ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED KANAB CREEK RIPARIAN RESTORATION PROJECT (DOI-BLM-AZ-A010-2015-0005-EA)

Prepared by

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TABLES

Acronyms and Abbreviations

ACEC	Area of Critical Environmental Concern
AGFD	Arizona Game and Fish Department
ASFO	Arizona Strip Field Office
AUM	Animal Unit Month
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
DFC	Desired Future Conditions
EA	Environmental Assessment
ESA	Endangered Species Act
GMU	Game Management Unit
MBTA	Migratory Bird Treaty Act
MSO	Mexican Spotted Owl
NEPA	National Environmental Policy Act
RMP	Resource Management Plan
ROS	Recreation Opportunity Spectrum
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	U.S. Geological Survey
VCR	Visual Contrast Rating
VRM	Visual Resource Management

Chapter 1

INTRODUCTION

1.1 BACKGROUND

This Environmental Assessment (EA) has been prepared to disclose and analyze the environmental consequences of the Kanab Creek Riparian Restoration Project as proposed by the Bureau of Land Management (BLM), Arizona Strip Field Office (ASFO). This EA is a site-specific analysis of potential impacts that could result with the implementation of the proposed action or no action alternatives.

The project area analyzed in this EA encompasses 13,500 acres of BLM-managed public land along Kanab Creek and associated drainages. The area analyzed is much larger than the area that is proposed to be treated as project activities would only occur in the riparian zone where tamarisk and Russian olive are present (approximately 806 acres). The project area includes the Kanab Creek Area of Critical Environmental Concern (ACEC) (13,148 acres). The ACEC is managed to protect cultural resources, endangered bird species (southwestern willow flycatcher), riparian and scenic values. The ACEC also contains wilderness characteristics with a high degree of naturalness, outstanding opportunities for solitude and opportunities for primitive and unconfined recreation.

Kanab Creek forms the boundary line between Coconino and Mohave Counties, Arizona and project activities would take place in both counties. The north end of the project area is approximately 8.6 miles southwest of Fredonia, Arizona. Included are 21.6 miles of Kanab Creek and approximately 21 miles of ephemeral drainages: Bitter Seeps Wash, Bulrush Wash, Rock Canyon, Gunsight Canyon, Water Canyon, and several smaller unnamed drainages (Map 1 in Appendix B).

Much of the Kanab Creek riparian corridor has become dominated by non-native tamarisk (*Tamarix sp.*) (also referred to as saltcedar) and Russian olive trees (*Elaeagnus angustifolia*). Tamarisk is a shrub or tree that grows in dense stands at springs, ponds, and along rivers and streams. Tamarisk, introduced into the U.S. in the 19th century as an erosion control agent, spread throughout the west and has caused major changes to riparian ecosystems.

The impacts caused by tamarisk are well documented. This prolific non-native displaces native vegetation and increases fire frequency and severity. Tamarisk spreads by seed and can propagate from buried or submerged stems. It can replace or displace native woody species, such as cottonwood, willow, and mesquite, which occupy similar habitats, especially when timing and amount of peak water discharge, salinity, temperature, and substrate texture have been altered by human activities such as dams or water diversion. Monotypic stands of tamarisk generally have lower wildlife values compared to stands of native vegetation, although tamarisk is used by many bird species as nesting or overwintering habitat (Brown and Trosset 1989).

Russian olive, while not as aggressive and disruptive as tamarisk, can displace native vegetation, especially where it grows in monotypic stands. Russian olive was initially promoted in the early 20th century as an effective windbreak in semi-arid environments as well as a source of food for wildlife. It was first reported outside of cultivation in Arizona in 1942 (Knopf and Olsen 1984). Much of the riparian corridor has become dominated by non-native tamarisk (also referred to as saltcedar) and Russian olive trees. Tamarisk is a shrub or tree that grows in dense stands at springs and along rivers and streams. Tamarisk, introduced into the U.S. in the 19th century as an erosion control agent, spread throughout the west and has caused major changes to riparian ecosystems.

1.2 PURPOSE AND NEED

The purpose of the proposed action is to remove tamarisk and Russian olive shrubs and trees to facilitate native plant recovery, reduce fire risk, and improve riparian ecosystem function.

The BLM needs to remove these non-natives because they alter the riparian ecosystem and may adversely affect native vegetation and wildlife. Tamarisk throughout the project area is defoliated every year by the tamarisk leaf beetle, reducing habitat quality for the endangered southwestern willow flycatcher and increasing fire hazard. Russian olive can form monotypic stands which may alter soil nutrient cycling, flow hydrology, and vegetation structure.

The proposed action is a project to reduce the prevalence of tamarisk and Russian olive from the Kanab Creek corridor and tributaries, and restore native riparian communities. The proposed action would enable the BLM to work within an adaptive management framework to conduct small-scale removals of tamarisk and Russian olive along Kanab Creek and adjacent drainages, to monitor the success of natural re-establishment of vegetation in areas formerly dominated by non-natives with native species, and to evaluate the success of the project as a whole to inform proposals for similar removal projects in the future.

1.3 CONFORMANCE WITH LAND USE PLANS

The proposed action described in Chapter 2 is in conformance with the *Arizona Strip Field Office Resource Management Plan* (RMP), approved on January 29, 2008 (BLM 2008a). The proposed action is consistent with the following decisions contained within this plan (see Section 1.4.1). It has also been determined that the proposed action would not conflict with other decisions throughout this plan.

1.3.1 Conformance with the Arizona Strip Field Office Resource Management Plan

The following decisions are from Table 2.3 in the RMP regarding Vegetation and Fuels Management:

DFC-RP-01. Riparian areas will consist of a diversity of vertical and horizontal structures, vegetative age classes, and endemic species.

DFC-RP-02. Riparian areas will be protected, enhanced, and/or restored by allowing tools that are necessary and appropriate to mitigate adverse impacts of allowable uses and undesirable disturbances, and contribute to meeting the Arizona Standards for Rangeland Health.

DFC-RP-03. Ecological functions and processes will be intact with vegetative species composition and cover appropriate to the site.

DFC-RP-05. All riparian areas will be in, or moving towards, proper functioning condition.

DFC-RP-07. Flowing water systems will provide contiguous water and associated riparian vegetative cover, where possible.

DFC-RP-09. A sufficient quantity of water with safe access for wildlife will be available, where appropriate.

DFC-RP-10. Riparian communities will provide habitat for common species such as rush, cottonwood, willow, and yellow-breasted chat, as well as rare species such as southwestern willow (SW) flycatcher, common black hawk, Lucy‘s warbler, and speckled dace where consistent with site potential.

DFC-RP-11. Invasive plants and animals such as tamarisk, Russian olive, and brown-headed cowbird will be reduced or eliminated.

The following decisions are from Table 2.4 in the RMP regarding Wildlife and Fish Management:

DFC-TE-33. No net loss will occur in the quality and quantity of suitable habitat for riparian-dependent special status bird species within the Arizona Strip FO.

DFC-TE-35. Riparian areas will be in proper functioning condition and be of sufficient quantity and quality to provide adequate foraging areas for SW flycatcher, Yuma clapper rail, yellow-billed cuckoo, and other special status birds.

DFC-TE-36. SW flycatcher and Yuma clapper rail will be recovered and delisted.

DFC-TE-37. Riparian areas that can physically support SW flycatcher habitats due to floodplain width and gradient will attain the vegetation structure, plant species diversity, density, and canopy cover to be suitable habitat.

DFC-TE-38. Riparian vegetation will be sufficiently dense and structurally complex to minimize or eliminate the effects of SW flycatcher predators and preclude brown-headed cowbirds from finding SW flycatcher nests.

DFC-TE-41. Potential roosting and nesting sites for riparian dependent special status birds will be abundant.

MA-TE-82 (in part).

- Riparian areas will be managed to achieve and/or maintain proper functioning condition in accordance with prescriptions described in the vegetation management section of this document (See Vegetation Management and Fire Management decisions).
- Suitable nesting riparian habitats for riparian-dependent special status bird species will be maintained or increased. Suitable structural characteristics may be achieved through restoring, maintaining, enhancing, and creating habitat. Management will aim for large, contiguous blocks of habitat rather than for small fragmented areas. Connectivity to currently isolated suitable sites will be enhanced. The use of buffer zones between riparian habitats and adjacent upland areas will be encouraged. Establishment of areas of slow/back waters will be promoted.
- Regeneration of native vegetation in restoring riparian habitats will be promoted. Natural reaches of riparian habitat will be restored by restoring intervening degraded segments.
- Occupied, suitable, and potential breeding habitat will be increased and improved.
- Restoration of native riparian vegetation will continue in sites that have the potential to support future breeding habitat for riparian dependent special status bird species.
- Native riparian vegetation in floodplains or channels will be retained.
- Protective measures for riparian-dependent special status bird species that are contained in the July 2004 "Recommended Protection Measures for Pesticide Applications in The Southwest Region of the USFWS" will be implemented when conducting chemical treatments.

MA-TE-86.

- Where possible and practicable, physical stresses, such as high salinity or reduced stream flows that favor exotic plants, will be reduced or eliminated. Actions that do not allow for natural stream flow regimes, including periodic flood events, will not be authorized.
- Direct impacts that topple or otherwise destroy nests of special status species will be reduced.

MA-TE-89.

- Suitable SW flycatcher habitat shall be managed so that its suitable characteristics are not eliminated or degraded. Management will be for large, contiguous blocks of habitat rather than for small fragmented areas. Connectivity to currently isolated suitable sites will be enhanced. The use of buffer zones between riparian habitats and adjacent upland areas will be encouraged. Establishment of areas of slow/back waters will be promoted.
- Potential habitat will be managed to achieve structural and vegetation characteristics necessary to support increasing numbers of breeding SW flycatcher pairs within 5-20 years. Potential flycatcher habitat shall be managed to allow natural regeneration (through natural processes) into suitable habitat as rapidly as possible.
- The use vs. availability of invasive exotic species, such as tamarisk, by SW flycatcher at occupied nesting sites will be determined.
- Native riparian vegetation will be retained in floodplains or channels.

- At native dominated sites, tamarisk will be retained in occupied SW flycatcher habitat and, where appropriate, in suitable but unoccupied habitat, unless there is a trend for steady increase of tamarisk.
- The BLM will implement conservation measures for protection of SW flycatcher as defined in Appendix F.

The following decisions are from Table 2.15 in the RMP regarding Special Designations:

MA-AC-01. Vegetation diversity will be maintained or improved in accordance with ecosite guides.

MA-AC-03. Restoration and vegetation treatments will be authorized only where doing so will result in benefits for resources and values protected by the ACEC.

MA-AC-02(KC). Vegetation management within the Kanab Creek ACEC will include conservation measures for SW flycatchers as described in Appendix F [of the RMP].

MA-AC-06(KC). Riparian areas will be managed to achieve and/or maintain proper functioning condition in accordance with prescriptions described in the [Vegetation Management] decisions.

1.4 RELATIONSHIP TO STATUTES, REGULATIONS, OR OTHER PLANS

This EA has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) and any additional federal or state statutes and local ordinances that may be relevant to the proposed action, such as those cited below.

The proposed action is consistent with the Fundamentals of Rangeland Health (43 Code of Federal Regulations [CFR] 4180.1) and Arizona's Standards and Guidelines, which were developed through a collaborative process involving the Arizona Resource Advisory Council and the BLM State Standards and Guidelines Team. The Secretary of the Interior approved the Standards and Guidelines in April 1997. These standards and guidelines address watersheds, ecological condition, water quality, and habitat for sensitive species. These resources are addressed later in this document.

Executive Order 13186 requires the BLM and other Federal agencies to work with the U.S. Fish and Wildlife Service (USFWS) to provide protection for migratory birds. BLM analyzes the impact to migratory birds through the NEPA process; these species are addressed later in this document.

The project area is located in Mohave and Coconino Counties, Arizona. The proposed action is consistent with the *Mohave County General Plan* (adopted September 1994 and revised December 2005) and the *Coconino County Comprehensive Plan* (adopted September 23, 2003). This action does not conflict with decisions contained within these plans.

The proposed action complies with *Arizona's State Wildlife Action Plan: 2012-2022* (AGFD 2012). Arizona Game and Fish Department's (AGFD's) strategic plan supports the management and enhancement of wildlife habitats, through partnerships with public agencies, property owners and lessees, and wildlife conservation organizations.

In addition, the proposed action would comply with the following laws and/or agency regulations and are consistent with applicable Federal, State, and local laws, regulations, and plans to the maximum extent possible.

- Federal Land Policy and Management Act of 1976 (43 United States Code [USC] 1707 et seq.)
- Endangered Species Act of 1973, as amended (ESA)
- Section 106 of the National Historic Preservation Act of 1966, as amended
- Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001–3013; 104 Stat. 3048-3058)

1.5 IDENTIFICATION OF ISSUES

Identification of issues for this assessment was accomplished by considering the resources that could be affected by implementation of one of the alternatives. A summary of the issues and the rationale for analysis are given below.

- **Invasive, Non-native Species:** The proposed action would potentially remove up to 10 acres of non-native vegetation per year.

- **Threatened, Endangered, or Candidate Animal Species:** The removal of non-native vegetation and, consequently, potential habitat, could temporarily affect the southwestern willow flycatcher and yellow-billed cuckoo that use these types of vegetation for nesting, forage, or cover.

- **Wetland/Riparian Zones:** The proposed action would take place in the riparian corridor of Kanab Creek and could potentially impact soil salinity and water table levels, as well as vegetative composition and structure.

- **Vegetation:** Minimal disturbance to vegetation could occur during project implementation, including the potential loss of shrubs, grasses, and forbs in and around the areas to be treated.

- **Wildlife Including Sensitive Species and Migratory Birds:** Temporary disturbance to wildlife, such as from noise and human presence, could occur during project implementation causing short-term displacement. The removal of non-native vegetation and, consequently, potential habitat, could affect a variety of wildlife species that use these types of vegetation for food, nesting, or cover.

- **Soils:** Tamarisk concentrates salt in its leaves and over time surface soils around tamarisk become highly saline. The proposed action (i.e., removal of tamarisk) would therefore reduce soil salinity. Soil erosion could also occur immediately post-treatment due to removal of vegetation.

- **Recreation:** Disturbance to the recreation setting and experiences could occur during project activities. Disturbances could include increased noise as well as reduced

opportunities for solitude in the short term. In the long-term, improvements to the riparian habitat could improve the recreation setting.

- **Visual Resources:** The proposed action has the potential to alter the appearance of the project area in the short term (i.e., less vegetation) but long-term improvements to the riparian habitat would likely enhance the visual resource.

- **Fire and Fuels Management:** Tamarisk removal would reduce highly flammable vegetation, which may impact fuels and fire management in the project area.

Chapter 2

PROPOSED ACTION AND ALTERNATIVES

This EA focuses on the proposed action and no action alternatives. The no action alternative is considered and analyzed to provide a baseline for comparing the impacts of the proposed action. The BLM interdisciplinary team evaluated the proposed action to determine whether the underlying need for the project, to remove non-native vegetation to allow for the re-establishment of native riparian species, would be met.

2.1 PROPOSED ACTION – ALTERNATIVE A

BLM would use contractors, volunteers, and/or agency personnel to remove tamarisk and Russian olive at various sites along a 21.6-mile stretch of Kanab Creek from the Kaibab-Paiute Reservation/BLM boundary in the north to the confluence with Snake Gulch in the south, and possibly along short sections of side drainages as deemed necessary. Various public notification processes such as press releases, notices placed in local communities, or temporary signs near the project area would be used to inform the public of activities in the area. One or more of the following methods would be used for removal, depending on the age of individual stems, the density of stands, and the degree of intermingling with native vegetation.

Hand-pulling: Personnel could hand pull smaller shrubs and stems from the ground. Hand tools, including picks, pulaskis, and shovels may be used to loosen the soil surrounding the larger plants and then the entire root system would be removed.

Basal-bark: This treatment would primarily be used on immature trees under one year in age and up to 3 meters tall. BLM, volunteers, or private contractor employees, certified in herbicide application by the State of Arizona, and under the supervision of a person certified by BLM's course 9000-1 would apply Triclopyr - Garlon 3a (near water) or Garlon 4 (away from water on terraces) - using hand-applicators to the base of the tree at manufacturer-recommended rates.

Cut-stump: This treatment would primarily be used on mature stems. Shrubs and trees along the banks and on the terraces would be cut or lopped at or near ground level and herbicide would be applied within a few minutes of cutting. Crews would use chainsaws, hand saws and/or loppers. BLM, volunteers, or private contractor employees, certified in herbicide application by the State of Arizona, under the supervision of a person certified by BLM's course 9000-1 would apply Triclopyr - Garlon 3a or Garlon 4 (depending on distance from water) - using hand-applicators to the cut stems at manufacturer-recommended rates.

Cut material would be scattered in those areas where only small amounts of material were treated. In areas of heavier concentrations, cut material would be cut into smaller pieces to facilitate handling. The cut material would be piled along the edge of the riparian corridor. Piled material would be allowed to cure as necessary to allow consumption by burning. Piles would be ignited using handheld devices such as drip torches. Piles would be allowed to burn out, and then mopped up. Residual material would be scattered or re-piled and burned as necessary. It is

anticipated that piles would be burned within one year after the material was cut, although they could remain in place for longer.
Treatments would occur incrementally at a rate of up to 10 acres per year, in order to limit the impacts to southwestern willow flycatchers, yellow-billed cuckoos, and other riparian-dependent birds, and would initially focus on priority areas such as Clear Water Spring (see map in Appendix B) where native vegetation is abundant to avoid the need for supplemental planting. If post-treatment monitoring of the initial treatment site indicates that removal of non-native vegetation is successful, then other sites along Kanab Creek would be assessed and treated. Some areas that are left sparsely vegetated following removal of dense stands would be monitored for natural revegetation to determine whether active planting of native vegetation would be necessary. At sites consisting of pure tamarisk and/or Russian olive stands (i.e., where no residual woody riparian vegetation is present) native vegetation such as willow or cottonwood could potentially be planted.

2.1.1 Best Management Practices

The following BMPs are included in the proposed action in an effort to minimize the impacts of the proposed action to social and natural environmental resources. The following are practices that would be implemented during all phases of the project:

- No more than 10 acres of riparian habitat would be treated per year in order to minimize the potential habitat loss to southwestern willow flycatchers, yellow-billed cuckoos, and other riparian-dependent birds.

- Crews would hike in to Kanab Creek carrying tools and supplies. If necessary, crews would camp at existing disturbed sites in or near the project area.

- Treatment activities would be scheduled to avoid peak breeding season for birds (April 1 to September 30). However, if an active bird nest is found that would be adversely affected by project activities, these activities would be delayed until after young have fledged.

- Prior to implementation, the BLM would apply for herbicide use permits from the state of Arizona. Personnel would comply with all of the terms and conditions of the permit.

- Prior to implementation of burning, the BLM would apply for smoke permits from the state of Arizona. Personnel would comply with all of the terms and conditions of the permit.

- Project personnel would receive a briefing on the goals and objectives of the treatment, to include information on sensitive cultural and biological resources in the area. The briefing would include information on employee and visitor safety.

- Project activities would be limited to daylight hours to minimize impacts to wildlife.

- Project activities would be conducted in a manner that would minimize disturbance to existing native vegetation.

- Any cultural (historic/prehistoric site or object) or paleontological resource (fossil remains of plants or animals) discovered during project activities would immediately be reported to the Arizona Strip Field Office Manager or his/her designee. All operations in the immediate area of the discovery would be suspended until written authorization to proceed is issued. An evaluation of the discovery would be made by a qualified archaeologist or paleontologist to determine appropriate actions to prevent the loss of significant cultural or scientifically important paleontological values.

- If in connection with this work any human remains, funerary objects, sacred objects or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (P.L. 101-601; 104 Stat. 3048; 25 U.S.C. 3001) are discovered, operations in the immediate area of the discovery would stop, the remains and objects would be protected, and the ASFO Manager would be immediately notified. The immediate area of the discovery would be protected until notified by the ASFO Manager that operations may resume.

- Herbicide application would not occur within ¼ mile of an occupied California condor nest, roost, or release site.

- Those involved with project activities would stop work and notify the BLM wildlife team lead if California condors visit the worksite while project activities are underway. BLM wildlife biologists would determine if project activities would need to be halted, delayed, or modified in order to avoid any adverse effects to condors.

- The project site and any camping or parking area would be cleaned up at the end of each day the work is being conducted (e.g., trash removed, scrap materials picked up) to minimize the likelihood of condors visiting the site. BLM staff may conduct site visits to the area to ensure adequate clean-up measures are taken.

2.1.2 Monitoring

Treatment areas would be monitored on a yearly basis to evaluate the success of removal and for colonization of native and non-native vegetation. This would be done primarily through the use of pre-established photo-monitoring plots distributed throughout the project area. Re-sprouts of treated tamarisk would be re-treated, and newly colonized non-native species would be removed. Monitoring would occur for a minimum of 15 years.

2.2 NO ACTION ALTERNATIVE – ALTERNATIVE B

Under the No Action Alternative, tamarisk and Russian olive would not be treated and no comprehensive non-native species control would occur. The BLM would continue to monitor vegetation conditions in the project area, but no effort to eradicate or control the spread of tamarisk or Russian olive in Kanab Creek and its tributaries on public land would occur.

Chapter 3

AFFECTED ENVIRONMENT

The purpose of this chapter is to describe the existing environment potentially affected by the alternatives. The affected environment of this EA was considered and analyzed by an interdisciplinary team of resource specialists. Table 3.1 (below) addresses the elements and resources of concern considered in the development of this EA. The resources identified and discussed in this chapter include the relevant physical and biological conditions that may be impacted with implementation of the alternatives, and provides the baseline for comparison of impacts described in Chapter 4.

3.1 General Setting

The Arizona Strip is comprised of 2.8 million acres of BLM-administered land in the northwestern portion of Arizona. The project area is located in Mohave and Coconino Counties, Arizona on lands managed by the BLM's Arizona Strip Field Office. The project area is about 8.6 miles south of Fredonia, Arizona. The project area lies outside of Grand Canyon-Parashant and Vermilion Cliffs national monuments.

3.1.1 Topography

Topography in the project area varies from high, steep cliffs to open benches of desert scrub, and dense areas of riparian vegetation; elevation within the project area ranges from approximately 3,800 feet to 4,600 feet with the riparian corridor restricted to only the lowest elevations in that range.

3.2 Elements/Resources of the Human Environment

The BLM is required to consider many authorities when evaluating a Federal action. Those elements of the human environment that are subject to the requirements specified in statute, regulation, or executive order, and must be considered in all EAs (BLM 2008b), have been considered by BLM resource specialists to determine whether they would be potentially affected by the proposed action. These elements are identified in Table 3.1, along with the rationale for determination on potential effects. If any element was determined to be potentially impacted, it was carried forward for detailed analysis in this EA; if an element is not present or would not be affected, it was not carried forward for analysis. Table 3.1 also contains other resources/concerns that have been considered in this EA. As with the elements of the human environment, if these resources were determined to be potentially affected, they were carried forward for detailed analysis in this document.

Table 3.1. Summary Evaluation of Elements/Resources of the Human Environment

Resource	Determination*	Rationale for Determination
* NP = Not present in the area that would be impacted by the proposed action. NI = Present, but not affected to a degree that would mean detailed analysis is required. PI = Present with potential for impact; analyzed in detail in the EA.		
Air Quality	NI	Air quality in the general area is good, although windblown dust can be a minor source of pollution. The project area is within an attainment area for all National Ambient Air Quality Standards. The proposed action would result in temporary, localized deterioration of air quality because of the operation of equipment and pile burning, but these emissions would be temporary and would cease once the project is complete.
Areas of Critical Environmental Concern	NI	The project area is located within the Kanab Creek Area of Critical Environmental Concern (ACEC). However, actions proposed would not affect the administrative special designation of this area. The values for which the ACEC was designated (southwestern willow flycatcher, riparian, scenic, and cultural) are addressed separately in this EA
Cultural Resources	NI	Removal of nonnative shrubs and trees by cutting and applying herbicide would have little or no impact on cultural resources. No impacts to cultural resources are anticipated from the pile burning since this activity would occur below the average annual high water mark. Best Management Practices outlined in Section 2.1.1 of this EA would prevent damage to artifacts if found during project activities.
Environmental Justice	NP	The proposed action would have no disproportionately high or adverse human health or other environmental effects on minority or low-income segments of the population. The proposed action would also have no effect on low-income or minority populations.
Farmlands (Prime or Unique)	NP	There are no prime or unique farmlands within the project area.
Floodplains	NI	No actions are proposed that would result in permanent fills or diversions, or placement of permanent facilities, in floodplains or special flood or hazard areas.
Invasive, Non-native Species	PI	Measures to prevent the spread of noxious weeds have been built into the proposed action. No impacts from the proposed action are therefore anticipated on noxious weeds. However, the proposed action would remove invasive tamarisk and Russian olive from the project area. This issue is therefore analyzed in detail later in this EA.
Native American Religious Concerns	NI	During the public scoping period no Native American religious concerns were identified in relation to removal of non-native vegetation.
Threatened, Endangered, or Candidate Plant Species	NP	No Threatened, Endangered, or Candidate plant species occur in the project area.
Threatened, Endangered, or Candidate Animal Species	PI	The project area is not within any critical habitat that has been designated or proposed under the ESA. California condors, southwestern willow flycatchers, and yellow-billed cuckoos have the potential to occur within the project area. The California condor may occasionally fly over or feed in the project area at any time of year. California condors are federally listed as endangered and a population of these condors was reintroduced on the Arizona Strip in 1996. This population is designated as experimental non-essential under Section 10(j) of the ESA. Condors are strictly scavengers and prefer to eat large, dead animals such as mule deer, elk, pronghorn, bighorn sheep, cattle, and horses. Condors range widely, easily covering over 100 miles in a day, and their current range includes the entire Arizona Strip. Practices to minimize impacts on the species have been built into the proposed action. Thus, no effect to this species would be expected with implementation of either alternative. Mexican spotted owl (MSO) potential habitat in the project area (ledges or shallow caves in steep, narrow canyons) would not be affected by the proposed action. The proposed action would occur in the riparian area, far away from possible nest sites. MSO prey species are not known to prefer tamarisk over

Resource	Determination*	Rationale for Determination
		native vegetation for foraging or cover. 15 GIS-modeled polygons (Willey and Spotskey 2000) totaling 318 acres are located within the action area. Field verifications indicate that these polygons are likely unsuitable for MSO nesting because they are too open and lack the cool, narrow canyons preferred by this species (data forms and photos on file at the ASFO). Furthermore, project activities would take place outside of the MSO breeding season. The project area does provide suitable habitat for both southwestern willow flycatchers and yellow-billed cuckoos. Since the project proposes to remove vegetation from the Kanab Creek riparian area, the potential exists for impacts to these species, so they are analyzed in detail later in this EA.
Wastes (hazardous or solid)	NI	No known hazardous or solid waste issues occur in the project area. Application of herbicides would occur under the proposed action. However, application would be by licensed applicators, at the rate recommended by the manufacturer and approved by the State of Arizona, and would only be applied directly on cut stumps or foliage of tamarisk and Russian olive plants. Thus, no impacts from herbicides are anticipated from actions proposed in this EA.
Water Quality (drinking/ground)	NI	While Kanab Creek has stretches of perennial water flow, this water is not used for domestic drinking water. The proposed action does include the use of the herbicide Triclopyr – Garlon 3a near the creek. However, application would be by licensed applicators, at the rate recommended by the manufacturer and approved by the State of Arizona, and would only be applied on cut stumps. Thus, no impacts to water quality are anticipated from actions proposed in this EA.
Wetlands/Riparian Zones	PI	The proposed action would take place in wetlands/riparian zones but would ultimately enhance these areas by promoting recolonization of native vegetation. This issue is therefore analyzed in detail in this EA.
Wild and Scenic Rivers	NP	There are no Wild and Scenic River segments classified as designated, eligible, or suitable within the project area.
Wilderness	NP	The project area is not located within designated wilderness.
Livestock Grazing	NI	The project is located within an active grazing allotment (grazed seasonally from November 1 to April 15). Removal of non-native tree and shrub species would not affect grazing activities within the allotment because these species are not used by cattle for forage, and no changes in grazing on the allotment are proposed.
Woodland/Forestry	NP	Forest and woodland products do not occur within the project area.
Vegetation	PI	Disturbance to vegetation would occur during project activities. This issue is therefore analyzed in detail in this EA.
BLM or State Sensitive Plants	NP	No BLM or State sensitive plants are known to occur in the project area.
Wildlife (including sensitive species and migratory birds)	PI	Disturbance to wildlife could occur as a result of project activities, including the loss of vegetation used for cover, food, and nesting, and, consequently, the potential short-term loss of wildlife habitat, as well as a short-term increase in noise and human disturbance. This issue is therefore analyzed in detail in this EA.
Soils	PI	The floodplain soils consist of river wash in the stream channels and Torrifluvents on the adjacent bars and terraces. The proposed action may have impacts to soil salinity through removal of tamarisk, which concentrates salt in surface soils. This issue is therefore analyzed in detail in this EA.
Recreation	PI	Disturbance to the recreation setting could occur during project activities, including increased noise as well as reduced short-term opportunities for solitude. This issue is therefore analyzed in detail in this EA.
Visual Resources	PI	Short-term alteration to the visual setting of the project area could occur during and immediately after vegetation removal activities. This issue is therefore analyzed in detail in this EA.
Geology/Mineral Resources/Energy Production	NI	Removal of non-native vegetation in Kanab Creek would not affect geology, mineral resources, or energy production because the proposed action would not close any areas to mineral development and would not alter any known geologic features.

Resource	Determination*	Rationale for Determination
Paleontology	NP	No paleontological resources are known to occur in the project area.
Lands/Access	NI	Access to public lands would not be altered or impaired by implementation of the proposed action. No other land issues have been identified in connection with the proposed action.
Fuels/Fire Management	PI	Tamarisk removal would reduce highly flammable vegetation, which may impact fuels and fire management in the project area. This issue is analyzed in detail in the EA.
Socioeconomic Values	NI	The economic base of the Arizona Strip is mainly ranching with a few gypsum/selenite mines and uranium operations. Nearby communities are supported by tourism (including outdoor recreation), construction, and light industry. The social aspect involves remote, unpopulated settings with moderate to high opportunities for solitude. Removal of non-native vegetation in Kanab Creek would have no effect on the economy or social aspect of the region since there would be no displacements or disruption to established businesses or uses of the area.
Wild Horses and Burros	NP	Disturbances to wild horses and burros would not occur because the project area is not located within a wild horse or burro herd management area.
Wilderness Characteristics	NP	The project area is not located within an area managed to maintain wilderness characteristics. Even though it is not managed to maintain wilderness characteristics specifically, it does contain a high degree of naturalness, outstanding opportunities for solitude, and opportunities for primitive and unconfined recreation.

3.3 Resources Brought Forward for Analysis

3.3.1 Invasive, Non-native Species

Tamarisk is present along the entire length of Kanab Creek in the project area. In certain areas, such as near Clear Water Spring and Gunsight Canyon, it occurs alongside extensive stands of native willows and cottonwood. In other areas it may be the only riparian vegetation present. Russian olive occurs sporadically throughout the riparian corridor, generally as isolated trees or in low densities among other riparian vegetation, but is increasing throughout the drainage.

Tamarisk is a facultative phreatophyte, meaning that it can draw water from underground sources but once established it can survive without access to ground water. It consumes large quantities of water, similar to woody native plant species that occupy similar habitats. Tamarisk is tolerant of highly saline habitats, and it concentrates salts in its leaves. Over time, as leaf litter accumulates under tamarisk plants, the surface soil can become highly saline, thus impeding future colonization by many native plant species. Mature plants are capable of producing 500,000 tiny, wind-dispersed seeds per year.

Tamarisk and Russian olive are both resistant to control (Shafroth et al. 2008). Simple cutting is ineffective as the plants will reestablish (i.e., prolifically resprout) within one to three years. Burning alone is also ineffective as tamarisk can recolonize rapidly following a fire; each initiation of a burn cycle can successively enhance this species' dominance of a site. These species can be controlled by five principal methods: 1) applying herbicide to foliage of intact plants; 2) removing aboveground stems by burning or mechanical means followed by foliar application of herbicide; 3) cutting stems close to the ground followed by application of

herbicide to the cut stems; 4) spraying basal bark with herbicide; and 5) digging out or pulling young plants.

3.3.2 Threatened, Endangered, or Candidate Animal Species

Southwestern willow flycatcher (*Empidonax traillii extimus*)

The southwestern willow flycatcher is a riparian obligate, nesting along rivers, streams, and other wetlands in dense riparian habitats from sea level to over 7,000 feet in elevation. Southwestern willow flycatchers most often select dense thickets of Geyer willow (*Salix geyeriana*), coyote willow (*Salix exigua*), Goodding's willow (*Salix gooddingii*), box elder (*Acer negundo*), tamarisk, Russian olive, or live oak (*Quercus agrifolia*) for nesting. Other plant species less commonly used for nesting include buttonbush (*Cephalanthus* sp.), black twinberry (*Lonicera involucrata*), cottonwood (*Populus* spp.), white alder (*Alnus rhombifolia*), blackberry (*Rubus ursinus*), and stinging nettle (*Urtica* spp.).

In Arizona, over 75% of flycatcher nests located between 1995 and 2000 were located in tamarisk (Paradzick et. al. 2001). However, the majority of nests (70-76 percent between 2001 and 2003) were located in mixed stands where either native species or tamarisk were dominant; monotypic tamarisk stands were used much less (14-18 percent) (Smith et. al. 2002, Smith et. al. 2003, and Smith et. al. 2004). Recent studies (Owen and Sogge 2002; Drost et. al. 2001) indicate that tamarisk not only provides adequate nesting habitat, but insect numbers are also sufficient to provide food for adult and young flycatchers. Comparisons of reproductive performance (USFWS 2002) and physiological condition (Owen and Sogge 2002) of flycatchers breeding in native versus exotic vegetation revealed no difference.

Nesting begins in late May and early June and young fledge from late June through mid-August (Sogge et al. 2010). Southwestern willow flycatchers typically lay three to four eggs in a clutch (range = 2-5). The breeding cycle, from laying of the first egg to fledging, is approximately 28 days. Eggs are laid at one-day intervals (McCabe 1991); they are incubated by the female for approximately 12 days; and young fledge approximately 12 to 13 days after hatching (Harrison 1979). Southwestern willow flycatchers typically raise one brood per year but have been documented raising two broods during one season (Whitfield 1990). They have also been documented renesting after nest failure (Sogge et al. 1993).

Extreme population reductions have been noted range-wide since the 1800s, though quantitative data are lacking. The known population of southwestern willow flycatchers as of 2007 stood at 1,299 territories (USFWS 2014a). These territories are distributed in a large number of very small breeding groups, and only a small number of relatively large breeding groups (USFWS 2002). This population distribution pattern increases the species' vulnerability to local extirpation from floods, fire, and other types of natural disasters.

Changes in riparian plant communities have resulted in the reduction, degradation, and elimination of nesting habitat for the willow flycatcher, curtailing the range, distribution, and numbers of this species. Loss and modification of southwestern riparian habitats have occurred from urban and agricultural development, water diversion and impoundment, channelization,

livestock grazing, off-road vehicle and other recreational uses, and hydrological changes resulting from these and other land uses. The series of dams along most major southwestern rivers have altered riparian habitats downstream through hydrological changes, vegetation changes, and inundated habitats upstream.

The project area does not include designated critical habitat for the southwestern willow flycatcher (USFWS 2013b). The Kanab Creek ACEC is managed for protection of southwestern willow flycatcher habitat and riparian, scenic, and cultural resources on 13,148 acres (BLM 2008a).

Riparian habitat in the project area has been further refined through site-specific assessments of possible southwestern willow flycatcher nesting areas. These areas fall into two categories: Suitable and Potential (Table 3.2). "Suitable" habitat has the density, height, and structure components preferred for southwestern willow flycatcher nesting, whereas "Potential" habitat does not have density, height or structure components required for nesting but is expected to reach that stage at some point in the future.

Table 3.2. Southwestern Willow Flycatcher Habitat in the Project Area.

Category	**Acres**	**Area (Miles^2)**
Potential	343.3	.536
Suitable	32.7	.051

The tamarisk leaf beetle (*Diorhabda carinulata*) was released in the early 2000s and now occupies southwestern willow flycatcher habitat throughout Utah, Nevada, New Mexico, Texas, Colorado, and northern Arizona (Tamarisk Coalition 2014). Leaf beetles defoliate tamarisk during the early portion of the flycatcher breeding season, reducing the vegetative cover relied upon for successful nesting (Paxton et al. 2011). Along the Virgin River in Utah where nesting flycatchers and beetles occur, tamarisk was defoliated while birds were nesting, degrading habitat quality (i.e. vegetative cover, humidity), likely causing or contributing to flycatcher nesting failure (Paxton et al. 2010). The effect of this sudden habitat change on nesting flycatchers and other riparian birds is often referred to as an "ecological trap". The habitat initially appears green and inviting to nesting birds only to change vegetation characteristics in the middle of the nesting season. It is anticipated that tamarisk will re-sprout following defoliation and continue those cycles until some proportion of the tamarisk trees die, which itself may eliminate or reduce nesting flycatcher habitat suitability (Paxton et al. 2011).

Suitable habitat in the Clear Water Spring area was surveyed by the BLM for willow flycatcher presence in 1998, 1999, 2000, 2001, 2002, and 2003 using the most recent protocol at the time (Sogge et al. 1997). No willow flycatchers have been detected in Kanab Creek, though the habitat appears to be among the best found on the Arizona Strip. Many species of riparian and upland birds have been detected during monitoring visits to the area in 2012, 2013, and 2014 but willow flycatchers have not been detected. No surveys for willow flycatchers, according to the accepted protocol, have occurred since 2003.

Yellow-billed cuckoo (*Coccyzus americanus*)

Yellow-billed cuckoos are primarily restricted to densely wooded rivers and streams and damp thickets with relatively high humidity. In Arizona, habitat for the species consists of lowland riparian habitats including streamside cottonwood and willow groves and larger mesquite bosques. They are rarely observed as transient in xeric desert or urban settings (Corman 1992). In Arizona, most cuckoo nests have been found in willows, but nests have also been discovered in cottonwood, sycamore, alder, mesquite, hackberry, and tamarisk (Corman and Wise-Gervais 2005). Yellow-billed cuckoos have not been recorded nesting in Russian olive (Shafroth et al. 2010)

In Arizona, peak nesting activity typically occurs from July to early August (Corman and Wise-Gervais 2005). Breeding often coincides with outbreaks of cicadas or tent caterpillars and the birds may lay more eggs in good prey-abundant years. Extra eggs may be parasitized in other birds' nests. Both male and female build nests, often in willow or mesquite thickets, from 4 to 30 ft above ground. In Arizona, most nests are built in willows (Corman and Wise-Gervais 2005) and one study in California found 99% of nest sites in willow (Laymon et al. 1997). The nest is a stick platform, thinly lined with leaves, mesquite and cottonwood strips, grass and catkins with little depression to hold eggs (Corman 1992). Eggs hatch synchronously. The male feeds first fledglings and the female feeds second fledglings (Erlich et al. 1988). Incubation lasts 4-11 days. The young are altricial[1] but leave the nest in 7-8 days. The yellow-billed cuckoo forages on hairy caterpillars, bird eggs, frogs, lizards, ants, beetles, wasps, flies, berries and fruit (Ehrlich et al. 1988).

The optimal size of habitat patches for this species are generally greater than 200 acres in extent and have dense canopy closure and high foliage volume of willows and cottonwoods (Laymon and Halterman 1989). However, much smaller habitat patches have been occupied in Arizona (Wooldridge, personal communication). Tamarisk may be a component of the habitat, especially in Arizona and New Mexico. As the proportion of tamarisk increases, the suitability of the habitat for the western yellow-billed cuckoo decreases. Sites that consist of a tamarisk monoculture are considered unsuitable habitat for the species (USFWS 2014c).
The yellow-billed cuckoo nests from southern Canada through the northeastern United States, south through the United States to the Florida Keys, Central America and southern Baja California. This species winters in South America to central Argentina and Uruguay (Terres 1980). It occurs in southern, central and extreme northwestern Arizona (Monson and Phillips 1981).

Historically, yellow-billed cuckoos were often listed as a common breeding species within extensive riparian forests in Arizona (Corman and Wise-Gervais 2005). These dense woodlands once extended for miles along the lower Colorado, Gila, Salt, Verde, Santa Cruz, and San Pedro River valleys. Today, these natural plant communities have been reduced and/or severely degraded so that they bear little resemblance to their former appearance and extent (Corman and Wise-Gervais 2005). The western distinct population segment of the yellow-billed cuckoo was listed as a threatened species on October 3, 2014 (USFWS 2014b).

[1] Having young that are hatched in a very immature and helpless condition so as to require care for some time.

Habitat along Kanab Creek is suitable in several areas. The Clear Water Spring area may provide nesting habitat for one to two breeding pairs. Surveys for yellow-billed cuckoos have not been conducted and no sightings of the species have been documented. However, this species is secretive and a large portion of the project area is difficult to access and sees very little human activity (especially during the hot summer months when cuckoos are nesting), so the lack of observations is likely a function of these circumstances. Cuckoos may use the riparian corridor during migration periods in very small numbers.

3.3.3 Wetland/Riparian Zones

Kanab Creek flows through the project area. Three segments or reaches within the area are monitored for Proper Functioning Condition (Segments 3, 4 and 5) and amount to approximately 162 acres, which includes the wet zone, woody regeneration zone and the floodplain. Segment 3 (Clear Water Spring) was last assessed in 2008 and was rated as properly functioning. Segment 4 (Water Canyon area) was last assessed in 2013 and was rated as functional – at risk[2] due to undesirable width/depth ratios present and poorly developed floodplain in some channel segments, likely due to recent flash flood events. Segment 5 (Snake Gulch area) was last assessed in 2009 and rated as properly functioning.

The primary riparian area/wetland zone in the project area is the Clear Water Spring area. For the purpose of this assessment, this area is defined as the riparian corridor from one mile upstream of the spring to a point approximately 1.4 miles downstream of the spring (Appendix B). The total riparian area in this Clear Water Spring section is approximately 86.1 acres. Native riparian vegetation in this area comprises 50-90% of the total riparian vegetation (based on aerial photos and site visits) with tamarisk representing a large percentage of the remaining vegetation. Tamarisk leaf beetles have been present in Kanab Creek since at least 2010 and extensive defoliation has occurred every year since. Russian olive is scattered throughout the area in small numbers (photos in Appendix A). As described above, this segment of the riparian area is rated as properly functioning.

The Clear Water Spring area was chosen for priority treatment under the proposed action based on several factors:

- Native vegetation (coyote willow, Goodding's willow, and Fremont cottonwood) is prevalent throughout the area in the form of dense, tall stands. This vegetation would provide a source for expansion into areas where tamarisk is removed.

- All "Suitable" habitat for the southwestern willow flycatcher within the Kanab Creek ACEC occurs in this section (32.7 acres).

- Surface water is present year-round, even during periods of little rainfall.

- Surveys in the area indicate that it is used by several species of riparian dependent birds (black phoebe, phainopepla, Lucy's warbler, common yellowthroat, yellow warbler,

[2] "Functional – at risk" means that "riparian-wetland areas … are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation" (BLM 1993).

yellow-breasted chat, song sparrow, summer tanager, black-headed grosbeak, and blue grosbeak). Surveys indicate that bird breeding density in the area is relatively high.

- Grazing impacts in the area are minimal.

- The area is easier to access than other areas along Kanab Creek; field crews carrying equipment such as chainsaws and backpack sprayers would use an established, one-mile long trail that follows a side canyon from the west.

Grazing does occur in the project area on the Kanab Creek Allotment which consists of a single pasture, so there is no formal grazing system. The season of use is November 1 through April 15 – grazing is not allowed past April 15 to allow growing season rest for riparian vegetation since southwestern willow flycatcher habitat is present in the allotment (BLM 2008a). Active preference for this allotment is 168 animal unit months (AUMs)[3]. The allotment had actual use over 100% for 10 years between 1994 and 2006. During that time the allotment had a few feral animals that were problematic to capture, and thus ran on the allotment yearlong. The few head that stayed yearlong account for the additional AUMs – these cattle were removed from the allotment when it changed hands to a new permittee in 2007. Since the new operator took over and the feral cattle were removed, actual use has been reduced and all animals are removed each year by April 15.

3.3.4 Vegetation

Vegetation was classified to the Ecological Zone level according to the Ecological Zones on the ASFO RMP map (BLM 2008a). The project area is located in the Colorado Plateau Transition and Riparian zones. However, the proposed treatments would be restricted to the Riparian Zone. The dominant plant species in the Riparian Zone are cottonwood (*Populus spp.*), willow (*Salix spp.*), seep willow (*Baccharis salicifolia*), arrowweed (*Pluchea sericea*), ash (*Fraxinus spp.*), cattail (*Typha spp.*), rush (*Juncus spp.*), and sedge (*Carex spp.*), as well as a variety of grasses and forbs. However, in Kanab Creek and associated side canyons, native vegetation is being displaced by invasive species such as tamarisk (*Tamarix spp.*). Tamarisk is now a dominant riparian shrubby tree in the Colorado River basin below 6,000 feet. Kanab Creek also hosts populations of Russian olive (*Elaeagnus angustifolia*), tree of heaven (*Ailanthus altissima*), and pampus grass (*Cortaderia spp.*)(BLM 2011).

3.3.5 Wildlife, Including Big Game Species, Migratory Birds, and Sensitive Species

Wildlife species present within the project area are typical of Colorado Plateau Transition and Riparian ecological zone communities. Mammals that use the area include black-tailed jackrabbits, desert cottontails, coyotes, porcupines, gray foxes, mule deer, desert bighorn sheep, mountain lions, and several rodent and bat species. Birds common to the area are listed in the Migratory Birds section. Reptiles that may be found in the project area include western rattlesnake, greater short-horned lizard, Great Basin collared lizard, and western fence lizard.

[3] A unit of measurement indicating how much forage is eaten by a cow/calf pair in one month.

Amphibians that may be present include Woodhouse's toad, canyon treefrog, red spotted toad, and tiger salamander.

Big Game Species

Mule Deer (*Odocoileus hemionus*)

Mule deer can be found throughout the Arizona Strip. Concentrations occur on Black Rock and Poverty Mountains, on Mt. Trumbull, in the Buckskin Mountains and in the Kanab Creek areas. Typical mule deer habitat is rough, steep canyons sparsely vegetated with brushy pockets that carve their way down through open grasslands. Mule deer often bed in juniper thickets or other shrubby areas.

Mule deer inhabit most of the Kanab Creek corridor and adjacent upland areas including the Kanab Plateau and associated areas such as Bulrush and Sunshine points (AGFD & BLM 2010). AGFD has categorized habitat characteristics for big game species within the state. Habitat categories are based on several factors such as topography, forage and cover, availability of water, and limiting factors such as prohibitive fencing. The entirety of the project area is categorized by AGFD as winter crucial habitat for mule deer. Population survey data, counts, and estimates of total population within AGFD Game Management Units (GMUs) 12B and 13A are included in Appendix C of this EA. While no population estimates are available specifically for the project area, AGFD considers the mule deer population in GMUs 12B and 13A to be stable.

Tamarisk can replace desirable riparian vegetation that could otherwise serve as productive forage for mule deer and can dramatically reduce the amount of surface water at springs and small water sources (Watkins et al 2007).

Desert bighorn sheep (*Ovis canadensis nelsoni*)

Desert bighorn sheep habitat has been identified from habitat analysis that evaluates a combination of slope, topography, aspect, vegetation, proximity to escape cover, and water availability (Bighorn Sheep Core Team 2011). To escape predators, bighorn sheep prefer rough, rocky terrain with slopes greater than 20%, as is found in the project area.

Desert bighorn sheep likely obtain some of the moisture they need from succulent vegetation. During the hot summer months, the sheep stay in shaded areas near water as much as possible and are seldom found more than three miles from dependable water sources. When rain or snowfall occurs, bighorn sheep expand their use of suitable habitat and range out from permanent waters. They also commonly drink from ephemeral pools of water found in rock pockets (Bighorn Sheep Core Team 2011).

Desert bighorn sheep are present in the project area. After Grand Canyon National Park was expanded in 1974, supplemental transplants of desert bighorn were made in lower Hack Canyon to ensure a huntable population was maintained. Several bighorn sheep water facilities were constructed overlooking Kanab Creek Canyon. In total, 63 have been translocated into this locality between 1985 through 1996. The Kanab Creek Habitat Area for bighorn sheep includes

the project area. This habitat area consists of BLM-administered land (41%) and National Forest System lands (59%).

In 2003, bighorn sheep managers started to have concerns related to declining sheep population levels in the Kanab Creek drainage. It has been theorized that the extreme drought of 2002 concentrated sheep around relatively limited water sources, which could have resulted in an increase in disease transmission (AGFD 2007). Disease is thought to be the primary reason for declining sheep numbers, and a disease assessment of the Kanab Creek population took place in 2006 and again in 2009 with several viral infections identified. These diseases apparently have an impact on the productivity of a population and may explain the slow decline in sheep numbers over the past several years although no sheep have been seen with disease symptoms in the last few years (AGFD 2013). Unit wildlife managers have completed a sheep recovery plan to address these issues, and have begun implementation of the actions identified in the plan. Strategies for improving bighorn sheep distributions in the Kanab Creek Habitat Area include repairing and maintaining existing catchments and spring developments, constructing a network of new sheep waters along the eastern boundary of the Kanab Creek Wilderness, and extending bighorn sheep distributions throughout the suitable habitat. In 2013 the process to begin augmenting this population utilizing transplanted sheep was initiated with releases planned for 2015 (AGFD 2013). In 2014, the population was estimated at 51 individuals (Felish-AGFD personal comm.).

Migratory Birds

The Migratory Bird Treaty Act (MBTA) protects against the take of migratory birds, their nests, and eggs except as permitted. Numerous birds use the project area year-round for foraging, cover, and nesting. Bird species observed using the riparian area for nesting or foraging during the breeding season include: mallard, Gambel's quail, mourning dove, white-throated swift, black-chinned hummingbird, northern flicker, black phoebe, Say's phoebe, ash-throated flycatcher, violet-green swallow, cliff swallow, Bewick's wren, blue-gray gnatcatcher, crissal thrasher, phainopepla, Lucy's warbler, common yellowthroat, yellow warbler, yellow-breasted chat, song sparrow, summer tanager, black-headed grosbeak, blue grosbeak, and lazuli bunting.

Sensitive Species

Sensitive species are usually rare within at least a portion of their range. Many are protected under certain state and/or federal laws. Species designated as sensitive by the BLM must be native species found on BLM-administered lands for which the BLM has the capability to significantly affect the conservation status of the species through management, and either:

1. There is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range; or

2. The species depends on ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk."

All federally-designated candidate species, proposed species, and delisted species in the 5 years following delisting are included as BLM sensitive species. Based on occurrence records and monitoring data, the sensitive species that may occur within the project area and that may be affected by actions proposed in one of the alternatives presented in Chapter 2 are displayed in Table 3.3.

Table 3.3. Sensitive Species within the Project Area

Species	Potential for Occurrence
American peregrine falcon (*Falco peregrinus*)	verified
Golden eagle (*Aquila chrysaetos*)	verified
Northern leopard frog (*Lithobates pipiens*)	verified

Additional sensitive species may also occur within the project area. However, it has been determined by BLM wildlife biologists that these species would not be affected by actions proposed in this EA. These species are therefore not addressed further in this document. Table 3.4 lists the sensitive species that will not be discussed in further detail, along with the rationale for their exclusion from further analysis. Additionally, impacts to sensitive species found outside the project area were not analyzed.

Table 3.4. Sensitive Species Excluded from Further Analysis

Species	Rationale for Excluding from Further Analysis
Ferruginous hawk (*Buteo regalis*)	During the breeding season, ferruginous hawks prefer grasslands, sagebrush, and other arid and semi-arid shrub country. Nesting occurs in trees or utility poles surrounded by open areas. Isolated nesting trees, such as junipers, would not be impacted by the proposed action and the proposed activities would occur outside the breeding season.
Western burrowing owl (*Athene cunicularia hypugea*)	Burrowing owls do not utilize riparian areas for nesting or foraging. Burrowing owls occupy a wide variety of open habitats including grasslands, deserts, or open shrublands. Burrowing owls do not dig their own burrows and must rely on existing burrows dug by prairie dogs, ground squirrels, badgers, skunks, coyotes, and foxes but will also use manmade and other natural openings.
Allen's big-eared bat *Idionycteris phyllotis* Townsend's big-eared bat *Corynorhinus townsendii* Greater western mastiff bat *Eumops perotis californicus* Spotted bat	Roost sites such as caves, abandoned mineshafts, and large crevices in cliff faces are inaccessible to work crews and would therefore not be impacted by project activities (cutting trees and burning slash piles). No measurable impacts (changes from the existing condition) would be expected.

Euderma maculatum	
Northern goshawk *Accipiter gentilis*	Habitat for this species is not present in the project area. On the Arizona Strip goshawks most frequently occupy ponderosa pine forests. Their nest sites are typically located on northerly slopes with canopy cover of 50% or greater (Reynolds et al. 1992).
Pinyon jay *Gymnorhinus cyanocephalus*	Pinyon jay habitat is not present in the project area and the species may only visit the area on a transient basis. Pinyon jay habitat preferences include mosaics of large tracts of pinyon-juniper woodlands especially those areas that contain large, mature, seed-producing pinyon pines, and relatively open structure with mixed shrubs (especially sagebrush) and grasses (Gabaldon 1979, Latta et al. 1999).
Bald eagle *Haliaeetus leucocephalus*	Bald eagles may be found in the riparian areas of Kanab Creek during the winter months. Fish is a major component of its diet, but waterfowl, gulls, small mammals, and carrion are also eaten. Carrion and easily scavenged prey items provide important sources of winter food in terrestrial habitats that are away from open water. Carrion would be the likely food source for bald eagles in the project area. The proposed action would have no impact on this food source.
Spring Snails (4 species)	These species are restricted to very small ranges and are not known to occur in or near the project area.

Peregrine falcon (*Falco peregrinus anatum*)

Peregrine falcons utilize areas that range in elevation from sea level to 9,000 feet and breed wherever sufficient prey is available near cliffs. Preferred habitat for peregrine falcons consists of steep, sheer cliffs that overlook woodlands, riparian areas, and other habitats that support a high density of prey species. Nest sites are usually associated with water. In Arizona, peregrine falcons now occur in areas that had previously been considered marginal habitat, suggesting that populations in optimal habitats are approaching saturation (AGFD 2002a).

Nesting sites, also called eyries, usually consist of a shallow depression scraped into a ledge on the side of a cliff. Peregrine falcons are aerial predators that usually kill their prey in the air. Birds comprise the most common prey item, but bats are also taken (AGFD 2002a).

Extensive potential nesting habitat is found along the steep cliff faces of the project area. Peregrine falcons have nested at two locations within the project area and other undocumented nest sites are likely to exist given the excellent habitat within the canyon.

Golden eagle (*Aquila chrysaetos*)

Golden eagles are typically found in open country, prairies, arctic and alpine tundra, open wooded country and barren areas, especially in hilly or mountainous regions. Black-tailed jackrabbits and rock squirrels are the main prey species taken (Eakle and Grubb 1986). Carrion also provides an important food source, especially during the winter months. Nesting occurs on rock ledges, cliffs, or in large trees. Several alternate nests may be used by one pair and the same nests may be used in consecutive years or the pair may shift to an alternate nest site in different years. In Arizona they occur in mountainous areas and vacate desert areas after breeding. Nests

were observed at elevations between 4,000 and 10,000 feet. Nests are commonly found on cliff ledges; however, ponderosa pine, junipers, and rock outcrops are also used as nest sites.

Golden eagles have nested in the project area and potential nest sites are present along the cliff faces throughout the canyon. Golden eagles forage over a large area and may utilize the area for hunting and scavenging. The presence of water attracts small mammals, which are prey species for the golden eagle.

Northern leopard frog (*Lithobates pipiens*)

Northern leopard frogs are found in a variety of habitats including grassland, brush land, woodland, and forest ranging high into mountains, usually in permanent waters with rooted aquatic vegetation; also frequents ponds, canals, marshes, springs, and streams. They may forage far from water where they may absorb dew to keep moist.

Northern leopard frogs breed from mid-March to early June. A single female may lay 3,000 to 5,000 eggs in one round mass that measures 3-6 in (7.5-15 cm) across. Tadpoles hatch in about a week and metamorphose in about three months. Aquatic larvae have been found to over winter in some areas (AGFD 2002b).

Northern leopard frogs have been documented in the project area and may persist in small numbers where permanent water exists. However, the presence of non-native fish in Kanab Creek, such as green sunfish, severely limits the extent of leopard frog distribution in the drainage.

3.3.6 Soils

River wash soils in the project area can be shallow to very deep with occasional exposures of sandstone or limestone bedrock. They consist of mixed stratified cobbles, gravels and sands from mainly sandstone, gypsiferous mudstones and shale, and limestone. Stones and cobbles are most common along canyon walls, talus slopes, or lateral alluvial fans. Flooding is frequent during spring runoff or after intense rain storms. Scouring is common and where a few small shallow pools remain afterwards, sedimentation can leave up to a foot of silts and clays.

Torrifluvent soils are moderately deep to very deep and form bars or terraces along the stream channels. They consist of mixed stratified gravel and sands, with occasional thin layers of silts or clays, from the same rock sources as the river wash. Sand textures range from very fine loamy sands to coarse sands. On some of the older, more stable terraces, scattered small dunes and hummocks are usually fine sands or loamy fine sands. Flooding is common, during flows large enough to leave the main channel, which causes some bars to shift in position and texture. These soils may be slightly saline in some areas, particularly where tamarisk occurs due to the accumulation of salt in the leaves of this species, with gypsum being the dominant salt.

3.3.7 Recreation

The project area provides opportunities for a primitive experience and solitude; the area is generally natural and undisturbed. The project area is located within the Arizona Strip Extensive

Recreation Management Area (ERMA). ERMAs are managed for visitor health and safety, user conflict and resource protection. Recreation in this portion of Kanab Creek typically includes hiking, backpacking, hunting, and horseback riding. Maintained trails are not present within the project area and access to the riparian area is only possible along a few trails through side drainages.

The Recreation Opportunity Spectrum (ROS) system used by the BLM is a framework for outdoor recreation managers and policymakers who make decisions regarding both the allocation and management of opportunities for recreation. ROS conditions, under this framework, range from modern and developed to primitive and undeveloped. Under the ROS system, the project area is classified as "semi-primitive, non-motorized". Kanab Creek ACEC protects riparian and scenic values which enhance recreation opportunities. The ACEC also protects outstanding opportunities for solitude and primitive and unconfined recreation.

As stated previously, the project area is located in AGFD GMUs 12B and 13A. Several hunting seasons are authorized by AGFD in these management units including general deer season, archery-only deer season, and general bighorn sheep season.

3.3.8 Visual Resources

BLM inventories and classifies public lands in order to identify and maintain areas that contain important scenic qualities; the Visual Resource Inventory classification system is based on a combination of three elements, including scenic quality, visual sensitivity, and distance zones, with the most important to visitors probably being scenic quality (BLM 1986). Scenic quality is described as the visual appeal of an area. The rating is based on seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. BLM lands fall into one of four Visual Resource Management (VRM) classes, which provide visual management standards for the design and development of projects.

The project area is within an area designated as VRM Class II. The management objective for VRM Class II is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape (BLM 1986, 2008a).

3.3.9 Fuels and Fire Management

Riparian corridors have long been considered barriers to the spread of wildfire because the higher foliar moisture and humidity in riparian communities can inhibit fire movement from upland areas. However, natural fires do occur in riparian zones when weather conditions are dry and when fuel loads are sufficient, but these occurrences are rare. Fire area and frequency have increased in desert riparian areas with the invasion of these systems by tamarisk (Busch 1995). Tamarisk monocultures have greater cover, stem density and fine twig density than do stands of native species, thus they increase potential fuel loading (Lair 2007). Maximum temperature, flame length, and rate of spread of fires in tamarisk-dominated riparian areas can be enhanced by foliar desiccation of tamarisk by tamarisk leaf beetles (USGS 2013), which are present

throughout the project area. No fire starts have been recorded in the project area since 1980, likely because of the lack of human-caused ignitions due to the remoteness of the area and subsequent low visitation.

Chapter 4

ENVIRONMENTAL CONSEQUENCES

This chapter includes a discussion of the environmental consequences (including a description of direct and indirect impacts, and cumulative effects, if any). Impacts are defined as modifications to the existing condition of the environment and/or probable future condition that would be brought about by implementation of one of the alternatives.

Impacts can be direct or indirect; direct impacts are those effects that are caused by the action or alternative and occur at the same time and place, while indirect effects are those effects that are caused by or would result from an alternative and are later in time or in a different place but that are still reasonably certain to occur. Cumulative effects are generally assessed using the environmental impacts of past, present, and reasonably foreseeable future actions within the project area.

The impact analyses in the following sections were based on knowledge of the resources and the sites, review of existing literature information provided by experts and other agencies, and professional judgment. The intent of this analysis is to provide the scientific and analytical basis for the comparison of environmental consequences.

4.1 Invasive, Non-native Species

4.1.1 Direct and Indirect Impacts of Alternative A – Proposed Action

The proposed action would result in up to 10 acres of non-native vegetation removal per year. The proposed action has been designed to minimize impacts on native vegetation by restricting cutting and herbicide application to tamarisk and Russian olive plants. The removal of these non-natives would allow for re-establishment of native species such as willow and cottonwood which is expected to occur within 2 to 5 years after treatment. Effects from tamarisk leaf beetle defoliation discussed below in Section 4.1.2 would occur in areas left untreated.

4.1.2 Direct and Indirect Impacts of Alternative B – No Action

Under the no action alternative, no tamarisk and Russian olive removal would occur in the project area. Tamarisk leaf beetles would continue to defoliate tamarisk throughout the project area and some portion of these trees would be expected to die off and could potentially be replaced by native vegetation. Russian olive would be expected to expand and could colonize areas of tamarisk die-off where suitable soils and available seeds are present, resulting in continued dominance of non-native vegetation in some areas (Hultine et al. 2010).

4.2 Threatened, Endangered, or Candidate Animal Species

4.2.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Southwestern willow flycatcher (*Empidonax traillii extimus*)

The primary effect of the proposed action to the southwestern willow flycatcher is the temporary removal of possible nesting habitat. Southwestern willow flycatchers do nest frequently in tamarisk in Arizona (USFWS 2014a). The proposed action would remove up to 10 acres of potential nesting habitat per year, which would minimize the loss of potential habitat at any given time. However, given that defoliation by tamarisk leaf beetles in the area occurs on a yearly basis, removal of tamarisk would eliminate the ecological trap effect (see section 3.3.2, page 17). Currently, willow flycatchers that would potentially occupy the project area may choose to nest in tamarisk while foliage is green only to have the tamarisk leaf beetle defoliate these areas during the breeding season, leading to nest failure (Paxton et al 2010, 2011). By removing tamarisk, willow flycatchers potentially occupying the area would be obligated to choose nest sites in native willow stands. The expansion of native vegetation into areas formerly occupied by tamarisk or Russian olive would also lead to an expansion of higher-quality nesting habitat. Since project activities would not occur between April 1 and September 30, no disturbance from noise, human presence, or smoke is expected.

The effects to southwestern willow flycatcher habitat from vegetation management activities would be beneficial to the species in the long-term by restoring native habitats and reducing the risk of catastrophic wildfires in tamarisk-dominated systems. Fire reduces or eliminates nesting, breeding, and foraging habitat components. Based on the analysis of effects, we have concluded that the proposed action ***may affect, and is not likely to adversely affect*** the southwestern willow flycatcher.

Yellow-billed cuckoo (*Coccyzus americanus*)

Unlike the southwestern willow flycatcher, the ecological trap effect caused by the tamarisk leaf beetle would not impact the yellow-billed cuckoo since it arrives on the breeding grounds after defoliation has occurred. Therefore, cuckoos would select native cottonwood or willows for nest sites as opposed to tamarisk. Removal of tamarisk and expansion of native vegetation may improve overall habitat quality and would result in a modest increase in the quantity of habitat suitable for cuckoos. Project activities would take place outside the breeding season and would therefore not disturb nesting cuckoos that may use the project area. Based on the analysis of effects, we have concluded that the proposed action ***may affect, and is not likely to adversely affect*** the yellow-billed cuckoo.

4.2.2 Direct and Indirect Impacts of Alternative B – No Action

Southwestern willow flycatcher

The no action alternative could have minor, site-specific impacts such as disturbance and temporary loss of habitat resulting from fire suppression activities discussed in Sections 4.2.1 and 4.9.2, should a fire start occur. Flycatchers that choose to nest in tamarisk would continue to be susceptible to the ecological trap effect caused by tamarisk leaf beetle defoliation. Not treating the riparian area would not remove tamarisk/Russian olive and not allow for the expansion of native vegetation into areas formerly occupied by these non-native species, and would therefore not lead to an expansion of higher-quality nesting habitat. Breeding success of these birds would likely be reduced as compared to Alternative A (Paxton et al. 2011).

Yellow-billed cuckoo

The no action alternative could result in some disturbance and temporary loss of habitat due to fire suppression activities. Yellow-billed cuckoos are unlikely to nest in tamarisk in the project area and would therefore not be susceptible to the ecological trap effect. Defoliated tamarisk has a higher risk of ignition, leading to an increased risk in habitat-damaging wildfire which could cause short-term habitat loss for this species.

4.3 Wetland/Riparian Zones

4.3.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Short-term effects to the water table and stream flow may occur with the removal of tamarisk and Russian olive under the proposed action. These effects would be minor, given that less than 10 acres per year would be treated under the proposed action and that these areas would be colonized by native vegetation within 5 years. Early studies reported very high rates of water use by tamarisk. However, the techniques used in these studies tended to overestimate water use because they were methodologically unreliable and are now considered out of date (Shafroth et al. 2005, Stromberg et al. 2009). Cleverly et al. (2006) reported a one-time annual savings of water when tamarisk and Russian olive were removed from beneath cottonwoods, but projected the evapotranspiration reduction to be short-lived because of rapid understory regrowth. Several recent studies have concluded that evapotranspiration rates show relatively small variability between tamarisk and other woody phreatophytes (Graf 1992; Shafroth et al. 2005; Owens & Moore 2007; Nagler et al. 2008).

4.3.2 Direct and Indirect Impacts of Alternative B – No Action

Under the no action alternative, no tamarisk and Russian olive removal would occur in the project area. Tamarisk leaf beetles would continue to defoliate tamarisk throughout the project area and some portion of these trees would be expected to die off and could potentially be replaced by either native vegetation or Russian olive, depending on localized conditions (Hultine et al. 2010). Short-term reduction in evapotranspiration by tamarisk would likely occur during defoliation, but any increases in stream flow or water yield would be negligible (Hultine et al. 2010).

4.4 Vegetation

4.4.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Native vegetation could be directly impacted by removal of non-natives through trampling, incidental damage from tree felling, or accidental herbicide application, particularly in locations where native and non-native vegetation is mixed. Best Management Practices listed in Section 2.1.1 would limit these impacts. Work crews would be instructed to avoid damaging native vegetation whenever possible and herbicide applicators would only apply herbicides to cut stumps or leaves of tamarisk and Russian olive.

Native vegetation would colonize areas of non-native removal either naturally or by direct planting. This establishment would be expected to occur within 2 to 5 years after removal at a rate of up to 10 acres per year.

4.4.2 Direct and Indirect Impacts of Alternative B – No Action

Under the no action alternative, no tamarisk and Russian olive removal would occur in the project area. Tamarisk leaf beetles would continue to defoliate tamarisk and some portion of these trees would be expected to die off. Native vegetation could naturally colonize areas of tamarisk die-off if conditions are favorable for establishment. Riparian vegetation could be modified as a result of fire suppression, post-fire rehabilitation, and related actions in riparian zones. Construction of hand lines and use of backfires could temporarily affect habitat and reduce its suitability for wildlife. These effects would be temporary, requiring from 2 to 5 years for regeneration of gaps in woody habitats and longer to restore entire patches.

4.5 Wildlife, Including Big Game Species, Migratory Birds, and Sensitive Species

4.5.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Big Game Species

Mule deer

A small amount of hiding/thermal cover would be lost due to the removal of up to 10 acres of non-native trees and shrubs per year. This loss of vegetation would be replaced over time by native willow, cottonwood, and desirable forage species, improving overall habitat quality for mule deer. Mule deer would likely be temporarily displaced during treatment activities which are estimated to take about two weeks per year. Project activities and human presence would result in a localized and temporary increase in noise that would likely cause mule deer to temporarily avoid selected treatment sites for the duration of activities and prevent deer from using water sources at the treatment site. However, this would be a negligible amount of disturbance given that project implementation would not take place during the hottest months of the year, would take place during daylight hours, and would occur over such a small area of the habitat for the species. Deer could also use other water sources along Kanab Creek where project activities are not being conducted.

Desert bighorn sheep

The proposed action would not alter forage resources or escape terrain utilized by desert bighorn sheep. Sheep would likely avoid selected treatment sites during project activities due to noise and human disturbance which would be expected to be about two weeks per year. Bighorn sheep may also be prevented from using water at the treatment sites during project activities. However, this would be a negligible amount of disturbance given that project implementation would not take place during the hottest months of the year, would take place during daylight hours, and would occur over such a small area of the habitat for the species. Sheep could also use other water sources along Kanab Creek where project activities are not being conducted.

Migratory Birds

Impacts to migratory birds would be minimized by implementing the project outside the breeding season (April 1 to September 30). In addition, should an active nest be found during project implementation, activities in that area would be delayed until after young have fledged. Removal of non-native tamarisk and Russian olive would result in a short-term loss of habitat at a rate of up to 10 acres per year. As native vegetation expands into the areas where these non-natives are removed, habitat would be replaced. This process is expected to take from 2 to 5 years once non-native vegetation is removed. Wintering or migrating birds occupying the area from October 1 to March 31, when project activities may take place, would likely be displaced from the immediate vicinity during cutting and burning operations. Disturbance within the

project area would be localized and is anticipated to last about 2 weeks per year for the duration of the project.

Sensitive Species

Peregrine falcon and golden eagle

The proposed action would not alter any habitat components (cliff faces or roost sites) used by these raptors. Both species may avoid treatment sites during project implementation which is expected to take about two weeks per year. This would be a negligible amount of disturbance given the amount of habitat available in the project area. Up to 10 acres per year of hiding cover for prey species, such as rabbits and quail, would be removed possibly increasing hunting success for these species. This would be a short-term habitat change since native riparian vegetation is expected to colonize areas where non-natives are removed. The proposed action would result in negligible impacts to golden eagles or peregrine falcons.

Northern Leopard Frog

The proposed action would not impact permanent water sources, aquatic vegetation, or marshes. Only tamarisk and Russian olive would be removed in small increments (no more than 10 acres per year). There is no evidence that these plants provide habitat or resources for this species. Short-term displacement may occur during project activities. Cut material would be piled away from native vegetation and would need to be placed in areas free of permanent moisture in order to cure. The proposed action would therefore result in no impact to the northern leopard frog.

4.5.2 Direct and Indirect Impacts of Alternative B – No Action

All Species

Under the no action alternative, no treatment activities and, therefore, no ground disturbance would occur. Migratory birds that choose to nest in tamarisk would continue to be susceptible to the ecological trap effect and would likely have reduced breeding success (Paxton et al. 2011). Tamarisk defoliation from the tamarisk leaf beetle may have an adverse impact on ground-dwelling herpetofauna, possibly due to changes in microclimate (Bateman et al. 2014).

Defoliated tamarisk has a higher risk of ignition, leading to an increased risk in habitat-damaging wildfire which could cause short-term habitat loss for riparian-obligate species. The no action alternative could also result in impacts such as disturbance and temporary loss of habitat resulting from fire suppression activities discussed in Sections 4.2.1 and 4.9.2. Riparian habitat could also be modified as a result of fire suppression, post-fire rehabilitation, and related actions in riparian zones. Construction of hand lines and use of backfires could temporarily affect habitat and reduce its suitability for wildlife. These effects would be temporary, requiring from 2 to 5 years for regeneration of gaps in woody habitats and longer to restore entire patches.

4.6 Soils

4.6.1 Direct and Indirect Impacts of Alternative A – Proposed Action

The primary effects of the proposed action on soils are a potential reduction in soil salinity and an increase in erosion hazard. Tamarisk tolerates much higher soil salinity levels than native riparian plants. Furthermore, tamarisk adds salt to the soil through its leaf litter, which is high in salt content (the leaves contain salt glands) (Shafroth et al. 1995). Monotypic tamarisk stands often have no understory plants or only salt tolerant species such as saltgrass (*Distichlis spicata*) (Brotherson and Field, 1987). Flow-regulated rivers often have much higher soil salinity levels than on free-flowing rivers due to the lack of frequent flooding which can flush out salts (Stromberg et al. 2009). On free-flowing rivers soil salinity was reported as low in both native and tamarisk-dominated stands (Bagstad et al. 2006). Removing up to 10 acres of tamarisk per year would reduce the amount of salt added to the soil from leaf litter in these locations, likely reducing soil salinity.

Tamarisk was initially introduced as an erosion-control agent and large-scale removal of tamarisk stands has resulted in high levels of erosion in areas where little vegetation remained post-treatment (Vincent et al. 2009). Tamarisk and Russian olive removal would occur in increments of less than 10 acres per year (less than 1.2% of the riparian area in the project area per year). The small scale and incremental nature of the proposed action would minimize the potential for large-scale erosion events. However, small-scale erosion events could occur during periods of high stream flow, although this potential for erosion would only occur until native riparian species have become re-established. In areas such as Clear Water Spring, which have existing stands of willow and other riparian-obligate species that would remain after treatment, this potential for erosion in the short-term would be minimal.

4.6.2 Direct and Indirect Impacts of Alternative B – No Action

Defoliation of tamarisk by leaf beetles would continue, leading to areas of die-off where tamarisk could potentially be replaced by either native vegetation or Russian olive, depending on localized conditions (Hultine et al. 2010). Soil salinity would likely decrease beneath dead tamarisk stands, especially after flooding events scour the area. However, the reduction of soil salinity would likely be minimal due to the random nature of tamarisk die-off. Effects to erosion hazards would also likely be small-scale due to this same random nature of tamarisk die-off and the unpredictability of re-establishment by other types of vegetation in these patches.

4.7 Recreation

4.7.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Temporary disturbance to the recreation setting and recreation opportunities would occur during project activities, and would include an increase in noise, dust, and smoke at each treatment site, as well as the reduced ability for users to avoid the sights, sounds, and evidence of other people. The presence of workers would temporarily result in a reduced opportunity for solitude in the vicinity of the treatment sites. The proposed action would have minor direct and indirect impacts to recreation opportunities as the areas identified for treatment, such as Clear Water Spring, receive very little recreation use.

4.7.2 Direct and Indirect Impacts of Alternative B – No Action

Under the no action alternative no tamarisk and Russian olive removal would occur. No disturbance to the recreational setting or opportunities would therefore due to vegetation treatments and pile burning. No impacts to the recreating public would be expected.

4.8 Visual Resources

4.8.1 Direct and Indirect Impacts of Alternative A – Proposed Action

The proposed action would result in a low level of change to the characteristic landscape, especially over the long term. Seemingly unnatural gaps in the riparian corridor would be created as non-native vegetation is removed, but over a period of 2 to 5 years native vegetation would fill these gaps, leaving the characteristic landscape little-changed over the long term. Project implementation may attract attention over the short term but would be unnoticeable over time. In areas where native riparian vegetation is already present (such as the Clear Water Spring area), these effects would be even less noticeable because these natives species (such as willow and cottonwood) would remain in place and gaps in the riparian corridor would be minimal.

4.8.2 Direct and Indirect Impacts of Alternative B – No Action

Because no removal of vegetation would occur with this alternative, the existing visual character in the project area would not be affected due to vegetation treatment. However, riparian vegetation could be modified (and therefore the existing character of the landscape) as a result of fire suppression, post-fire rehabilitation, and related actions should a fire occur in the riparian corridor (see discussion in Section 4.9.2 below). These effects would be temporary, requiring from 2 to 5 years for regeneration of gaps in woody habitats and longer to restore entire patches.

4.9 Fuels and Fire Management

4.9.1 Direct and Indirect Impacts of Alternative A – Proposed Action

Under the proposed action, up to 10 acres per year of tamarisk and Russian olive removal would occur in the project area, resulting in an incremental reduction in wildfire potential. Riparian areas are often considered barriers to the spread of wildfire, due to higher foliage moisture and humidity compared to the surrounding landscapes (USGS 2013). Native vegetation would naturally colonize areas of non-native removal where conditions are favorable for establishment or would be actively planted in areas as deemed necessary by monitoring efforts. Native riparian vegetation has lower fire risk than non-natives (such as tamarisk) due to its foliage being less flammable.

4.9.2 Direct and Indirect Impacts of Alternative B – No Action

Under the no action alternative, no tamarisk and Russian olive removal would occur in the project area. Tamarisk leaf beetles would continue to defoliate tamarisk and some portion of these trees would be expected to die off. Beetle herbivory increases desiccation of tamarisk foliage, creating high loads of dead leaf and twig material in the crown. Crown fires are common in tamarisk stands during summer months, and beetle herbivory may further elevate flammability before the dead foliage drops from the plants into the litter layer (Drus et al. 2013). Tamarisk leaf beetles would likely cause short-term increases in fire risk in tamarisk stands and enhance fire intensity during summer months. In the long-term, however, beetle herbivory should reduce fire intensity and risk in invaded riparian areas as it decreases overall dominance of riparian fuelbeds by tamarisk (Drus et al. 2013).

Riparian vegetation could be modified as a result of fire suppression, post-fire rehabilitation, and related actions in riparian zones. Construction of hand lines and use of backfires could temporarily affect habitat and reduce its suitability for wildlife. These effects would be temporary, requiring from 2 to 5 years for regeneration of gaps in woody habitats and longer to restore entire patches.

4.10 Cumulative Impacts

"Cumulative impacts" are those impacts resulting from the incremental impact of an action when added to other past, present, or reasonably foreseeable actions regardless of what agency or person undertakes such other actions. This EA attempts to qualify and quantify the impacts to the environment that would result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions. These impacts can result from individually minor but collectively important actions taking place over a period of time.

There are a wide variety of uses and activities occurring on the lands within and adjacent to the project area. Specific actions that are occurring, or are likely to occur in the reasonably foreseeable future are:

- *Livestock grazing* – Grazing does occur in the project area on the Kanab Creek Allotment from November 1 through April 15. Active preference for this allotment is 168 AUMs but the actual use has been below this amount for the past eight years. Utilization across all key areas has averaged 26.6% for the last three years it was read (2006, 2013, and 2014). All adjacent BLM-administered lands have active grazing allotments. Each of these allotments is managed separately under its own grazing plan and system that is documented and described in an allotment management plan (AMP). Livestock grazing has occurred in the area for 150+ years. The portion of Kanab Creek on U.S. Forest Service lands (adjacent to the project area) is closed to livestock grazing.

- *Mining and Mineral Resources* – Public lands in and adjacent to the project area are open to mineral development (see below for a discussion on the Northern Arizona Mineral Withdrawal). The primary economic mineral resource in the area consists of locatable mineral deposits, including breccia pipe deposits (i.e., vertical collapse features formed from the collapse of karst solution caverns in the underlying Redwall limestone). Other potential mineral resources in the area are salable minerals (consisting primarily of sand, stone and gravel). The potential for gravel is high. Several existing mineral material pits occur in the area, the closest of which to the project area is near Bitter Seeps Wash, just south of the Kaibab-Paiute Reservation.

- *Northern Arizona Mineral Withdrawal* – On January 9, 2012, the Secretary of the Interior issued a decision to withdraw approximately 1 million acres of Federal locatable minerals in northern Arizona from the location of new mining claims under the Mining Law of 1872 [30 USC 22–54] (Mining Law), subject to valid existing rights. The affected lands are located near Grand Canyon National Park in northern Arizona, and consist of lands managed by the BLM and the U.S. Forest Service. The decision to withdraw these lands was made in order to protect the Grand Canyon watershed from adverse effects of locatable mineral exploration and development. The withdrawal does not affect use, management, or disposition of the lands other than under the Mining Law. The project area is within the Northern Arizona Mineral Withdrawal.

  The Secretarial decision to implement the Northern Arizona Mineral Withdrawal in 2012 acknowledged that there were several unknowns and uncertainties related to the effects of uranium mining in the Grand Canyon region. A key factor in the decision to withdraw lands from future uranium mining for 20 years was the limited amount of scientific data available to assess potential impacts, specifically in the terms of groundwater flow paths, radionuclide migration, and biological toxicity pathways. A number of scientific studies to reduce these unknowns and uncertainties were identified by an interagency team consisting of the BLM, U.S. Forest Service, NPS, USFWS, and the U.S. Geological Survey (USGS); several studies (such as dust monitoring) have already been initiated.

  USGS recently proposed to install an automated water sampler in the project area (at Clearwater Spring). This sampler would provide USGS with temporal data on background water chemistry (uranium and trace elements) of the spring, as well as possible uranium mine related impacts to water chemistry. Project planning for installation of this water sampler is in progress.

The proposed action would cumulatively add up to 10 acres per year of non-native vegetation removal in the riparian zone of the project area. Most of this vegetation would be replaced by native plants within 2 to 5 years post-treatment. Increased human presence and disturbance would also be expected during project implementation which could be up to two weeks per year. Work crews present in the project area would increase the baseline amount of noise, dust, and traffic to a broader area that would also include disturbance from mining operations, grazing operations, powerline maintenance, road grading, and recreation.

4.10.1 Invasive, Non-native Species

Livestock grazing continues over most of the Arizona Strip, including on public lands in and around the project area. Proper grazing use which maintains stable plant communities (as is the case in the project area) would act to prevent and control the spread of invasive plant species. For example, Sprinkle et al (2007) found that grazing exclusion does not make vegetation more resistant to invasion by exotic annuals. Loeser et al. (2007) reported that moderate grazing was superior to both grazing exclusion and high-impact grazing in maintaining plant diversity and in reducing exotic plant recruitment in a semi-arid Arizona grassland. In addition, the BLM will continue to work with permittees and the counties on implementing a program to treat weeds across the area.

Continuing uranium mining in the region, as well as use of mineral material sites in the area, would cumulatively increase the risk of introduction and spread of invasive plants. However, reclamation activities and mineral material permits include preventative measures to inhibit the spread of invasive species (such as power washing all vehicles and equipment before entering the Arizona Strip, as well as cleaning it between work sites) to remove seeds and other plant materials which should curtail infestation by species such as Scotch thistle.

No other tamarisk removal projects are planned for the project area or lands nearby, although the National Park Service (NPS) has been working on tamarisk removal from 63 tributaries of the Colorado River in Grand Canyon National Park since 2002. That project has "significantly reduced tamarisk distribution within the treated areas and allowed native vegetation to reestablish without exotic plant competition" (NPS 2005). It is reasonable to assume that the current proposed action (on BLM lands) would have similar results and effects on tamarisk as those on NPS lands. However, tamarisk is extremely widespread in native riparian habitats in the southwestern U.S. (including on the Arizona Strip), so it is anticipated that neither of the alternatives would result in significant cumulative impacts on invasive, non-native species when added to other past, present, and reasonably foreseeable activities in the area.

4.10.2 Threatened, Endangered, or Candidate Animal Species

As stated previously, grazing occurs in the project area (on the Kanab Creek Allotment) from November 1 through April 15 – grazing is not allowed past April 15 to allow growing season rest for riparian vegetation since southwestern willow flycatcher habitat is present in the allotment (BLM 2008a). This also benefits the yellow-billed cuckoo. Active preference for this allotment is 168 AUMs. The allotment had actual use over 100% for 10 years between 1994 and 2006. During that time the allotment had a few feral animals that were problematic to capture, and thus

ran on the allotment yearlong. The few head that stayed yearlong account for the additional AUMs – these cattle were removed from the allotment when it changed hands to a new permittee in 2007. Since the new operator took over and the feral cattle were removed, actual use has been reduced and all animals are removed each year by April 15. Grazing impacts in the project area are light (utilization across all key areas has averaged 26.6% for the last three years it was read).

Mining-related activities in the area include ongoing operations at the Arizona 1 and Pinenut uranium mines, both of which are located on the Kanab Plateau several miles to the southwest of the project area, and the potential for several additional future mines. Impacts to federally-listed species from uranium mining activities were fully analyzed in the Northern Arizona Proposed Withdrawal EIS. This analysis stated that "Given the relatively small area of surface impact and the [Endangered Species Act] requirements concerning impacts to listed species and critical habitat, all of the alternatives [including the proposed withdrawal] would result in minor and less than significant cumulative impacts to threatened, endangered, and candidate species when added to other past, present, and reasonably foreseeable activities in the proposed withdrawal area" (BLM 2011). However, as described on page 35 of this EA, there is a level of uncertainty connected with uranium mining in the Grand Canyon region, and a number of scientific studies to reduce these unknowns and uncertainties have been identified, with several already initiated. One such study is to conduct habitat and species surveys (including for threatened and endangered species) in and adjacent to active mine sites (Arizona 1 and Pinenut) to determine the degree that biota occur near and are attracted to mining activities. Results from this study will help identify species for radiation and chemical characterization and will therefore help bound uncertainty in the ecological risk analysis. USGS personnel began field work (i.e., mist netting and collecting blood samples) for this study in late June 2015.

The effects on threatened, endangered, and candidate species in the project area have been analyzed under the "Direct and Indirect Effects" section of this chapter. Past, present, and reasonably foreseeable actions within the analysis area could continue to influence these species. However, consultation with USFWS would help ensure that potential effects are mitigated, reduced or eliminated. It is therefore anticipated that neither of the alternatives would result in cumulative impacts to threatened, endangered, and candidate species when added to other past, present, and reasonably foreseeable activities in the area.

4.10.3 Wetland/Riparian Zones

As described previously, livestock grazing occurs in the project area from November 1 through April 15 – grazing is not allowed past April 15 to allow growing season rest for riparian vegetation. Three segments or reaches within the area are assessed for Proper Functioning Condition (Segments 3, 4 and 5). Segment 3 (Clearwater Spring) was last assessed in 2008 and was rated as properly functioning. Segment 4 (Water Canyon area) was last assessed in 2013 and was rated as functional – at risk due to undesirable width/depth ratios present and poorly developed floodplain in some channel segments, likely due to recent flash flood events. Segment 5 (Snake Gulch area) was last assessed in 2009 and rated as properly functioning. Livestock grazing did not appear to be measurably impacting these riparian segments during these assessments.

Riparian areas may be affected by increased runoff, flooding, and erosion events as an indirect impact from mining operation activities in upland areas. The increased sedimentation and soil erosion may also occur as a result of construction activities and increased vehicular travel. These impacts could range from minor to moderate, depending on the location of mine facilities, the severity of rain events, and subsequent erosion (BLM 2011). However, uranium mines are engineered and constructed to include perimeter berms to withstand a 500-year 24-hour flood event outside the mine perimeter. This perimeter berm is intended to contain mining-generated materials within the site by preventing run-off from leaving the site. Thus, failure or overtopping of the berms is not considered reasonably foreseeable (BLM 2011).

As previously stated, USGS has proposed to install a small automated water sampler at Clear Water Spring in order to collect temporal data on temporal data on background water chemistry (uranium and trace elements) of the spring, as well as possible uranium mine related impacts to water chemistry. Due to the small size of this monitoring device, and the lack of ground disturbance to install it, no impacts to wetland/riparian zones are anticipated.

The effects on wetland/riparian zones in the project area have been analyzed under the "Direct and Indirect Effects" section of this chapter. Past, present, and reasonably foreseeable actions within the analysis area could continue to influence these sites. However, consultation with USFWS to help ensure that potential effects to federally listed species that may occur in the Kanab Creek riparian area – southwestern willow flycatcher and yellow-billed cuckoo – and the riparian habitats that support them, are mitigated, reduced or eliminated. It is therefore anticipated that neither of the alternatives would result in cumulative impacts to wetland/riparian zones when added to other past, present, and reasonably foreseeable activities in the area.

4.10.4 Vegetation

Livestock grazing in the project area occurs from November 1 through April 15. Plants are most sensitive to grazing when they are flowering and forming seeds. Under the current grazing system in the project area, livestock would be authorized to graze primarily in the dormant season. Grazing vegetation during the non-growing season or early season (as plants are just coming out of dormancy) would allow plants to fix carbon, reproduce and set seed as the growing season progresses into the summer. This season of grazing would have neutral to negligible effects on plant communities because plants would be able to fix a significant amount of carbon prior to biomass removal and would be able to set seed. Allotment monitoring (which includes trend, composition, and utilization) is occurring on a regular and ongoing basis.

Continuing uranium mining in the region, as well as use of mineral material sites in the area, would cumulatively affect vegetation through the loss of vegetation, increased deposition of dust on vegetation adjacent to roadways (i.e., haul routes), and introduction and spread of invasive plants. Reclamation activities would counter some of the reduction in vegetative cover, and preventative measures to inhibit the spread of invasive species could curtail infestation by species such as Scotch thistle.

The effects on vegetation in the project area have been analyzed under the "Direct and Indirect Effects" section of this chapter. Past, present, and reasonably foreseeable actions within the analysis area could continue to influence this resource. However, continuing to monitor plant

communities and to implement the Arizona Standards for Rangeland Health should help ensure the long-term health of rangeland resources, including vegetation. It is therefore anticipated that neither of the alternatives would result in cumulative impacts to vegetation when added to other past, present, and reasonably foreseeable activities in the area.

4.10.5 Wildlife, Including Big Game Species, Migratory Birds, and Sensitive Species

As described previously, livestock grazing does occur in the project area (Kanab Creek Allotment) from November 1 through April 15, with no grazing authorized past April 15 to allow growing season rest for riparian vegetation since southwestern willow flycatcher habitat is present in the allotment (BLM 2008a). This also benefits many species of migratory birds that nest in the project area or use the area as a migratory corridor. Grazing impacts in the project area are light (utilization across all key areas has averaged 26.6% for the last three years it was read) and do not impact forage resources for big game species.

Wildlife may be affected by other activities occurring within and adjacent to the project area, including mineral development and various dispersed recreational activities. Mineral development has led to reduction of habitat quality and physical disturbance in a variety of habitats. Mining-related activities in the area include ongoing operations at the Arizona 1 and Pinenut uranium mines, both of which are located on the Kanab Plateau several miles to the southwest of the project area, and the potential for several additional future mines. Impacts to wildlife species from uranium mining activities were fully analyzed in the Northern Arizona Proposed Withdrawal EIS. This analysis stated that "Given the relatively small area of surface impact, it is anticipated that none of the alternatives [including the proposed withdrawal] would result in significant cumulative impacts to migratory birds [and wildlife resources] when added to other past, present, and reasonably foreseeable activities in the proposed withdrawal area" (BLM 2011). However, as described previously in this EA, there is a level of uncertainty connected with uranium mining in the Grand Canyon region, and a number of scientific studies to reduce these unknowns and uncertainties have been identified, with several already initiated. One such study is to conduct habitat and species surveys (including for sensitive species) in and adjacent to active mine sites (Arizona 1 and Pinenut) to determine the degree that biota occur near and are attracted to mining activities. Results from this study will help identify species for radiation and chemical characterization and will therefore help bound uncertainty in the ecological risk analysis. USGS personnel began field work (i.e., mist netting and collecting blood samples) for this study in late June 2015.

Recreational pursuits, particularly off-highway vehicle (OHV) use, have caused disturbance to most all species and their habitats. With the increase in local populations has come a dramatic increase in the level of OHV use, resulting in increased disturbance, injury, and mortality to wildlife, particularly ground dwelling species with low mobility. Transportation corridors exist through the habitat of virtually all species found within the planning area. Impacts vary by species and by the location, level of use, and speed of travel over the road.

The effects on wildlife in the project area have been analyzed under the "Direct and Indirect Effects" section of this chapter. Past, present, and reasonably foreseeable actions within the analysis area could continue to influence these species. This additive impact may affect wildlife

habitat or corridors and the greater ecosystems by altering vegetation associations or decreasing water quality. These systems and the health of the region as a whole are important for the survival of many native species. Consultation with AGFD during development of the land health evaluation for the Kanab Creek Allotment did not identify any issues related to BLM management of the allotment livestock grazing beyond those discussed previously in this EA – that agency's primary concern was disease noted in the bighorn sheep population beginning in 2003, which now appears to have run its course. Given the fact that the allotment currently meets all applicable standards for rangeland health (which takes into account all uses of public rangelands, not just livestock grazing), and neither of the alternatives are anticipated to change that determination, it is anticipated that neither of the alternatives would result in cumulative impacts to wildlife when added to other past, present, and reasonably foreseeable activities in the area.

4.10.6 Soils

Soils in the area formed under conditions that had no vehicles or large numbers of large animals to impact them. Population growth, grazing, and developments in the past 150 years have resulted in soil disturbance on hundreds of thousands of acres at and near homesteads, communities, roads, and waters across the Arizona Strip. Continued population growth and the resulting growth in vehicle and OHV use and visitation in the region would continue to add to the acreage of soil disturbance.

Livestock grazing occurs across the Arizona Strip, including within the project area and lands surrounding the project area. Livestock grazing can result in compaction of soils through trampling and decreasing vegetative ground cover, thereby increasing runoff and erosion and reducing water holding capacity and infiltration rates.

Continuing or additional mines in the area would increase disturbance to soils. Some roads, exploration sites, and mines associated with valid existing rights that are anticipated to be developed in or near the project area might be located adjacent to Kanab Creek or tributary canyons or in areas with sensitive soils. Therefore, moderate impacts from increased soil erosion might occur in the project area where roads, exploration sites, or mines are located in areas of steep topography or sensitive soils, but impacts would be expected to be minor in other areas (BLM 2011). In addition, reclamation would stabilize the replace soils.

Visitor use on the Arizona Strip is expected to increase, which would continue to impact soil resources. Areas where public recreation use is concentrated, such as campgrounds, trails, trail heads, and near visitor facilities, would experience the most soil compaction and erosion and a loss or reduction of vegetation cover. However, the project area is remote and difficult to access, which keeps visitor use low, and impacts to soils from this type of use are minimal.

The effects on soils in the project area have been analyzed under the "Direct and Indirect Effects" section of this chapter. Past, present, and reasonably foreseeable actions within the analysis area could continue to influence this resource. However, continuing to monitor soils and to implement the Arizona Standards for Rangeland Health should help ensure that soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and ecological site. It is therefore anticipated that neither of the alternatives would result in

cumulative impacts to soils when added to other past, present, and reasonably foreseeable activities in the area.

4.10.7 Recreation

Recreational experiences and the potential attainment of a variety of beneficial outcomes are vulnerable to any management action that would alter the settings and opportunities in a particular area. Recreation settings are based upon a variety of attributes, such as remoteness, the amount of human modification in the natural environment, evidence of other users, restrictions and controls, and the level of motorized vehicle use. Management actions that greatly alter such features within a particular area could affect the capacity of the landscape in that area to produce appropriate recreation opportunities and beneficial outcomes.

Over time, continued population growth of communities in the area will contribute to greater visitation to the public lands in and near the project area. However, the project area is remote and difficult to access, which keeps visitor use low and associated impacts minimal.

Mining at existing uranium mines (that had been in stand-by status) renewed in 2009, first at the Arizona 1 Mine, then at Pinenut Mine. Operations at these mines are scheduled to cease in mid-2015 and no other mines are scheduled to open in the near future – the EZ Mine is proposed but is still several years from any sort of potential approval, including a determination on the validity of the associated claims. Disturbance from mining operations produce a baseline amount of noise, dust, traffic, and increased human presence in the project area and adjacent areas, which reduces the remoteness attribute of the physical recreation setting and also alters the encounters with others attribute of the social recreation setting. Work crews present in the project area during project implementation would increase this baseline up to two weeks per year, reducing opportunities for solitude.

The effects on recreation in the project area have been analyzed under the "Direct and Indirect Effects" section of this chapter. Past, present, and reasonably foreseeable actions within the analysis area could continue to influence this resource. Management of the area as the Kanab Creek ACEC, as well as the remoteness of the area, would contribute to maintaining the landscape and its recreation setting conditions. Thus, it is not anticipated that either of the alternatives would result in cumulative impacts to recreation when added to other past, present, and reasonably foreseeable activities in the area.

4.10.8 Visual Resources

Impacts to visual resources occur from management actions that create visual contrasts or changes to the basic landscape elements of form, line, color, and texture. Visual impacts associated with mineral exploration and mining would result from new road construction, power line construction, ore-haul trucking traffic, dust, and night lighting. All of these impacts would result in landscape contrast changes through altered form, line, color, and texture. New roads would result in color and line contrast changes. Power lines could bring form and line contrasts, with vertical lines potentially visible along horizon lines. The degree of impact would vary, depending on the location of mining operations (BLM 2011).

Where livestock grazing continues to be authorized (such as the Kanab Creek Allotment, in the project area), the installation of additional fences or livestock improvements could directly impact visual resources by adding forms, lines, colors, and textures not found in the surrounding landscape. Such impacts would be localized and long term, and could range from negligible to moderate. However, the Arizona Strip Field Office RMP directs that no new corrals or water developments will be authorized within the Kanab Creek ACEC, and it is unlikely that new fences would be installed due to the relatively small size of the Kanab Creek Allotment.

Population growth of communities in the area over time will contribute to greater visitation to the public lands in and near the project area. However, the project area is remote and difficult to access, which keeps visitor use low and associated impacts minimal. In addition, dispersed recreation activities (such as occur in the project area due to its remoteness) would create fewer impacts to visual resources than more intensive, concentrated recreation uses.

The effects on visual resources in the project area have been analyzed under the "Direct and Indirect Effects" section of this chapter. Past, present, and reasonably foreseeable actions within the analysis area could continue to influence this resource. Management of the area as the Kanab Creek ACEC, as well as the remoteness of the area, would contribute to maintaining its characteristic visual landscape. Thus, it is not anticipated that either of the alternatives would result in cumulative impacts to visual resources when added to other past, present, and reasonably foreseeable activities in the area.

4.10.9 Fuels and Fire Management

Actions affecting fire management primarily include factors that affect fuel loads (e.g., spread of invasive species, vegetation treatments on lands adjacent to the project area, surface disturbing activities, drought conditions) and factors that provide potential ignition sources (e.g., recreation, OHV use). The continued spread of exotic annual grasses would increase the size and number of fires. Invading tamarisk would continue to increase flammable fuel loads in riparian areas, increasing the risk of stand-replacing fire. Surface disturbing activities would alter plant species composition and density, and promote the spread of invasive plants. Drought would impact fuel loads, fire intensities, and the size of wildland fires. P opulation growth and resulting increases in vehicle and OHV use may increase ignitions.

Livestock grazing and mining operations in or near the project area have little to no impact on fuels and fire management. Grazing in the project area occurs during the cool season and utilization is considered light. Therefore, no measurable reduction in vegetative cover related to fuel load, especially during the fire season, is expected. Human presence in conjunction with mining operations may increase the risk of accidental fire starts, especially under extreme fire hazard conditions. These types of fires would occur in upland pinyon-juniper or shrub communities near mines, mineral material pits, or roads and would not be expected to impact the Kanab Creek riparian zone. For all of these factors, it is not anticipated that either of the alternatives would result in cumulative impacts to fire and fuels management when added to other past, present, and reasonably foreseeable activities in the area.

Chapter 5

CONSULTATION AND COORDINATION

5.1 SUMMARY OF PUBLIC AND AGENCY PARTICIPATION

Public and agency involvement for the Kanab Creek Riparian Restoration project began with an internal scoping meeting on February 2, 2015. A scoping letter was sent to the Arizona Strip District Office NEPA mailing list on February 17, 2015. Two comment letters were received, one from AGFD and the other from USFWS. Comments are summarized below in Table 5.1 along with a response and/or reference to where the comment is addressed in the EA.

Table 5.1. List of Comments and Responses

Comment	Response
AGFD #1. In general for large projects removing acres of tamarisk, we recommend planning and funding be immediately available for the replacement of the removed vegetation with desirable riparian vegetation comprised of appropriate species for the area. When there is abundant existing native vegetation that contributes to voluntary repopulation of treated areas, planned vegetation plantings become less important in restoring and maintaining suitable wildlife habitat.	As stated in the proposed action, project activities would initially focus on areas with abundant native vegetation such as Clear Water Spring. In areas where native vegetation is not present at a treatment site, native plants would be planted (see Section 2.1 of this EA).
AGFD #2. A qualified biologist should conduct a survey for nesting birds within the project area prior to removal or trimming of trees/vegetation during the breeding season. Breeding season for birds is generally May through late August, depending on the species and habitat. If you anticipate your project will not be in compliance with MBTA, the Department recommends you contact the U.S. Fish and Wildlife Service (USFWS) for their Technical Assistance. The USFWS will provide options to comply with the MBTA.	Surveys for breeding birds have been conducted in the Clear Water Spring and Gunsight Canyon areas as part of the monitoring of the southwestern willow flycatcher habitat in Kanab Creek. These surveys would continue throughout the life of the project. We do not anticipate conducting any treatments during the breeding season as stated in Section 2.1.1 - Best Management Practices: "Treatment activities would be scheduled to avoid peak breeding season for birds (April 1 to September 30)."
USFWS #1. The [scoping] letter mentions that the nonnative shrubs and trees adversely affect the southwestern willow flycatcher. Since the flycatcher was listed, there has been considerable research into salt cedar (tamarisk) and its relationship to the flycatcher. In our recent 5 year review of the flycatcher, we specifically discussed how tamarisk should not	The statement included in the scoping letter, "These non-natives alter the ecosystem and adversely affect native vegetation and wildlife, including the southwestern willow flycatcher." was poorly worded. Healthy tamarisk (especially where mixed with native vegetation) does provide nesting habitat for southwestern willow flycatchers and other

be considered a threat to the flycatcher. Over 50% of the known territories across its range contain an important contribution from tamarisk. In general, tamarisk and causes for its proliferation have been misunderstood. While there may be unique scenarios, in the general sense, tamarisk proliferation is a symptom of landscape issues caused by damming, groundwater depletion, and other stressors.	birds and does not, in and of itself, adversely affect these species. The discussion on this subject (in Section 3.3.2 of the EA) incorporates this USFWS comment.
USFWS #2. We recommend that you look into where surveys are needed along the stretch [of Kanab Creek] you want to work in order to adequately evaluate the potential effects of this project.	Although project implementation would occur outside the breeding season, surveys would be conducted in selected areas in the breeding season preceding any treatment activities. Any southwestern willow flycatcher or yellow-billed cuckoo nest sites found would be evaluated and treatment plans would be amended to avoid these nest sites.

5.2 LIST OF CONTRIBUTORS AND REVIEWERS

The following tables list persons who contributed to the preparation of this EA.

Table 5.2. List of BLM Preparers/Reviewers

Name	Title	Responsible for the Following Program
Gloria Benson	Tribal Liaison	Native American Religious Concerns
Whit Bunting	Team Lead, Range and Vegetation	Range, Weeds
Laurie Ford	Team Lead, Lands & Geological Sciences	Lands & Realty
Diana Hawks	Team Lead, Recreation/Wilderness/Cultural Resources	Recreation, Wilderness, Visual Resources
Jon Jasper	Outdoor Recreation Planner	Visual Resources, Wilderness Characteristics
Shawn Langston	Wildlife Biologist	Project Lead, Special-Status Animals, Wildlife
Lorraine Christian	Field Office Manager	Project Oversight
Jace Lambeth	Rangeland Management Specialist	Special Status Plants, Vegetation, Range
John Sims	Supervisory Law Enforcement	Law Enforcement
Bob Smith	Soil Scientist (Retired)	Soil, Water, Air
Richard Spotts	Environmental Coordinator	NEPA Compliance
John Herron	Archaeologist	Cultural Resources

Table 5.3. Non-Federal Agency EA Reviewers

Name	Agency/Organization	Title
Steve Rosenstock	Arizona Game and Fish Department	Habitat Program Manager
Peter Bungart	Hualapai Tribe	Cultural Staff
Dawn Hubbs	Hualapai Tribe	Cultural Staff
Daniel Bulletts	Kaibab-Paiute Tribe	Cultural Staff

Chapter 6

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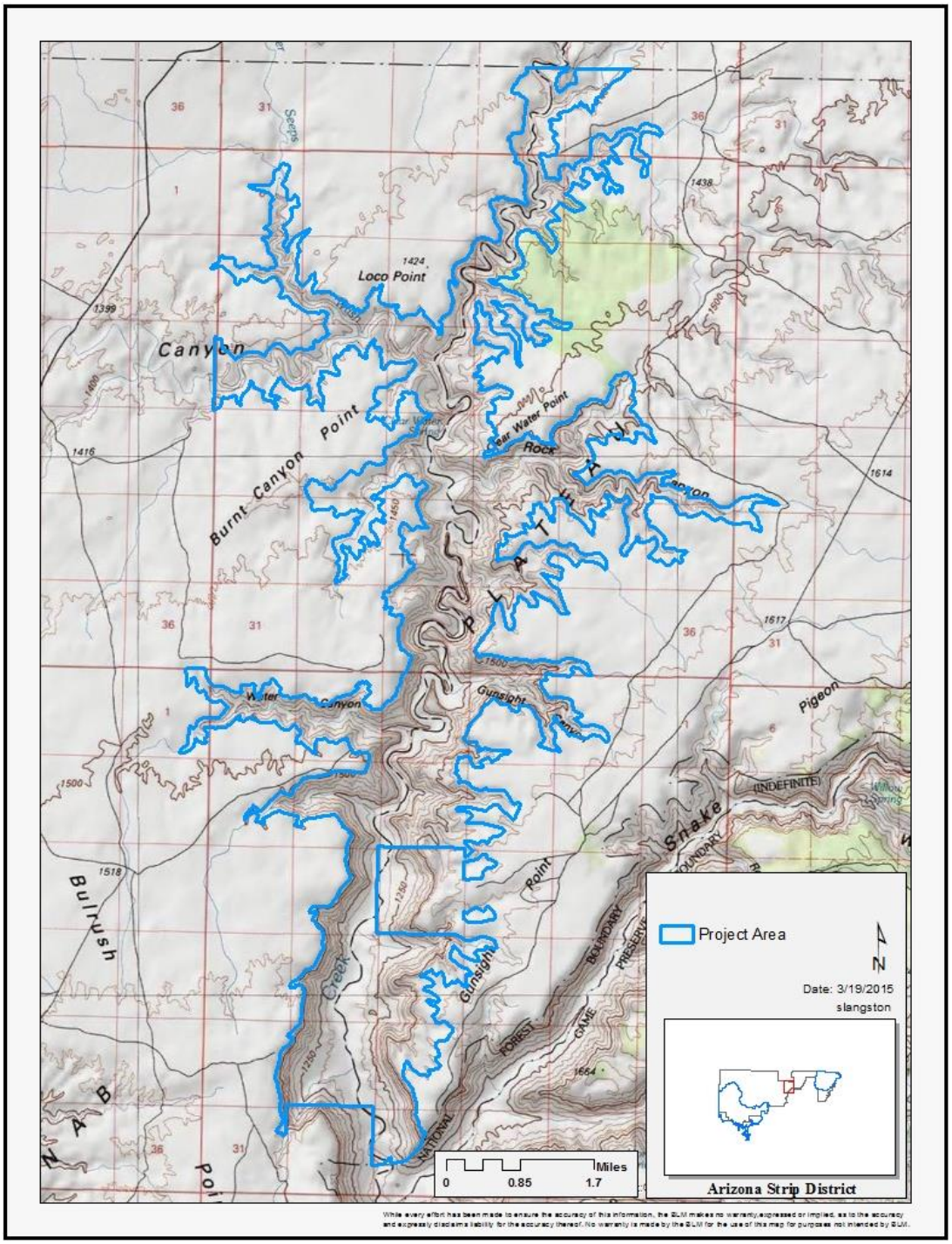
Appendix A – Site Photographs

Photo A1. Clear Water Spring (looking upstream) 6/28/2012.

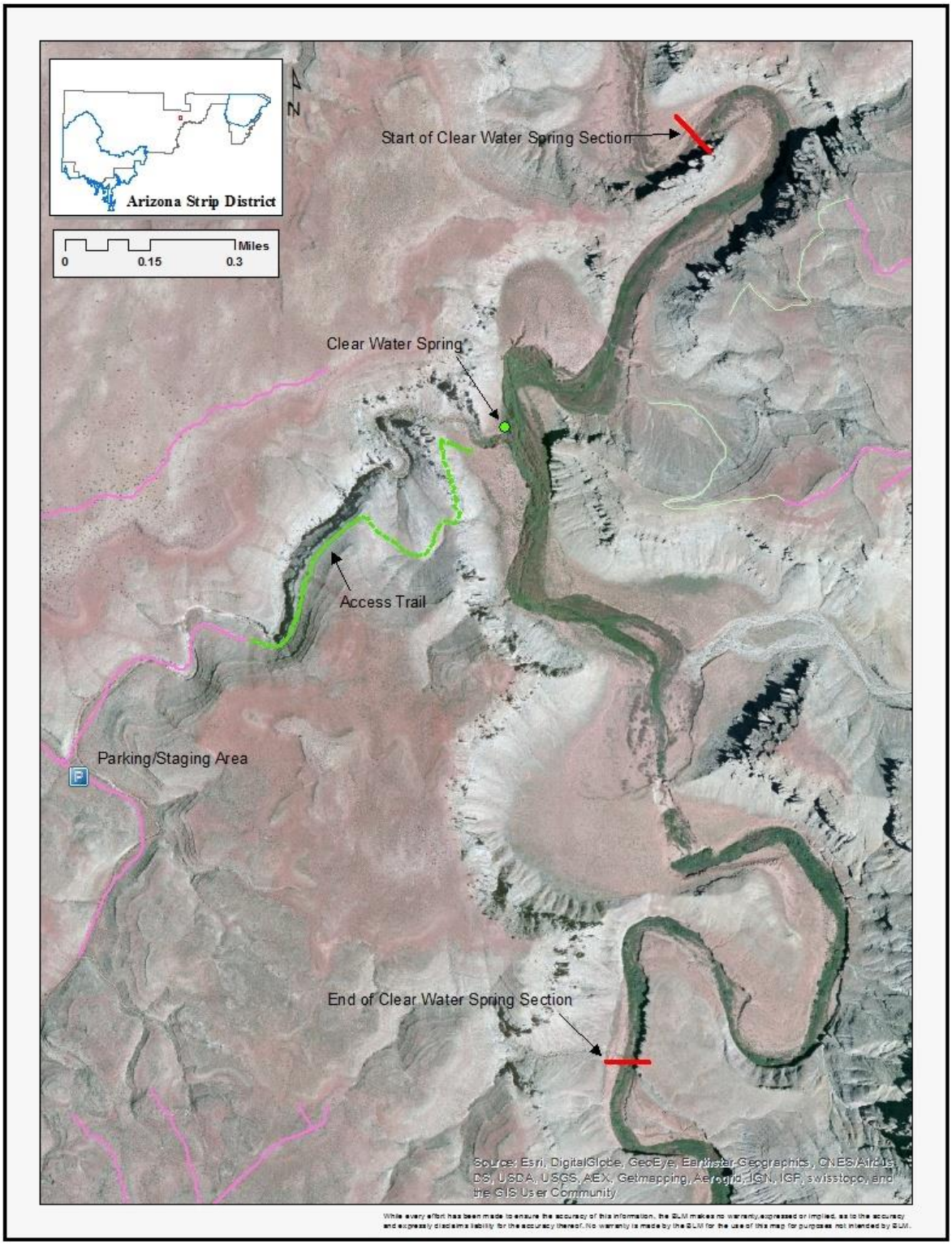
Photo A2. Clear Water Spring (looking downstream) 6/28/2012.

Appendix B – Maps

Map 1. Project Area.



Map 2. Clear Water Spring Area.



Appendix C – Mule Deer Population Tables

Arizona Game & Fish Unit 12B Mule Deer Population Counts			
Year	**Number of Animals Surveyed**	**Bucks / 100 does**	**Fawns / 100 does**
1992	Insufficient Data	22	59
1993	Insufficient Data	13	39
1994	Insufficient Data	14	58
1995	528	11	53
1996	436	18	42
1997	344	13	50
1998	432	22	61
1999	358	19	37
2000	519	24	36
2001	443	15	44
2002	511	21	28
2003	603	20	81
2004	504	31	68
2005	223	18	76
2006	383	34	73
2007	509	31	51
2008	341	36	70
2009	118	27	49
2010	207	15	64
2011	305	14	86
2012	153	31	80
2013	234	28	75
2014	174	48	174

Arizona Game & Fish Unit 13A Mule Deer Population Counts			
Year	**Number of Animals Surveyed**	**Bucks / 100 does**	**Fawns / 100 does**
1989	86	52	39
1990	44	10	27
1991	15	29	57
1992	Insufficient Data		
1993	9	0	13
1994	43	42	84
1995	51	29	35
1996	55	42	69
1997	No Survey		
1998	59	8	44
1999	108	23	31
2000	170	27	33
2001	165	36	68
2002	57	28	50
2003	148	39	59
2004	140	40	75
2005	136	38	84
2006	230	43	61
2007	145	54	38
2008	97	50	42
2009	68	14	70
2010	125	33	48
2011	243	39	78
2012	113	31	104
2013	182	38	99
2014	199	60	83

Appendix D – Bighorn Sheep Population Tables

Arizona Game & Fish Unit 12A & 12B West Desert Bighorn Sheep Population Counts						
Year	Total Rams	Ewes	Lambs	Yearling	Unclassified	Total
2005	5	11	3	2	0	21
2006	9	8	2	0	0	19
2008	4	11	0	0	0	18
2011	5	7	0	0	0	12
2013	21	22	7	1	0	51
2014	8	13	3	3	0	27

Arizona Game & Fish Unit 13A Desert Bighorn Sheep Population Counts						
Year	**Total Rams**	**Ewes**	**Lambs**	**Yearling**	**Unclassified**	**Total**
2006	25	38	4	5	0	72
2008	3	5	1	0	0	9
2011	6	25	7	0	0	38
2013	12	26	13	1	0	52
2014	12	12	5	6	0	35