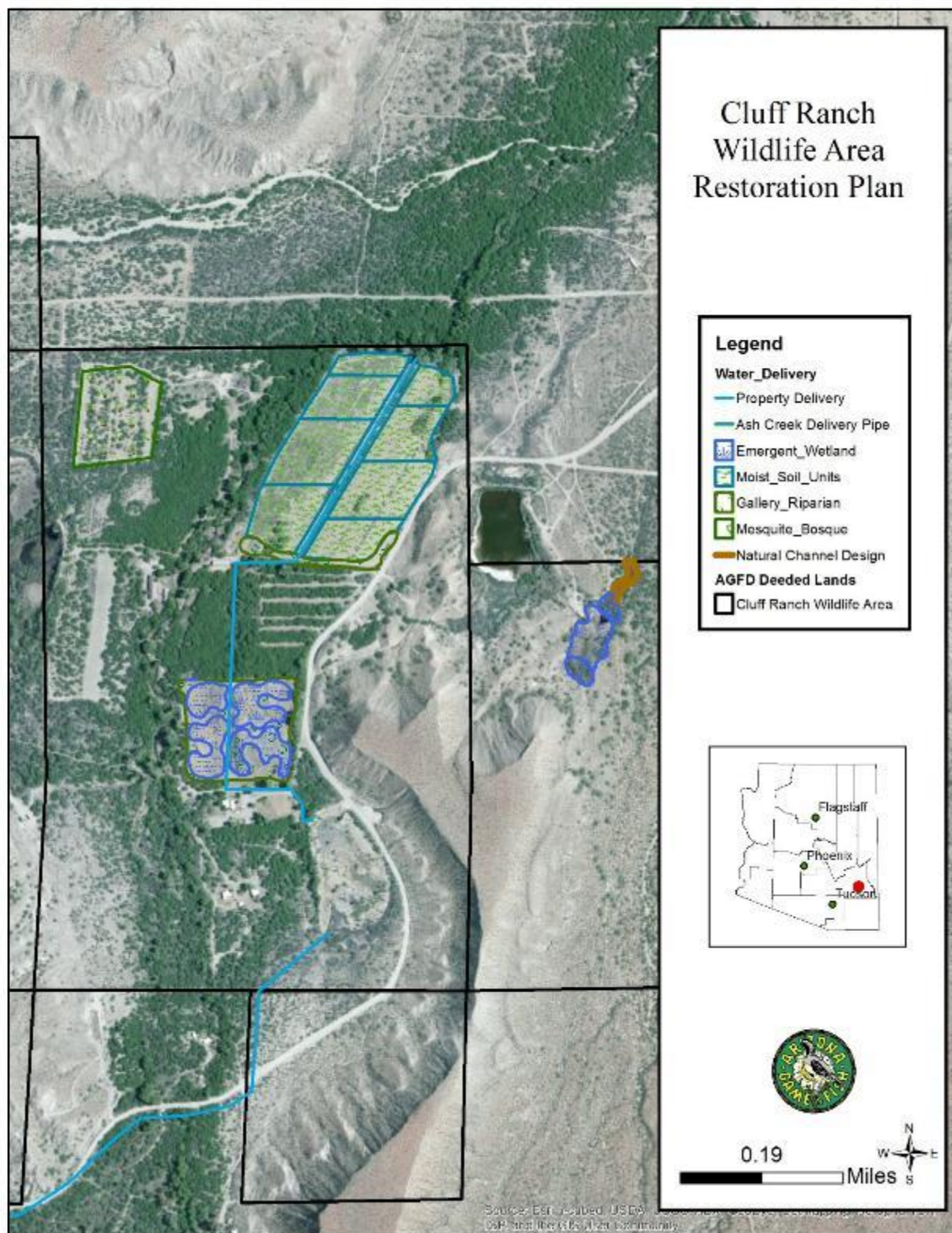


Figure 3.3. Cluff Ranch Wildlife Area wetland restoration, detailed view.

Expected benefits to wildlife

A diverse assemblage of non-game birds including several species of raptors and riparian and wetland-associated birds are represented on the wildlife area. Species include mourning and white-winged doves, Gambel's quail, greater roadrunner (*Geococcyx californianus*), and a variety of migratory and summering birds including phainopepla (*Phainopepla nitens*), vermilion flycatcher (*Pyrocephalus rubinus*), summer tanager (*Piranga rubra*), Lucy's warbler (*Vermivora luciae*), hooded oriole (*Icterus spurius*), and blue grosbeak (*Guiraca caerulea*). Raptor species including Cooper's (*Accipiter cooperii*), red-tailed (*Buteo jamaicensis*), and gray (*Buteo nitidus*) hawks, and great horned (*Bubo virginianus*), elf (*Micrathene whitneyi*), and western screech (*Megascops kennicottii*) owls all breed within the CRWA.

The wildlife and habitat benefits from this project stem from creating and enhancing emergent wetlands, and re-establishing native woody vegetation on the property. These restored habitats, in addition to the created moist soil units, will be used by existing bird species as foraging and nesting habitat. The restoration will also attract additional wetland-dependent species including waterfowl, shorebirds, and wading birds. Migratory species are expected to use the area during part of their annual cycle. In this arid environment, the enhanced wetland habitats will provide surface water that will also benefit and attract other wildlife species including amphibians, reptiles, fish, and mammals.

In addition to the enhanced ecological values provided, this project will also benefit the public, who are allowed to access the CRWA for recreational purposes. The wildlife that wetland and riparian habitats attract will provide valuable wildlife watching, photography, angling, and environmental education opportunities. Designated walkways with educational signage will be provided to limit potential recreational damage at the restored areas on CRWA. Public access to wetland and riparian habitats will be restricted during avian nesting periods to limit disturbance.

The current management emphasis for CRWA will continue post-restoration, which includes hunting of upland small game species (mourning and white-winged doves, Gambel's quail and cottontail rabbits), big game hunting (archery hunting for deer and javelina) and fishing (AGFD 2014). Hunting and fishing is not expected to conflict with the other recreational and educational uses that CRWA provides.

Overview of maintenance and monitoring

Pre- and post-restoration monitoring, conducted primarily by the Trustees or their designees, will provide ecological information needed to make critical management adjustments and ensure the sustainability of the restoration efforts. Monitoring data will be used to establish measurable objectives (desired conditions) for restoration efforts and track the progress of these efforts. This robust program will consist of a three-phase monitoring approach: (1) baseline, (2) five years of post-restoration monitoring, and (3) long-term effectiveness. Monitoring at each phase will entail conducting surveys and inventories on both biotic (faunal and floral) and abiotic indicators (weather, water, soil, and geomorphology). This information will be used to evaluate indicator trends, adjust restoration activities when necessary to meet restoration objectives (desired conditions), and drive adaptive management to fulfill those objectives. Upon completion of one

or more of the project components, an annual report will be developed that includes an evaluation of the ecological effectiveness of the habitat restoration project and management recommendations. Prior to the beginning of restoration activities at CRWA, a detailed inventory and monitoring plan will be developed by the Trustees or its designees.

3.5.2 Wetland Restoration at Chevelon Creek Wildlife Area

Project objectives

1. Enhance and restore water flow regimes through the wetland complexes (riparian gallery and emergent wetland communities) through water collection and delivery system improvements;
2. Eradicate exotic woody and emergent plant species within the project area;
3. Re-establish native woody and emergent wetland vegetation within the 49 hectare (120 acre) project area, and;
4. Develop monitoring and long-term management plans to ensure that ecologically-based performance standards are being met and the area perpetually remains in its restored state

Project area

The Chevelon Creek Wildlife Area (CCWA) is located within the floodplains of Chevelon Creek and the Little Colorado River, approximately 24 kilometers (15 miles) southeast of Winslow in Navajo County, Arizona. The elevation at CCWA is approximately 1,494 meters (4,900 feet) and the average annual precipitation is 178 millimeters (7 inches). The CCWA is approximately 270 hectares (668 acres) in size and contains nearly 49 hectares (120 acres) of created emergent wetlands and 18 hectares (45 acres) of riparian gallery forest (Figure 3.4). The remaining acreage consists of upland short grass prairie. The property was purchased by AGFD for the conservation of wildlife habitat, emphasizing nesting and feeding habitat for waterfowl and small game species.

Project description

Currently, the emergent wetland and associated riparian vegetation communities on the CCWA are severely degraded. This degradation has been attributed to overgrazing by livestock and invasion by exotic plant species, primarily saltcedar (*Tamarix ramosissima*) and camelthorn (*Alhagi maurorum*). In addition, an inadequate water supply has rendered the existing emergent wetlands ecologically nonfunctional.

To functionally restore the emergent wetlands, restoration efforts will include upgrading the existing water delivery system. The system currently in place is unable to move water from Chevelon Creek to the existing wetlands at a rate sufficient for the development of native emergent vegetation and therefore habitat for wetland-dependent species. The improvement of the water delivery system and renewal of a consistent water source to the wetlands will provide an ecological enhancement to 49 hectares (120 acres) of emergent wetland habitat (Figure 3.4). Restoration efforts will also include eradicating exotic plant species within the project area, and

re-establishing native emergent (e.g., grasses, sedges, and rushes) and riparian woody species (cottonwoods and willows) to improve the diversity, structure, and function of the wetland communities. Restored areas will be surrounded by fencing to exclude cattle and other domestic livestock.

Expected benefits to wildlife

A total of 44 bird species actually or potentially occur on the CCWA. The restored habitat will be used by breeding and migrating warblers, blackbirds, orioles, kinglets, flycatchers, kingbirds, and swallows (10,000 + individuals will benefit from the restoration, and an additional 25 bird species are expected to use the area during part of their annual cycle). Nesting and migrating American coots (*Fulica americana*), shorebirds (e.g., spotted sandpipers [*Actitis macularia*], common snipe [*Gallinago gallinago*]) and wading birds (e.g., Virginia rail [*Rallus limicola*], sora rail [*Porzana carolina*]) will benefit from the enhancement of emergent wetland habitats.

In addition to the ecological benefits this project will also benefit the public, who are allowed to access the CCWA for recreational purposes. The wildlife that wetland and riparian habitats attract will provide valuable wildlife watching, hunting, photography, angling, and environmental education opportunities. Designated walkways with educational signage will be provided to limit potential recreational damage at the restored areas on CCWA. Public access to wetland and riparian habitats will be restricted during avian nesting periods to limit disturbance.

Overview of maintenance and monitoring

Pre- and post-restoration monitoring, conducted primarily by the Trustees or their designees, will provide ecological information needed to make critical management adjustments and ensure the sustainability of the restoration efforts. Monitoring data will be used to establish measurable objectives (desired conditions) for restoration efforts and track the progress of these efforts. This robust program will consist of a three phase monitoring approach: (1) baseline, (2) five years of post-restoration monitoring, and (3) long-term effectiveness. Monitoring at each phase will entail conducting surveys and inventories on both biotic (faunal and floral) and abiotic indicators (weather, water, soil, and geomorphology). This information will be used to evaluate indicator trends, adjust restoration activities when necessary to meet restoration objectives (desired conditions), and drive adaptive management to fulfill those objectives. Upon completion of one or more of the project components, an annual report will be developed that includes an evaluation of the ecological effectiveness of the habitat restoration project and management recommendations. Prior to the beginning of restoration activities at CRWA, a detailed inventory and monitoring plan will be developed by the Trustees or its designee.

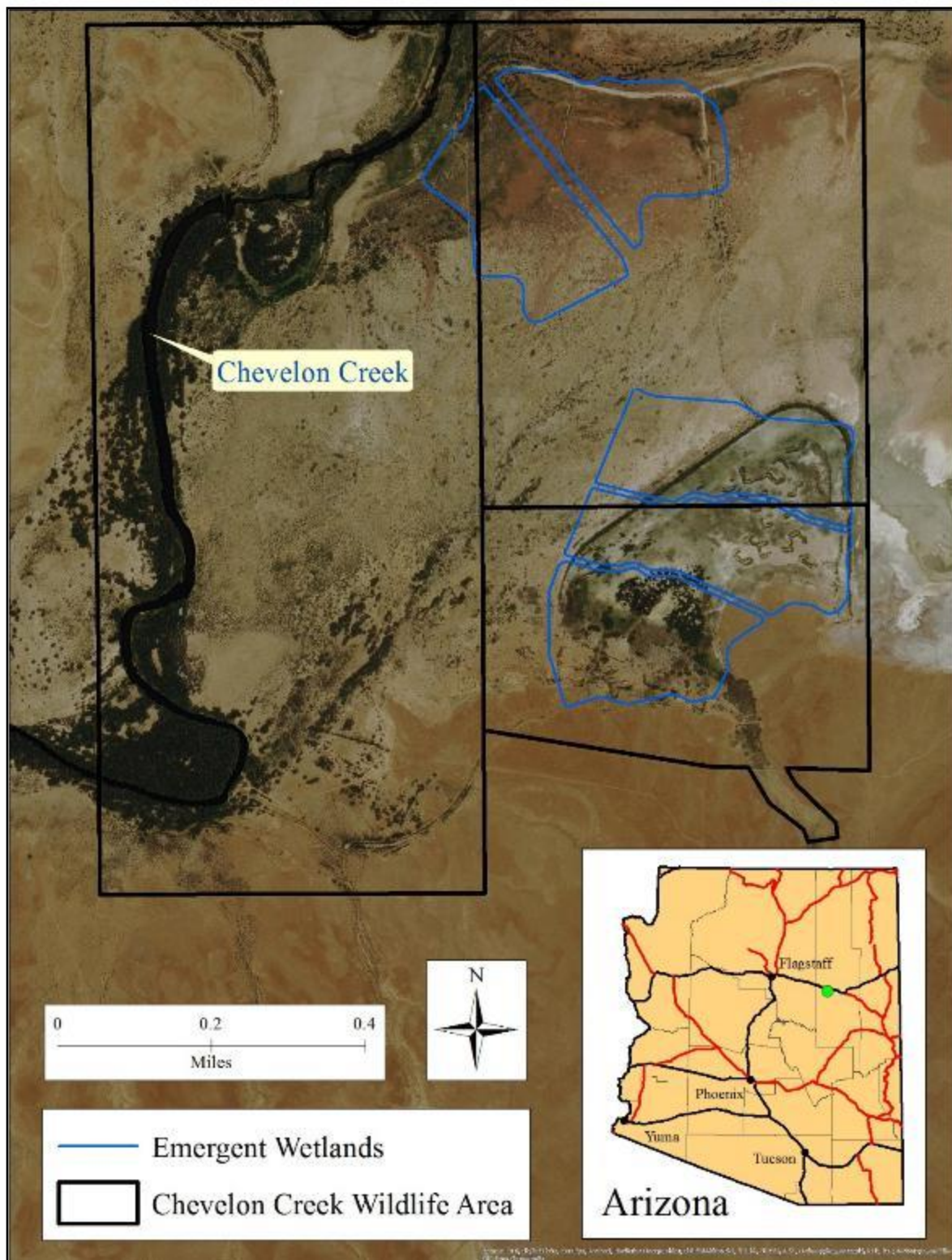


Figure 3.4. Chevelon Creek Wildlife Area wetland restoration.

3.5.3 Rocky Mountain Bighorn Sheep Population Enhancements

Project objectives

- Plan and conduct all preparation for at least one Rocky Mountain bighorn sheep (RMBS) translocation event per year, for four years from start of project. These activities will include:
 - Population Monitoring
 - Implement a monitoring plan that will assess status and trends for RMBS at the Site and surrounding areas including the Eagle Creek and San Francisco River populations.
 - Implement a monitoring plan that will assess status and trends for RMBS in potential release locations.
 - Translocation Planning
 - Draft plans and coordinate all activities required including environmental documentation necessary for the translocation of RMBS from within or proximate to the vicinity of the Site.
 - Coordinate translocation activities with the appropriate AGFD staff, mine personnel, Arizona Desert Bighorn Sheep Society (ADBSS) staff, and U. S. Forest Service (USFS) staff.
 - Evaluate potential release sites within typical RMBS habitats in Arizona.
 - Capture/Release Implementation
 - Complete pre-baiting activities in preparation for using drop-net capture, capture pen, or ground darting.
 - Conduct RMBS health monitoring during capture/release.
 - Telemetry Support
 - Fit captured RMBS with GPS/VHF collars to monitor survival and movement patterns at release sites.
 - Reporting
 - Annual reports will be prepared and provided to all appropriate entities involved in this project

Project description

Although once widespread (Russo 1956), bighorn sheep (*Ovis canadensis*) populations were either extirpated or declined substantially throughout much of their range in Arizona by the 1980s (Hoffmeister 1986). The San Francisco and Gila River drainages were among the areas where bighorn sheep were extirpated (Heffelfinger et al. 1995). The introduction of livestock diseases to native bighorn sheep (deVos 1989), competition with livestock, and unregulated market hunting are all thought to be factors leading to the extirpation of this population. Beginning in 1964, the New Mexico Game and Fish Department initiated a bighorn sheep restoration program with the release of 10 Rocky Mountain bighorn sheep (RMBS) from Banff National Park in Canada. Subsequent releases also occurred in New Mexico and Arizona, with the last release taking place in 1980 (Heffelfinger et al. 1995). The releases were successful and by the mid-1980s, RMBS were found throughout the San Francisco River drainage from the New Mexico border to the town of Clifton, Arizona. Rocky Mountain bighorn sheep were also

observed along Eagle Creek (Heffelfinger et al. 1995). The San Francisco-Eagle Creek RMBS population is currently estimated to range between 300-400 individuals in the Clifton-Morenci area (Wakeling, AGFD; December 2012 Arizona Game and Fish Commission meeting).

Results of telemetry studies (Heffelfinger 1995, Gagnon et al. 2011), in which RMBS were captured in the San Francisco River-Eagle Creek vicinity and fitted with telemetry collars to track movements and habitat use, suggested that some RMBS spent considerable time on the Site, and moved frequently between the mine footprint and surrounding drainages. This is consistent with observations from the area AGFD Wildlife Manager who indicated that family groups spend considerable time on the Site, and have been observed there for years (S. H. Najar, AGFD Wildlife Manager, Personal Communication).

The purpose of this project is to enhance RMBS populations off-site (equivalent replacement through translocation of most at-risk RMBS). The direct and significant ecological benefits that will be accomplished with this project include: (1) restoring RMBS to areas in eastern Arizona where they once occurred, and (2) reduction of vehicle collisions with RMBS along U.S. Highway 191. Wakeling (December 2012 Arizona Game and Fish Commission meeting) reported on the level of highway mortality between 2001 and 2012 during which highway related mortality exceed 10 sheep per year in all but one year (2003) and exceeded 20 per year in three years during this period.

Project location

The AGFD developed a comprehensive document that evaluated multiple release sites where preliminary review by qualified biologists determined that suitable habitat conditions existed within the historic range of RMBS (AGFD 2015). This existing planning document will guide translocation efforts. Potential release locations that are being considered to mitigate impacts to RMBS populations at and in the vicinity of the Site include locations within AGFD Game Management Units (GMU) 1 and 27: (1) Hobson Canyon/South Fork of Little Colorado River; (2) Clabber City/Black River (GMU 1); (3) South Buffalo Crossing/Black River; (4) Mother Hubbard/Turkey Creek (GMU 1); and (5) Red Hill/Foote Creek (Figure 3.5).

Expected benefits to wildlife

A significant ecological benefit of this project includes restoring RMBS to areas of eastern Arizona where they once occurred naturally. New or enhanced populations of RMBS will additionally benefit both consumptive (e.g., hunting) and non-consumptive (e.g., photography, wildlife viewing) wildlife users, as well as potentially bolstering wildlife-related tourism in the area. Hunting of RMBS within release areas will be managed per the Annual Arizona Hunting Regulations that are distributed and enforced by the AGFD.

Overview of population monitoring

The focus of this project is to develop and implement a four -year protocol to remove sheep from the Site's vicinity in an effort to provide resource rehabilitation for RMBS. Different methods to monitor the success of RMBS releases were considered. Global Positioning System (GPS)/Very

High Frequency (VHF) collars were selected as the monitoring tool based on cost and project need.

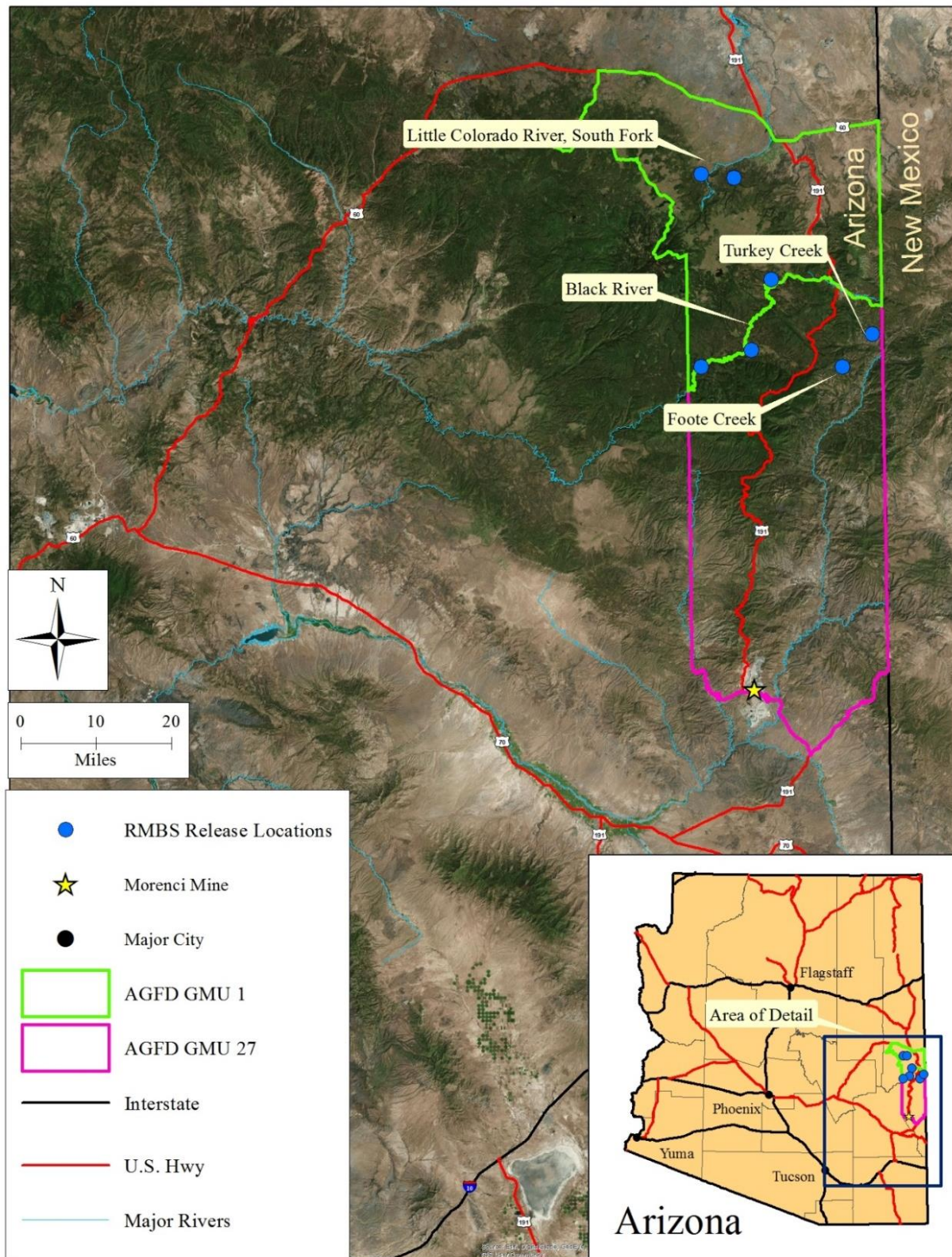


Figure 3.5. Potential RMBS release areas identified by AGFD Game Management Units. Specific release sites within these Units have not yet been identified.

By using GPS/VHF collars, populations at both the Site and release locations can be monitored as needed from fixed-wing aircraft. This will result in substantial cost reductions while providing needed documentation on project success as well as impacts to release populations from natural predation (e.g., wolves, mountain lions) and disease.

3.5.4 Wetland Restoration at Rabbit Farm

Project Objectives

1. Maintain 2.9 kilometers (1.8 miles) of existing exclosure fence;
2. Install rolling berms to restore overland flow to collection ponds;
3. Install additional solar panels to increase water pumping capacity at the well;
4. Restore water at two ponds for waterfowl and plant native riparian trees;
5. Conduct pre- and post-treatment vegetation, water quality, and avian monitoring within the project area.

Project area

Restoration and enhancement of wetland habitat will occur within the Rabbit Farm wildlife exclosure, which currently supports cienega-like habitat. This exclosure is located on public land administered by the BLM in the San Simon Valley, east of Safford and approximately 13 kilometers (8 miles) north of Bowie, Graham County, Arizona (Figure 3.6). The San Simon Valley, positioned between the Peloncillo and Pinaleno Mountains, forms a north-south corridor for waterfowl as well as terrestrial wildlife. The scarcity of water throughout the valley emphasizes the importance of perennial water for both resident and migratory wildlife. The San Simon Valley has been the focus of land management and conservation efforts since 1950, as it is regarded as a seriously degraded environment needing extensive restoration (Bahre 1991).

Project description

The Rabbit Farm wildlife exclosure features multiple ponds and a mesquite bosque. The property is approximately 49 hectares (120 acres) in size with 8 hectares (20 acres) of bosque habitat, a 0.6-hectare (1.5 acre) ephemeral pond, a 0.2-hectare (0.6 acre) deep pond (approximately 9 meters [30 feet] deep), a 0.4-hectare (1.0 acre) shallow pond (approximately 3 meters [10 feet] deep), and a 0.04-hectare (0.1 acre) perennial seep (approximately 0.6 meters [2 feet] deep) (Figures 3.6-3.7). Rabbit Farm also includes 2.9 kilometers (1.8 miles) of exclosure fence. In the 1980's, Rabbit Farm supported ponds and a gallery of large cottonwood trees. The water in the well head is approximately 4.6 meters (15 feet) deep. A larger pump would increase the amount of water currently produced by a magnitude of three. Included in this project is a feasibility study to determine how much water can be safely drawn off the current well and how much water could then be added to the ponds. Restoration goals at Rabbit Farm include returning water to the deep pond and shallow pond while preserving a watering system for livestock outside of the

exclosure. Cottonwood and willow plantings would help reestablish large trees in the area, increasing habitat diversity.

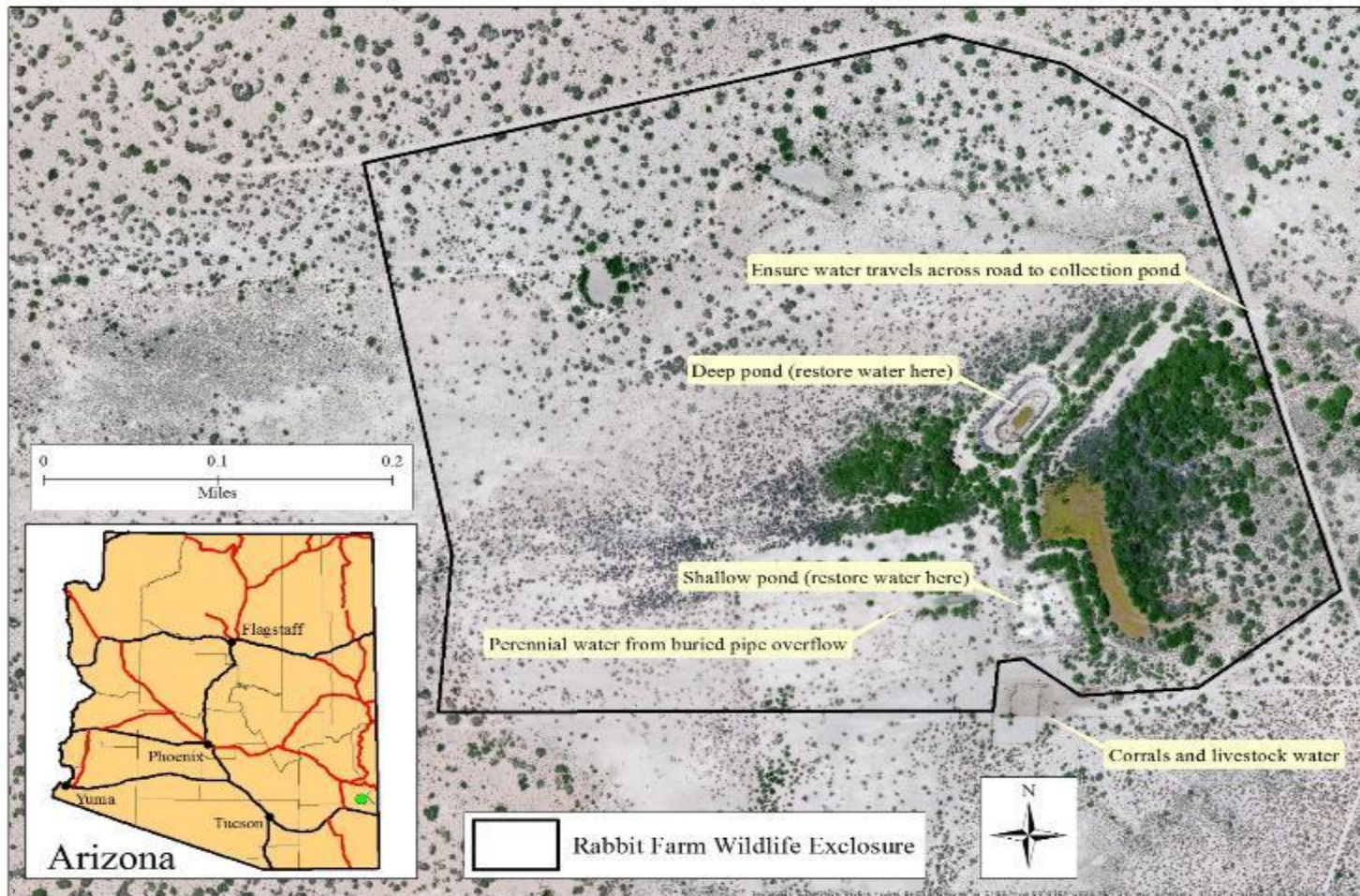


Figure 3.6. Rabbit Farm wetland restoration.



Figure 3.7. The perennial seep at Rabbit Farm is fed by underground pipes attached to the existing well.

Expected benefits to wildlife

The wildlife benefits of this project derive from restoring and enhancing the aquatic habitat and adjacent terrestrial habitat on the property. The scarcity of water throughout the valley emphasizes the importance of perennial water for both resident and migratory wildlife. The San Simon Valley is an important fly-way for many avian species of concern. Bird observation data collected by the BLM in the 1980's indicated that several wildlife waters in the Valley supported numerous riparian and aquatic bird species. These restored habitats will be used by existing bird species as foraging and nesting habitat in addition to attracting other riparian and aquatic species including waterfowl, shorebirds, and wading birds. Migratory species are expected to use the area during part of their yearly cycle. In this arid environment, the enhanced aquatic habitats will provide surface water that will also benefit and attract other wildlife species including amphibians, reptiles, fish, and mammals.

In addition to the ecological values, this project will benefit the public through numerous community outreach and education opportunities offered by the BLM. The project will be used as a demonstration project to highlight the benefits of restoring degraded and unproductive

habitats for wildlife. The BLM has developed and organized working field trips that engage community members in restoration projects. Additionally, the BLM is working with the Gila Watershed Partnership, Eastern Arizona College, and the Southwest Conservation Corps to involve youth in restoration projects. Designated walkways with educational signage will be provided to limit potential recreational damage at Rabbit Farm. Public access to wetland and riparian habitats will be restricted during avian nesting periods to limit disturbance.

Overview of maintenance and monitoring

The BLM is working with Center for Wetlands and Stream Restoration and Bat Conservation International to learn new techniques in restoring function and value to wildlife waters to ensure their longevity and reduce maintenance. In addition the BLM, in partnership with Eastern Arizona College and the Rocky Mountain Bird Observatory, will use funds to conduct pre-treatment and post-treatment vegetation surveys and water quality and avian community monitoring within the project area. Upon completion of one or more project monitoring components, an annual report will be completed for the Trustees that includes an evaluation of the ecological effectiveness of the habitat restoration project and management recommendations.

4.0 Affected Environment and Environmental Consequences

4.1 Introduction

Actions undertaken by the Trustees to restore natural resources and their services under CERCLA and other federal laws are subject to the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 et seq., and the regulations guiding its implementation at 40 C.F.R. Parts 1500 through 1517. NEPA and its implementing regulations outline the responsibilities of Federal agencies, including those for preparing environmental assessments (EAs). In general, Federal agencies contemplating implementation of a major Federal action must produce an environmental impact statement (EIS) if the action is expected to have significant impacts on the quality of the human environment. When it is uncertain whether a contemplated action is likely to have significant impacts, Federal agencies prepare an EA to evaluate the need for an EIS. If the EA demonstrates that the proposed action will not significantly impact the quality of the human environment, the agency issues a Finding of No Significant Impact (FONSI), which satisfies the requirements of NEPA, and no EIS is required.

This chapter describes the environmental conditions (i.e., affected environment) where the individual restoration projects would be implemented. It provides the background information needed to assess the potential impacts of these proposed projects on the environment, as required by NEPA. The environmental and socioeconomic impacts associated with each proposed action including no-action are also identified in this chapter. Descriptions of the cumulative environmental and socioeconomic impacts that would result from implementing the suite of restoration projects that comprise the preferred restoration alternative are also included in this chapter.

4.2 Water Resources

4.2.1 Wetland Restoration at Cluff Ranch Wildlife Area

Affected Environment

Ash Creek and Shingle Mill Creek both occur on the CRWA property. Well-developed riparian woodlands, consisting of cottonwoods, willows, mesquite and other woody species occur along these streams. Two ponds that total 7 surface hectares (18 acres) with a capacity of 185,022 cubic meters (150 acre-feet) are also located on CRWA. The AGFD holds a water right for 1,509,140 cubic meters (1,223.48 acre-feet) per year from Ash Creek. This water right has a 1912 priority date and allows for continuous diversion of 173 cubic meters/hour (first 68 miner's inches) from Ash Creek. The water is also appurtenant to 55 hectares (137 acres) of irrigated fields. The original water delivery system consisted of approximately 3.2 kilometers (2 miles) of concrete-lined ditch originating at a holding pond in the southwest corner of the property. The pond was used for storage of water diverted from Ash Creek through AGFD's deeded water right. The original ditch is currently in a state of disrepair, and unable to transport water from the storage pond. As such, the deeded water resources are currently underused. No water is removed from Shingle Mill Creek but it was functional at one time to divert water into another pond on the property. In total, riparian areas, wetlands, and ponds account for 28% (84 hectares [207 acres]) of CRWA (AGFD 2014).

Impacts – No Action Alternative

Under the No Action alternative, the original water delivery system would remain in a state of disrepair and AGFD's deeded water right from Ash Creek would continue to be underused. Emergent wetlands and moist soil units would not be created. As such, additional water that would be required to support these areas would not be diverted from Ash Creek. It is expected that existing ponds on the CRWA will continue to be maintained for recreational and wildlife purposes, but anticipated positive effects on the region's water resources through increasing the amount and quality of wetland and riparian areas would not be realized.

Impacts – Proposed Action Alternative

Under the Proposed Action alternative, 21 hectares (53 acres) of moist soil units and emergent wetland habitat bordered by native riparian vegetation would be created. Temporary increases in sediment transport and the turbidity level of surface waters would likely occur during implementation of restoration actions at the CRWA (i.e., repair or re-construction of the water delivery system, excavation and re-grading proposed wetland areas, and clearing non-native vegetation). These impacts would be temporary and would be minimized by appropriately adhering to all federal, state, and local laws, regulations, and policies and following Best Management Practices (BMP's) for erosion control work.

Following completion of construction work, additional water will be diverted from Ash Creek via the renovated water delivery system to feed the created emergent wetlands and seasonally flooded moist-soil units. No adverse effects to aquatic habitat and wildlife in Ash Creek are

anticipated. It is expected that restoration actions would have long-term positive impacts on water resources in the region by increasing the amount and quality of riparian and wetland areas.

4.2.2 Wetland Restoration at Chevelon Creek Wildlife Area

Affected Environment

The CCWA is located within the floodplains of Chevelon Creek and the Little Colorado River. In total, riparian areas and wetlands account for 25% (67 hectares [165 acres]) of the CCWA. The property includes artesian seeps and approximately one mile of Chevelon Creek just above the confluence with the Little Colorado River. After the CCWA was acquired by the AGFD in 1961, a 24-hectare (60-acre) emergent wetland and a pumping station was installed at Chevelon Creek. In 1962, three additional emergent wetlands totaling 24 hectares (60 acres) were constructed north of the original wetland. These four wetlands currently exist on the CCWA property, which total 49 surface hectares (120 acres). Water is pumped from Chevelon Creek to maintain these areas for waterfowl and small game. However, the current water delivery system is deteriorated and unable to move water from Chevelon Creek at a rate sufficient to support native wetland habitat for wildlife. As such, these areas are currently in a degraded state and dominated by exotic plant species. The AGFD holds two Certificates of Water Right for 4,463,964 cubic meters (3,619 acre-feet) and 1,797,180 cubic meters (1,457 acre-feet) from Chevelon Creek (AGFD 1997).

Impacts – No Action Alternative

Under the No Action alternative, the original water delivery system would remain in a state of disrepair and AGFD's deeded water rights from Chevelon Creek would continue to be underused. Emergent wetland habitat would continue to remain degraded because of the lack of sufficient water to support native vegetation communities. Additional water that would be required to support these areas would not be diverted from Chevelon Creek because water collection and delivery system improvements would not occur. The anticipated positive effects on the region's water resources, through increasing the amount and quality of wetland and riparian areas via restoration actions, would not be realized.

Impacts – Proposed Action Alternative

Under the Proposed Action alternative, 49 hectares (120 acres) of emergent wetland habitat bordered by native riparian vegetation would be restored. Temporary increases in sediment transport and the turbidity level of surface waters would likely occur during implementation of restoration actions at the CCWA (i.e., repair or re-construction of the water delivery system and clearing non-native vegetation). These impacts would be temporary and would be minimized by appropriately adhering to all federal, state, and local laws, regulations, and policies and following BMP's for erosion control work.

Following completion of construction work, additional water will be diverted from Chevelon Creek via the renovated water delivery system to feed the emergent wetlands. No adverse effects to aquatic habitat and wildlife in Chevelon Creek are anticipated. It is expected that restoration

actions would have long-term positive impacts on water resources in the region by increasing the amount and quality of riparian and wetland areas.

4.2.3 Rocky Mountain Bighorn Sheep Population Enhancements

Affected Environment

This project proposes to capture RMBS on the Site for use in translocations to new, unoccupied habitats and to augment existing populations in eastern Arizona. The population that occupies the Site is part of a larger population occupying the San Francisco River, Blue River, Eagle Creek, and Gila River drainages. Potential release sites include locations within 2 AGFD Game Management Units (Section 3.5.3, Figure 3.5). Release sites are located within the following drainages: Little Colorado River (south fork), Black River, Foote Creek, and Turkey Creek. Because of the immense size of the project area and the low density of bighorn sheep proposed for capture and release in the project areas, there is anticipated to be no effect to the region's water resources.

Impacts – No Action Alternative

Under the No Action alternative, RMBS capture and translocation to identified release areas would not occur, and existing conditions of the region's water resources would continue into the future.

Impacts – Proposed Action Alternative

Under the Proposed Action alternative, RMBS will be captured from the Site and translocated to identified release areas. Water resources in the region are not expected to be affected by the proposed actions as bighorn sheep spend little time grazing, watering, or resting in wetland and riparian habitats because of the lack of escape cover and risk of predation. The low numbers of bighorn sheep proposed for capture and release at project sites are not expected to adversely affect vegetation cover and erosion potential within the surrounding watershed. If population increases over time result in decreased vegetation cover or increased erosion potential then appropriate actions will be implemented to reduce local herd sizes.

4.2.4 Wetland Restoration at Rabbit Farm

Affected Environment

The Rabbit Farm wildlife enclosure features multiple ponds and a mesquite bosque. The project area is approximately 49 hectares (120 acres) in size with 8 hectares (20 acres) of bosque habitat, a 0.6-hectare (1.5-acre) ephemeral pond, a 0.2-hectare (0.6-acre) deep pond (approximately 9 meters [30 feet] deep), a 0.4-hectare (1.0 acre) shallow pond (approximately 3 meters [10 feet] deep), and a 0.04-hectare (0.1-acre) perennial seep (approximately 0.6 meters [2 feet] deep). Restoration goals at Rabbit Farm include returning water to the deep pond and shallow pond via groundwater pumping while preserving a watering system for livestock outside the enclosure. The water in the well head is approximately 4.6 meters (15 feet) deep. Included in this project is a feasibility study to determine how much water can be safely drawn off the current well and how much water could then be added to the ponds. The deep pond collects overland flow and

monsoonal rain so additional water to maintain a perennial condition would be less than expected.

Impacts – No Action Alternative

Under the No Action alternative, additional groundwater pumping will not occur and water will not be restored to the deep and shallow ponds on the property. These ponds will continue to remain dry and nonfunctional. The anticipated positive effects on the region's water resources, through increasing the amount and quality of wetland and riparian areas via restoration actions, would not be realized.

Impacts – Proposed Action Alternative

Under the Proposed Action alternative, approximately 0.8 hectares (2 acres) of surface water bordered by native riparian vegetation will be restored at two ponds on the Rabbit Farm property. To support these areas, groundwater pumping capacity at the well will be increased via installation of additional solar panels. No adverse effects to groundwater levels in the region are anticipated through this increased pumping. Temporary increases in sediment transport and the turbidity level of surface waters may occur during implementation of restoration actions at Rabbit Farm (i.e., clearing non-native vegetation, planting native vegetation). These impacts would be temporary and would be minimized by appropriately adhering to all federal, state, and local laws, regulations, and policies and following BMP's for erosion control work.

The scarcity of water throughout the San Simon valley emphasizes the importance of perennial water for both resident and migratory wildlife. It is expected that restoration actions would have long-term positive impacts on water resources in the region by increasing the amount and quality of riparian and wetland areas.

4.2.5 Cumulative Impacts of Proposed Actions to Water Resources

Over the long term, implementing the suite of wetland restoration and riparian revegetation projects is expected to have a net positive impact on water resources in eastern Arizona. It is anticipated that proposed actions will positively impact the region's water resources by increasing the amount and quality of riparian and wetland areas. Wetland and riparian ecosystems improve the quality of surface water entering rivers and streams by filtering out pollutants and sediment. In addition, these ecosystems support a great diversity of plants and animals, and many wildlife species in the region depend on these habitats at some time during their life cycles. In particular, migratory and waterfowl bird species depend on riparian habitat for food and resting places along their migration routes.

During implementation of restoration actions, there would likely be temporary increases in sediment transport and in the turbidity level of surface water caused by heavy equipment, excavation, movement of large materials, infrastructure repair, and vegetation clearing. These impacts would be temporary because the restoration activities would ultimately stabilize these areas through revegetation, lead to long-term decreases in erosion from upland areas, and lead to improvements in surface water quality. Temporary impacts would be minimized by appropriately

adhering to all federal, state, and local laws, regulations, and policies and following BMP's for erosion control. Maintenance of restored wetland and riparian areas via pumping of groundwater or water diversion from streams is not expected to have negative long-term impacts on groundwater levels or aquatic habitat within streams.

4.3 Biological Resources

4.3.1 Wetland Restoration at Cluff Ranch Wildlife Area

Affected Environment

Vegetation

The CRWA lies on the north aspect of the Pinaleno Mountains at an elevation of 914 meters (3,000 feet). Upland vegetation on the CRWA is characterized as Sonoran Desertscrub (Brown 1994) and is comprised primarily of various species of cacti, saltbush, creosotebush (*Larrea tridentata*), and white bursage. The riparian woodland along Ash Creek is well developed and represents biotic communities originally found along the upper Gila River. Dominant riparian woody vegetation includes cottonwoods, willows, mesquite, walnut (*Juglans* spp.), ash (*Fraxinus* spp.), and netleaf hackberry. The relative proportions of habitat types at CRWA are: Sonoran Desertscrub – 40% (129 hectares [318 acres]), mesquite bosque – 22% (67 hectares [166 acres]), riparian wetlands and ponds – 28% (84 hectares [207 acres]), urban and agricultural lands – 17% (34 hectares [83 acres]), and residential – 14% (6 hectares [14 acres]) (AGFD 2014).

Fish and Wildlife

Populations of upland bird and small game species including mourning and white-winged doves, greater roadrunner, Gambel's quail, and desert cottontail rabbit flourish at CRWA. A variety of migratory and summering birds such as phainopepla, vermilion flycatchers, summer tanagers, Lucy's warblers, hooded orioles, and blue grosbeaks also use the area as do several species of birds of prey including Cooper's, red-tailed, and gray hawks, and great horned, elf, and western screech-owls. A healthy population of white-tailed deer (*Odocoileus virginianus*) and limited numbers of mule deer (*O. hemionus*) also use the area as well as javelina (*Tayassu tajacu*), coyote (*Canis latrans*), and bobcat (*Lynx rufus*). The rocky slopes and mesquite bottoms are home to a diverse reptile and amphibian community. Clark's spiny (*Sceloporus clarki*) and ornate tree (*Urosaurus ornatus*) lizards, canyon spotted whiptails (*Aspidoscelis burti*), and round-tailed horned lizards (*Phrynosoma modestum*) can all be found on CRWA. Snakes of the area include common kingsnakes (*Lampropeltis getula*), Sonoran whipsnakes (*Masticophis taeniatus*), checkered gartersnakes (*Thamnophis marcianus*), western diamond-backed (*Crotalus atrox*) and Mojave (*Crotalus scutulatus*) rattlesnakes (AGFD 2014).

The functioning ponds at CRWA support a productive warm water fishery including largemouth bass (*Micropterus salmoides*), black crappie (*Pomoxis nigromaculatus*), bluegill sunfish (*Lepomis macrochirus*), channel catfish (*Ictalurus punctatus*) and black bullhead (*Ameiurus melas*). The ponds are also stocked by AGFD with catchable rainbow trout (*Onorhynchus mykiss*) during the winter months (AGFD 2014).

Special Status Species

State listed species occurring within the project area, identified by AGFD's Heritage Data Base Management System, include 28 birds, two fishes, nine reptiles, four amphibians, four invertebrates, and 23 mammals (AGFD 2016). The USFS and BLM have additional lists of special status species requiring additional management measures.

The USFWS Information for Planning and Conservation (IPAC) tool lists 11 species that are endangered, threatened, or candidates for listing as resources that may occur or potentially be impacted by restoration activities at CRWA (Table 4.1). No proposed or designated critical habitats were identified by USFWS at this location (USFWS 2016).

Table 4.1. USFWS Threatened, Endangered, or Candidate Species that may be impacted by restoration activities at the CRWA, Graham County, Arizona (USFWS 2016).

Class	Common Name	Status*	Effects of Activities
Amphibians	Chiricahua leopard frog	T	Increase habitat amount/quality
Birds	Mexican spotted owl	T	No effect
	Southwestern willow flycatcher	E	Increase habitat amount/quality
	Yellow-billed cuckoo	T	Increase habitat amount/quality
Fish	Gila trout	T	Increase habitat amount/quality
	Headwater chub	PT	Increase habitat amount/quality
	Razorback sucker	E	Increase habitat amount/quality
	Roundtail chub	PT	Increase habitat amount/quality
Mammals	Lesser long-nosed bat	E	No effect
	Mt. Graham red squirrel	E	No effect
Reptiles	Northern Mexican gartersnake	T	Increase habitat amount/quality

* E – Listed Endangered; T – Listed Threatened; PT – Proposed Threatened.

Impacts – No Action Alternative

Under the No Action alternative, the project area would likely continue to support the same vegetation communities, and numbers of fish and wildlife species that currently exist. Emergent wetlands and moist soil units would not be created, and establishment of native riparian forest habitat would not occur. Agricultural fields would remain fallow, and ponds that are currently dry would continue to be nonfunctional and provide little or no benefit as wildlife habitat.

Impacts – Proposed Action Alternative

Under the Proposed Action alternative, 21 hectares (53 acres) of moist soil units and emergent wetland habitat bordered by native riparian vegetation would be created and maintained in perpetuity. Local vegetation resources would be enhanced through removal of exotic species, and establishment of native riparian and wetland vegetation in areas that are currently degraded. Although construction activities would result in short-term disturbances, restoration actions would have long-term positive impacts on fish and wildlife species by increasing the amount and quality of riparian and wetland habitats in the region.

4.3.2 Wetland Restoration at Chevelon Creek Wildlife Area

Affected Environment

Vegetation

The CCWA is located within the floodplains of Chevelon Creek and the Little Colorado River at an elevation of approximately 1,494 meters (4,900 feet). The property consists of approximately 270 hectares (668 acres) including 204 hectares (503 acres) of uplands, 49 hectares (120 acres) of degraded emergent wetlands, and 18 hectares (45 acres) of degraded riparian gallery forest. Upland vegetation on the CCWA is characterized as Great Basin Desertscrub (Brown 1994). Several shrub and short-grass prairie species dominate the upland vegetation at the CCWA including four-wing saltbush (*Atriplex canescens*), winterfat (*Eurotia lanata*), rabbitbrush (*Chrysothamnus nauseosus*), snakeweed (*Gutierrezia sarothrae*), blue grama (*Bouteloua gracilis*), saltgrass (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), and Indian rice grass (*Achnatherum hymenoides*) (AGFD 1997). The emergent wetland and riparian vegetation communities are currently dominated by two exotic plant species: camelthorn and salt cedar (AGFD 1997, Clark 2015).

Fish and Wildlife

Birds are the most abundant wildlife at the CCWA. A total of 44 bird species are known or suspected to occur at the CCWA (Table 4.2). Recent point-count surveys documented 23 bird species within the salt cedar vegetation community along Chevelon Creek (Clark 2015). Canada geese (approximately 150-200 individuals) and other waterfowl use Chevelon in the winter. Some waterfowl nesting occurs in the spring. Large flocks of snow and Ross' geese occasionally use the area and the adjacent Hugo Meadow (AGFD 1997).

The CCWA also supports a variety of mammals including big game, small game, predators, and furbearers (Table 4.2). Surveys by AGFD in 2015 also documented several small mammal species at the CCWA, including the common house mouse (*Mus musculus*), deer mouse (*Peromyscus maniculatus*), northern grasshopper mouse (*Onychomys leucogaster*), Ord's kangaroo rat (*Dipodomys ordii*), western harvest mouse (*Reithrodontomys megalotis*), silky pocket mouse (*Perognathus flavus*), woodrat (*Neotoma* spp.) and pinon mouse (*Peromyscus truei*) (Clark 2015).

Chevelon Creek and the degraded wetlands at the CCWA also support numerous fish, including primarily non-native species (Table 4.2). These areas are also habitat for several amphibian and reptiles including the American bullfrog (*Lithobates catesbeiana*), Mexican spadefoot (*Spea multiplicata*), Couch's spadefoot (*Scaphiopus couchii*), Plains spadefoot (*Spea bombifrons*) and black-necked gartersnake (*Thamnophis cyrtopsis*) (Clark 2015). Terrestrial

amphibian and reptile species observed at the CCWA include the plateau striped whiptail (*Aspidoscelis velox*), common sagebrush lizard (*Sceloporus graciosus*), plateau lizard (*Sceloporus tristichus*), prairie rattlesnake (*Crotalus viridis*), gopher snake (*Pituophis catenifer*), and Woodhouse's toad (*Bufo woodhousii*) (Clark 2015).

Table 4.2. Wildlife species known or suspected to occur at the CCWA, Navajo County, Arizona (AGFD 1997).

Class	Common Name	Scientific Name
Bird	American avocet	<i>Recurvirostra americana</i>
	American coot	<i>Fulica americana</i>
	American crow	<i>Corvus brachyrhynchos</i>
	American kestrel	<i>Falco sparverius</i>
	American widgeon	<i>Anas americana</i>
	Bald eagle	<i>Haliaeetus leucocephalus</i>
	Blue-winged teal	<i>Anas discors</i>
	Bufflehead	<i>Bucephala albeola</i>
	Canada goose	<i>Branta canadensis</i>
	Canvasback	<i>Aythya valisineria</i>
	Cassin's kingbird	<i>Tyrannus vociferans</i>
	Cinnamon teal	<i>Anas cyanoptera</i>
	Cliff swallow	<i>Petrochelidon pyrrhonota</i>
	Common merganser	<i>Mergus merganser americana</i>
	Common nighthawk	<i>Chordeiles minor</i>
	Common raven	<i>Corvus corax</i>
	Common snipe	<i>Gallinago gallinago</i>
	Double-crested cormorant	<i>Phalacrocorax auritus</i>
	Gadwall	<i>Anas strepera</i>
	Gambel's quail	<i>Callipepla gambelii</i>
	Great blue heron	<i>Ardea herodias</i>
	Green-winged teal	<i>Anas crecca</i>
	Hooded merganser	<i>Lophodytes cucullatus</i>
	Killdeer	<i>Charadrius vociferus</i>
	Lesser scaup	<i>Aythya affinis</i>
	Mallard	<i>Anas platyrhynchos</i>
	Mockingbird	<i>Mimus polyglottos</i>
	Mountain bluebird	<i>Sialia currucoides</i>
	Mourning dove	<i>Zenaida macroura</i>
	Northern harrier	<i>Circus cyaneus</i>
	Northern pintail	<i>Anas acuta</i>
	Northern shoveler	<i>Anas clypeata</i>
	Red-tailed hawk	<i>Buteo jamaicensis</i>
	Red-winged blackbird	<i>Agelaius phoeniceus</i>
	Redhead	<i>Aythya americana</i>
	Ring-necked duck	<i>Aythya collaris</i>
	Ross's goose	<i>Chen rossii</i>
	Ruddy duck	<i>Oxyura jamaicensis</i>
	Snow goose	<i>Chen caerulescens</i>
	Snowy egret	<i>Leucophoyx thula</i>
	Turkey vulture	<i>Cathartes aura</i>

	Western meadowlark	<i>Sturnella neglecta</i>
	White-faced Ibis	<i>Plegadis chihi</i>
	Wilson's phalarope	<i>Steganopus tricolor</i>

Table 4.2 (continued). Wildlife species known or suspected to occur at the CCWA, Navajo County, Arizona (AGFD 1997).

Class	Common Name	Scientific Name
Mammal	Badger	<i>Taxidea taxus</i>
	Bobcat	<i>Lynx rufus</i>
	Coyote	<i>Canis latrans</i>
	Gray fox	<i>Urocyon cinereoargenteus</i>
	Mule deer	<i>Odocoileus hemionus</i>
	Muskrat	<i>Ondatra zibethicus</i>
	Pronghorn	<i>Antilocarpa Americana</i>
	Raccoon	<i>Procyon difficilis</i>
Fish	Black bullhead	<i>Ictalurus melas</i>
	Bluegill	<i>Lepomis macrochirus</i>
	Carp	<i>Cyprinus carpio</i>
	Channel catfish	<i>Ictalurus punctatus</i>
	Fathead minnow	<i>Pimephales promelas</i>
	Flannelmouth sucker	<i>Catostomus latipinnis</i>
	Gila Roundtail chub	<i>Gila robustus robustus</i>
	Golden shiner	<i>Notemigonus crysoleucus</i>
	Green sunfish	<i>Chaenobryttus cyanellus</i>
	Largemouth bass	<i>Micropterus salmoides</i>
	Little Colorado spinedace	<i>Lepidomeda vittata</i>
	Little Colorado sucker	<i>Catostomus sp.</i>
	Red shiner	<i>Notropis lutrensis</i>
	Rio Grande killifish	<i>Fundulus zebrinus</i>
	Speckled dace	<i>Rhinichthys osculus</i>
	Yellow bullhead	<i>Ictalurus natalis</i>

Special Status Species

State-listed species occurring within the project area, identified by AGFD's Heritage Data Base Management System, include 11 birds, five fishes, one reptile, two amphibians, one invertebrate, and 19 mammals (AGFD 2016). The USFS and BLM have additional lists of special status species requiring additional management measures.

The USFWS IPAC tool lists four species that are endangered, threatened, or candidates for listing as resources that may occur or could potentially be impacted by restoration activities at the CCWA (Table 4.3). Designated critical habitat for the Little Colorado spinedace is located within the project area (USFWS 2016).

Impacts – No Action Alternative

Under the No Action alternative, the project area would likely continue to support the same vegetation communities, and numbers of fish and wildlife species that currently exist. Existing emergent wetland habitats would not be restored and establishment of native riparian forest habitat would not occur. These areas would continue to remain degraded as a result of

overgrazing by livestock and invasion by exotic plant species. An inadequate water supply would continue to render the existing emergent wetlands nonfunctional, providing little or no benefit as wildlife habitat.

Table 4.3. USFWS Threatened, Endangered, or Candidate Species that may be impacted by restoration activities at the CCWA, Navajo County, Arizona (USFWS 2016).

Class	Common Name	Status*	Effects of Activities
Bird	Yellow-billed cuckoo	T	Increase habitat amount/quality
Fish	Little Colorado spinedace	T	Increase habitat amount/quality
	Roundtail chub	PT	Increase habitat amount/quality
Reptile	Northern Mexican gartersnake	T	Increase habitat amount/quality

* E – Listed Endangered; T – Listed Threatened; PT – Proposed Threatened.

Impacts – Proposed Action Alternative

Under the Proposed Action alternative, 49 hectares (120 acres) of emergent wetland habitat bordered by native riparian vegetation would be created and maintained in perpetuity. Local vegetation resources would be enhanced through removal of exotic species and establishment of native riparian and wetland vegetation in areas that are currently degraded. Although construction activities would result in short-term disturbances, restoration actions would have long-term positive impacts on fish and wildlife species by increasing the amount and quality of riparian and wetland habitats in the region.

4.3.3 Rocky Mountain Bighorn Sheep Population Enhancements

Affected Environment

Vegetation

This project proposes to capture RMBS on the Site for use in translocations to new, unoccupied habitats and to augment existing populations that are below desired levels or to expand their range and occupancy in existing suitable habitat. Potential release sites include locations within two AGFD Game Management Units (Section 3.5.3, Figure 3.5). The primary habitat where the captures will occur is characterized as Sonoran Desertscrub and releases will occur in forest habitat characterized as Great Basin Conifer Woodland and Petran Montane Conifer Forest (Brown 1994).

Sonoran Desertscrub vegetation occurs at elevations up to 1,067 meters (3,500 feet) and includes shrubs, cacti, succulents, grasses, and annuals during years of adequate moisture. Common trees include paloverde (*Parkinsonia* spp.), mesquite, and desert ironwood (*Olneya tesota*). Common shrubs are whitethorn acacia (*Acacia constricta*), creosote, and bursage (*Ambrosia* spp.). Cacti are an important vegetation type and include saguaro (*Carnegiea gigantea*), several species of cholla (*Cylindropuntia* spp.), and many others (Brown 1994).

Great Basin Conifer Woodland generally occupies foothills and lower mountain slopes from 1,219-2,286 meters (4,000-7,500 feet) in elevation. This vegetation community is dominated by pinyon (*Pinus* spp.) and juniper (*Juniperus* spp.). These trees rarely exceed 12 meters (39 feet) in height and typically form open-spaced woodlands. These woodlands often support an understory of blue grama intermixed with side-oats grama (*Bouteloua curtipendula*), western wheatgrass, and tobosa (*Hilaria mutica*). Other common herbaceous plants include gilias (*Gilia* spp.), buckwheats (*Eriogonum* spp.), penstemons (*Penstemon* spp.), and globemallows (*Sphaeralcea* spp.). In areas where the pinyon-juniper canopy has closed, grasses and herbaceous plants become rare to nonexistent. Winterfat, threadleaf groundsel (*Senecio longilobus*), cliffrose (*Cowania mexicana*), snakeweed, and *Yucca* spp. typically comprise the shrub understory (Brown 1994).

Petran Montane Conifer Forest is found on the slopes and peaks of higher mountains, and high plateaus at elevations of 1,981-3,048 meters (6,500-10,000 feet). This community is dominated by ponderosa pine (*Pinus ponderosa*) but also includes Gambel oak (*Quercus gambelii*), Arizona walnut (*Juglans major*), aspen (*Populus* spp.), Douglas fir (*Pseudotsuga menziesii*), Arizona white pine (*Pinus strobiformis*), and New Mexican locust (*Robinia neomexicana*). Understory shrubs are rarely dense and not especially common except in certain seral stages, natural openings, and at forest edges. Under more open canopies, grasses and grass-like plants tend to dominate including blue grama, western wheatgrass (*Pascopyrum smithii*), Arizona fescue (*Fescue arizonica*), mountain and screwleaf muhly (*Muhlenbergia montana* and *M. virescens*), junegrass (*Koeleria cristata*), muttongrass (*Poa fendleriana*), and dryland sedge (*Carex geophila*) (Brown 1994).

Fish and Wildlife

A variety of upland bird, reptile, and mammal species typically associated with Sonoran Desertscrub vegetation occupy the Site. Some of these wildlife species include Gambel's quail, greater roadrunner, cactus wren, mourning and white-winged doves, western diamondback rattlesnake, desert cottontail rabbit, kangaroo rat (*Dipodomys* spp.), woodrat and coyote (Brown 1994).

Bird species associated with coniferous forest vegetation include northern goshawk (*Accipiter gentilis*), Mexican spotted owl, bald eagle (*Haliaeetus leucocephalus*), Steller's jay (*Cyanocitta stelleri*), pinyon jay (*Gymnorhinus cyanocephalus*), pygmy nuthatch (*Sitta pygmae*), brown creeper (*Certhis familiaris*), yellow-rumped warbler (*Dendroica coronata*), dark-eyed junco (*Junco hyemalis*), vireos (*Vireo* spp.), and downy and hairy woodpeckers (*Picoides pubescens* and *P. villosus*). Mammals include southwestern myotis (*Myotis auriculus*), shrews (*Sorex* spp.), voles (*Microtus* spp.), chipmunks (*Eutamias* spp.), deer mouse, pinyon mouse (*Peromyscus truei*), long-tailed weasel (*Mustela frenata*), porcupine (*Erethizon dorsatum*), white-tailed deer, mule deer, elk (*Cervus elaphus*), gray wolf (*Canis lupus*), and black bear (*Ursus americanus*). Amphibians and reptiles commonly encountered here include tiger salamanders (*Ambystoma tigrinum*), Arizona toads (*Bufo microscaphus*), eastern collared lizards (*Crotaphytus collaris*), common sagebrush lizards (*Sceloporus graciosus*), striped plateau lizards (*Sceloporus virgatus*), plateau lizards (*S. tristichus*), Clark's and Yarrow's spiny lizards (*S. clarkii* and *S. jarrovi*), Gila spotted whiptails (*Aspidoscelis flagellicauda*), greater short-horned lizards (*Phrynosoma*

hernandesi), striped whipsnakes (*Masticophis taeniatus*), Sonoran mountain kingsnakes (*Lampropeltis pyromelana*), terrestrial gartersnakes (*Thamnophis elegans*), black-tailed rattlesnakes (*Crotalus molossus*), and Arizona black rattlesnakes (*C. cerberus*) (Brown 1994, Brennan and Holycross 2006).

Federally Listed Species

The USFWS IPAC tool lists 23 species that are endangered, threatened, or candidates for listing as resources that may occur or have potential to be affected by RMBS capture and release activities within the identified areas (Table 4.4). Designated or proposed critical habitat for 12 of the species was also identified (Table 4.4; USFWS 2016).

Table 4.4. USFWS Threatened, Endangered, or Candidate Species that may occur or could potentially be impacted by RMBS capture and release activities, Greenlee County and Apache County, Arizona (USFWS 2016).

Class	Common Name	Scientific Name	Status*	Effects of Activities
Amphibian	Chiricahua leopard frog	<i>Rana chiricahuensis</i>	T/CH	No effect
Bird	Least tern	<i>Sterna antillarum</i>	E	No effect
	Mexican spotted owl	<i>Strix occidentalis lucida</i>	T/CH	No effect
	Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E/CH	No effect
	Yellow-billed cuckoo	<i>Coccyzus americanus</i>	T/CH	No effect
	Apache trout	<i>Oncorhynchus apache</i>	T	No effect
	Gila trout	<i>Oncorhynchus gilae</i>	T	No effect
	Headwater chub	<i>Gila nigra</i>	PT	No effect
	Little Colorado spinedace	<i>Lepidomeda vittata</i>	T/CH	No effect
	Loach minnow	<i>Tiaroga cobitis</i>	E/CH	No effect
	Roundtail chub	<i>Gila robusta</i>	PT	No effect
	Spikedace	<i>Meda fulgida</i>	E/CH	No effect
	Zuni bluehead sucker	<i>Catostomus discobolus yarrowi</i>	E	No effect
	Gila chub	<i>Gila intermedia</i>	E/CH	No effect
	Razorback sucker	<i>Xyrauchen texanus</i>	E	No effect
Plant	Zuni fleabane	<i>Erigeron rhizomatus</i>	T	Potential trampling and utilization
Mammal	Gray wolf	<i>Canis lupus</i>	E	Increased long-term prey availability

	Mexican wolf	<i>Canis lupus baileyi</i>	E	Increased long-term prey availability
	Lesser long-nosed bat	<i>Leptonycteris curasoae yerbabuenae</i>	E	No effect
	New Mexico meadow jumping mouse	<i>Zapus hudsonius luteus</i>	E/CH	No effect

* E – Listed Endangered; T – Listed Threatened; PT – Proposed Threatened.; CH – Designated or Proposed Critical Habitat.

Table 4.4 (continued). USFWS Threatened, Endangered, or Candidate Species that may occur or could potentially be impacted by RMBS capture and release activities, Greenlee County and Apache County, Arizona (USFWS 2016).

Class	Common Name	Scientific Name	Status*	Effects of Activities
Reptile	Narrow-headed gartersnake	<i>Thamnophis rufipunctatus</i>	T/CH	No effect
	Northern Mexican gartersnake	<i>Thamnophis eques megalops</i>	T/CH	No effect
Invertebrate	Three forks springsnail	<i>Pyrgulopsis trivialis</i>	E/CH	No effect

Impacts – No Action Alternative

Under the No Action alternative, RMBS capture at the Site and translocation to identified release locations would not be conducted. These areas would likely continue to support the same vegetation communities and numbers of fish and wildlife species that currently exist. RMBS will not be reintroduced into historical areas of occurrence and current populations within identified release areas will not be augmented with additional sheep. Wildlife-vehicle collisions involving RMBS will likely remain high near the Site as reductions in sheep through capture activities will not occur.

Impacts – Proposed Action Alternative

Under the Proposed Action alternative, RMBS will be captured from the Site and translocated to identified release areas to expand their range and occupancy in existing habitat or augment existing populations where populations are below desired levels.

Impacts of Capture Activities: Generally, impacts from capture activities include alteration of the herd hierarchy of the existing population and reduction of RMBS grazing pressure in the capture area. Removing sheep from the capture area reduces potential population stresses such as disease and competition for resources (e.g., water, forage). Removal of animals also helps keep the population below carrying capacity, which can help maintain habitat quality.

Impacts of Release Activities: Overall, reintroduction of RMBS that historically occurred within an ecosystem will enhance biodiversity, and may improve ecosystem functions. Augmenting populations with RMBS from other populations may increase genetic diversity and improve the persistence of the species within an area.

Aquatic and Riparian Species: The capture and translocation of RMBS will have no impact on the aquatic environment and therefore no impact on the least tern, Chiricahua leopard frog, Apache trout, Gila trout, headwater chub, Little Colorado spinedace, loach minnow, roundtail chub, spikedace, Zuni bluehead sucker, Gila chub, razorback sucker, narrow-headed gartersnake, northern Mexican gartersnake, or three forks springsnail. Southwestern willow flycatchers, yellow-billed cuckoos, and New Mexico meadow jumping mice are riparian obligates and no project actions will occur in the riparian areas. No effects are anticipated.

Birds of Prey: Mexican spotted owls are nocturnal and all project actions will take place during daylight hours. No effects are anticipated.

Mammals: Gray and Mexican gray wolves could be disturbed by capture and release activities. Wolves are highly mobile and have large home ranges. Any disruption is anticipated to be minor and of short duration. The long term impact of an additional prey species could be beneficial to wolves. Lesser long-nosed bats are nocturnal and all project actions will take place during daylight hours. No effects are anticipated.

Plants: Releases of RMBS into areas where populations of Zuni fleabane occur could result in potential trampling or use of this plant by sheep. These impacts are anticipated to be minor, as sufficient foraging resources have been identified within the release areas.

4.3.4 Wetland Restoration at Rabbit Farm

Affected Environment

Vegetation

Rabbit Farm lies within the San Simon Valley, positioned between the Peloncillo and Pinaleno Mountains, at an elevation of 1,036 meters (3,400 feet). The property is approximately 49 hectares (120 acres) in size including 39 hectares (97 acres) of uplands, 8 hectares (20 acres) of mesquite bosque, and 1.2 hectares (3 acres) of ponds and perennial seep areas. Upland vegetation at Rabbit Farm is characterized as Chihuahuan Desertscrub (Brown 1994). Upland areas support predominantly warm season grasses with a mixture of forb, shrub, and cactus species. Tobosa, gramas (*Bouteloua* spp.), and three-awns (*Aristida* spp.) are the dominant perennial grasses. Common shrubs and cacti include creosote, broom snakeweed, burroweed (*Isocoma tenuisecta*), mesquite, cholla, and prickly pear (*Opuntia* spp.). Mesquite, with lesser amounts of cat-claw acacia (*Acacia greggii*) and desert willow (*Chilopsis linearis*) form the overstory, and burroweed tends to dominate the understory within the bosque areas. Other common shrubs include burrobrush (*Hymenoclea salsola*), rabbitbrush, seep willow (*Baccharis salicifolia*), and desert broom (*Baccharis sarothroides*).

Fish and Wildlife

A 2006 inventory of birds, mammals, reptiles, and amphibians conducted by Kingsley (2006) at Posey Well, another BLM wildlife exclosure in the San Simon Valley, documented a variety of wildlife species across several habitat types (i.e., grassland, mesquite, riparian). These species also

may potentially occur at Rabbit Farm, as this site is located only 8 kilometers (5 miles) from Posey Well. The avian community at Posey Well was the most speciose with a total of 32 species detected via point counts and incidental observations (Table 4.5). Fifteen mammal species were detected using live trapping, incidental observations, or track identification (Table 4.6). The few reptiles observed included common side-blotched lizards (*Uta stansburiana*), zebra-tailed lizards (*Callisaurus draconoides*), whiptails (*Cnemidophorus* spp.), and eastern fence lizards (*Sceloporus undulatus*). No amphibians were detected (Kingsley 2006).

Table 4.5. Bird species detected at the Posey Well wildlife enclosure in 2006, Cochise County, Arizona (Kingsley 2006).

Common Name	Scientific Name
Turkey vulture	<i>Cathartes aura</i>
Northern harrier	<i>Circus cyaneus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Gambel's quail	<i>Callipepla gambelii</i>
Mourning dove	<i>Zenaida macroura</i>
Great horned owl	<i>Bubo virginianus</i>
Lesser nighthawk	<i>Chordeiles acutipennis</i>
Gila woodpecker	<i>Melanerpes uropygialis</i>
Ladder-backed woodpecker	<i>Picoides scalaris</i>
Say's phoebe	<i>Sayornis saya</i>
Vermilion flycatcher	<i>Pyrocephalus rubinus</i>
Western kingbird	<i>Tyrannus verticalis</i>
Loggerhead shrike	<i>Lanius ludovicianus</i>
Chihuahuan raven	<i>Corvus cryptoleucus</i>
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>
Cactus wren	<i>Campylorhynchus brunneicapillus</i>
House wren	<i>Troglodytes aedon</i>
Ruby-crowned kinglet	<i>Regulus calendula</i>
Black-tailed gnatcatcher	<i>Poliophtila melanura</i>
American pipit	<i>Anthus rubescens</i>
Yellow-rumped warbler	<i>Dendroica coronata</i>
Yellow warbler	<i>Dendroica petechia</i>
Abert's towhee	<i>Pipilo aberti</i>
Chipping sparrow	<i>Spizellapasserina</i>
Brewer's sparrow	<i>Spizella breweri</i>
Black-throated sparrow	<i>Amphispiza bilineata</i>
Song sparrow	<i>Melospiza melodia</i>
Vesper sparrow	<i>Pooecetes gramineus</i>
Eastern meadowlark	<i>Sturnella magna</i>
Hooded oriole	<i>Icterus cucullatus</i>

House finch	<i>Carpodacus mexicanus</i>
Lesser goldfinch	<i>Carduelis psaltria</i>

Table 4.6. Mammal species detected by BLM at the Posey Well wildlife enclosure in 2006, Cochise County, Arizona (Kingsley 2006).

Common Name	Scientific Name
Big brown bat	<i>Eptesicus fuscus</i>
Desert cottontail	<i>Sylvilagus audubonii</i>
Black-tailed jackrabbit	<i>Lepus californicus</i>
Harris's antelope squirrel	<i>Ammospermophilus harrisii</i>
Merriam's kangaroo rat	<i>Dipodomys merriami</i>
Fulvous harvest mouse	<i>Reithrodontomys fulvescens</i>
Western harvest mouse	<i>Reithrodontomys megalotis</i>
Cactus mouse	<i>Peromyscus eremicus</i>
White-footed mouse	<i>Peromyscus leucopus</i>
Southern grasshopper mouse	<i>Onychomys torridus</i>
Hispid cotton rat	<i>Sigmodon hispidus</i>
Western white- throated woodrat	<i>Neotoma albigula</i>
Coyote	<i>Canis latrans</i>
American badger	<i>Taxidea taxus</i>
Javelina	<i>Tayassu tajacu</i>

Special Status Species

State listed species occurring within the project area, identified by AGFD's Heritage Data Base Management System, included 21 birds, two fishes, nine reptiles, one amphibian, and 20 mammals (AGFD 2016). The USFS and BLM have additional lists of special status species requiring additional management measures.

The USFWS IPAC tool lists five species that are endangered, threatened, or candidates for listing as resources that may occur or could potentially be impacted by restoration activities at Rabbit Farm (Table 4.7). No designated critical habitats were identified by USFWS at this location (USFWS 2016).

Table 4.7. USFWS Threatened, Endangered, or Candidate Species that may be impacted by restoration activities at Rabbit Farm, Graham County, Arizona (USFWS 2016).

Class	Common Name	Status*	Effects of Activities
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Bird	Yellow-billed cuckoo	T	Improve habitat amount/quality
Fish	Headwater chub	PT	Improve habitat amount/quality
	Roundtail chub	PT	Improve habitat amount/quality
Mammal	Lesser long-nosed bat	E	No effect
Reptile	Northern Mexican gartersnake	T	Improve habitat amount/quality

* E – Listed Endangered; T – Listed Threatened; PT – Proposed Threatened.

Impacts – No Action Alternative

Under the No Action alternative, the project area would likely continue to support the same vegetation communities and numbers of fish and wildlife species that currently exist. Existing ponds would remain degraded because of an inadequate water supply and establishment of native riparian forest habitat would not occur. Ponds that are currently dry would continue to be nonfunctional and would provide little or no benefit as wildlife habitat or water sources.

Impacts – Proposed Action Alternative

Under the Proposed Action alternative, approximately 0.8 hectares (2 acres) of perennial aquatic habitat bordered by native riparian vegetation would be restored and maintained in perpetuity. The scarcity of water throughout the San Simon Valley emphasizes the importance of perennial water for both resident and migratory wildlife. Local vegetation resources would be enhanced through establishment of native riparian vegetation around the ponds. Although construction activities would result in short-term disturbances, restoration actions would have long-term positive impacts on fish and wildlife species by increasing the amount and quality of aquatic and riparian habitats in the region.

4.3.5 Cumulative Impacts of Proposed Actions to Biological Resources

The Trustees selected the restoration projects included in the preferred alternative to restore, replace, or acquire natural resources as compensation for natural resource injuries to wildlife and wildlife habitat at the Site. The cumulative environmental impacts from implementing the suite of restoration projects are expected to be beneficial. All projects are focused on benefiting wildlife, through wildlife habitat protection and restoration as well as population enhancements of wildlife species.

Restoration of native vegetation and wetland ecosystem functions at the project sites would improve general conditions for all resident and migratory wildlife. These projects would increase the area and quality of riparian and wetland habitats used by migratory birds and waterfowl, and would also improve or create additional areas of surface water that would be used by other wildlife. Long-term commitment to the control or eradication of non-native vegetation (i.e., saltcedar) at sites will maintain native vegetation community diversity that will also benefit wildlife over the long-term.

Within the last decade, the AGFD began to translocate bighorn sheep from the Site to augment existing herds in eastern Arizona and to create new populations in suitable habitat where they once occurred. Benefits of the proposed project include increasing long-term population viability and re-establishing RMBS into historic ranges within eastern Arizona. The cumulative effects to ecosystems would be to enhance biological diversity and potentially improve ecosystem health and function in this area of Arizona.

4.4 Cultural Resources

4.4.1 Wetland Restoration at Cluff Ranch Wildlife Area

Affected Environment

A Class III cultural resource survey was conducted in 2013 by Jacobs Engineering on a portion of the CRWA, in addition to seven cultural resource investigations previously conducted near or within the wildlife area (Herron and Massey 1987, Heuett 1998, Stull 1998, Dart 1999, Jones 2000, McKee and Dart 2006, and Bowler 2007). These surveys resulted in 20 recorded cultural resource sites within 2.6 square kilometers (1 square mile) surrounding the CRWA, including two sites recorded directly within the CRWA. The Class III survey conducted by Jacobs Engineering in 2006 was implemented to determine whether significant cultural resources existed prior to a proposed project designed to reestablish water delivery infrastructure between two ponds, and as part of on-going operations and maintenance activities within the CRWA. The 2013 Class III survey identified five cultural resource sites within the project area. The sites consisted of one previously recorded, multi-component site, one newly recorded multi-component site, one newly recorded prehistoric site, and two newly recorded historic sites. All five sites are recommended as eligible for the National Register of Historic Places (NRHP) under criterion D.

The cultural chronology description for the CRWA, described below, was summarized using the cultural context section in the report by Jacobs Engineering (Stubing 2014).

The CRWA lies within the Safford Basin region of Arizona, which has seen sporadic human occupation for over 11,000 years. Regional occupation can generally be divided into five major prehistoric time periods. These are the Paleo-Indian Period (ca. 9,500-8,500 B.C.), the Archaic Period (ca. 8,500-150 B.C.), the Early Formative period (150 B.C.-A.D. 800), the Late Formative period (A.D. 800-1200), and the Classic Period (A.D. 1200-1450). “It is unclear what happened to the prehistoric inhabitants of the Safford Basin, but at the time of the Spanish arrival (A.D. 1540), Piman-speaking peoples occupied southern Arizona” (Stubing 2014). According to Spanish accounts, Apaches (members of the Athabaskan linguistic family) entered southeastern Arizona in the late sixteenth to early seventeenth century (Laird 1987). EuroAmericans followed, drawn to the fertile soils and availability of irrigation water of the eastern Gila River Valley. This region became extensively farmed, producing cotton, alfalfa, grain, and other crops (Swartz

1998). Several farming communities and towns were established in the 1800's, including Safford, Pima, and Thatcher (Stubing 2014).

Impacts – No Action Alternative

Under the No Action alternative, no change in existing conditions of cultural resources would occur.

Impacts – Proposed Action Alternative

Proposed restoration actions at the CRWA constitute an undertaking under the federal National Historic Preservation Act (NHPA) of 1966, as amended (P.L. 89-6650) and the Arizona State Antiquities Act (ARS Section 41-841 et seq., as amended); and the Arizona State Historic Preservation Act (ARS Sections 41-861 through 41-864, as amended). The NHPA requires an inventory of cultural resources that may be eligible for inclusion in the NRHP, and that may be adversely affected by the proposed undertaking. Archaeological surveys will be performed prior to implementing any restoration undertaking that entails land disturbance. As part of the proposed undertaking, mitigation options will be developed for sites determined to be significant and would emphasize avoidance of any significant cultural resources.

If previously unidentified cultural resources, especially human remains or burials, are encountered during future land disturbance on the parcels, work shall cease immediately at the location. Any required consultation will be conducted prior to any disturbance to the newly identified cultural resources. Long-term benefits to cultural resources would be possible through the protection and conservation of the identified cultural resources into perpetuity.

4.4.2 Wetland Restoration at Chevelon Creek Wildlife Area

Affected Environment

The AGFD conducted a Class III cultural resource survey in advance of proposed wildlife management and habitat restoration projects at the CCWA. All cultural resources present within the wildlife area were inventoried during the surveys to better inform project proponents in planning and management. The cultural chronology description below was developed using the cultural history section within the draft report in progress by AGFD (Fjerstad and Hohmann, n.d.). These surveys were in addition to three cultural resource investigations previously conducted within the CCWA (Andrews 1981, Andrews and Larkin 1983, and Moses et al. 2007).

According to the cultural history summary contained within AGFD's draft report (Fjerstad and Hohmann n.d.), the project area appears to have been used and sporadically occupied by Ancestral Pueblo (Anasazi) populations. Close contacts and material exchanges with the nearby Sinagua populations located to the immediate west are also very evident (McGregor 1965). Traditionally this region can be divided into three major prehistoric time periods. These are the Paleo-Indian Period (pre-6000 BC), the Archaic Period (6000 BC to AD 300), and the Ceramic Period (AD 300 to AD 1550; Basketmaker and Pueblo periods). Sometime after A.D. 1500, the

Navajo peoples likely moved into the region, and were then followed shortly thereafter by EuroAmerican populations.

The Class III survey by AGFD re-recorded nine previously recorded sites and recorded 34 new cultural resource sites within the APE. The sites recorded (and re-recorded) by AGFD CRCP archaeologists, consist of 31 prehistoric sites, eleven multi-component sites (prehistoric and historic), and three historic sites. Site types range from prehistoric habitation loci to an historic homestead.

Impacts – No Action Alternative

Under the No Action alternative, no change in existing conditions of cultural resources would occur.

Impacts – Proposed Action Alternative

Proposed restoration actions at the CCWA constitute an undertaking under the National Historic Preservation Act (NHPA) of 1966, as amended (P.L. 89-6650); and the Arizona State Antiquities Act (ARS Section 41-841 et seq., as amended) and the Arizona State Historic Preservation Act (ARS Sections 41-861 through 41-864, as amended). The NHPA requires an inventory of significant cultural resources that may be affected by the undertaking. A cultural resource survey was performed by certified AGFD archaeologists. A final report of findings will be submitted and accepted by the State Historic Preservation Office (SHPO) prior to implementing any restoration action that entails land disturbance. As part of the proposed action, mitigation options will be developed for sites determined to be significant and would emphasize avoidance of any significant cultural resources.

If previously unidentified cultural resources, especially human remains or burials, are encountered during future land disturbance on the parcels, work shall cease immediately at the location. Any required consultation will be conducted prior to any disturbance to the newly identified cultural resources. Long-term benefits would be possible through the protection and conservation of the identified cultural resources into perpetuity.

4.4.3 Rocky Mountain Bighorn Sheep Population Enhancements

Affected Environment

This project proposes to capture RMBS on the Site for use in translocations to new, unoccupied habitats and to augment existing populations in eastern Arizona. Potential release sites include locations within two AGFD Game Management Units (Section 3.5.3, Figure 3.5). Because of the immense size of the project area and the low density of bighorn sheep proposed for capture and release in the project areas, no effect to the region's cultural resources is anticipated.

Impacts – No Action Alternative

Under the No Action alternative, no change in existing conditions of cultural resources would occur.

Impacts – Proposed Action Alternative

Proposed actions entailing capture and release of RMBS is not expected to cause any ground disturbance or affect any archaeological, historical, or cultural sites within the project areas.

4.4.4 Wetland Restoration at Rabbit Farm

Affected Environment

The BLM conducted a cultural resource survey in 1985 near and within the Rabbit Farm project area. Numerous cultural resources were identified throughout the dune ridges of the Rabbit Farm-Whitlock Cienega-Parks Lake areas. Identified cultural features and artifacts appear to be from the Mogollon and Archaic periods (BLM 1985).

Impacts – No Action Alternative

Under the No Action alternative, no change in existing conditions of cultural resources would occur.

Impacts – Proposed Action Alternative

Proposed restoration actions at the CRWA constitute an undertaking under the NHPA. The NHPA of 1966, as amended, 16 USC §§ 470 et seq., is intended to preserve historical and archaeological sites. Compliance with the NHPA would be undertaken through consultation with the State Historic Preservation Officer for the project. The NHPA requires an inventory of significant cultural resources that may be affected by the undertaking. Archaeological surveys will be performed prior to implementing any restoration action that entails ground disturbance. As part of the proposed action, mitigation options will be developed for sites determined to be significant and would emphasize avoidance of any significant cultural resources.

In addition, to be in compliance with the BLM Cultural Resources Programmatic Agreement, the Arizona BLMSHPO Protocol, the 1980 Programmatic Memorandum of Agreement between the BLM, Advisory Council on Historic Preservation, and the BLM 8100 Manual series, actions will be taken to identify cultural resources located in the project area, evaluate the eligibility of cultural resources for listing in the NRHP, determine the effect of the undertaking on eligible cultural resources, and design mitigation measures or alternatives where appropriate.

If previously unidentified cultural resources, especially human remains or burials, are encountered during future land disturbance on the parcels, work shall cease immediately at the location. Any required consultation will be conducted prior to any disturbance to the newly identified cultural resources.

Additional cultural resource surveys may be required in the event that the project location is changed or additional surface disturbing operations are added to the project after the initial survey. Any such survey will be completed prior to commencement of operations.

4.4.5 Cumulative Impacts of Proposed Actions to Cultural Resources

The restoration projects included in the preferred alternative would have a cumulative positive cultural benefit on the regions in which they occur. Cultural resources that have already been identified or will be identified through future surveys in proposed project areas will be maintained and protected from development on these conservation lands.

4.5 Land Ownership and Use

4.5.1 Wetland Restoration at Cluff Ranch Wildlife Area

Affected Environment

The CRWA is within Region V of the AGFD and is deeded Arizona Game and Fish Commission property. The AGFD is the lead agency in the operation, maintenance, and restoration activities on the CRWA. The operational plan guides the continual yearly activities of the wildlife area. For parcels of Cluff Ranch that were obtained from other agencies (e.g., General Services Administration and BLM), the AGFD is obligated to maintain its properties as prescribed by agreement. Under Arizona Revised Statutes Title 17, Commission Order 1, the AGFD is vested with the authority to manage the State's Wildlife Areas and properties as a public trust for the recreational benefit of present and future generations (AGFD 2014).

The current management emphasis for the CRWA is hunting of upland small game species (mourning and white-winged doves, Gambel quail and cottontail rabbits), big game hunting (archery hunting for deer and javelina), and fishing. Other wildlife-oriented recreation uses such as wildlife watching, photography, and environmental education are also emphasized in the management of Cluff Ranch. At present Cluff Ranch continues to provide thousands of recreational use days annually to the public. Fishing and recreation at the functioning ponds generates the greatest use days with other activities contributing to the total. Water levels within these ponds have been maintained through the continuing drought and provide the main winter public fishing recreation in the Gila Valley (AGFD 2014).

Impacts – No Action Alternative

Under the No Action alternative, current management and land use practices in the project area will continue.

Impacts – Proposed Action Alternative

Under the Proposed Action alternative, current management and land use practices in the project area will continue. Restoration actions will increase wetland and riparian habitat for wildlife

species, and are expected to enhance opportunities for outdoor recreation (e.g., birding, hunting, angling, hiking, photography), hunting, and environmental education for nearby communities. This, in turn, may result in increased visitation and recreational use days at the CRWA.

4.5.2 Wetland Restoration at Chevelon Creek Wildlife Area

Affected Environment

The CCWA is within Region I of the AGFD and is deeded Arizona Game and Fish Commission property. The AGFD is the lead agency in the operation, maintenance, and restoration activities on the CRWA. The operational plan guides the continual yearly activities of the wildlife area. Under Arizona Revised Statutes Title 17, Commission Order 1, the AGFD is vested with the authority to manage the State's Wildlife Areas and properties as a public trust for the recreational benefit of present and future generations (AGFD 1997).

The current management emphasis at CCWA is to provide marshland habitat primarily for the nesting, feeding, and resting of resident and migrating waterfowl and other wildlife. The CCWA provides a limited amount of waterfowl and small game hunting. Hunting during the waterfowl season is allowed in the smaller impoundments, but not within the original 24-hectare (60-acre) impoundment (Commission Order 1). Many other recreational activities occur at the CCWA including fishing, boating, hunting, bird watching, photography, and camping. The CCWA provides opportunities for about 100 non-consumptive and 100 consumptive recreation use days spent at waterfowl and small game hunting, and other outdoor recreational activities (e.g., fishing, boating, wildlife viewing, photography, camping) (AGFD 1997).

Impacts – No Action Alternative

Under the No Action alternative, current management and land use practices in the project area will continue.

Impacts – Proposed Action Alternative

Under the Proposed Action alternative, current management and land use practices in the project area will continue. Restoration actions will increase wetland and riparian habitat for wildlife species, and are expected to enhance opportunities for outdoor recreation including birding, hunting, angling, hiking, photography, and environmental education for nearby communities. This, in turn, may result in increased visitation and recreational use days at the CCWA.

4.5.3 Rocky Mountain Bighorn Sheep Population Enhancements

Affected Environment

This project proposes to capture RMBS on the Site, which is privately owned by FMI, for use in translocations to new, unoccupied habitats and to augment existing populations in eastern Arizona. Potential release sites are located within the Springerville and Alpine Ranger Districts of the Apache-Sitgreaves National Forests. The Apache-Sitgreaves National Forests' 850,202

hectares (2.1 million acres) are managed as a single administrative unit by the USFS, an agency of the U.S. Department of Agriculture (USDA).

Impacts – No Action Alternative

Under the No Action alternative, current management and land use practices in the project area will continue.

Impacts – Proposed Action Alternative

Under the Proposed Action alternative, current management and land use practices in the project area (i.e., Site where captures will occur and release locations) will continue. Proposed project actions are consistent with the conservation and management approaches for wildlife identified in the USFS Land Management Plan for the Apache-Sitgreaves National Forests: “The Apache-Sitgreaves National Forests work in partnership with the AGFD to protect and reintroduce native species. Agreements are implemented so that appropriate species and subspecies are introduced” (page 63, 2015). Reintroducing species such as bighorn sheep into areas they historically occurred will increase biodiversity and may help improve ecosystem health and function, which is identified as a priority need in the Land Management Plan for the Apache-Sitgreaves National Forests (2015).

4.5.4 Wetland Restoration at Rabbit Farm

Affected Environment

The Rabbit Farm wildlife exclosure is located on public land administered by the BLM in the San Simon Valley, Graham County, Arizona. The Safford Field Office manages BLM land in the San Simon Valley in accordance with the *Safford District Resource Management Plan* (RMP), Part I 1992 and Part II 1994. The RMP prescribes that management guidance and proposed restoration actions at Rabbit Farm conform to the land use plan terms and conditions as required by 43 CFR 1610.5, BLM MS 1617.3.

Proposed restoration actions are consistent with the following management objectives identified in the Safford District Resource Management Plan (1991):

- 1) Page 33, "Permit the removal of nonnative vegetation for the improvement of riparian vegetation."
- 2) Page 33, "Manage priority wildlife species habitat (vegetation communities) or special features of that habitat (water, riparian vegetation, cliffs, etc.) to maintain or enhance population levels."
- 3) Page 33, "Focus management efforts on enhancing biological diversity."

Impacts – No Action Alternative

Under the No Action alternative, current management and land use practices in the project area will continue.

Impacts – Proposed Action Alternative

Under the Proposed Action alternative, current management and land use practices in the project area will continue. Restoration actions will increase wetland and riparian habitat for wildlife species, and are expected to enhance opportunities for outdoor recreation (e.g., birding, angling, hunting, hiking, photography) and environmental education for nearby communities. The project will be used as a demonstration project to highlight the benefits of restoring degraded and unproductive habitats for wildlife. The BLM will develop and organize working field trips that engage community members in restoration projects. Additionally, the BLM will work with the Gila Watershed Partnership, Eastern Arizona College, and Southwest Conservation Corps to involve youth in restoration projects.

4.5.5 Cumulative Impacts of Proposed Actions to Land Ownership and Use

The suite of restoration projects included within the preferred alternative are consistent with current management and land use practices within the project areas. Proposed actions, which entail wetland habitat restoration and reintroduction of RMBS, are expected to enhance opportunities for outdoor recreation, hunting, and environmental education for nearby communities. Increased visitation and recreational use days spent wildlife watching, angling, and hiking are anticipated to be long-term beneficial impacts.

4.6 Socioeconomics

4.6.1 Wetland Restoration at Cluff Ranch Wildlife Area and Rabbit Farm

Affected Environment

The CRWA and Rabbit Farm restoration projects are both located in Graham County, Arizona, which is composed primarily of persons of White or Hispanic racial and ethnic backgrounds (Table 4.8). For 2010-2014, the population of Graham County was 37,311, which corresponded to a population increase of 11.4% since the 2000 census. Safford, the county seat, is the largest city with 9,574 people (Table 4.9). Population density is 20.7 people per square kilometer (8.0 people per square mile). Both population growth and density in Graham County are lower than the state average growth rate of 27.9% and density of 149 people per square kilometer (57.6 people per square mile) (USA.com 2016).

Table 4.8. Comparison of population statistics for Arizona, Graham County, and nearby towns (2010-2014) (USA.com 2016).

Geographic Area	Total Population	White (%)	Black (%)	Asian (%)	Native (American Indian, Alaska Native, Hawaiian Native, etc.) (%)	Two or More Races (%)	Hispanic (of any race) (%)
Arizona	6,561,516	78.9	4.2	2.9	4.6	3.1	30.1
Graham County	37,311	76.2	2.1	0.5	14.1	2.3	31.3
Safford	9,574	87.3	0.8	0.9	1.7	3.0	44.8
Thatcher	4,894	88.2	2.7	0.7	2.8	1.9	28.3
Swift Trail Junction	2,913	81.8	6.0	1.0	3.7	1.2	30.8
Pima	2,270	94.3	0.1	0.7	2.8	3.5	26.2

For 2010-2014, the median household income for Graham County was \$46,965, which has grown by 58.3% since the 2000 census. The median household income for residents of Safford was lower than the county and state average for 2010-2014. Thatcher, the second-most populated town in Graham County, had a higher median household income than the county and state average. Unemployment rates for civilian employees over 16 years of age were 13.0% and 10.0% for Safford and Thatcher, respectively. These rates were slightly lower than the county average and slightly higher than the state average for 2010-2014 (Table 4.9). Of the 11,934 civilian employees in the county, 3,189 (26.7%) are in the educational services, health care, and social assistance industries, 1,585 (13.3%) are in the agriculture, forestry, fishing, hunting, and mining industries, and 1,425 (11.9%) are in the retail trade industry (Table 4.10).

Table 4.9. Income and poverty statistics for Arizona, Graham County, Safford, and Thatcher (2010-2014) (USA.com 2016).

Population Attribute	Arizona	Graham County	Safford	Thatcher
Population (2010-2014)	6,561,516	37,311	9,574	4,894
Population, % change since 2000	27.9	11.4	3.7	21.7
Median household income (2010-2014), (\$)	49,928	46,965	46,140	52,339
Per capita income (2010-2014), (\$)	25,537	17,687	20,016	21,932
Percent of population below poverty level (2010-2014), (%)	18.2	21.8	16.4	14.2
Unemployment rate, civilian employees >16 years of age (2010-2104), (%)	9.9	13.1	13.0	10.0

Impacts – No Action Alternative

Under the No Action alternative, it is anticipated the current socioeconomic trends within Graham County would continue into the foreseeable future.

Impacts – Proposed Action Alternative

The proposed actions at Cluff Ranch Wildlife Area and Rabbit Farm are expected to have positive socioeconomic impacts on the region. Restoration actions will increase wetland and native riparian forest habitat for birds and other wildlife species, as well as enhance opportunities for outdoor recreation (e.g., birding, hunting, angling, hiking, photography), hunting, and environmental education for nearby communities. Associated construction activities could also provide a minor contribution to local area businesses through potential employment opportunities, either directly or indirectly through the supply chain for materials.

Table 4.10. Employment by industrial sector, Graham County (2010-2014) (USA.com 2016).

Industry	No. of Employees	%
Agriculture, Forestry, Fishing, Hunting, Mining	1,585	13.3
Construction	679	5.7
Manufacturing	442	3.7
Wholesale Trade	101	0.9
Retail Trade	1,425	11.9
Transportation, Warehousing, Utilities	471	4.0
Information	150	1.3
Finance, Insurance, Real Estate, Rental, Leasing	429	3.6
Professional, Scientific, Management, Administrative, Waste Management Services	708	5.9
Educational Services, Health Care, Social Assistance	3,189	26.7
Arts, Entertainment, Recreation, Accommodation, Food Services	1,041	8.7
Public Administration	1,058	8.9
Other Services, Except Public Administration	656	5.5

4.6.2 Wetland Restoration at Chevelon Creek Wildlife Area

Affected Environment

The CCWA is located in Navajo County, which is composed primarily of persons of White or Native racial and ethnic backgrounds (Table 4.11). For 2010-2014, the population of Navajo County was 107,489 which had grown 10.3% since the 2000 census. Show Low is the largest city in the county with 10,754 people (Table 4.12). The Navajo County population density is 27.9 people per square kilometer (10.8 people per square mile). Both population growth and density in Navajo County are lower than the state average growth rate of 27.9% and density of 149 people per square kilometer (57.6 people per square mile) for 2010-2014 (USA.com 2016).

For 2010-2014, the median household income for Navajo County was \$36,591, which had grown by 28.1% since 2000. Median household incomes for the cities of Show Low and Winslow were both higher than the county average but much lower than the state average for 2010-2014. The unemployment rate for civilian employees over 16 years of age in Navajo County was much higher than the state average for this time period (Table 4.12). Of the 32,043 civilian employees in the county, 9,347 (29.2%) are in the educational services, health care, and social assistance services, 4,061 (12.7%) are in the retail trade industry, and 3,890 (12.1%) are in the arts, entertainment, recreation, accommodation, and food service industries (Table 4.13).

Table 4.11. Comparison of population statistics for Arizona, Navajo County, and nearby towns (2010-2014) (USA.com 2016).

Geographic Area	Total Population	White (%)	Black (%)	Asian (%)	Native (American Indian, Alaska Native, Hawaiian Native, etc.) (%)	Two or More Races (%)	Hispanic (of any race) (%)
Arizona	6,561,516	78.9	4.2	2.9	4.6	3.1	30.1
Navajo County	107,489	49.2	0.6	0.5	43.9	2.8	11.0
Show Low	10,754	91.4	0.3	0.6	4.8	2.2	10.9
Winslow	9,570	47.2	3.1	0.3	28.0	3.9	37.3
Snowflake	5,595	96.8	0.5	0.3	0.1	1.3	6.1
Holbrook	5,003	61.7	1.4	1.2	21.0	4.7	22.7
Pinetop-Lakeside	4,297	93.0	0.1	1.4	3.8	0.9	3.5

Table 4.12. Income and poverty statistics for Arizona, Navajo County, Show Low, and Winslow (2010-2014) (USA.com 2016).

Population Attribute	Arizona	Navajo County	Show Low	Winslow
Population (2010-2014)	6,561,516	107,489	10,754	9,570
Population, % change since 2000	27.9	10.3	39.8	0.5
Median household income (2010-2014), (\$)	49,928	36,591	39,795	40,556

Per capita income (2010-2014), (\$)	25,537	16,355	21,192	16,782
Percent of population below poverty level (2010-2014), (%)	18.2	30.7	18.5	26.5
Unemployment rate, civilian employees >16 years of age (2010-2104), (%)	9.9	19.8	16.1	15.5

Table 4.13. Employment by industrial sector, Navajo County (2010-2014) (USA.com 2016).

Industry	No. of Employees	%
Agriculture, Forestry, Fishing, Hunting, Mining	1,150	3.6
Construction	2,545	7.9
Manufacturing	1,245	3.9
Wholesale Trade	381	1.2
Retail Trade	4,061	12.7
Transportation, Warehousing, Utilities	2,036	6.4
Information	450	1.4
Finance, Insurance, Real Estate, Rental, Leasing	1,114	3.5
Professional, Scientific, Management, Administrative, Waste Management Services	1,712	5.3
Educational Services, Health Care, Social Assistance	9,347	29.2
Arts, Entertainment, Recreation, Accommodation, Food Services	3,890	12.1
Public Administration	2,876	9.0
Other Services, Except Public Administration	1,236	3.9

Impacts – No Action Alternative

Under the No Action alternative, it is anticipated the current socioeconomic trends within Navajo County would continue into the foreseeable future.

Impacts – Proposed Action Alternative

The proposed action is expected to have positive socioeconomic impacts on the region. Restoration actions at Chevelon Creek Wildlife Area will increase wetland habitat for birds and other wildlife species, and enhance opportunities for outdoor recreation (e.g., birding, hunting, angling, hiking, photography) and environmental education for nearby communities. Associated construction projects would also have a positive socioeconomic effect on the area through

potential employment opportunities, either directly or indirectly through the supply chain for materials.

4.6.3 Rocky Mountain Bighorn Sheep Population Enhancements

Affected Environment

The purpose of this project is two-fold: (1) reduce RMBS populations at and in proximity of the Site in Greenlee County; and (2) provide population enhancement, through translocation of captured RMBS, in the region where the environmental injuries occurred. Potential release locations that are being considered occur within Greenlee and Apache Counties (Figure 3.5).

Greenlee and Apache Counties are composed primarily of persons of White, Hispanic, or Native racial and ethnic backgrounds. From 2010-2014, populations ranged from only 8,800 in Greenlee County to over 70,000 in Apache County (Table 4.14). Since the 2000 census, population growth was much lower in Greenlee County (3.0%) and Apache County (3.9%) compared to the state average (27.9%) (Table 4.15). Population densities within these counties are much lower (12.4-16.6 people per square kilometer [4.8-6.4 people per square mile]) than the state average density of 149 people per square kilometer (57.6 people per square mile) (USA.com 2016).

Table 4.14. Comparison of population statistics for Arizona, Greenlee County, and Apache County (2010-2014) (USA.com 2016).

Geographic Area	Total Population	White (%)	Black (%)	Asian (%)	Native (American Indian, Alaska Native, Hawaiian Native, etc.) (%)	Two or More Races (%)	Hispanic (of any race) (%)
Arizona	6,561,516	78.9	4.2	2.9	4.6	3.1	30.1
Greenlee County	8,800	86.3	1.4	0.2	3.1	2.7	47.3
Apache County	72,142	23.4	0.6	0.4	72.5	2.0	6.1

For 2010-2014, the median household income for Greenlee County was \$50,818, which increased by 29.0% since 2000. The unemployment rate for civilian employees over 16 years of age in Greenlee County was 8.7%, and 14.6% of the population lived below poverty. Median household income was much lower for Apache County (\$39,396) from 2010-2014. The unemployment rate (20.1%) and the percentage of population living below poverty (35.9%) were much higher in Apache County than in Greenlee County (Table 4.15). Of the 3,418 civilian employees in Greenlee County, 45.0% are in the forestry, fishing, hunting, and mining industries, and 14.7% are in the educational services, health care, and social assistance services. Civilian employees within Apache County (n = 18,492) are primarily in the educational services, health care, and social assistance services; public administration services; retail trade industry; and arts, entertainment, recreation, accommodation, and food service industries (Table 4.16).

Table 4.15. Income and poverty statistics for Arizona, Greenlee County, and Apache County (2010-2014) (USA.com 2016).

Population Attribute	Arizona	Greenlee County	Apache County
Population (2010-2014)	6,561,516	8,800	72,142
Population, % change since 2000	27.9	3.0	3.9
Median household income (2010-2014), (\$)	49,928	50,818	32,396
Per capita income (2010-2014), (\$)	25,537	22,334	12,828
Percent of population below poverty level (2010-2014), (%)	18.2	14.6	35.9
Unemployment rate, civilian employees >16 years of age (2010-2014), (%)	9.9	8.7	20.1

Table 4.16. Employment by industrial sector for Greenlee County and Apache County (2010-2014) (USA.com 2016).

	Greenlee County		Apache County	
Industry	No.	%	No.	%
Agriculture, Forestry, Fishing, Hunting, Mining	1,539	45.0	515	2.8
Construction	361	10.6	1,735	9.4
Manufacturing	58	1.7	362	2.0
Wholesale Trade	43	1.3	152	0.8
Retail Trade	157	4.6	1,883	10.2
Transportation, Warehousing, Utilities	67	2.0	1,314	7.1
Information	25	0.7	144	0.8
Finance, Insurance, Real Estate, Rental, Leasing	54	1.6	510	2.8
Professional, Scientific, Management, Administrative, Waste Management Services	148	4.3	576	3.1
Educational Services, Health Care, Social Assistance	503	14.7	6,948	37.6
Arts, Entertainment, Recreation, Accommodation, Food Services	264	7.7	1,686	9.1
Public Administration	123	3.6	2,119	11.5
Other Services, Except Public Administration	76	2.2	548	3.0

Impacts – No Action Alternative

Under the No Action alternative, it is anticipated that the current socioeconomic trends within Greenlee and Apache Counties would continue into the foreseeable future.

Impacts – Proposed Action Alternative

Removing RMBS from the Site and its vicinity is not expected to adversely affect the socioeconomic conditions of local communities within Greenlee County. Reducing RMBS populations at and in the vicinity of the Site is anticipated to decrease highway mortality as there will be fewer sheep trying to navigate across U.S. Highway 191. A reduction in vehicle collisions with sheep will directly benefit local communities by reducing resources expended on wildlife-vehicle collisions. Removing sheep from the Site is also not expected to affect hunting and wildlife-related tourism in the area as these activities are not allowed on the Site. Sheep translocations to other sites in eastern Arizona are expected to result in new or enhanced populations of RMBS that will benefit both consumptive (e.g., hunting) and non-consumptive (e.g., photography, wildlife viewing) users, as well as potentially bolstering wildlife-related tourism in the area.

4.6.4 Cumulative Socioeconomic Impacts of Proposed Actions

The suite of restoration projects included in the preferred alternative would have cumulative positive socioeconomic impacts on the regions in which they occur. Although short-term negative impacts to public access and recreation may occur at wetland restoration sites during construction and maintenance, these impacts would be outweighed by the long-term benefits. These long-term benefits include increased recreational access to birding, hiking, and other nature-based recreational opportunities resulting from improved wildlife habitat at the project sites. In addition, new or enhanced populations of RMBS in areas of eastern Arizona will benefit both consumptive (e.g., hunting) and non-consumptive (e.g., photography, wildlife viewing) users, as well as potentially bolstering wildlife-related tourism in these areas.

These restoration projects would not only enhance wildlife habitats and populations, but also help to preserve the natural resource base that is at the heart of the areas' tourism and recreation-based industries, and quality of life. Construction projects would have a positive economic effect on the area through potential employment opportunities, either directly or indirectly through the supply chain for materials. Community outreach and outdoor education opportunities at restoration sites would also provide socioeconomic benefits to surrounding communities.

5.0 Summary of Impacts by Alternative

The Trustees do not anticipate any violation of federal, state, or local laws designed to protect the environment incident to or as a consequence of the implementation of any of the selected actions. The restoration actions will be implemented in compliance with all applicable environmental laws. Table 5.0 summarizes impacts by category of the preferred alternative and the no-action alternative. Cumulative impacts are discussed below.

Table 5.0. Comparison of impacts by alternative.

Category of Impact	No-Action Alternative	Preferred Action/Preferred Alternative
Water impacts	No change in water use or quality.	Potential temporary increases in sediment transport and turbidity levels in surface waters. Groundwater pumping and water diversion from streams to maintain restored wetlands are not expected to

		produce long-term negative impacts. Restoration actions expected to have long-term positive impacts on water resources in the region by increasing amount and quality of wetland and riparian areas.
Biological impacts	No additional habitats or wildlife populations would be preserved, restored, or enhanced. Compensation for injuries to wildlife and habitats would not occur.	Restoration actions would increase the area and quality of riparian and wetland habitats used by migratory birds and waterfowl, and would also improve or create additional areas of surface water that would be used by other wildlife. Long-term commitment to the control or eradication of non-native vegetation will maintain native vegetation community diversity at sites. Increase long-term population viability and re-establish RMBS into historic ranges within eastern Arizona.

Table 5.0 (continued). Comparison of impacts by alternative.

Category of Impact	No-Action Alternative	Preferred Action/Preferred Alternative
Cultural resource impacts	No change in existing conditions of cultural resources would occur.	Known cultural resources within project areas and those identified through future surveys will be maintained and protected from development on these conservation lands.
Land ownership and use impact	No change in current land ownership and use.	No long-term or significant negative impacts are expected from the preferred alternative.
Socioeconomic impacts	No impacts on local economies are expected.	Short-term negative impacts to public access and recreation may occur during construction and maintenance. Restoration activities would generate short-term economic benefits. Improved recreational opportunities and habitat protection would generate long-term economic benefits, including benefits to the local ecotourism economy.
Indirect impacts	No indirect impacts.	Indirect beneficial impacts expected through improved habitat for birds, wildlife, and fish in the project areas.
Cumulative impacts	Cumulative impacts would be negative because no additional habitats or wildlife populations would be preserved, restored or	Cumulative impacts expected to be beneficial through long-term benefits to riparian and wetland habitat quality, water quality, migratory birds, waterfowl, fish and other wildlife in and around the project sites.

	enhanced. Compensation for injuries to wildlife and habitats would not occur.	
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The Trustees selected the restoration projects included in the preferred alternative to improve natural resources as compensation for natural resource injuries at the Site. Thus, the cumulative impacts from implementing the restoration projects are expected to be beneficial. The projects would result in long-term benefits to water quality, vegetation, migratory birds and waterfowl, fish, and other wildlife in and around the project sites. There would also be long-term socioeconomic benefits to local economies through protection and improvement of natural resources. Cultural resources identified within the project areas would also benefit in the long-term through protection from additional development. Any negative impacts on cultural resources caused by restoration actions would be mitigated.

Under the no-action alternative, there would be no positive changes to habitats or wildlife beyond the actions taken by state and federal agencies, organizations, and private citizens with limited funding. Although there would be no short-term impacts associated with project implementation, there would also be no long-term benefits from implementation of the preferred alternative. In short, the public would not be compensated for the injuries to wildlife and wildlife habitat resulting from the release of hazardous substances at the Site.

6.0 List of Preparers

The draft RP/EA was prepared by representatives of the natural resource trustee agencies listed below:

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