

Horseshoe Allotment Grazing Authorization Renewal

Final Environmental Assessment

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21605 North 7th Avenue
Phoenix, Arizona 85027
623-580-5500

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It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

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1.0 INTRODUCTION/PURPOSE AND NEED

1.1 Introduction

The Bureau of Land Management (BLM), Agua Fria National Monument (AFNM) proposes to fully process the term grazing authorization on the Horseshoe Allotment (Allotment) (Figure 1). The Allotment is located in the southeastern portion of Yavapai County, Arizona. The Horseshoe/Copper Creek Coordinated Resource Management Plan (CRMP), was developed to provide area-specific management in partnership with the Tonto National Forest (Tonto NF), Cave Creek Ranger District, Arizona Game and Fish Department (AGFD), and multiple stakeholders (Appendix 1). The CRMP identifies the need for many of the management actions proposed in this document. A Land Health Evaluation (LHE) was prepared for this Allotment in 2018 (Appendix 2).

The AFNM was established under Presidential Proclamation 7263 issued on January 11, 2000 under the Antiquities Act of 1906 (Appendix 3) (34 Stat. 225, 16 U.S. Code 431A). The AFNM was created to protect an array of scientific, archaeological, historical, and biological “objects.” These monument objects include one of the most significant systems of late prehistoric sites in the American Southwest, with hundreds of archaeological sites such as stone-masonry pueblos, cliffs covered with distinct rock art symbols, and extensive agricultural terraces used as ancient farms.

There are also historical sites that are remnants of ranching, sheep herding, mining, and military activities during the 19th and 20th centuries. Monument objects also encompass an expansive mosaic of semi-desert grassland, cut by ribbons of rare riparian forest, that provide habitat for a wide array of sensitive and endangered wildlife species. These include native fish species in the Agua Fria River and its tributaries.

The Proclamation governs how the provisions of the Federal Land Policy and Management Act of 1976 (FLPMA) will be applied within the AFNM. Along with FLPMA, the National Environmental Policy Act (NEPA), and other legal mandates, it provided direction for the preparation of a management plan which was approved in 2010 (BLM 2010).

The Proclamation states the following regarding livestock grazing in the AFNM: “Laws, regulations, and policies followed by the Bureau of Land Management in issuing and administering grazing leases on all lands under its jurisdiction shall continue to apply with regard to the lands in the monument.” The Proclamation did not require the BLM to complete a separate grazing compatibility document, nor did the Proclamation close allotments within the AFNM to livestock grazing.

This Environmental Assessment (EA) has been prepared to analyze and disclose the potential environmental consequences associated with the Proposed Action and alternatives for livestock management on the Allotment. The analysis was conducted in accordance with the NEPA, the Council on Environmental Quality (CEQ), regulations implementing NEPA (40 Code of Federal Regulation (CFR) 1500-1508), and guidance provided under BLM NEPA Handbook H-1790-1 (2008).

1.2 Purpose and Need

The purpose of this action is to consider livestock grazing opportunities on public lands where consistent with management objectives, including the BLM *Arizona Standards for Rangeland Health and Guidelines for Livestock Grazing Management* (Standards) (Appendix 4).

The need for this action is, established by the Taylor Grazing Act of 1934, the FLPMA, Fundamentals of Rangeland Health (43 Code of Federal Regulations (CFR) 4180), and the AFNM Resource Management Plan (RMP) (BLM 2010), to respond to an application for renewal of an expiring livestock grazing permit or lease to graze livestock on public land.

1.3 Scoping and Issue Identification

Based on comments received from scoping in 2015, the BLM identified five primary concerns that were raised related to the Proposed Action. Some of these issues are either addressed in one or more of the three alternatives, are part of the analysis of the alternatives, and/or have been addressed through mitigation measures incorporated into the Proposed Action as shown directly following the concern.

The primary issues identified during public scoping include:

- How would continued livestock grazing affect cultural resources?
- How would continued livestock grazing affect the health of native, endemic upland vegetation?
- How would continued livestock grazing affect the control of noxious and invasive weeds?
- How would continued livestock grazing affect visual resource management?
- How would continued livestock grazing affect water quality and the health of riparian vegetation?
- How would additional range improvements affect resources within the Allotment?

1.4 Land Use Plan Conformance Statement

Rangeland management decisions in the Agua Fria RMP¹ that pertain to the Proposed Action include:

Desired Future Conditions

- GM-1 “Rangeland conditions conform to the Land Health Standards described in *Arizona Standards for Rangeland Health and Guidelines for Grazing Administration*, which describe the desired conditions needed to encourage proper functioning of ecological processes. These standards are described in greater detail in the above section on Land Health Standards.”
- GM-2 “Watersheds are in properly functioning condition, including their upland, riparian, and aquatic components. Soil and plant conditions support infiltration, storage, and release of water that are in balance with climate and landform.”
- GM-3 “Ecological processes are maintained to support healthy biotic populations and communities.”

¹ Management decisions applicable to Rangeland Management (GM) are numbered and listed on pages 33-35 of the web version Agua Fria RMP ROD (BLM 2010).

Land Use Allocation

- GM-4 “Administer 11 grazing authorizations within the grazing allotment boundaries shown on Map 6.”

Management Actions

- GM-5 “Limit livestock grazing in riparian areas to the winter season (November 1 to March 1).”
- GM-7 “Fence construction and maintenance will follow guidance provided in BLM’s Handbook on Fencing No. 17-41-1.”
- GM-9 “Inventory and/or monitoring studies are used to determine if adjustments to permitted use levels, terms and conditions, and management practices are necessary in order to meet and/or make significant progress towards meeting the Arizona Standards for Rangeland Health and other management objectives.”
- GM-12 “Range improvements needed for proper management of the grazing program will be determined and completed, including repair and/or installation of fences, cattle guards, water developments, and vehicle routes needed to access improvement areas.”
- GM-15 “Management practices to achieve Desired Plant Community (DPCs) will consider protecting and conserving known cultural resources, including historical sites, prehistoric sites, and plants of significance to Native American people.”
- GM-16 “Apply management actions outlined in the Arizona Standards for Rangeland Health and Guidelines for Grazing Administration to recognize and correct potential erosion problems that could degrade other resources, with prioritized emphasis on sites that might directly affect species that have been listed as threatened, endangered, or candidate by the FWS.”

Guidelines for Standard One

- GM-17 “Management activities will maintain or promote ground cover that will provide for infiltration, permeability, soil moisture storage, and soil stability appropriate for the ecological sites. The ground cover should maintain soil organisms, plants, and animals to support the hydrologic and nutrient cycles and energy flow. Ground cover and signs of erosion are surrogate measures for hydrologic and nutrient cycles, and energy flow.”

Guidelines for Standard Two

- GM-19 “Management practices maintain or promote sufficient vegetation to maintain, improve or restore riparian-wetland functions of energy dissipation, sediment capture, groundwater recharge, stream bank stability, thus promoting stream channel morphology (e.g. gradient, width/depth ratio, channel roughness, and sinuosity), and functions suitable to climate and landform.”

Guidelines for Standard Three

- GM-23 “Intensity, season and frequency of use, and distribution of grazing use will be managed to provide for growth and reproduction of plant species needed to reach DPC (Desired Plant Community) objectives.”
- GM-26 “DPC objectives will be quantified for each allotment through the rangeland monitoring and evaluation process. Ecological site descriptions available through the

Natural Resources Conservation Service and other data will be used as a guide for addressing site capabilities and potentials for change over time. These DPC objectives are vegetation values that BLM is managing over the long-term. Once established, DPC objectives will be updated and monitored by the use of indicators for Land Health Standard Three.”

1.5 Relationships to Statutes, Regulations, Manuals and Other Plans

Livestock grazing on public lands is managed according to grazing regulations found in the Code of Federal Regulations (at 43 CFR 4100). The objectives of these regulations are “. . . to promote healthy, sustainable rangeland ecosystems; to accelerate restoration and improvement of public rangelands to properly functioning conditions; to promote the orderly use, improvement and development of the public lands; to establish efficient and effective administration of grazing of public rangelands; and to provide for the sustainability of the western livestock industry and communities that are dependent upon productive, healthy public rangelands” (43 CFR 4100.0-2). 43 CFR 4100.0-2(b) also states, in part, “These objectives will be realized in a manner consistent with land use plans, multiple use, sustained yield, environmental values, economic and other objectives stated in the Taylor Grazing Act of June 28, 1934, as amended (43 U.S.C. 315, 315a-315r); Section 102 of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701) and the Public Rangelands Improvement Act of 1978 (43 U.S.C. 1901(b)(2)).”

The Proposed Action would comply with 43 CFR 4100.0-8 which states, in part, “The authorized officer shall manage livestock grazing on public lands under the principle of multiple use and sustained yield, and in accordance with applicable land use plans.” The Proposed Action also would comply with 43 CFR 4130.2(a) which states, in part, “Grazing permits or leases shall be issued to qualified applicants to authorize use on the public lands and other lands under the administration of the Bureau of Land Management that are designated as available for livestock grazing through land use plans”.

The Proposed Action would be consistent with the Fundamentals of Rangeland Health (43 CFR 4180.1) and Rangeland Health Standards, 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 (BLM 1997).

The following statutes, regulations, or plans apply to BLM-managed lands within the Allotment:

- Taylor Grazing Act of 1934
- Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 et seq.)
- Public Rangelands Improvement Act of 1978
- 43 CFR 4100 Grazing Administration - Exclusive of Alaska
- Arizona Water Quality Standards, Revised Statute Title 49, Chapter II
- Endangered Species Act of 1973, as amended
- Section 106 of the National Historic Preservation Act of 1966, as amended
- National Environmental Policy Act of 1969
- Migratory Bird Treaty Act of 1917, and Executive Order 13186 – *Responsibilities of Federal Agencies to Protect Migratory Birds*

- Addressing Hunting, Fishing, Shooting Sports, and Big Game Habitats, and Incorporating Fish and Wildlife Conservation Plans and Information from Tribes, State Fish and Wildlife Agencies, and other Federal Agencies in Bureau of Land Management (IM-2018-062)
- Secretarial Order 3362: Improving Quality in Western Big-Game Winter Range and Migration Corridors.

1.6 Decision to be Made

The Authorized Officer would decide whether to renew, renew with modifications, or not to renew the term livestock grazing permit. If renewed the Authorized Officer would decide which management actions, mitigation measures, and monitoring requirements would be prescribed for the Allotment to ensure management objectives and Standards are achieved. The Authorized Officer would also decide whether to authorize the range improvements described in Section 2.1.4.

Separately, the Authorized Officer would issue a Decision Record to authorize the weed treatments in the Allotment as described in the Proposed Action. This Decision Record would be subject to appeal under 4 CFR 4.21.

The BLM would use the following procedures to authorize site-specific treatments:

1. Conduct on-going monitoring to identify locations of weed infestations;
2. Prepare a pesticide use proposal (PUP) or ensure one has been completed;
3. Complete any required compliance under the NHPA, including tribal consultation; and
4. Document whether this analysis is sufficient for the site-specific treatments (in a Determination of NEPA Adequacy [DNA] or other appropriate environmental analysis and ensure land use plan conformance).

2.0 PROPOSED ACTION AND ALTERNATIVES

This chapter describes the alternatives to be analyzed in detail in Chapter 3.0. The interdisciplinary team developed three alternatives: 1) Proposed Action; 2) No Action Alternative; and 3) No Grazing Alternative, based on the analysis and technical recommendations presented in the LHE (Appendix 2) as well as to respond to issues identified during scoping. The alternatives are designed to meet the purpose and need for action, conform to existing land use plans, and satisfy the legal and regulatory requirements for rangeland management.

Actions Common to All Action Alternatives

The following actions apply to each of the action alternatives below.

Arizona Standards for Rangeland Health

All the alternatives were designed to meet the following objectives, as described in the Rangeland Health Standards:

1. Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).
2. Riparian and wetland areas are in properly functioning condition.
3. Productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained.

Table 1. Comparison of the Alternatives.

Action	Proposed Action	No Action Alternative	No Grazing Alternative
Livestock Grazing Authorized	Yes	Yes	No
New Range Improvements Authorized	Yes	No	No
Weed Treatment Study Plots	Yes	No	No
Weed Treatments	Yes	No	No
New Riparian Enclosures	Yes	No	No
Adaptive Monitoring Requirements	Yes	Yes	No
Reductions in Livestock Intensity	Yes	No	Yes

2.1 Proposed Action

The Proposed Action is to renew the Allotment grazing authorization for a period of 10-years with the terms and conditions, as well as proposed new range improvement projects. Specific goals and objectives, which represent the desired future conditions for the Allotment, have been developed and are listed in Appendix A of the CRMP. The Proposed Action consists of six sections as derived from the CRMP:

- 1) Wildlife management;
- 2) Heritage resources management;
- 3) Livestock grazing management;
- 4) Range improvement improvements projects;
- 5) Rangeland research projects, and;
- 6) Natural and heritage resources monitoring.

Although the CRMP applies to both the Horseshoe and Copper Creek allotments, actions identified in the Proposed Action in this EA apply only to the BLM-administered Horseshoe Allotment (Figure 1).

2.1.1 Wildlife Management

Biological goals and objectives have been developed in the CRMP for both long- and short-term timeframes to improve wildlife habitat for both terrestrial and aquatic wildlife. Many of the goals and objectives that have been developed have been based upon the guiding principles of using adaptive management in the Allotment.

Focal Species: The goals, objectives, strategies, and actions identified within the CRMP were developed to ensure habitat is maintained and/or improved for all fish and wildlife species. However, specific wildlife species associated with specific habitat types (e.g. semi-desert grasslands and riparian deciduous forests) were used for planning purposes and influenced the development of multi-resource objectives, strategies and actions. It is presumed that by using these species for planning purposes, implementation level actions would maintain or improve habitat conditions for most wildlife species found within the Allotment.

Table 2. Wildlife Focal Species for Riparian and Upland (Terrestrial) Ecosystems.

Riparian Obligate Species		Terrestrial Grassland Species	
Common Name	Scientific Name	Common Name	Scientific Name
Western Yellow-Billed Cuckoo	<i>Coccyzus americanus</i>	Pronghorn Antelope (fawning)	<i>Antilocapra americana</i>
Northern Mexican Garter Snake	<i>Thamnophis eques megalops</i>	Various Grassland Bird Species	-
Gila Chub, Gila Topminnow	<i>Gila intermedia, Peociliopsis occidentalis</i>	-	-

In addition to management of habitat quality for the benefit of wildlife, wildlife population management objectives would be implemented to maintain diversity and species population trends as listed below:

- Build riparian exclosures around Silver Creek, and many springs to protect sensitive areas and resources, including Gila chub;
- Maintain existing water sources to improve water distribution for both wildlife and livestock;
- Suspend surface water diversions of Indian Creek, Silver Creek and the Agua Fria River to improve surface water availability; and
- Stock Gila topminnow into Silver Creek when appropriate.

Adaptive Management: Many actions have been developed in the CRMP to benefit fish and wildlife and habitats upon which they depend. These actions would be implemented by actively and adaptively managing grazing across the Allotment to ensure habitat requirements for wildlife are maintained and/or improved. Other actions include building/removing range improvement projects (Section 2.1.4), constructing exclosures and supplemental stockings of threatened and endangered species. The specific actions that are intended to benefit fish and wildlife that may be implemented based on monitoring are listed below:

- Adjustments in timing, duration, frequency of livestock use to:
 - Maintain key forage for wildlife by actively managing livestock.
 - Maintain adequate pronghorn fawn hiding cover in fawning areas.
- Implement utilization thresholds in upland and riparian areas to maintain and improve habitat the vegetative community and the ecological services it provides;
- Limit livestock use of riparian areas during the winter season (November 1 to March 1) to maintain riparian health;
- Construct new water sources where appropriate to improve water availability to wildlife;
- Build, maintain and relocate fences with wildlife friendly designs to reduce entrapment and/or injury, and improve permeability and access to water for wildlife; and
- Stock Gila topminnow into Silver Creek and Copper Creek to increase threatened and endangered species populations.

Refer to the CRMP (Appendix 1) for more information about triggers and responses.

2.1.2 Heritage Resources Management

The Allotment falls within one of the richest cultural landscapes in the American southwest, the Perry Mesa National Registered Archaeological District, the nation’s largest Archaeological District. Information concerning modern human impacts to archaeological sites and features is well documented; however, information about impacts from livestock grazing to archaeological sites and features is limited. Therefore, goals and objectives have been developed within Appendix A of the CRMP to better manage heritage resources, especially in relationship to livestock grazing.

Adaptive Management: Cultural resource areas identified as being impacted by humans and/or livestock would be managed using the principles of adaptive management to assist in mitigating the situation. The specific actions that are intended to benefit heritage resources and some possible mitigation measures would be implemented based on monitoring are listed below:

- Build fences around cultural sites;
- Block closed or illegally built roads to cultural areas;
- Use salt or mineral supplements to entice livestock away from cultural areas; and
- Adjust livestock numbers/class; or completely removing livestock from areas with high cultural significance.

Monitoring is also an important part of adaptive management for cultural resources.

2.1.3 Livestock Grazing Management

Historical grazing management, prescribed fires and wildfire has left some areas of the Allotment in less than desirable condition (BLM 2018). The overall theme of the CRMP calls for conservative use of the forage and water resources in the Allotment to improve resource conditions.

Livestock Numbers: Total permitted numbers would range from 0 to 381 cattle (0 to 4,572 Animal Unit Months (AUMs) for up to 12 months annually. AUMs are defined as “a month’s use and occupancy of range by one cow, bull, steer, heifer, horse, burro, mule, 5 sheep, or 5 goats over 6 months of age at the time of entering public lands” per 43 C.F.R. §4130.8-1(c). Natural prongey

under six months of age, provided they do not become 12 months of age during the authorized period, upon entering public lands or lands administered by BLM or that are born during the authorized grazing period are not included as part of their annual allocation of AUM's per 43 C.F.R. § 4130.8-1(c). The proposed amount of livestock use would be authorized on a yearly basis. It would be expected that during normal precipitation and forage growth years, the lessee would likely use between 2,500-3,000 AUMs in the Allotment on an annual basis. The Silver Creek and Long Gulch enclosures would reduce acres available to livestock grazing by approximately 884 acres (Table 3, Figure 3). However, AUMs would remain the same as the No Action Alternative because utilization thresholds have not been reached; indicating that the proposed small reduction in acreage would have a minimal impact on the amount of forage available and that utilization would remain within acceptable levels.

Table 3. Proposed Pasture Realignments and Acreage Adjustments.

Pasture	Current Acreage	CRMP Adjusted Acreage
North River	1,639	1,031
South River	3,586	2,104
Boone Tank	4,181	2,550
Double Tank	4,037	4,278
Silver Creek	1,573	1,413
Indian	528	0
New Mill	6,381	6,382
Copper 1	758	758
Copper 2	497	497
Joes Hill	6,459	6,459
Lousy	2,630	2,630
Upper Agua Fria†		1,468
Lower Agua Fria†		1,812
Silver Creek Enclosure		766
Long Gulch Enclosure		118
Total	32,269	32,264

†Denotes newly proposed riparian pastures. No livestock use would be authorized in the Agua Fria riparian pastures outside of the November 1 to March 1 use period (BLM 2010). The discrepancy in total acreages are likely a result of GIS mapping inconsistencies.

Grazing System: The proposed grazing system would use an adaptively managed, rest rotational grazing system to move livestock in single or multiple herds through pastures until scheduled use dates are met, or until forage utilization thresholds (“triggers”) are met in upland and riparian areas (Appendix 1). After livestock grazing, the lessee would rest a pasture for at least one cool and warm growing season before returning with livestock. There may be instances where the lessee would be prescribed to use livestock as a tool for weed treatments of invasive annual grasses (e.g. wild oats) by the BLM, which may decrease the amount of rest between grazing cycles.

Within the Allotment, no hot season grazing would be authorized in any riparian areas from March 1 to October 31 annually, as directed by in the AFNM Record of Decision (ROD) and Approved RMP (BLM 2010).

Adaptive Management: Livestock use would be managed using adaptive management strategies. Adaptive management is a tool that uses documented results of management actions to continually modify management in order to achieve specific objectives. Management is designed to provide sufficient flexibility to adapt management to changing circumstances. Monitoring of forage availability and utilization, range readiness and resource conditions, and other short and long-term monitoring data would be used to determine whether management is being properly implemented and whether actions are effective at achieving or moving toward desired conditions. If monitoring indicates that desired conditions are not being achieved, an adaptive management decision would be used to modify management. Such changes may include annual administrative decisions to adjust the specific number of livestock and/or AUMs, specific dates for grazing, class of animal, or pasture rotations. However, such changes would not exceed limits for timing, intensity, duration and frequency defined in the grazing permits. For more information on monitoring, see the CRMP (Appendix 1).

Table 4. Terms and Conditions for the Allotment.

Allotment	Pasture	Livestock Number Kind	Begin Date	End Date	Percent Public Land	Type use†	AUMs	
Horseshoe		381	Cattle	03/01	02/28	100	Adaptive	4,094
	Upper Agua Fria	381	Cattle	11/1	03/01	100	Adaptive	214
	Lower Agua Fria	381	Cattle	11/1	03/01	100	Adaptive	264

†Type use adaptive provides the lessee with maximum flexibility of use in their operation. The AUMs will not be exceeded however the number of livestock would be allowed to exceed the authorization. An increase in the number of livestock would also shorten the duration of the grazing period to comply the available AUMs.

Proposed Lease Terms and Conditions: The following proposed terms and conditions would be added to the grazing lease for the Allotment:

- All wildlife troughs would be left full of water and operational year-round for wildlife accessibility, unless in limited circumstances where extreme freezing conditions may damage facilities or extreme droughts limit water availability.
- When entering the next scheduled pasture, all livestock would be removed from the previous pasture within two weeks.
- Lessee would ensure that enough time is allowed to remove livestock to meet the pasture move date(s) and avoid unauthorized and/or excessive use.
- Lessee would ensure adequate range improvements to be in functioning condition prior to entering the next scheduled pasture.
- Any changes in the grazing schedule for any reason must be requested in writing at least 30 days before the requested changes are proposed to occur and be approved by the BLM Authorized Officer in writing.

- Supplementation feeding is limited to salt, mineral, and/or protein in block, granular, or liquid form. If used, these supplements must be placed at least one-quarter (1/4) mile from livestock water sources and known cultural sites, and one-eighth (1/8) mile away from major drainages and washes, sensitive wildlife habitat, and designated recreational sites. Supplements would be removed from pastures when cattle have left an area, and not placed within a pasture until the cattle arrive. Additionally, supplements would not be placed in the same location(s) each year.
- The lessee must properly complete, sign and date an Actual Grazing Use Report Form (BLM Form 4230-5) annually. The completed form(s) must be submitted to the BLM, Hassayampa Field Office (HFO) within 15 days from the last day of authorized annual grazing use (43 CFR 4130.3-2 9d)).
- If in connection with Allotment operations under this authorization, 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, the permittee shall stop operations in the immediate area of the discovery, protect the remains and objects, and immediately notify the Authorized Officer of the discovery. The permittee shall continue to protect the immediate area of the discovery until notified by the Authorized Officer that operations may resume.

2.1.4 Rangeland Improvement Projects

The Proposed Action includes new range improvement projects to promote better livestock grazing distribution, provide reliable sources of water for wildlife, and reduce surface water diversions from riparian areas (Figure 2, Table 5). The proposed improvements projects also incorporate fences to exclude the North River and South River riparian areas from livestock grazing during warm periods (March 1 to October 31) (Figure 3). Additionally, the Proposed Action includes a permanent exclosure fence around the Silver Creek riparian area to exclude Gila chub designated critical habitat from the added pressure of livestock grazing. The Proposed Action includes three proposed water wells, approximately five 10,000-gallon water storage tanks, approximately 17 miles of pipelines, approximately seventeen 500-gallon watering troughs, and removal of old range improvements (Figure 2, Table 5). Construction would take place outside of critical pronghorn fawning season (March 1 to June 1) in designated fawning areas located on mesa tops on the east side of the Allotment. To avoid the yellow-billed cuckoo breeding season, proposed projects near or in riparian areas would be constructed between October 1 to April 30.

Table 5. Proposed Range Improvement Projects.

Project #	Pasture	Approx. Length (Miles)	Description
1	North River South River	2.1	Pipeline connecting four troughs to well and storage tank
2	North River South River	4.7	Fence paralleling the Agua Fria River on the west side to make upland and riparian pastures
3	Boone Tank	2.2	Fence paralleling Indian Creek on the east side to make upland and riparian pastures and exclude Long Gulch
4	Boone Tank	0.7	Remove existing fence
5	Boone Tank	1.9	Well, storage tank, pipeline, and three troughs
6	Boone Tank, Double Tank	3.6	Fence off Silver Creek and provide for vehicle and livestock crossing
7	Boone Tank	1.4	Remove existing fence
8	Silver Creek, Double Tank	1.8	New well, storage tank, and three troughs
9	New Mill	< 0.1	Wildlife trough New Mill windmill
10	Joe's Hill, New Mill	8.4	Pipeline, four troughs, two wildlife troughs, and storage tank
11	Joe's Hill, Lousy	2.6	Pipeline, storage tank and three troughs
12	Boone	< 0.1	Maintain road
13	North River, New Mill, Joe's Hill	N/A	300 feet square fenced, three vegetation study plots

Access for new range improvement projects would follow existing roads and trails (open and administrative) wherever possible to limit the footprint of construction activities. Wherever possible, trough locations would also be located in areas that have previously been disturbed by livestock (e.g. dirt reservoirs). Class III cultural pedestrian surveys have been completed for all of the proposed improvements. Proposed locations were adjusted to avoid impacts to cultural resources. All ground disturbing activities would be monitored using an approved archaeologist. Any discovery of subsurface remains and/or cultural resources would immediately stop construction activity.

Maintenance responsibilities for range improvement projects would be assigned to the livestock grazing lease holder.

Corrals: Two of the corrals located in the Double Tank and Joe's Hill pastures (Figure 2, Table 3) are in disrepair and would need to be reconstructed. The lessee has indicated interest in following the guidance and instruction of low-stress livestock handling expert Dr. Temple Grandin. Dr. Grandin has authored several scientific papers on low-stress handling and has shown beneficial benefits to livestock production from following such techniques (Grandin 2008 and 2011). All corral designs would mimic designs that have already been implemented by Dr. Grandin.

Wells: The Proposed Action includes several wells to be drilled or repaired to distribute groundwater through pipelines to watering troughs for both livestock and wildlife use. Three wells have been proposed which are located in the North River, Double Tank, and Boone Tank Pastures (Figure 2, Table 4). It is estimated that the wells would produce up to 150,000-200,000 gallons of

water per year. Wells would be constructed by a class 8 (3 axle) vehicle. Water facility improvements in the Indian Creek area would be constructed between October 1 and April 30 to avoid impacts to Endangered Species Act (ESA) listed species.

The Tonto NF has also proposed several wells to be located in the Copper Creek Allotment. These wells would potentially feed troughs located in the Joe's Hill, Lousy, and New Mill pastures. If the Tonto NF is unable to authorize these wells through their own analysis, these segments would likely be abandoned or revisited by the BLM to be reconfigured. Any reconfiguration of water facilities (i.e. new well location) would be subject to new environmental review.

Pipelines: The Proposed Action also presents pipelines to be associated with the wells previously mentioned. The pipelines would be located in the North River, South River, New Mill, Joe's Hill, Lousy, Upper Agua Fria (proposed), and Boone Tank pastures (Figure 3, Table 4). Water facility improvements in the Indian Creek area would be constructed between October 1 and April 30 to avoid impacts to ESA-listed species. All pipelines would be laid on the soil surface to minimize disturbance to soils, vegetation, and cultural resources. In areas where the pipeline would need to be underground (e.g. near troughs and road crossings), trenches would be no more than 24 inches deep and would be backfilled appropriately.

Watering Troughs (including wildlife only troughs): Several livestock troughs are proposed to be associated with the previously mentioned wells and pipelines. The new troughs would be located in the North River, South River, New Mill, Joe's Hill, Lousy, Upper Agua Fria (proposed), and Boone Tank pastures (Figure 2, Table 4).

Wildlife only troughs are proposed near New Mill and Perry Mill and would be fenced by small (approximately 300 feet x 300 feet) wildlife friendly barbed wire or pipe-rail fences to prevent livestock use. All troughs would have wildlife escape ramps to ensure that wildlife would not become trapped in the troughs. When livestock are moved to other areas of the Allotment, the livestock troughs would be turned off while the wildlife troughs would remain on.

All water troughs and tanks with open tops that are located on public lands within the Allotment would have wildlife escape ramps installed to reduce risk of wildlife drowning.

Fences: The North and South River pastures are proposed to be realigned with the addition of fencing near the Agua Fria River. The Proposed Action would allow the pastures to be managed with the maximum amount of flexibility that is needed for adaptive management. The Proposed Action would also create two new riparian pastures, the Upper and Lower Agua Fria pastures that would only be used during the cool season (November 1 to March 1). A fence that currently acts as boundary fence between the North River and Boone Tank pastures would be removed with the addition of the new fences.

A fence has also been proposed for the western side of the Perry Mesa portion of the Boone Tank pasture. This would create an eastern pasture fence for the Upper Agua Fria riparian pasture. Other fences have also been proposed in the southern portion of the Boone Tank and northern portion of the Double Tank pastures; this would create a riparian enclosure around the Silver Creek riparian area.

All new fences would be wildlife friendly and would be built specified to agency standards (BLM 1989).

Old Range Improvements Removal: The Proposed Action includes the removal of unnecessary fences and an existing steel pipeline (Figure 3, Table 4). The pipelines have historically pumped water from the Agua Fria River, Indian Creek and Silver Creek to dirt reservoirs located in the upland areas of the Allotment. These improvements would be replaced by the new improvements and would no longer be needed for livestock grazing operations.

Gates and Cattleguards: Gates are commonly used at road crossings to separate pastures. Frequently gates are not properly closed by recreation users which results in livestock movement into inappropriate areas. One cattleguard is proposed on Bloody Basin Road in the North River Pasture.

2.1.5 Weed Treatments

Noxious weeds located in the Allotment would be treated as necessary. Noxious weed monitoring would be carried out at the same time Allotment inspections are conducted. As noxious weed populations are found they would be mapped, monitored, and treated. No weed treatments would be implemented in areas with high densities of cultural resource artifacts or rock art. Vegetative treatments would not occur in areas where cultural resources have been identified unless the current conditions are an ongoing threat to cultural resources and these conditions could be improved with vegetative treatment without greater impact to cultural resources. The public would be notified about any proposed weed treatments through public outreach and signs posted near the treatment areas. Depending on the species, extent of noxious and invasive weed species, the BLM may use one or more of the following treatment methods as outlined in the Phoenix District Integrated Weed Management Plan (IWMP) (BLM 2015).

Manual Treatment

Manual treatments would include the use of hand tools and hand-operated power tools to cut, prune, or remove herbaceous and woody species. Treatments would include but are not limited to cutting undesired plants above ground level; pulling, digging, or grubbing out root systems to prevent resprouting and regrowth; cutting at the ground level or removing competing plants around desired plants; or placing mulch around desired vegetation to limit weed germination or growth (BLM 1991). Hand tools include handsaw, axe, shovel, rake, machete, grubbing hoe, mattock, brush hook, hand clippers, motorized chainsaw, weed whacker, power brush saw, and Pulaski tool.

Manual treatments would typically be used on small, isolated infestations, where BLM sensitive or ESA-listed species occur, or in sensitive habitat areas. Manual treatments are most effective on small weed infestations and when complete root removal is possible (Rees et al. 1996). Manual treatments work well for annual or biennial species with tap roots or shallow roots that do not resprout from tissue remaining in the soil. Sandy or gravelly soils allow for easier root removal. Repeated treatments are often necessary due to soil disturbance and residual weed seeds in the seed bank.

Biological Treatment

Biological treatments involve the use of domestic animals to selectively suppress, inhibit, or control vegetation. The use of domestic animals requires a “prescribed grazer,” such as sheep or goats, to control the top-growth of certain weeds. Sheep consume a variety of forbs, as well as grasses and shrubs, and goats can eat large quantities of woody vegetation; their daily diets can include up to 50% of the weed (BLM 1991). In order for domestic animals to be effective, the right combination of animals, stocking rates, timing (i.e., high intensity and short-duration grazing), and rest must be used to control a particular weed species while minimizing impacts to perennial native vegetation. Grazing should occur when plants are palatable as grazing can damage or reduce viable seeds. Biological treatments are used to reduce the targeted weed population to an acceptable level by stressing target plants and reducing competition with the desired plant species. Biological control agents are most suitable for larger sites where the target plant is well established and very competitive with native species. Biological treatments are most effective when used in combination with other treatments.

Chemical/Herbicides

Chemical treatments involve the use of herbicides to kill or suppress target weed plants and the use of chemicals applied with herbicides that improve their efficiency (adjuvants). Application methods that could be used include spraying from a backpack unit or spray bottle or wiping (wicking) directly onto the foliar tissue, horseback sprayers, and sprayers mounted on all-terrain vehicles (UTVs), and trucks. All chemical treatments would be conducted in accordance with BLM Manual 9011 (BLM 1991) and the *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States PEIS* (BLM 2007a).

Herbicides could be used selectively to control specific vegetation types or non-selectively to clear all vegetation in a particular area. Selection of a specific herbicide and application rate for site-specific use would depend on its effectiveness on a particular weed species, success in previous similar applications, habitat types, soil types, and proximity to water. Herbicide treatments are most effective when used at the optimum time for controlling persistent weeds, including perennial species. Herbicide control is less labor intensive than manual methods and is more effective in controlling larger weed infestations (BLM 2007b).

The Proposed Action includes potential use of four of the 18 herbicide active ingredients approved in the 2007 PEIS (BLM 2007a). The active ingredients include 2, 4-D, glyphosate, imazapyr, and triclopyr. All BLM-approved herbicides have been deemed effective in controlling vegetation, have minor effects on the environment and public health if used properly, are registered with the Environmental Protection Agency (EPA), and were approved for use in the 2007 PEIS. Additional information concerning the herbicides available for use under the Proposed Action is included in the 2007 PEIS (BLM 2007a).

Under the Proposed Action, all application rates, procedures, and restrictions would be within label rates and used according to direction in the 2007 PEIS. The proposed IWM program would incorporate best management practices (BMP) for preventing weed infestations; standard operating procedures (SOP), conservation measures, mitigation measures, and associated monitoring for implementing weed treatments. These are taken from the RMPs (BLM 2010 a, b) and the PEIS and PER (BLM 2007a, b). In addition to the SOPs that are protective of resources/values in the planning area, restrictions would be applied to public lands that are within

all threatened, endangered, candidate, and BLM sensitive species habitat. Any weed treatments in riparian zones would be conducted in a manner to ensure that impacts to non-target species would be minimized and/or avoided. Only herbicides that have been approved for riparian-area application would be used in riparian areas.

Rehabilitation and Revegetation

Where appropriate, rehabilitation of disturbed area may occur to prevent establishment of weeds following manual or chemical treatments or other ground disturbing activities. Revegetation of disturbed soil (except travel ways) would be conducted in a manner that optimizes plant establishment for each specific project site. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching, as necessary.

Where practical, weed-seed-free topsoil may be stockpiled and placed on disturbed areas (e.g., road embankments or landings). Seeds and straw mulch to be used for site rehabilitation (for wattles, straw bales, dams, etc.) would be inspected to certify that they are free of weed seed and propagules. Native materials would be used where appropriate and feasible.

Standard Operating Procedures, Best Management Practices, Mitigation Measures, Monitoring, and Conservation Measures will be incorporated into all applicable weed treatments and are considered part of the Proposed Action (Appendix 5).

2.1.6 Rangeland Research Projects

The Proposed Action includes installing three study plots (approximately five acres) on upland areas of the Allotment (Figure 2) to evaluate weed treatments of non-native and invasive grass species such as wild oats (*Avena fatua*) and red brome (*Bromus rubens*) and shrubs such as catclaw acacia (*Senegalia greggii*). Treatment methods would be consistent with the protocols established under the IWMP and may include use of herbicide, manual, or biological methods (or a combination of methods) to reduce or eradicate unwanted species within the Allotment (BLM 2015).

Chemical and manual weed treatments would be implemented within the three study plots using hand tools and sprayers. Chemical application periods would occur during the time/date periods suggested by the chemical manufacturer. All suggested Personal Protective Equipment would be worn as appropriate and recommended by the chemical manufacturer. Reseeding of native plant species would occur within in the plots via hand application without the disturbance of soil.

The location of two study plots have been identified and cultural resources inventories were completed. The location of a third study plot has not been identified and a cultural resources inventory would be completed first. If a cultural site is present, the third study plot would be changed to a location without a cultural site.

The public would be notified about any proposed weed treatments through public outreach and signs posted near the treatment areas. Table 6 outlines BLM-approved chemical herbicides and application amounts that may be used to treat unwanted weed species within the proposed study plots (BLM 2015).

Table 6. Proposed Herbicide Use for Weed Treatment Study Plots.

Herbicide Name (Trade/Common)	Application Amount (Oz/Acre)	Selective Herbicide	Application Method
Imazapic/Plateau	2-3	Yes	Foliar/Soil
Glyphosate/Round-up	6.2-12.4	No	Foliar
Hexazinone/Velpar L.	128-320	No	Foliar or Soil
Imazapyr/Polaris	128-192	No	Foliar
Picloram/Tordon K.	10-30	Yes	Foliar
Dichlorophenoxyacetic acid/2-4D	10-30	Yes	Foliar
Non-ionic Surfactants	Varies	N/A	N/A

Cattle may be used as biological control agents to help with weed treatments through intensively managed prescriptive grazing. Livestock would be used when the invasive plants are at their most palatable and susceptible stage of plant growth. This would first be tested in the study plots and may be applied to other areas of the Allotment provided key species utilization levels are not exceeded.

2.1.7 Natural and Heritage Resource Monitoring

Monitoring as discussed in the CRMP would be conducted to determine if resource conditions within the Allotment are meeting or moving towards the goals and objective of the CRMP and the broader goals and objects identified in the RMP (effectiveness or long-term monitoring).

2.1.8 Livestock Use

Grazing would be managed to achieve long-term goals in pasture key areas. It is the responsibility of permittee to ensure livestock grazing does not exceed vegetative use thresholds.

Table 7. Use Thresholds in the Allotment.

Vegetation	Use Threshold
Upland Herbaceous Use	30-40% of current year's growth
Upland Browse Species	50% of current year's growth
Tobosa grass in Key Pronghorn Fawning areas [†]	Maintain a minimum of 8" average stubble height on Tobosa grass during pronghorn fawning season: late March through June.
Riparian Herbaceous Use	Limited to 50% of plant species biomass and maintain 6-8 inches of stubble height for emergent species such as rushes, sedges, cattails, and horsetails; measured during grazing season.
Riparian Woody Species	Limited to 40% of leaders browsed on upper 1/3 plants up to 6 feet tall

[†]Map of pronghorn fawning areas can be found in Appendix D of the CRMP.

2.2 No Action Alternative

Under No Action Alternative, current livestock grazing management would continue. A grazing permit for the Allotment would be issued for a 10-year period to the holder of the preference for grazing privileges under the current terms and conditions of the permit (Table 3). This would be based on what is authorized in a previous decision for the Allotment (BLM 1997a).

Annual temporarily permitted numbers would be tied to the previous environmental assessment decision which authorized up to 500 adult cattle yearlong between the BLM Horseshoe and USFS Copper Creek allotments. The authorized AUMs for the Allotment would continue at its current level of 4,572 per year, which is approximately 381 head of livestock per year. Livestock use on the Allotment would continue under the existing grazing authorization as it has for the past six years, when the current livestock operator first started. No new range improvement projects or research plots would be authorized. Standard monitoring procedures would continue to be implemented as they have on the Allotments following corresponding agency protocols. The current grazing schedule would remain in place on the Allotment and would be a term and condition of the grazing permit. Under the No Action Alternative, no weed treatments would be authorized by this project, however weed treatments may be separately authorized at any time via the IWMP.

2.3 No Grazing Alternative

Under No Grazing Alternative, livestock grazing would be eliminated from the BLM-administered lands within the Allotment under 43 CFR 4100. The existing grazing permits would be cancelled, reducing the active AUMs to 0 in the Allotment. All maintenance requirements/agreements for upkeep of rangeland improvement projects (e.g. wells, windmills, troughs, fences) would be eliminated with the livestock permittee. Boundary fence maintenance responsibilities would be transferred to the corresponding neighbor lessees and/or permittees with BLM administrated allotments. Interior fences may be removed as funding or workforce allows. Standard monitoring procedures would continue to be implemented as they have on the Allotment following corresponding agency protocols. Under the No Grazing Alternative, no weed treatments would be authorized by this project, however weed treatments may be separately authorized at any time via the IWMP.

Alternative Summary

Utilization levels for the No Grazing Alternative were omitted from Table 8 because use would be restricted to wildlife.

Table 1. Comparison of Utilization Levels Between the Proposed Action and No Action Alternative.

Vegetation	Proposed Action - Use Threshold	No Action Alternative - Use Threshold
Upland Herbaceous Use	30-40% of current year's growth	40% utilization on key upland forage species
Upland Browse Species	50% of current year's growth	40% utilization on key upland forage species
Tobosa grass in Key Pronghorn Fawning areas	Maintain a minimum of 8 inches average stubble height on Tobosa grass during Pronghorn fawning season: late March through June.	Tobosa height below 12 inches
Riparian Herbaceous Use	Limited to 50% of plant species biomass and maintain 6-8 inches of stubble height for emergent species such as rushes, sedges, cattails, and horsetails; measured during grazing season.	50% utilization of herbaceous riparian species

Vegetation	Proposed Action - Use Threshold	No Action Alternative - Use Threshold
Riparian Woody Species*	Limited to 40% of leaders browsed on upper 1/3 plants up to 6 feet tall	N/A

*Designated critical habitat within Silver Creek has utilization limitation on woody species at 30 percent of apical stems. The No Action Alternative does not have woody species utilization limits.

2.4 Alternatives Considered but Eliminated From Detailed Analysis

During public review of the draft EA, the BLM received a suggestion to consider two additional alternatives. These two new alternatives were considered but dismissed from detailed analysis as described below:

Reduced Livestock Grazing, No Vegetation Treatments

A reduced grazing alternative, one with a lower maximum perennially authorized AUMs would not be feasible. Standards 1 and 3 are being met, and Standard 2 is not being met due to wildfire and drought. Livestock are not the causal factor for the non-attainment of Standard 2. Heavy sedimentation from the 2005 Cave Creek Complex Fire continue to adversely impact Silver Creek and ground water pumping from urbanization within the watershedacerbate drought conditions when they occur on the allotment. Also, the recruitment of several riparian obligate plants (BLM 2018) indicates that the seasonal restrictions currently used would lead to attainment of Standard 2 given enough time. The riparian exclosures included in the Proposed Action will ensure that Standards are maintained or improved in those areas. Therefore, BLM determined that a reduced grazing alternative is not needed.

No Livestock Grazing, Vegetation Treatments Only

Under the IWMP, weed treatments could be authorized in the Allotment or elsewhere in the Phoenix District outside of a grazing renewal. Authorized use is not anticipated to increase or decrease with or without weed treatments. Therefore, analyzing a weed treatments only alternative in this document is unnecessary as the IWMP considered the direct, indirect, and cumulative effects from weed treatments and provided a mechanism for the authorization of such treatments. In this EA, this alternative would be similar to the No Grazing Alternative (Section 2.3) which BLM considered. The BLM determined not to analyze this alternative in detail.

3.0 AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

This chapter identifies and describes the current condition and trend of elements or resources in the human environment which may be affected by the Proposed Action or No Action Alternative. The Affected Environment is the same for all alternatives.

This chapter also describes the potential direct, indirect, and residual effects to resources that may result from the Proposed Action or No Action Alternative, as well as identifies the potential monitoring needs associated with the specific resources.

3.1 General Setting

The allotment is located centrally within the AFNM approximately 40 miles north of Phoenix, Arizona (Figure 1). The Allotment is approximately two miles east of Interstate 17 and bisected by Bloody Basin Road and is bounded on the east by the Tonto NF and falls within Yavapai County.

Resources Considered for Analysis

The BLM determined which resource or issues are present and warrant detailed analysis in this Final EA. See Appendix 6 for a list and description of those resources or issues not present in the Allotment, and those resources or issues that are present in the Allotment that do not warrant detailed analysis.

3.2 Types of Effects

In this document, the terms “effect” and “impact” are used synonymously. Effects fall into two categories:

- **Direct:** caused by the action and occur at the same time and place.
- **Indirect:** caused by the action, but occur later in time or further in distance, but are still reasonably foreseeable.

For the purpose of this analysis, direct or indirect impacts are referred to as “impacts.”

For the purpose of this analysis, the duration of the impacts are defined as follows:

- **Long-term:** impacts that would occur over the life of a term livestock grazing permit of 10-years.
- **Short-term:** impacts of limited duration from implementation-level actions such as modifications to range improvements.

For the purpose of this analysis, intensity of the impact is defined as follows:

- **Negligible:** effects are undetectable and immeasurable. See Appendix 6 for those resources or issues present but not affected to a degree beyond negligible.
- **Minor:** effects are apparent, measurable, small, localized, and contained within the footprint of the action.

- **Moderate:** effects are readily apparent and measurable over a larger area but are still mainly within the footprint of the action.

For the purpose of this analysis, the type of impact is defined as follows:

- **Adverse:** impacts that would have a detrimental effect to a resource.
- **Beneficial:** impacts that would have a positive effect to a resource.

The Proclamation identified monument “objects.” Table 9 lists the object and applicable section(s) in this Final EA that considered the potential effects from the alternatives. The Proclamation does not include a list or table of objects. Table 9 is a representation of those objects.

Table 9. Monument Objects Analyzed in this Final EA.

Object Name	Applicable Resources	EA Section(s)
Archeological features and artifacts, historic sites	Cultural Resources	Appendix 3
Vegetation communities	Vegetation Resources	3.2.1-3.3.2
Topographical features	Geologic Resources	No Impacts to this Object
Availability of water	Water Resources	3.7.1-3.7.2
Habitat for sensitive species, wildlife including fish species	General Wildlife, Migratory Birds, BLM Sensitive Species, Threatened or Endangered Species	3.4.1-3.4.4

Resources Considered for Analysis

The following resources are or may be present in the Project Area and may be affected by the Proposed Action, No Action Alternative or No Grazing Alternative.

3.2.1 Affected Environment - Vegetation Resources

Vegetation information presented in this section is described in detail in the LHE (BLM 2018). The report assessed whether the Standards are being achieved on the Allotment. The LHE determined:

- Standard One is being achieved.
- Standard Two is not being achieved. Causal factor(s): drought and wildfire
- Standard Three is being achieved.

3.2.2 Environmental Consequences - Vegetation Resources

Impact Indicators: The health of upland vegetation would be measured by achieving or progressing toward the relevant BLM objectives that are identified in the RMP. An impact indicator of grazing intensity illustrates the differences of grazing use on the Allotment between the alternatives.

Proposed Action

Herbaceous forage utilization would be set at a conservative use level, approximately 40 percent of current year’s growth on key perennial upland species and 50 percent utilization level of upland browse species, allowing for the physiological requirements of vegetative growth and reproduction, and to ensure progress towards meeting Standards and objectives identified in the CRMP. During periods of prolonged drought, as identified by the use of the Standardized

Precipitation Index of -1 (drought), livestock use of forage would be no more than 30 percent on key upland forage species. Soft and hard triggers would include thresholds which are intended to help proactively guide when livestock should be moved to other areas, before permitted use levels are exceeded. This would provide the BLM and permittee the flexibility needed to properly manage livestock use within the Allotment and to adapt to current environmental conditions.

Livestock may adversely affect upland vegetation by reducing plant vigor and productivity, decreasing or eliminating desirable forage species, and causing loss of, or injury to, individual plants from trampling, allowing for the establishment and/or persistence of weed species. This impact would be most apparent near water developments (Fusco et al. 1995). Plant communities may benefit from grazing by increased photosynthesis, increased tillering, reduced shading, reduced transpiration loss, reduction of excess litter accumulation that may physically and chemically inhibit vegetative growth (Loeser et al. 2004, Strand et al. 2014). Reduction in litter accumulation (fuels) may also reduce wildfire fuel loading, flame length, rate of spread and fire intensity (Diamond et al. 2009, Strand et al. 2014). Grazing impacts on upland vegetation resources would be minimized, in addition to the application of triggers and thresholds identified in Table 7. These measures include timing of use, herd management (yearlings), adjustment of stocking rates, addition of range improvements, limiting utilization rates, and conformance with the Standards.

The Proposed Action would limit forage use levels up to 40 percent for grasses, forbs, and shrubs. This would be within the range recommended for moderate grazing in semi-desert grass and shrublands. Ranges in good condition can withstand the higher use level without loss of productivity. Most rangeland grasses and forbs can have 35 percent to 45 percent of their leaves and stems removed every year and still remain healthy and productive so that plants can photosynthesize and manufacture energy to produce more leaves, stems, and seeds (Holechek 1988). With the grazing use stipulations, the Proposed Action would maintain or improve upland vegetation productivity over current conditions by maintaining grazing intensity at lower levels than currently on the Allotment. Overall impacts to vegetation communities from livestock grazing would be adverse, minor, and long-term.

Rangeland Improvement Projects

Proposed range improvement would play a key role in moving current conditions towards desired conditions and helping to achieve management objectives set forth in this analysis. The addition of the proposed fencing, wells, troughs, and pipeline will help BLM improve livestock distribution which would reduce the grazing pressure on upland vegetation and at water points (Ganskopp 2001, Briske 2011). Some areas near proposed projects may experience higher levels of use as livestock congregate around water in arid ecosystems. It is expected that forage use across the Allotment would likely decrease because the proposed range improvement projects, especially the wells, provide additional distribution opportunities for livestock and reduce the overall grazing pressure on upland vegetation by grazing more uniformly across the Allotment (Bailey 2004). This is expected to result in better maintenance of forage cover and cause fewer over all disturbances to watershed, riparian, and soil resources (Appendix C in the CRMP, Bailey 2004). Use around current livestock waters are also expected to decrease because of the additional water troughs would better distribution of livestock around each existing water location, further reducing grazing pressure around livestock waters (Ganskopp 2001). Overall impacts from proposed range improvements would be adverse, negligible to minor, and short- and long-term.

Wells & Storage Tanks

Three wells are proposed on the Allotment. The direct impacts would include disturbance to vegetation around the well site from the well drilling truck. This would be localized to an area approximately 30 feet x 30 feet around the well. Vegetation resources would be impacted by storage tank placement that would impact approximately 100 square feet of vegetation.

Pipelines & Troughs

The proposed range improvement locations were designed to following existing roads and areas that have been previously disturbed, minimizing impacts to existing vegetation. Vegetation would be directly impacted in the short-term by the installation of the proposed pipelines and troughs. Polyethylene pipe going from the proposed wells to troughs would be placed above ground in all areas except at road crossings and near troughs. All pipelines would be placed between 12-24 inches underground using a small excavator or trenching machine (e.g. ditch witch) to dig the trench for the proposed pipelines. All soils removed while trenching would be replaced using hand tools. Disturbed areas would be reseeded using an approved native seed mixes correlated to the appropriate to ecological site (Appendix 1). In areas where putting pipe underneath the soil surface wouldn't be feasible due to rocky substrates, or hard soils (e.g. clay pan), pipe would be laid on top of the ground using a horse and pull behind cart to lay pipe on the ground. Pipelines would be weaved through and around existing vegetation causing minor impacts. Indirect impacts may include the expansion of invasive species into disturbed areas. Disturbed soils would be anticipated to be revegetated within three years.

Fencing

Additional fencing for grazing exclosures and study plots would impact vegetation through the partial clearing of woody vegetation for fence line construction and maintenance, typically six feet on either side of the fence. Additional impacts would occur from livestock and wildlife that may use the fence line as a travel corridor. Livestock grazing and vegetation trampling may increase in these areas.

Study Plots

Weed species within the three 5-acre study plots would be periodically removed through weed treatment actions. The study plots would impact approximately 15 acres of the Allotment.

Weed Treatments

Under the Proposed Action, weed treatments identified in Section 2.5 of this document would be used to control the spread of noxious and invasive weeds within the Allotment. As identified in the IWMP, all treatments have the potential to disturb plant communities within the Allotment. Vegetation may experience trampling during application of herbicides by foot and/or vehicle traffic as well as from equipment. There is also the potential to transport the seeds for noxious, invasive weeds on equipment, vehicles, and clothing. Use of domestic animals to control noxious, invasive weeds could lead to soil compaction, increased erosion from reduced canopy cover, trampling of non-target vegetation. Damage or killing of non-target vegetation may occur from pesticide drift, runoff, run-on, or accidental spills when using herbicides. The extent of these impacts would vary by treatment method, the extent of the presence of noxious weeds and native species, soil types present, weather conditions during application, and the active ingredient used.

Treatments may kill disturbance intolerant species, and free up light and nutrients for early successional species. Implementing SOPs and mitigation measures would reduce potential adverse impacts on vegetation resources. Overall, impacts from weed treatments would be adverse, minor, and short- and long-term.

Common to All Treatment Methods

All of the treatment methods have the potential to disturb native plant communities by damaging or killing non-target vegetation. Indirectly, the IWMP would have long-term, beneficial impacts to native plant communities by increasing the health and vigor of native plant communities, increasing desired native plant species for riparian and upland areas, reducing competition for resources with weeds, creating a more stratified age structure and abundance of native vegetation, and increasing native plant diversity. The degree of beneficial impacts would depend on the number of acres treated and the success of the treatments over both the short- and long-term.

Manual Treatments

Manual methods would use manual and hand-operated power tools to remove the entire plant and to minimize seed production. Direct impacts to vegetation could include trampling, damage, or removal of native plant species. There could also be the potential for spilling oil and fuels from hand-held equipment, which could kill or harm native plants. Indirect, adverse impacts could include replacement of weed species with other, more competitive weed species. Implementing the SOPs and mitigation measures would reduce potential adverse impacts to native vegetation.

Biological Treatments

Biological control by domestic animals could lead to soil compaction from trampling, increased soil erosion from loss of plant cover, and loss of biological soil crusts, which have an important role in hydrology and nutrient cycling (Belnap et al. 2001). Impacts to non-target vegetation could occur from trampling or grazing by livestock. The extent of the effects would depend on the animal species used, the plant species' tolerance to grazing, management of the grazing system (e.g., timing, intensity, duration), and existing site conditions and disturbances.

Chemical Treatments

Herbicides could impact non-target plant species through drift, runoff, wind transport, or accidental spills and direct spraying. Possible adverse effects could include one or more of the following: mortality, loss of photosynthetic foliage, reduced vigor, abnormal growth, or reduced reproductive output. Potential adverse impacts would depend on the extent and method of treatment, soil types present, and weather conditions at time of application. However, implementing SOPs to ensure that spraying does not occur under conditions favorable to drift and of mitigation measures to provide an adequate buffer between target and non-target areas is expected to reduce potential adverse risks.

Indirectly, treatments would likely affect plant species composition of a treatment area and may or may not affect plant species diversity (BLM 2007a). Selective herbicides that target certain types of plants (for example, broadleaf species; 2,4-D) while leaving others such as grasses unaffected have the greatest potential to impact species composition, both

positively and negatively. To minimize adverse impacts, where necessary multiple herbicides should be used to prevent domination by undesirable species. Indirectly, the use of herbicides would benefit plant communities by decreasing the growth, seed production, and competitiveness of target weed plants, thereby releasing native species from competitive pressures (e.g., water, nutrient, and space availability) and aiding in the reestablishment of native species; BLM 2007a). The degree of beneficial impacts would depend on the toxicity of the herbicides to the target weed species, impacts to non-target plant species, and the success of the treatments.

The range of herbicides and herbicide types available to combat weed species present at the would minimize the chance that weeds would become resistant to herbicides that are sprayed in the same location for repeated treatments. Weed resistance to herbicides could be minimized by using multiple herbicides with different sites of action in the same application, alternating herbicides with different sites of action each year, or alternating herbicide use with other effective forms of treatment (BLM 2007a). Implementation of weed treatments provides the greatest likelihood of maintaining and possibly increasing the acreage of healthy rangeland within the Allotment.

Rehabilitation and Revegetation

Rehabilitation through seeding and other revegetation and stabilization efforts would have beneficial long-term impacts due to accelerated establishment of vegetation in treated areas and reduced erosion.

No Action Alternative

Herbaceous forage utilization on the Allotment would be continued at a moderate level, which is up to 40 percent of the current year's growth on key perennial species. This degree of use allows the physiological requirements of vegetative growth and reproduction to be met and ensures progress towards meeting Standards.

The environmental consequences to vegetation resources in the No Action Alternative would be similar to the Proposed Action, except livestock disturbance would be limited to less acreage within the Allotment due to limited water and/or forage availability during certain parts of the year. Also, none of the proposed weed treatments would be authorized under this alternative as a part of the grazing renewal and may affect the attainment of or significantly demonstrating progress toward the Standards for upland vegetation in the long-term. This may have undesired consequences on the various types of plant communities within the Allotment due to the increased frequency and repeated timing of defoliation by livestock, which may lead to less herbaceous species, more woody and weed species over time (Fusco et al. 1995) as well as increased resource competition from noxious, invasive weeds. This impact would be most apparent near water developments (Pinchak et al. 1991, Fusco et al. 1995) and areas near noxious, invasive weed infestations. In drought conditions, use of key upland vegetation species would be 40 percent which is greater than the Proposed Action. This may result in a reduction in plant vigor and recruitment of desired native vegetation compared to the Proposed Action allowing for the potential recruitment of noxious, invasive weeds. An increase in fire severity and intensity would likely occur, providing an opportunity for increases in non-native plant species. The No Action Alternative would likely keep the Allotment in a similar condition to the current state (meeting all Standards in the upland areas) over the term of the grazing authorization; however, additional

measures to address the impacts from noxious, invasive weeds would need to be implemented. Overall, impacts on vegetation communities from the No Action Alternative would be adverse, minor, and long-term.

No Grazing Alternative

Herbaceous forage use on the Allotment would be allocated at 0 percent for livestock, though wildlife would continue to use available resources. Impacts associated with the development of new range improvements would not occur because the improvements would not be authorized. Interior pasture fences within the Allotment may be removed and boundary fences would be assigned to other permittees. No weed treatments would be authorized and would have similar impacts as the No Action Alternative.

Wild ungulates such as pronghorn antelope (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), Coues white-tailed deer (*Odocoileus virginianus couesi*), and elk (*Cervus canadensis*) would still impact herbaceous and browse plant species. However, these impacts are expected to be minor. The physiological growth requirements of the forage plants would be favored in all key areas under this alternative. Therefore, areas on the Allotment would likely increase in desirable forage plant densities and litter. Additionally, there would be an increase in plant species composition and improved vigor of forage plants within the Allotment. Plants that would benefit most from the No Grazing Alternative are grass and forb species. Current year's leaf growth is important for photosynthesis. It is the most digestible part of the plant and is the portion generally removed by grazing animals. The overall forage production (biomass) would be greatest due to the absence of livestock grazing compared to the other alternatives for a short time, however this trend would not be expected to continue long-term due to the persistence of non-palatable noxious and invasive weeds and the responding restrictive growth of desirable forage plants.

Under the No Grazing Alternative, vegetation would improve the most in short-term productivity, vigor, species composition, and formation of new stems compared to the other alternatives. Conversely, in the absence of fire and grazing, native species production, vigor, and composition would likely decrease compared to the Proposed Action and No Action Alternative on some ecological sites; i.e. clayey uplands overtime due to the accumulation of old plant material around palatable plants causing them to be undesirable to wildlife and livestock (Holecheck 2008). Noxious and invasive weeds would also persist and would likely expand within the Allotment without active management. Overall, impacts on vegetation communities from the No Grazing Alternative would be beneficial, minor, and long-term.

3.3.1 Affected Environment - Riparian Resources

Within the Allotment, there are approximately 17 miles of riparian areas including the Agua Fria, Indian, Silver, Bishop, and Larry Creeks (BLM 2018). The LHE determined:

- Standard Two is not being achieved. Causal factor(s): drought and wildfire.
- Standard Three is being achieved.

3.3.2 Environmental Consequences - Riparian Resources

Impact Indicator: The impact indicator of riparian condition was evaluated by comparing the miles of riparian area accessible to livestock grazing between alternatives. Additionally, as proposed/existing water developments vary between alternatives, the dependency on riparian areas

for available water would vary and with that livestock concentrations within them. Impacts were accessed through a GIS exercise in which the approximate linear distance was calculated for identified riparian areas that livestock would have access to between the different alternatives.

Table 10. Approximate Miles of Riparian Used by Cattle: Comparison of Alternatives.

Allotment	Proposed Action Miles of Riparian Available to Livestock	No Action Alternative Miles of Riparian Available to Livestock	No Grazing Alternative Miles of Riparian Available to Livestock
Horseshoe	12.5	17	0

Proposed Action

Under the Proposed Action, livestock will have access to approximately 7.4 miles of the Agua Fria River, 2.2 miles of Indian Creek, 0.8 miles of Silver Creek, and 2.1 miles of Bishop Creek. Use of these areas by livestock would occur during winter season only (November 1 to March 1); the time period where riparian obligate plant species are dormant. Data gathered through monitoring would be used to inform adaptive management actions.

The implementation of the Proposed Action would adopt a stubble height of aquatic emergent herbaceous vegetation to no less than 4 inches to 6 inches and/or 50 percent use, and limit use of riparian obligate woody species to no greater than 40 percent of new leader growth. When use on aquatic emergent vegetation approaches 40 percent and/or a stubble height of 10 inches to 12 inches, and 40 percent use of new leader growth on riparian obligate browse species, adaptive management actions would be implemented.

Stubble height limitations and use thresholds would maintain or improve the riparian plant community by increasing vegetative cover and recruitment. This will ensure these areas continue to meet Standards and DPC objectives. Bank alterations as a result of hoof shear are expected in some areas. Bank alterations would reduce bank stability and remove aquatic emergent vegetation and riparian obligate woody species in these areas. Stubble height maintenance requirements and riparian obligate woody species use limitations would offset these impacts. If monitoring, such as Multiple Indicator Monitoring (TR-1737-23) and woody species belt transects (TR-1737-8), determine DPC objectives are showing downward trends in greenling composition, woody species age class, streambank stability, and cover with livestock as the likely causal factor, additional adaptive management actions would be employed such as temporary closure of pastures, further restrictions on season of use, or reduction in acceptable utilization thresholds. Overall, impacts on riparian resources from the livestock grazing would be adverse, minor, and long-term.

Range Improvement Projects

The Proposed Action includes range improvements that could affect riparian resources. Largely, these range facilities such as fences and water developments would be located in upland areas. However, some fences would cross riparian areas. The purpose of these facilities would be to provide alternate sources of water in upland areas to relieve pressure on riparian areas. Fences located largely in upland areas would provide for more flexible livestock management of riparian areas.

Pruning or removal of live, woody riparian vegetation where fence construction activities cross riparian areas may be required except for the streambank where no live, woody riparian vegetation

would be removed. Ground and vegetation disturbance will be limited to the minimum necessary and only within the immediate area along the fence line. In addition, limited soil disturbance in the form of holes dug for fence poles may also occur depending on the type of fence poles or posts used. Where fence construction crosses riparian areas, construction will be limited to the use of hand tools only, i.e., no motorized track or wheeled equipment (backhoe, excavator, tractor, support vehicle, etc.). Fence posts would not be installed within a waterbody or its streambank. All equipment, materials, and motorized vehicles will be staged outside all riparian areas and motorized vehicles will not enter riparian areas. Soil and vegetation removed or disturbed during construction will be reused onsite, i.e., refill hole, scatter removed vegetation over disturbed areas, etc. Any sediment yield produced by fence construction activities within riparian areas would be limited and dispersed within the immediate area due to existing or scattered ground cover. There would be no measurable effect on water quality or quantity due to fence construction activities within riparian areas. Vegetation damaged during construction would be expected to recover within one growing season.

The Proposed Action would include the construction of an enclosure around Silver Creek, except for a hardened crossing site at the 9023A road. The enclosure would remove livestock from approximately four miles of riparian habitat. Approximately 0.6 miles of Silver Creek would be exposed to livestock grazing and is usually dry except during high flow events associated with floods and is dominated by facultative and facultative wetland vegetative communities. Within the enclosure, aquatic emergent and woody species recruitment would be expected to increase which would provide additional streambank armament. Increased bank stability would be expected to reduce erosion and increased sedimentation potential along the bank.

The crossing site at Silver Creek would concentrate livestock along approximately 100 feet of Silver Creek. This area would be expected to have reductions to both upland and riparian vegetation, soil stability, bank stability and water quality. Small amounts of sedimentation are expected to be released into the stream during livestock crossing activities. However, the hardened crossing site which is well armored with rock and increased vegetation within the enclosure would likely abate any sediment input.

The well located in North River Pasture is on a hilltop approximately one mile from the closest riparian area. The well in Double Tank Pastures is located on a mesa top at least ½ mile from the closest riparian area. Therefore, there would be no potential impact to riparian areas due to geographic isolation. The well in Boone Pasture is approximately 0.1 mile from Indian Creek. Although riparian obligate plant species grow upstream of the proposed well in Boone Pasture, this area and areas downstream are losing reaches, usually dry, support very few riparian obligate species, and have limited potential for riparian obligate recruitment. Overall, impacts on riparian resources from the range improvements would be adverse, minor, short- and long-term.

Weed Treatments

Under the Proposed Action, impacts of weed treatments would be similar to upland weed treatments. Applications of the herbicides identified for riparian use would follow the label instructions to prevent impacts to surface and ground water quality from accidental spills, drift, excessive application of the active ingredient, among other potential impacts. This will also control potential impacts that affect to non-target vegetation, wildlife, and livestock. Vegetation removal

by any of the weed treatment methods could cause short-term increases in surface runoff, which could lead to increased erosion and sedimentation. Increased erosion and sedimentation could reduce surface water quality, exacerbate overland flow, change channel morphology, and increase instream temperatures from loss of shading. Implementing SOPs and mitigation measures would reduce potential adverse impacts on vegetation resources. It is expected that the long-term benefits of noxious, invasive weed removal in riparian areas would reduce sedimentation, improve nutrient cycling, maintain channel morphology, and water quality. Overall, impacts on riparian resources from the weed treatments would be adverse and beneficial, minor, short- and long-term.

Common to All Treatment Methods

Vegetation removal by any of the weed treatment methods could cause short-term increases in surface runoff, which could lead to increased temperature, bank erosion, and sedimentation (Ott 2000). Rates of sedimentation and erosion would be influenced by precipitation events. Increased runoff from precipitation events could scour wetlands and modify their morphology. Sediment loads could also reduce the amount of sunlight available to plants, slowing or reducing plant growth. Increased temperature, erosion, and sedimentation would be reduced and/or eliminated once native vegetation re-established. Increased nutrient flows to nearby wetland/riparian zones could also occur due to reduced nutrient uptake by plants (Binkley and Brown 1993).

Wetland/riparian zones often have mixed vegetation communities of native species and weed species. Removal of weeds along the wetland/riparian banks would improve the health of the wetland/riparian vegetation communities, which improves bank stability, habitat values, and overall wetland and riparian functions. In addition, removal of weeds would reduce the hazardous fuel load, resulting in a beneficial, long-term impact by reducing the risk of more intense wildfires. Intense wildfires could remove most of the plant community, causing an increase in wetland/riparian sedimentation and discharge.

Long-term benefits would be increased vigor, diversity, and reproductive success of desirable species in riparian and wetland habitats, which would reduce erosion, slow the rate of storm-related runoff, improve bank stability, improve hydrologic function, and provide better cover, structural diversity, and food quantity and quality for a variety of wildlife. Overall, impacts on vegetation communities from the No Action Alternative would be adverse, minor, and long-term.

Manual Treatments

Manual treatments would target small areas (100 acres or less) and would cause little soil disturbance or erosion. Individual plants could be directly killed or injured by treatment or trampling by crew personnel. Typically, manual treatments could remove weeds without disturbing the more desirable native species.

Biological Treatments

Biological control by domestic animals could cause mortality and injury to non-target riparian and wetland plants through browse and trampling and alteration of riparian channel/wetland morphology. The degree of effect to wetlands and riparian areas from treatments using domestic animals would be dependent on the timing, duration, and intensity of grazing. Use of grazing animals would follow SOPs listed in Appendix E of the IWMP to minimize adverse impacts to riparian/wetland zones.

Chemical Treatments

Herbicide treatments could have short-term, adverse impacts on species diversity, competitive interactions, species dominance, and vegetation distribution due to potential killing of non-target vegetation through imprecise application and/or drift, surface water runoff, or erosion. Herbicides may indirectly or directly affect the survival, health, or reproduction of non-target wetland or riparian plants or may affect characteristics of these plant communities and their ecosystem functions. In particular, accidental spills near wetland and riparian zones could be particularly damaging to wetland and riparian vegetation. Risks to wetland and riparian non-target species would depend on a number of factors, including the amount, selectivity, and persistence of the herbicide used; the application method used; the timing of the application; and the plant species present.

Removal of weeds could temporarily reduce vegetation cover causing increased sedimentation, nutrient loading, and temperature, and changes to hydrologic conditions. Risks to wetlands and riparian areas from surface runoff would be influenced by precipitation rates, soil types, and proximity to the application area. The four proposed active herbicide ingredients—2, 4-D (salt formulation), glyphosate, imazapyr, and triclopyr (triethylamine salt and a BEE formulations) are approved for riparian and aquatic habitats (BLM 2007a). The aquatic labeled herbicides would not impact water quality if used according to label rates of application. Adverse impacts from herbicide treatments would be minimized by implementing the SOPs and mitigation/conservation measures.

Rehabilitation and Revegetation

Rehabilitation through seeding and other revegetation and stabilization efforts would have negligible short-term impacts due to the minor activity associated with installation. Long-term impacts would be beneficial for wetlands and riparian zones due to accelerated establishment of vegetation and prevention of erosion.

No Action Alternative

Livestock Management

The effects of the No Action Alternative would be similar to the Proposed Action. Livestock will have access to riparian areas during the winter months (November 1 to March 1) which is typically the season of dormancy for riparian obligate plant species. Utilization thresholds would be similar to the Proposed Action, and differences are discussed below.

The No Action Alternative differs from the Proposed Action in a few ways. Silver Creek would not be excluded from livestock grazing and utilization thresholds differ slightly on a few key species. Utilization levels of upland species would be 40 percent. Utilization levels of aquatic emergent vegetation would be 50 percent. These utilization levels would continue to meet DPC objectives throughout much of the Allotment. The No Action Alternative differs from the Proposed Action in that use on riparian obligate woody species would not be required to remain below 40 percent utilization levels. Silver Creek would still have a 30 percent apical stem use limitation because it is managed under an existing Biological Opinion 02-21-03-F-0409-R1 (BLM 2006). This may limit woody species recruitment in riparian areas. However, this effect would be lessened by limiting livestock use in riparian areas to the non-growing season and overall goal of properly functioning riparian areas.

Silver Creek would experience higher livestock use compared to the Proposed Action. Approximately four miles of Silver Creek would be exposed to winter season of use by livestock. As stated above, use of aquatic emergent vegetation and riparian obligate woody species would occur. Bank alterations would also occur. This would result in a reduction of vegetative cover, increased erosion and sedimentation, and a decrease in bank stability compared to the Proposed Action. Overall, impacts on riparian resources from the livestock grazing would be adverse, minor, and long-term.

Range Improvement Projects

No new fences or enclosures would be built under the No Action Alternative. Sedimentation influx and vegetation damage associated with construction activities would not occur. The Silver Creek enclosure would not be built and impacts associated with the hardened crossing site across Silver Creek would not occur. There would be no impacts to riparian resources from proposed range improvements, because none would be authorized

Weed Treatments

The potential risks to non-target riparian and wetland plants from accidental spills, drift, and persistence in the environment would not occur. However, this alternative would have less impact on weeds than the Proposed Action, as no weed treatments would be authorized. Weeds and larger infestations would not be controlled and/or eradicated. Consequently, weeds could continue to spread at a faster rate, outcompeting native wetland and riparian species and contributing to the loss or decline in wetland and riparian functions and values. Noxious, invasive vegetation such as salt cedar along with other weeds would continue to expand along stream corridors, impacting ground water levels, altering stream channel morphology, and increasing fuel loads; contributing to increased wildfire danger. There would be no impacts to riparian resources from weed treatments because none would occur under the No Action Alternative, however weed treatments may be approved separately under the IWMP.

No Grazing Alternative

Livestock Management

Under the No Grazing Alternative, livestock would be removed from the Allotment. Approximately 17 miles of riparian areas would not be exposed to livestock use. This alternative would have the least amount of associated livestock grazing impacts on riparian resources of all of the alternatives evaluated. Other ungulates such as elk and deer would continue to have access to the riparian areas and could potentially contribute to increased streambank alteration, erosion, and reduced plant vigor and cover. Use of aquatic emergent vegetation and riparian obligate woody species by livestock would not occur under this alternative. Bank alterations by livestock would also be eliminated. Recruitment of aquatic emergent vegetation and riparian obligate woody species would be expected to increase across all riparian areas within the Allotment. Increased vegetation and the elimination of livestock induced bank alterations are expected to result in more stable streambanks, a reduction in erosion rates, better high energy water flow dissipation, and the building of floodplains. Deeper pools and a greater diversity of stream channel characteristics are anticipated. Increased vegetation is expected to improve water quality by filtering sediment and contaminations.

Range Facilities

There would be no impacts to riparian resources from range improvements under the No Grazing Alternative, because none would be authorized.

Weed Treatments

Under the No Grazing Alternative, no weed treatments would be authorized by this project, however weed treatments may be separately authorized at any time via the IWMP.

3.4.1 Affected Environment – General Wildlife, Migratory Birds, BLM Sensitive Species

Many wildlife species occupy the Allotment. These include but are not limited to game species such as pronghorn antelope, deer, javelina (*Pecari tajacu*), and bird species including migratory birds, small native and non-native fish, reptiles, and amphibians (BLM 2018). Approximately 1,524 acres (4.7 percent of the Allotment) along the western edge of the Allotment is within Sonoran desert tortoise (*Gopherus morafkai*) habitat Category II.

3.4.2 Environmental Consequences – General Wildlife, Migratory Birds, BLM Sensitive Species

Proposed Action

Under the Proposed Action, livestock would be authorized to use most of approximately 32,360-acre Allotment, excluding the Horseshoe Range which is managed by the AGFD. Portions of Silver Creek and the surrounding upland area, totaling approximately 766 acres, will be excluded from livestock use by a fence. Livestock will continue to be excluded from riparian areas between March 1 and November 1, the time period when riparian plants actively grow. Livestock will have seasonal access to approximately 12.5 miles of 17 total miles of riparian areas.

The number of authorized livestock would vary depending on resource conditions but will not exceed 4,572 AUMs annually. Use of triggers and thresholds would be used to inform stocking rates and pasture use. Livestock directly compete for resources used by wildlife for habitat. Livestock use of vegetation reduces plant vigor, production, decrease forage for wildlife, reduces or eliminates hiding cover, causes trampling, and competes for water resources. Thresholds specifically developed to maintain wildlife habitat may trigger the removal of livestock from pasture, strategically placing mineral blocks, removal of water resources for livestock, a reduction in AUMs, or other adaptive management actions required to meet resource objectives.

Livestock may reduce forage availability and hiding cover for grassland dependent migratory birds, reptiles, small mammals and game species such as pronghorn. Analysis of livestock grazing impacts included approximately 11,337 acres of designated pronghorn fawning grounds and 20,203 acres of designated movement corridors located on the mesa tops on the east side of the Allotment. Livestock use of upland areas would be maintained at conservative levels. The maximum acceptable amount of use on key forage species is 40 percent, key browse species would be limited to 50 percent use, and the maintenance of at least 8 inches of stubble height would meet the minimum requirements for hiding cover and forage availability for pronghorn as well as other wildlife. Additionally, 40 percent use of tobosa and other key forage species would provide open areas for wildlife dependent forbs species to grow. Limiting use of browse species to 50 percent would maintain important forage species such as shrubby buckwheat which is relied upon by pronghorn for winter survival. These conservative use thresholds would also maintain habitat for grassland dependent migratory birds, reptiles, and small mammals. Sonoran desert tortoise habitat

requirements would be maintained by these conservative use thresholds and geographic isolation provided by steep canyon walls which effectively excludes the majority of desert tortoise habitat within the Allotment.

The use of emergent herbaceous vegetation would directly affect many wildlife species by reducing hiding cover and increasing chance of depredation. However, retaining at least four inches to six inches of aquatic emergent vegetation would maintain adequate hiding cover for many small wildlife species. Use of aquatic emergent vegetation and riparian obligate browse would also reduce forage availability for macro-invertebrates which are used opportunistically by many wildlife species. Adequate vegetative groundcover would maintain streambank armament and protection for undercut banks, where the potential for undercut banks exists. Deeper pools and more diverse channel characteristics which would improve habitat for fish species.

The presence of livestock may result in the temporary displacement of some wildlife species and local habitat modifications. Bank alterations by hoof shear would also be expected. Grazing livestock are known to break up root masses and reduce the continuity of herbaceous ground cover in riparian areas (BLM 2006). Areas where emergent herbaceous vegetation occurs would be susceptible to hoof shear. Bank alterations through hoof shear have similar effect to the riparian obligate wildlife species and proposed critical habitat as the aforementioned emergent herbaceous vegetation use.

Human activities associated with livestock management such as gathering, trailing and supplement placing may displace wildlife while the activity occurs. This effect would be short-term in duration, likely to last less than a day or two. Livestock may temporarily displace wildlife species when present at water sources, but wildlife are expected to return when livestock are not present.

Supplements will be placed $\frac{1}{4}$ mile from water sources and $\frac{1}{8}$ mile away from drainages. This would improve livestock distribution and further reduce impacts to riparian dependent wildlife and other areas used by wildlife. Increased livestock distribution would also facilitate the maintenance or improvement of DPC objectives across the Allotment. Overall impacts to general wildlife, BLM migratory birds, and BLM sensitive species from livestock grazing would be beneficial and adverse, minor, and long-term.

Range Improvement Projects

The Proposed Action includes the implementation of a number of range improvements including water sources, pipelines, and fences (Figures 2 and 3). These range facilities are needed to increase management flexibility and provide reliable water sources for both livestock and wildlife. Wildlife such as pronghorn and mule deer would benefit from more reliable water sources than currently exist. Movement corridors for pronghorn would be improved because of reliable water sources. It is expected that wildlife species would be temporarily displaced during the construction and/or maintenance of both existing and proposed range improvement projects. However, it is anticipated that wildlife species would remain in the general vicinity of the range improvements and would likely return once maintenance and/or construction activities cease.

The quality of habitat immediately surrounding water sources, particularly dirt tanks, would continue to be degraded for some wildlife species but may benefit other species. Higher

percentages of bare ground, higher utilization levels, and shorter vegetation heights are expected around water sources compared to areas where livestock do not congregate. This effect would be expected to gradually diminish proportionally to the distance from water. Effects are expected to be greatest immediately surrounding water sources and negligible at distances greater than ¼ mile. The duration of habitat degradation around the water sources would be indefinite as long as the water source is used by livestock and/or wildlife. The loss in vegetation surrounding around water sources would favor some species, particularly grassland dependent migratory birds that prefer low vegetation densities and heights. However, pronghorn fawn hiding requirements may not be met within ¼ of a mile surrounding water sources. This effect may be mitigated by a net increase in permanent water sources which may benefit many wildlife species including pronghorn, mule deer and other wildlife species since water is often a limiting factor in population growth (AGFD 2013).

Approximately 5.5 miles of fences would be constructed to exclude Silver Creek and create riparian pastures in the Agua Fria River and Indian Creek. New fences and exclosures may marginally decrease habitat permeability for some species such as pronghorn and deer. However, fences constructed with smooth top and bottom wires decrease this impact and avoid injuries induced by barbed wire.

The proposed fence would be built in the upland habitat would run roughly parallel to the stream. Break-away (water gap) fences would be installed where the fence crosses Silver Creek. Drilling with motorized hand tools may be required to set posts in bedrock areas, especially when constructing water gap fences.

The Silver Creek Exclosure will eliminate livestock use of approximately four miles of riparian habitat. The Silver Creek Exclosure would reduce bank alteration due to livestock trampling, further reducing stream bank erosion. As banks stabilize, the stream would likely develop deeper pools and more diverse channel characteristics which would improve wildlife habitat. The Proposed Action should have little adverse effect on the upland wildlife species in the area. The Silver Creek Exclosure would result in improved wildlife habitat conditions compared to the No Action Alternative and impacts would be the same as the No Grazing Alternative.

The crossing areas on the 9023A road would be constructed to allow livestock to cross from one pasture to another and for livestock watering (Figure 3). The crossings would consist of two parallel wire fences spanning across the stream, adjoining the exclosure fence in the upland habitat. The crossing areas would be located where the stream channel is armored by large rock or bedrock, making these areas more resistant to livestock impacts (Figures 2 and 3). The width of the crossing would be approximately 60 feet wide to limit livestock loafing. The crossing area would have gates in the upland habitat so that the crossings could be closed when they are not in use or when the water gap fences are damaged.

The exclosure fence will be inspected and repaired, if necessary, prior to turning cattle out into riparian pastures. The water gap fences will also be inspected and repaired, if necessary, after flood events when cattle are in riparian pastures. Overall impacts to general wildlife, BLM migratory birds, and BLM sensitive species from range improvements would be beneficial and adverse, minor, and long-term.

Study Plots

The construction and use of three 5-acre study plot exclosures for weed treatments would temporarily displace wildlife during construction. This effect would be expected to last less than one week per exclosure. Weed treatments via manual, biological, and herbicide applications within the exclosures would reduce forage availability, forage quantity, and hiding cover for pronghorn and other grassland dependent species. These effects may degrade habitat for multiple years. However, these small treatment study plots would degrade less than one percent of designated fawning grounds and even less upland habitat.

Reseeding of native species would occur in the same footprint of weed treatment study plots. It would take multiple years to reduce non-native plant species and allow native species to recover in adequate numbers and size to improve wildlife habitat. Human activities associated with reseeded may displace wildlife during installation of fencing.

Weed Treatments

Common to All Treatment Methods

Weed treatments could temporarily displace wildlife species from treatment areas due to removal of vegetation or associated public presence and noise. If surrounding habitats were already at or near capacity in the number of wildlife species they could support, displaced wildlife species may have lower productivity or die. Removal of vegetation in aquatic habitats could reduce vegetation cover along stream banks and wetland/riparian banks, which could increase water temperature and sedimentation. However, removal of weeds would likely have beneficial, long-term impacts by restoring native plant communities, thus restoring wildlife habitat. In addition, the removal of weeds could reduce the hazardous fuel loads from habitats, reducing the likelihood of future intense wildfires. Unplanned and uncontrolled fire could consume large tracts of wildlife habitat, having an adverse effect on wildlife populations.

Indirect effects would occur from the removal of vegetation, as seeds, berries, and other plant materials utilized as food could decrease in abundance. However, over the long-term, effects of vegetation removal could be positive if the species composition of the area changed to favor species of greater food value. Indirect effects could also occur if prey items, such as insects, were affected.

All treatment methods would reduce weeds to varying degrees, allowing native species to increase in abundance, which would be expected to have a long-term positive effect on migratory bird and wildlife habitat. Overall impacts to general wildlife, BLM migratory birds, and BLM sensitive species from weed treatments would be beneficial and adverse, minor, and long-term.

Manual Treatments

Manual treatment impacts would be short-term and site-specific due to potential soil disturbance from weed removal and potential displacement of birds from the treatment areas due to public presence and noise from hand-held power tools (e.g., chainsaws). Public presence and noise from manual treatments could temporarily displace mobile wildlife species (e.g., deer, pronghorn) from the treatment areas and cause stress to wildlife species that are less mobile (e.g., rodents, lizards).

These effects would be short-term and are not likely to adversely affect the long-term health and habitat use by wildlife in the treatment areas. Manual treatments would be most effective in sensitive areas, such as wetland and riparian habitat, as it has more control over vegetation impacts than other methods.

Biological Treatments

Using domestic livestock to control weeds could affect non-target plant species. Domestic livestock does allow for treatment of larger areas and may stimulate new growth of native plant species. If used in moderation, domestic livestock could alter the productivity and composition of plant communities to benefit wildlife habitat (Payne and Bryant 1998). Goats have been shown to effectively control shrubs and in sensitive areas such as near streams and wetlands (BLM 2007a, 1991). Use of domestic livestock could remove residual cover required by ground-nesting birds or alter species diversity and density in riparian habitats, making areas less suitable for migratory birds. Livestock could potentially harm or trample nests, eggs, and hatchlings.

Over time, the species composition of the plant community would change as treated weeds die and native vegetation is restored. This would benefit species that favor native vegetation but may temporarily adversely affect species that adapted to weed species (e.g., tamarisk used as a food source or nesting and foraging habitat). However, as invasive species are replaced by native species and the plant communities are reestablished, it is probable that the wildlife species adapted to weed species would use the restored native plant communities. Indirect impacts to wildlife from biological treatments would be beneficial and long-term as native plant communities are restored and hazardous fuel loads are reduced, making future intense, wildfires unlikely.

Livestock may be used for weed treatments on Perry Mesa, intended to improve the vegetative community to meet DPC objectives. Grazing would result in a short-term (< 5 years) decline in the quality of habitat for grassland dependent migratory birds. A loss in vegetation would also locally reduce small mammal populations which would reduce prey for golden eagles (*Aquila chrysaetos*) which are known to breed cliff faces of the adjoining Cross Y Allotment.

Chemical Treatments

Wildlife species may be harmed directly through contamination of food, water sources, habitat alteration, or direct contact. Use of timing restrictions would minimize impacts to wildlife. These timing restrictions would exclude treating during critical wildlife breeding or staging periods, including those for big game such as deer, and pronghorn. SOPs, mitigation measures, and conservation measures would be implemented to reduce potential adverse impacts. The presence of crews and the use of vehicles associated with herbicide applications may temporarily disturb nesting birds. The extent of impacts would depend on the season and the proximity to nesting birds. Although adult birds would be able to fly away from treatment sites, some birds could be inadvertently exposed to herbicides, as could nests, eggs, and young, flightless birds.

Field studies suggest that appropriate herbicide use is not likely to have significant direct toxicological effects on wildlife (e.g., Cole et al. 1997, Sullivan et al. 1998). Under the Proposed Action, the four herbicides proposed for use—2,4-D, glyphosate, imazapyr, and triclopyr—could have adverse health impacts on birds. Based on the Environmental Risk Assessment (ERAs) (BLM 2007a) direct spray by 2, 4-D, glyphosate, or triclopyr at the typical application rate, or by imazapyr at the maximum application rate. Adverse impacts could also result from touching plant

materials sprayed by 2, 4-D at the typical application rate, or by glyphosate or triclopyr at the maximum application rate. Based on the results of the ERAs ingestion of invertebrates sprayed by 2,4-D, glyphosate, or triclopyr at the typical application rate, or by imazapyr at the maximum application rate, would also potentially result in adverse health effects.

The presence of crews and the use of vehicles associated with herbicide applications may temporarily disturb nesting birds. The extent of impacts would depend on the season and the proximity to nesting birds. Although adult birds would be able to fly away from treatment sites, some birds could be inadvertently exposed to herbicides, as could nests, eggs, and young, flightless birds.

Indirect, adverse effects could occur if substantial habitat loss of vegetation occurred in suitable nesting habitats, particularly at nest sites. These effects would likely be short-term in nature. Indirect, long-term benefits from removal of weeds would include improvements in habitat and ecosystem function for all migratory birds and reducing the potential for intense, wildfires. SOPs and mitigation/conservation measures listed will be implemented to reduce adverse impacts to migratory birds and their habitat. These results indicate a moderate risk from direct spray of 2, 4-D applied at a moderate rate and low risk from glyphosate and triclopyr applied at a low rate. Based on the ERA, there is low risk from contact of vegetation sprayed with 2, 4-D at the typical rate and a low risk from vegetation sprayed by glyphosate and triclopyr at maximum rates. Based on the results of the ERAs ingestion of invertebrates sprayed by 2,4-D, glyphosate, or triclopyr at the typical application rate, or by imazapyr at the maximum application rate, would also potentially result in adverse health effects. Herbicides used properly or improperly could potentially harm wildlife individuals, populations, or species (USFS 2005). Harm at the population or species level is unlikely for general wildlife species because of the size and distribution of treatment areas relative to the dispersal of wildlife populations and the foraging area and the behavior of individual animals. Adverse impacts from herbicide treatments on wildlife species and habitat would be minimized by implementing the SOPs and mitigation/conservation measures.

Aquatic wildlife species could come into contact with herbicides if sprayed formulations were to enter water bodies during the application process through direct spray, accidental spray by terrestrial herbicides, or off-site drift or surface runoff of herbicides sprayed in upland habitats near water bodies. Herbicides could also enter aquatic habitats during an accidental spill before, during, or after the treatment. The four proposed herbicides are approved for use in aquatic habitats. Furthermore, project specific provisions, which greatly reduce the potential for a chemical spill or use of inappropriate chemicals, are included as part of the weed spraying guidelines. If procedures are followed to prevent spills and direct spraying into fish bearing waters, herbicide use is anticipated to have little effect on aquatic species.

The potential affects to aquatic habitat from the drift of herbicides into water is also expected to be minor because the chemical application requirements do not allow spraying under windy conditions and because of established buffers in sensitive riparian areas. This combined with the guidelines for the types of chemicals that may be applied within riparian areas is expected to prevent any direct, indirect or cumulative affects to aquatic resources or water quality from chemical drift.

Of the herbicides proposed for use, the following herbicides would potentially result in adverse health effects to fish if sprayed directly into aquatic habitats: glyphosate and triclopyr BEE. Furthermore, the following herbicides would potentially result in adverse health effects to aquatic invertebrates (a food source for fish species) if sprayed directly into aquatic habitats: glyphosate (the more toxic formulation) and triclopyr BEE.

In all other scenarios (including upland scenarios with 2,4-D, glyphosate, imazapyr, or triclopyr), adverse health effects to fish species predicted by ERAs would result from accidental spray of terrestrial herbicides into bodies of water.

Indirect, adverse effects include reduction in plant species diversity and consequent availability of preferred food, habitat, and breeding areas; decrease in wildlife population densities within the first year following application as a result of limited reproduction; habitat and range disruption if treated areas are avoided due to habitat changes; and increase in predation due to loss of cover (EPA 1998).

Indirect, adverse effects could occur if substantial habitat loss of vegetation occurred in suitable nesting habitats, particularly at nest sites. These effects would likely be short-term in nature. Indirect, long-term benefits from removal of weeds would include improvements in habitat and ecosystem function for all migratory birds and reducing the potential for intense, wildfires. SOPs and mitigation/conservation measures will be implemented to reduce adverse impacts to migratory birds and their habitat.

The extent of direct and indirect impacts to wildlife would vary by the effectiveness of herbicide treatments in controlling target plants and promoting the growth of native vegetation, as well as by the extent and method of treatment and chemical used (e.g., toxic vs. non-toxic; selective vs. non-selective), the physical features of the terrain (e.g., soil type, slope), and weather conditions (e.g., wind speed) at the time of application. Long-term benefits would be habitat improvements of increased understory native grasses and forbs and smaller unbroken blocks of weed monocultures; decreased susceptibility to intense, wildfires; decreased to community replacing weed invasions; and increased native forage and cover.

Sonoran Desert Tortoise Conservation Measures

The following conservation will be applied to minimize or avoid impacts to the Sonoran desert tortoise when treating in Sonoran desert tortoise habitat:

- In Sonoran desert tortoise habitat, conduct weed treatments when tortoises are least active (typically November 1 to March 1).
- During treatment and pre-treatment activities look out for and avoid tortoises.
- Prior to operating or moving vehicles or equipment, check underneath and around vehicles/equipment to ensure that tortoises are not in danger of being injured.
- If tortoises must be moved to avoid harming them, they will be moved according to the AGFD Guidelines to handling Sonoran desert tortoises encountered on development projects.
- To the greatest extent possible, avoid desert tortoise burrows during herbicide treatments.

- When conducting herbicide treatments in upland habitats occupied by Sonoran desert tortoises, do not broadcast spray 2,4-D, glyphosate, or triclopyr; do not broadcast spray these herbicides in areas adjacent to habitats occupied by Sonoran desert tortoises under conditions when spray drift onto the habitat is likely.
- If conducting manual spot applications of glyphosate or triclopyr to vegetation in upland habitats occupied by Sonoran desert tortoises, utilize the typical, rather than the maximum, application rate. If spraying imazapyr in or adjacent to upland habitats occupied by Sonoran desert tortoises, apply at the typical, rather than the maximum, application rate.

No Action Alternative

Stocking rates would be dependent upon resource conditions and allow for flexibility in livestock numbers. Two thousand, four-hundred and seven AUMs would be permitted year around with the flexibility to go down to 1,815 AUMs and up to 4,572 AUMs. Use on riparian areas would continue to be limited to the winter season only (November 1 to March 1).

The No Action Alternative uses similar use thresholds as the Proposed Action. The effects of these use thresholds to wildlife and their habitat would be similar to the Proposed Action (Section 3.4.1.1.) Differences are discussed below.

The No Action Alternative differs from the Proposed Action in that the use thresholds differ slightly on a few key species. Use on riparian obligate woody species would not be required to remain below 40 percent. This may limit woody species recruitment in riparian areas over many years, potentially reducing habitat for riparian obligate wildlife species. However, this effect would be lessened by limiting livestock use in riparian areas to the non-growing season and overall goal to obtain riparian rating of proper functioning condition.

In upland areas, tobosa height would be required to be below 12 inches instead of above 8 inches as in the Proposed Action. This use requirement may limit hiding cover for pronghorn fawns below the recommended 8 inch minimum (Yokum 1980) on approximately 11,337 acres of fawn hiding cover. Tobosa use in excess of 12 inches, particularly when at the greater end of the spectrum (i.e. low tobosa stubble height or extreme use), would create open niches for forbs to grow which provide forage for species such as pronghorn. Migratory bird species that prefer less vegetative cover would also benefit. Other species that require taller vegetation may avoid areas where hiding cover requirements are not met. Sonoran desert tortoise habitat conditions would be maintained as described in Section 3.4.2.1.

The placement of supplements would not be required to be placed ¼ mile from water sources and 1/8 mile away from drainages. This would increase livestock use around water sources and create less uniform livestock distribution compared to the Proposed Action. The loss in vegetation surrounding around water sources would favor some species, particularly grassland dependent migratory birds that prefer low vegetation densities and heights. Pronghorn fawn hiding requirements may not be met within ¼ of a mile surrounding water sources. Other areas away from water resources may have higher vegetation heights, less bare ground, more forage availability compared to the Proposed Action. It is expected that DPC objectives would be maintained or improved across the Allotment. Overall impacts to general wildlife, BLM migratory birds, and BLM sensitive species from livestock grazing would be beneficial and adverse, minor, and long-term.

Range Improvement Projects

No new range improvement projects would be built under the No Action Alternative. Consequently, less wildlife disturbance would occur compared to the Proposed Action. No new fences or water facilities would be constructed and the associated disturbance to wildlife would not occur. Wildlife ingress and egress would remain marginally better compared to the Proposed Action due to the presence of fewer miles of fence within the Allotment, but this impact would be considered negligible because wildlife have the ability to cross fences. Fewer permanent water sources would be present on the Allotment which may limit water resources for wildlife such as pronghorn and cause reduced wildlife distributions and populations. Movement corridors would be maintained but unreliable water sources may adversely impact wildlife movements, particularly for pronghorn, compared to the Proposed Action.

Under the No Action Alternative, an enclosure around Silver Creek would not be constructed. Wildlife would not be temporarily displaced because of enclosure construction. Wildlife egress in ingress in the area would be slightly better compared to the Proposed Action without the presence of a fence.

Livestock would continue to have access to Silver Creek. Use thresholds on aquatic emergent vegetation in Silver Creek would be no greater than 50 percent and riparian obligate woody species use would be limited to 30 percent (FWS 2006). Bank alterations would also be limited to less than 25 percent. This would maintain habitat conditions for wildlife in the area including the ESA-listed yellow-billed cuckoo and Gila chub. The No Action Alternative would allow greater use of vegetation and increased potential for erosion of streambanks and sediment loads compared to the Proposed Action. This would result in a reduced quality of habitat and water quality in Silver Creek for many species including Gila chub, lowland leopard frog, longfin dace, desert sucker and riparian obligate migratory birds. There would be no impacts to general wildlife, BLM migratory birds, and BLM sensitive species from range improvements because none would be authorized.

Study Plots

Activities associated with study plots, weed treatments and seeding efforts would not occur. Wildlife would not be temporarily displaced during activities related to construction and use of three 5-acre study plots, two of which are within pronghorn fawning grounds, for the purposes of studying weed treatment effectiveness. In total, 10 acres of the approximately 11,337-acre fawning grounds would not be treated for weeds which would result in higher vegetation heights within these areas compared to the Proposed Action. However, these areas would likely remain to be dominated by non-native grass species and would provide lower habitat quality overall within these areas. The study plots are not located near suitable habitat for ESA, therefore there should not be adverse environmental consequences to any of those species that may potentially occur within the Allotment.

Weed Treatments

Under the No Action Alternative, weed treatments would not occur under this project, however weed treatments may be separately authorized under the IWMP. Wildlife species would not be exposed to herbicides and the associated risks. Weeds would likely continue to expand and cause further infestations of native plant communities and wildlife habitat. This could result in altering

the species composition and diversity of native plant communities, reduce quality and quantity of habitat and forage for wildlife species, increase the potential for soil erosion and adverse impacts on water quality, and cause degradation or loss of aquatic habitat. There would be no impacts to general wildlife, BLM migratory birds, and BLM sensitive species from weed treatments because none would be authorized.

No Grazing Alternative

Competition with livestock for resources such as food, water, cover, and space would be eliminated under the No Grazing Alternative. The removal of livestock would largely benefit wildlife by the elimination of resource competition. Vegetation abundance, densities, and heights are expected to be greatest under this alternative. This would largely result in the best habitat for wildlife of the three alternatives. Vegetation heights are expected to be greatest under this alternative which would provide the maximum hiding cover for wildlife of the alternatives. Vegetation abundance and densities are also expected to be greatest under this alternative which would provide the most forage for wildlife species. This would result in the best habitat for many species including but not limited to migratory birds, small mammals, reptiles including the Sonoran desert tortoise. Water quality, particularly in naturally occurring areas, would be expected to be greatest in this alternative as livestock are removed as point sources of pollution and the maximum amount of vegetation would be available to provide ecosystem services such as bank stabilization and sediment filtration.

The removal of livestock may result in less water availability across the Allotment as well as lower quality and less forage for some wildlife species such as pronghorn. Tobosa grass can dominate some sites without some disturbance. This may result in less forb production which is the primary diet of pronghorn (Brown et al. 2006, Richardson 2006). However, environmental factors such as fire would be more likely under this alternative relative to the Proposed Action and No Action Alternative which may offset this effect by creating open space for forbs to grow.

Livestock would be removed year around from riparian areas which would preclude the effects of livestock use on vegetation, bank alterations, and water quality. Livestock interactions and associated public activities with wildlife would be eliminated. The elimination of these actions would be the most beneficial of the three alternatives by removing these stresses, but other users of the area would still stress wildlife. Overall impacts to general wildlife, BLM migratory birds, and BLM sensitive species would be beneficial, minor, and long-term.

Range Improvement Projects

No new construction of range improvement projects would occur under the No Grazing Alternative. Additionally, maintenance of existing facilities such as stock tanks and fences would not occur. This would have both beneficial and adverse effects to wildlife species.

Water quantity across the Allotment would be reduced in upland areas as stock tanks fall into disrepair. It is possible that the only two functional waters in upland areas are two wildlife catchments located on Perry Mesa. This would result in the perpetuation of inadequate water developments for pronghorn antelope (AGFD 2013). Wildlife, particularly large mammals such as pronghorn and deer, would leave the area to find permanent water sources elsewhere and movement corridors for these species would be adversely impacted.

No additional fences would be constructed under the No Grazing Alternative. Existing pasture fences may go into disrepair. Fences in disrepair still have the potential to entrap wildlife. Existing boundary fences will be assigned to adjacent permittees (if applicable). Interior fences and other improvements may be removed, mitigating potential adverse impacts to wildlife and public users. Water developments, important for wildlife may be maintained where feasible, or removed using other program funds or volunteers.

The study plots and weed treatments would not occur under the No Grazing Alternative. Impacts to wildlife would be similar to the No Action Alternative. Weeds would likely continue to expand and cause further weed infestations of native plant communities and wildlife habitat. This could result in altering the species composition and diversity of native plant communities, reduce quality and quantity of habitat and forage for wildlife species, increase the potential for soil erosion and adverse impacts on water quality, and cause degradation or loss of aquatic habitat.

Wildlife would not be temporarily disturbed by public activities associated with range facility construction and maintenance. Overall impacts to general wildlife, BLM migratory birds, and BLM sensitive species would be beneficial, minor, and long-term.

3.4.3 Affected Environment - Threatened and Endangered Species

ESA-listed species are found within the Allotment. Critical habitat has been either proposed or designated for multiple species. Detailed reviews of the effects of the Proposed Action to these species and proposed and designated critical habitat are documented in the Biological Assessment Horseshoe Allotment Grazing Authorization Renewal (BLM 2018) and corresponding Concurrence for the Reissuance of the Horseshoe Allotment Grazing Lease (FWS 2018).

3.4.4 Environmental Consequences - Threatened and Endangered Species

Proposed Action

The Proposed Action identifies many conservation measures developed to maintain or improve habitat conditions for ESA-listed species. These include use limits, construction of an enclosure, and seasonal restrictions which allows use of riparian areas in the non-growing season (November 1 to March 1).

The Proposed Action includes a variety of conservation measures to manage wildlife and habitat resources on the Allotment, especially those associated with Silver and Indian Creeks and the Agua Fria River. A permanent enclosure fence will be constructed to prevent year-round grazing at Silver Creek and associated springs. Surface water diversions at Indian and Silver Creeks and the Agua Fria River will be suspended to increase surface water flow. Livestock grazing in riparian areas will occur only in the winter non-growing season (November 1-March 1).

The Proposed Action will reduce the area allowed for grazing, restrict the duration livestock may graze in riparian areas, and implement more conservative use thresholds for herbaceous and woody riparian species. The total length of riparian habitat (combining Silver and Indian Creeks, Larry Creek tributary, and the Agua Fria River) on the Allotment is 17 miles. The proposed Silver Creek year-round enclosure will extend for 4.5 miles and encompass 766 acres. The remaining 12.5 miles of riparian area along Indian Creek, Larry Creek tributary, and the Agua Fria River are located in other pastures on the Allotment. Larry Creek tributary is inaccessible to livestock due to

topographical features. Livestock are excluded from Silver Creek year-round, but livestock will have access to the remaining riparian area along the Agua Fria River and Indian Creek during the winter non-growing season. Overall, the Proposed Action reduces the amount of riparian area available for grazing from 17 to 12.5 miles, a 26 percent reduction. Fencing materials will be wildlife friendly and built to BLM agency standards. Personnel will build the enclosure fence using power tools such as augers, rock drills, and power saws to trim vegetation along the fence line and install fence posts into rock.

Gila chub and Gila topminnow both occur within the project area in the Larry Creek tributary and were abundant in sampling in 2016. This area is inaccessible to livestock due to terrain, and these populations will not be affected by the Proposed Action. Silver Creek's surface flow is now mostly absent due to increased sediment from the 2005 Cave Creek Complex Fire and Gila chub and Gila topminnow have not been sampled in recent surveys. Livestock will be excluded from nearly all of Silver Creek within the Allotment, therefore there are unlikely to be direct effects to individuals or potential habitat. Impacts to habitat such as vegetation, cover, prey base, and water quality from livestock use at the Silver Creek crossing are expected to be inconsequential because the stream channel at this crossing is bedrock; the crossing is generally dry both upstream and downstream (except during high flow events, when livestock will not be present); and any increased sediment from this crossing will likely be immeasurable due to the small area (164 feet) that cattle are able to access.

Gila chub designated critical habitat occurs along Silver Creek and the Larry Creek tributary. The only Gila chub critical habitat that is accessible to livestock is the 164-foot Silver Creek crossing. The stream channel in this crossing is bedrock and is usually dry both upstream and downstream. The upland range condition within the Allotment is meeting the BLM's health and resource standard condition. As a result, proposed use and thresholds should maintain or improve current conditions for the Gila chub and its critical habitat. Livestock will be excluded from nearly all of Silver Creek within the Allotment and will not influence Gila chub critical habitat physical and biological features such as perennial pools and runs between pools, water temperature, water quality, invertebrate food base, and cover in and around the water channels. The installation of the enclosure fence includes a water gap fence and will not alter or hinder the natural flow of the stream. There is no Gila topminnow designated critical habitat in the Allotment.

Proposed critical habitat for cuckoo and gartersnake occurs along Indian and Silver Creeks and the Agua Fria River. The cuckoo has been known to breed during the summer months in areas surrounding the Agua Fria River, Indian and Silver Creeks. There have been no documented occurrences of the northern Mexican gartersnake in the action area; yet the gartersnake may occur within the broader Agua Fria drainage (last sighting in the Agua Fria drainage in 1993). Livestock use of riparian pastures along these three streams will be limited to the winter non-growing season (November 1-March 1) to benefit 12.5 miles of riparian habitat. Livestock use of riparian pastures during the winter non-growing season will limit impacts to riparian plant growth and regeneration and is not likely to adversely affect the cuckoo, the gartersnake, and their habitat. Restricting livestock access to riparian areas during the winter non-growing season will limit the effects of grazing to the physical and biological features essential to the conservation of the species such as the abundance, distribution, and recruitment of riparian plants; the presence of insect species; and dynamic hydrologic river processes and associated stream functions. Monitoring of the riparian

vegetation utilization thresholds will ensure that the effects to vegetation and habitat function are minimized. The timeframe for livestock use (November 1 – March 1) in riparian pasture and proposed range improvements in or near suitable cuckoo habitat such as the Silver Creek enclosure fence will occur when cuckoos are not present in Arizona (October 1- April 30), therefore cuckoos will not be adversely impacted by the Proposed Action.

The Proposed Action will limit potential adverse consequences to the physical and biological features essential to the conservation of the species such as the abundance, distribution, and recruitment of riparian plants, herbaceous vegetation, and aquatic habitat; available terrestrial space; riparian habitat and stream quality; and the presence and distribution of harmful non-native predators by limiting livestock to the non-growing season, improving fencing for livestock exclusion that will not impede gartersnake movement, monitoring livestock utilization, and removing non-native predators when and where possible. Direct effects to gartersnakes from livestock grazing and range improvements in or near riparian habitat are not likely because these activities will occur during the winter months when gartersnakes are less likely to be surface active. Overall impacts to threatened and endangered species from livestock grazing would be beneficial and adverse, negligible to minor, and long-term.

Study Plots

The study plots are not located near suitable habitat for ESA, therefore there should not be adverse environmental consequences to any of those species that may potentially occur within the Allotment.

Weed Treatments

The effects of the proposed weed treatments on ESA listed and proposed species were analyzed in the Biological Assessment (BA) for the IWMP (BLM 2015). This document was prepared in consultation with FWS for a “not likely to adversely affect” determination for all ESA listed and proposed wildlife and plant species. Application and adherence to the Conservation Measures listed for each species will be effective in avoiding adverse effects to the species and their critical habitats; thus, rendering any effects insignificant and discountable. Overall impacts to threatened and endangered species from weed treatments would be beneficial and adverse, negligible, and long-term.

Western Yellow-Billed Cuckoo and Proposed Critical Habitat Conservation Measures

To minimize or avoid impacts to the western yellow-billed cuckoo and proposed critical habitat, the following conservation measures will be applied for all respective treatment types. These conservation measures will continue to apply to designated critical habitat if, and when, a final rule is issued.

Riparian areas that are suitable for use by yellow-billed cuckoo will be evaluated for the need for consultation at the project level prior to treatment. Project level evaluation, including detailed information about the location, time of year, species of vegetation to be removed, and method and extent of vegetation removal are necessary because of complex life history and habitat requirements of the cuckoo. In particular, riparian areas consisting of the following species should be given special consideration; willow (*Salix spp.*), tamarisk (also known as saltcedar, *Tamarix spp.*), cottonwood (*Populus fremontii*), mesquite (*Prosopis spp.*), velvet ash (*Fraxinus velutina*),

Arizona sycamore (*Plantanus wrightii*), box elder (*Acer negundo*), Arizona alder (*Alnus oblongifolia*), Arizona walnut (*Juglans major*), oak (*Quercus spp.*), netleafhackberry (*Celtis reticulata*), Mexican elderberry (*Sambucus mexicanus*), seep willow (*Baccharis glutinosa*), soapberry (*Sapindus saponaria*), and juniper (*Juniperus spp.*).

Northern Mexican Gartersnake and Proposed Critical Habitat Conservation Measures

To minimize or avoid impacts to the northern Mexican gartersnake and proposed critical habitat, the following measures would be applied to all respective treatment types. These conservation measures will continue to apply to designated critical habitat if, and when, a final rule is issued.

- Domestic livestock biological treatment methods will not be used within suitable habitat for northern Mexican gartersnakes.
- Prior to burning slash piles within one mile of critical habitat or riparian/wetland areas that contain suitable habitat for northern Mexican gartersnakes, the potential effects to northern Mexican gartersnakes and the need to initiate consultation with USFWS will be evaluated.
- Treated areas will be replanted or reseeded with native species, if needed.
- Within riparian areas, wetlands, and aquatic habitats, conduct herbicide treatments only with herbicides that are approved for use in those areas.
- Do not broadcast spray herbicides (including 2,4-D, glyphosate, or triclopyr BEE) in riparian areas or wetlands that may provide habitat for northern Mexican gartersnakes; do not broadcast spray 2,4-D within ¼ mile of habitat that may be occupied by northern Mexican gartersnakes.
- When conducting herbicide treatments in upland areas adjacent to aquatic or wetland habitats that support northern Mexican gartersnakes, do not broadcast spray during conditions under which off-site drift is likely.
- In watersheds where northern Mexican gartersnakes occur, do not apply triclopyr BEE in upland habitats upslope of aquatic habitats that support northern Mexican gartersnakes under conditions that would likely result in surface runoff.
- Follow all instructions and SOPs to avoid spill and direct spray scenarios into aquatic habitats that support northern Mexican gartersnakes.
- Within northern Mexican gartersnake habitat, do not drive vehicles off established roads.
- Within 150 feet of northern Mexican gartersnake habitat, do not fuel/refuel equipment, store fuel, or perform equipment maintenance (locate all fueling and fuel storage areas, as well as service landings outside protected riparian areas and ensure proper storage and secondary containment measures and protocols are strictly followed).

Federally Listed Fish Species Conservation Measures: Gila Topminnow, Gila Chub and Critical Habitat.

Contact the USFWS and coordinate weed treatment projects in areas where listed and proposed fishes are present and inside critical habitat. Avoid stream crossing and other weed treatment activities during spawning season for listed and proposed fishes.

Conservation Measures for Site Access and Fueling/Equipment Maintenance

For treatments occurring in watersheds with federally listed fish species or designated critical habitat:

- Consult at the project level when stream crossing is necessary in critical habitat or occupied habitat.
- Where federally listed fish species occur, consider ground-disturbing activities on a case-by-case basis, and implement SOPs to ensure minimal erosion or impact to the aquatic habitat.
- Do not conduct biomass removal (harvest) activities that will alter the timing, magnitude, duration, or spatial distribution of peak, high, and low flows outside the range of natural variability.
- Within riparian areas, do not drive vehicles off established roads; do not land helicopters except in emergencies.
- Outside riparian areas do not drive vehicles off established roads on slopes steeper than 20%.
- Within 150 feet of wetlands or riparian areas, do not fuel/refuel equipment, store fuel, or perform equipment maintenance (locate all fueling and fuel storage areas, as well as service landings outside protected riparian areas).
- Prior to helicopter fueling operations, prepare a transportation, storage, and emergency spill plan and obtain the appropriate approvals; for other heavy equipment fueling operations use a slip-tank not greater than 250 gallons; prepare spill containment and cleanup provisions for maintenance operations.
- To prevent transfer of aquatic invasive species, diseases and parasites, thoroughly clean and dry all equipment and personal protective gear prior to entering another aquatic site.

Conservation Measures Related to Revegetation Treatments

Do not hydromulch within 300 feet of critical habitat or habitat occupied by federally listed fish. This precaution will limit adding sediments and nutrients and increasing water turbidity.

Conservation Measures Related to Herbicide Treatments

- Maintain equipment used for transportation, storage, or application of chemicals in a leak-proof condition.
- Do not store or mix herbicides or conduct post-application cleaning within 0.5 mile of critical habitat or habitat occupied by federally listed fish.
- Ensure that trained personnel monitor weather conditions at spray times during application. Strictly enforce all herbicide labels.
- Follow all instructions and SOPs to avoid spilling or direct spraying herbicides into aquatic habitats.
- Do not broadcast spray within 100 feet of open water when wind velocity exceeds 5 mph.
- Do not broadcast spray if precipitation is occurring or is expected within 24 hours.
- Do not broadcast spray if air turbulence is sufficient to affect the normal spray pattern.
- Do not broadcast spray in upland habitats within 0.5 mile of aquatic habitat that contains federally listed species when the potential exists for runoff from the treated area into the aquatic habitat.

- Use only herbicides approved for use in aquatic systems when treating weeds in riparian areas, 100-year floodplains, or designated or proposed critical habitat for federally listed fish species.
- Treat the smallest area that will achieve the desired level of weed control.
- Use the typical application rate, rather than the maximum application rate, whenever practicable based on the weed species, site conditions, application method, and desired level of weed control.

The special restrictions and buffer distances provided below are based on the information provided by ERAs and are designed to provide protection to threatened, endangered, proposed, and candidate (TEPC) aquatic species. Observe the following buffers or restrictions on application methods for specific herbicides:

Do not use terrestrial formulations of glyphosate or triclopyr BEE to treat aquatic vegetation where federally listed aquatic species or their key prey species occur or may occur. Do not use imazapyr to treat upland sites with the potential for transport by runoff drift into streams, ponds, or lakes where federally listed aquatic species or their key prey species occur or may occur. Do not broadcast spray glyphosate or triclopyr BEE by ground methods to treat upland sites adjacent to aquatic habitats that support or may support federally listed aquatic species or their key prey species. Do not use glyphosate formulations that include R-11 and either avoid formulations with the surfactant POEA or use the formulation with the lowest amount of POEA available.

Conservation Measures Related to Biological Control Treatments using Livestock

For treatments in watersheds that support federally listed aquatic species or in critical habitat:

- Where terrain permits, locate stock handling facilities, camp facilities, and improvements at least 300 feet from lakes, streams, and springs.
- Construct enclosure fences if needed to prevent livestock from entering streams, or riparian areas surrounding streams, occupied by federally listed fish.
- Educate stock handlers about at-risk aquatic species and how to minimize adverse effects to the species and their associated habitat.
- Employ appropriate dispersion techniques to range management, including judicious placement of salt blocks, troughs, and fencing, to prevent damage to riparian areas but increase weed control. Equip each watering trough with a float valve.
- Do not conduct weed treatments involving domestic animals within riparian areas.
- Conduct treatments in such a way that they will not result in overgrazing and subsequent erosion and overland transport of sediments into streams occupied by federally listed fish.
- Do not locate troughs, storage tanks, or guzzlers within 300 feet of critical habitat or streams occupied by federally listed aquatic species.

No Action Alternative

The No Action Alternative would allow livestock grazing consistent with the existing Biological Opinion (02-21-03-F-0409-R1) (FWS 2006). Livestock grazing would be allowed in riparian areas during the non-growing season (November 1 to March 1). In portions of Silver Creek designated as critical habitat, use of upland vegetation would be limited to 40 percent of current year's growth

and 50 percent use of herbaceous growth in riparian areas, bank alterations caused by livestock hoof action would be limited to 25 percent, and woody riparian seedling use would be limited to 30 percent of apical stems. Use thresholds in riparian areas would be 50 percent for herbaceous species but no browse limitations would be required. Overall impacts to threatened and endangered species from livestock grazing would be adverse, negligible, and long-term.

No Grazing Alternative

ESA-listed species would largely benefit from the No Grazing Alternative. Refer to the “Environmental Consequences – Wildlife Resources” “No Grazing” Section 3.4.2.3 of this document for impacts to the habitat for ESA-listed species. Overall impacts to threatened and endangered species from livestock grazing would be beneficial, minor, and long-term.

3.5.1 Affected Environment - Soil Resources

This section discloses the impacts of livestock grazing on soil resources within the Allotment. Soils of the Allotment are typical of the 12 to 16-inch precipitation zone of the Mogollon Transition Area of central Arizona. An in-depth discussion of soil resources can be found in the LHE (BLM 2018). Soils were found to meet Standard 1 in the LHE.

3.5.2 Environmental Consequences - Soil Resources

Proposed Action

Livestock grazing can affect soil condition in various ways. Soil compaction can occur from concentrated hoof action. Heavy livestock use can reduce litter and vegetative cover. These can result in reduced water infiltration, increased runoff, increasing erosion and soil loss. Less than satisfactory soil conditions can result in a reduction in soil productivity (USFS 1999). Livestock trailing on steeper slopes results in soil disturbance leading to greater erosion and soil loss. Livestock tend to use gentler slopes resulting in a greater level of impact (Holechek 1992) from hoof action. The probability of achieving desired conditions depends largely on the type of management and stocking rates. Meeting short-term utilization goals would limit the annual impacts of livestock grazing. Long-term desired conditions are measured through effectiveness monitoring. Generally grazing intensity has a greater influence on impacts to soils than timing of grazing.

Throughout the Allotment, 85.3 percent of soils have medium potential for compaction (Web Soil Survey 2018). Only 0.6 percent has high potential for compaction and 14 percent is undetermined. The erosion ratings (tons per acre per year) range between 1 to 5 acres per year which is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting productivity.

Water erosion within the Allotment occurs during intense summer thunderstorms. Soils are well drained but intense rainfall can overwhelm soil infiltration capacity and create overland flow. Intense monsoon rainfall can produce overland flow in part due to dry soils forming crusts that resist percolation. Overland flow transports soil particles along erosion pathways from runoff surfaces to run-on areas, typically formed by vegetation patches or topographic breaks. Compaction and trailing from cattle can exacerbate erosion when trails align with water flow pathways when soils are wet. This effect would be mostly localized around livestock water sources on the Allotment.

Livestock grazing does affect soil productivity by removing a portion of the vegetative standing crop. Annually produced biomass serves both a physical and biological role. Plant litter physically works to insulate soils from evaporation and contributes as protective groundcover. Decomposition of litter provides substrate for soil microbes that increases available nutrients. Soils, low in organic matter, have poorer surface structure and soil friability. Overall impacts to soil resources from livestock grazing would be beneficial and adverse, negligible to minor, and long-term.

Under the Proposed Action, soils are expected to maintain their integrity on the Allotment. Areas of soil disturbance associated with proposed livestock facilities would decrease soil integrity immediately surrounding water developments/congregation sites while in use. Installation and removal of fences would have a localized, slightly adverse and temporary effect to soil though installation of posts and fences (or removal).

Range Improvement Projects

There are 17 new troughs proposed; six of which are collocated with existing water developments. Consequently, there are 11 areas in which soils would be adversely impacted by livestock use both by increasing soil compaction and erosion potential. Impacts would be greatest near water sources and diminish gradually until approximately ¼ mile where they would be negligible. However, the improved livestock distribution facilitated by these water sources would provide a net beneficial effect to soil resources by more evenly distributing grazing utilization across the Allotment. Overall impacts to soil resources from livestock grazing would be beneficial and adverse, negligible to minor, and long-term.

Weed Treatments

Under the Proposed Action, weed treatments would be authorized. Weed treatments have the potential to affect soils by altering their physical, chemical, and/or biological properties. These effects could include loss of soil from erosion due to short-term removal of vegetative cover or changes in soil structure, porosity, or organic matter content. Whether such changes are beneficial or harmful would depend on the method of treatment, the soil type, and in some cases (e.g., tamarisk) the weed species being treated. However, it is expected that in the long-term, the majority of soil impacts resulting from weed treatments will be beneficial, and will include the return of more stable soils, attenuated nutrient cycling, along with a return to normal fire cycles (BLM 2015). Overall impacts to soil resources from weed treatments would be beneficial and adverse, negligible to minor, and long-term.

Manual Treatments

Manual treatments would have short-term soil disturbing impacts limited to the area once occupied by the target species. Limiting the number of people and the amount of time spent in each site would help minimize trampling (Tu et al. 2001). Removing the target species would have substantial positive long-term impacts to soils. The increased organic matter caused initially by leaves, stems and roots of the treated plants and secondarily by the increased production of grasses and forbs would improve the fertility of the soil.

Biological Treatments

The use of domestic animals could cause soil disturbance and compaction, increasing the potential to both wind and water erosion; alter the nutrient cycle by depositing organic urine from feces; or damage biological soil crusts at treatment sites. However, implementing the SOPS in addition to limiting the number and amount of time animals remain on a site and using fences and supplemental nutrition (salt blocks) to restrict livestock to treatment areas would reduce potential adverse impacts to soils.

Chemical Treatments

Herbicides may affect soils through increased erosion as vegetation is removed and there is less plant material to intercept precipitation and less to contribute to organic matter that protects soils from erosion. The increased potential for erosion would be temporary lasting until vegetation was reestablished. Reestablishing the native plant community could improve soil stability compared to sites dominated by weed species.

Herbicide applications may result in contact with soils, either intentionally for systemic treatments, or unintentionally as spills, overspray, drift, or windblown dust. Contact may also occur as a result of herbicide transport through plants to their roots where herbicide may be released into the soil (BLM 2007a). The treatment method with the greatest potential for adverse short-term effects on soils is herbicide use on dense monotypic stands leading to substantial loss of vegetation cover. Two of the proposed herbicides, 2, 4-D and glyphosate are relatively non-persistent in soil (BLM 2007a). Impacts from herbicides would depend on the herbicide used and method of application. Following the SOPs and mitigation measures and the herbicide label directions would minimize potential soil contamination.

Rehabilitation and Revegetation

Rehabilitation through seeding and other revegetation and stabilization efforts would have negligible short-term impacts due to the minimal public activity associated with installation, which could cause minor soil compaction or disturbance. Long-term impacts would be beneficial for soils due to accelerated establishment of vegetation and reduced erosion.

No Action Alternative

Impacts to soil resources would be expected to be similar to the Proposed Action. Overall impacts to soil resources from livestock grazing would be beneficial and adverse, negligible to minor, and long-term.

Range Improvement Projects

The No Action Alternative would not authorize construction of new range improvement projects and would continue livestock grazing at the currently authorized levels. Localized soil impacts from range improvement construction and use would not occur. Continuing present livestock management practices on the Allotment would not result in impaired soil conditions given the findings of the LHE (BLM 2018).

Weed Treatments

No weed treatments would be authorized under the No Action Alternative. Noxious, invasive weeds would continue to expand and have impacts could include changes to species composition along with structure of natural plant communities, alter the fire behavior (e.g., frequency and intensity), increase the potential for soil erosion as well as compaction, and change soil

composition. Effects from increased wildfires could alter the physical soil structure, develop hydrophobic soil layers, as well as damage nutrient and biotic soil characteristics which could lead to poorer soil stability, promote erosion, promote colonization, affect litter cover, among other resources (BLM 2015).

No Grazing Alternative

The removal of livestock from the Allotment would increase the litter for soil processes and reduce compaction and bare soil exposure from livestock trampling. Soil recovery would be highest where groundcover re-establishes at former livestock congregation areas. However, it is expected that plant community response would be slow following livestock removal given the semi-arid nature of the Allotment (Michunas 2006).

Impacts to vegetation and soils across the Allotment would be depend on the level of forage that livestock grazing previously impacted by grazing and fire as well as the amount and timing of precipitation. A seven-year study near Flagstaff found significant reductions in vegetation cover and plant community composition only in the heavily grazed treatment when compared to the moderate and no grazing treatments (Loeser et.al. 2007). Overall impacts to soil resources from the No Grazing Alternative would be beneficial, minor, and long-term.

Weed Treatments

Under the No Grazing Alternative, no weed treatments would be authorized by this project, however weed treatments may be separately authorized at any time via the IWMP.

3.6.1 Affected Environment - Noxious and Invasive Weed Species

Noxious and invasive weed species information is presented in this section. There have been several species of noxious or invasive weeds documented on the Allotment including filaree, red brome, wild oats, foxtail barley and tumble mustard (BLM 2018). The IWMP provides guidance on mitigation measures in response to the localized infestations found within the Allotment.

3.6.2 Environmental Consequences - Noxious and Invasive Weed Species

Proposed Action

Under the Proposed Action, noxious weeds located in these Allotment would be treated as necessary. Noxious weed monitoring would be carried out at the same time Allotment inspections are conducted. As noxious weed populations are found they would be mapped, monitored, and treated. The public would be notified about any proposed weed treatments through public outreach and signs posted near the treatment areas. Depending on the species, extent of noxious and invasive weed species, the BLM may use one or more of the treatment methods as outlined in the IWMP.

The impacts from livestock grazing such as removal of the above ground biomass of noxious, invasive weeds are unlikely to be different from current management as most of these weeds are unpalatable. Concentrated livestock use in one area over time can be detrimental to plants and their habitat, and often become areas where undesirable invasive, noxious species establish. Under the Proposed Action several range improvements are proposed to disperse livestock impacts throughout the Allotment. Some initial damage to the native plant community may occur from the construction of range improvements that could produce undesirable impacts that encourage the establishment of noxious, invasive weeds. However, impacts from range improvements would be

reduced through the application of weed treatments. Overall impacts to noxious and invasive weed species from livestock grazing would be adverse, negligible to minor, and long-term.

No Action Alternative

Under the No Action Alternative authorized grazing would continue at existing levels. Impacts from livestock grazing such as the removal of the above ground biomass of vegetation along with impacts to habitat such as trampling, and compaction of soil would continue. Range improvements are designed to disperse livestock into other areas of the Allotment and can be beneficial to plant species as it reduces concentrated grazing. The proposed range improvements would not occur under the No Action Alternative, nor would the localized disturbance that could lead to an increase in invasive species at these locations. Without the additional proposed water locations, current livestock concentration areas within the Allotment would continue. The loss of vegetative cover around the concentration areas would increase the risk of soil erosion and allow the continued expansion of noxious, invasive weeds. Under the No Action Alternative weed treatments would not be authorized, and invasive non-native plants present throughout the Allotment will continue to compete with native vegetation. This abundance of invasive non-native plants, many of which are annuals, may lead to an increase in the frequency, intensity, and extent of wildfires. Non-target native vegetation could benefit, in the short-term, from the No Action Alternative as no weed treatments would be authorized. However, noxious and invasive plants would also persist and eventually out compete the non-target native plants for resources in the long-term leading to a reduction of desirable native plants. Overall impacts to noxious and invasive weed species from livestock grazing would be adverse, negligible to minor, and long-term.

No Grazing Alternative

Under the No Grazing Alternative livestock grazing would not be authorized and the impacts would be similar to the No Action Alternative. Removal of livestock would have a slight beneficial impact on the spread of non-native, invasive weed species that occur within the Allotment. Non-livestock vectors of spread would continue to contribute invasion by noxious and non-native weed species across the Allotment from neighboring areas which would be exacerbated by ecological factors such as wildfire and drought. None of the proposed weed treatments nor range improvements would be authorized. Overall impacts to noxious and invasive weed species from the No Grazing Alternative would be beneficial, negligible, and long-term.

3.7.1 Affected Environment - Water Resources

Watershed Description

Throughout this section, the term “5th and/or 6th field HUC” or “5th or 6th field watershed” is used. These interchangeable terms refer to watersheds of a specific size defined as part of a hierarchical classification system used by the United States Geological Survey. Within the hierarchical scheme, groups of adjacent and related 6th field HUCs combine to form “sub watersheds” or 6th level HUCs, 6th level HUCs combine to form “watersheds” or 5th level HUCs. Project area watershed boundaries were identified from the BLM GIS dataset and include one 5th field HUC and seven 6th field HUC watersheds listed in Table 11.

Table 11. Fifth and Sixth Field HUC Watersheds Found within the Allotment.

Watershed Name 5 th Field HUC	Watershed Area (acres)	Allotment Area (acres)†	Watershed Affected (%)
Sycamore Creek – Agua Fria River	234,276	68,862	29
Sub Watershed Name 6 th Field HUC	Sub Watershed Area (acres)	Allotment Area (acres)	Watershed Affected (%)
Badger Spring Wash-Agua Fria River	19,300	6,545	33
Bishop Creek	29,300	22,849	77
Indian Creek	17,725	3,433	19
Lousy Canyon-Agua Fria River	29,436	11,455	38
Silver Creek	12,706	9,934	78
Squaw Creek	36,108	5,350	14
Tank Creek	9,297	9,280	99

† HUC units include lands managed by the United States Forest Service in addition to BLM-administered lands.

Stream Channels Associated with the Allotment

The Allotment has approximately 308 miles of perennial, intermittent, and ephemeral streams and the watershed includes approximately 1,102 miles of streams, listed in Table 12. Both the Allotment and the watershed consist mainly of unnamed ephemeral streams or those that only flow for a short time in direct response to precipitation or snowmelt and are always above the water table.

Table 12. Stream Types Within the Allotment and 5th Field HUC.

Stream Type	Allotment (miles)	Watershed (miles)
Perennial	5	41
Intermittent	51	263
Ephemeral	252	798

Perennial streams normally having water in their channel at all times within the Allotment include the Agua Fria River (0.8 miles) and Silver Creek (4.2 miles). Intermittent streams that flow in response to rainfall runoff or springs, or from some surface source such as melting snow make up approximately 51 miles of the Allotment and include Bishop Creek, Copper Creek, Hackberry Wash, Indian Creek, Larry Creek, Squaw Creek, Tank Creek, and portions of the Agua Fria River and Silver Creek.

Water Quality

The Bradshaw-Harquahala RMP/ROD directs water quality to be maintained, restored, or enhanced in conformance with State and Federal standards (WS-1). In addition, water quality in streams and springs will be monitored and protected to meet federal and State standards and to ensure that the needs of fish and wildlife are met along with the needs of people (WS-6). 43 CFR 4180.1(c) states that “water quality complies with State water quality standards and achieves, or is making significant progress toward achieving, established BLM management objectives such as meeting wildlife needs”.

Within the Allotment, water quality is regulated by Arizona Department of Environmental Quality (ADEQ). Designated uses and water quality objectives (standards) are in the Arizona Administrative Code (Title 18, Chapter 11) and listed in 12 for the Allotment. A designated use is one of the various ways that water can be used for the benefit of people and/or wildlife. When a

water body is not meeting water quality objectives for a designated use(s) due to a pollutant, it is placed on the State of Arizona list of impaired waters as required under Section 303(d) of the Clean Water Act.

Table 13. Designated uses for Waterbodies within the Allotment.

Surface Water	Aquatic and Wildlife			Human Health			Agricultural		
Agua Fria River	A&Ww ²			FBC ³		DWS ⁴	FC ⁵	AgI ⁶	AgL ⁷
Unlisted Tributary, Ephemeral		A&We ⁸			PBC ⁹				
Unlisted Tributary, Perennial or Intermittent (<5000 feet elevation)	A&Ww			FBC			FC		

Source: Arizona’s 2018 303(d) list of impaired waters, all Allotment streams are meeting their designated beneficial uses except one as listed in Table 14. The Agua Fria River between Sycamore and Bishop Creek is not meeting federal and State water quality standards for selenium and *E. coli*.

Table 14. Waterbodies not Meeting Federal and State Water Quality Standards within the Watershed.

Stream Name	303(d) Impairment	Horseshoe Allotment	Pasture
Agua Fria River	Selenium and <i>E. coli</i>	Yes	North and South River
Money Metals Tributary	Copper and Zinc	No	N/A
Unnamed Tributary to Eugene Gulch	Copper	No	N/A

Floodplains

Executive Order 11988 provides direction to avoid adverse impacts associated with the occupancy and modification of floodplains. Floodplains are defined by this order as “...the lowland and relatively flat areas adjoining inland and coastal waters including flood-prone areas of offshore islands, including at a minimum that area subject to a 1% (100-year recurrence) or greater chance of flooding in any one year.”

Many of the stream channels associated with the Allotment have limited floodplain development due to channel incision with steep canyon walls, and frequent stream channel migration across its

² Aquatic and wildlife (warm water) (A&Ww) means the use of a surface water by animals, plants, or other water-water organisms, generally occurring at an elevation less than 5000 feet, for habitation, growth, or propagation.

³ Full-body contact (FBC) means the use of a surface water for swimming or other recreational activity that causes the human body to come into direct contact with the water to the point of complete submergence. The use is such that ingestion of the water is likely and sensitive body organs, such as the eyes, ears, or nose, may be exposed to direct contact with the water.

⁴ Domestic water source (DWS) means the use of a surface water as a source of potable water. Treatment of a surface water may be necessary to yield a finished water suitable for human consumption.

⁵ Fish consumption (FC) means the use of a surface water by humans for harvesting aquatic organisms for consumption. Harvestable aquatic organisms include, but are not limited to, fish, clams, turtles, crayfish, and frogs.

⁶ Agricultural irrigation (AgI) means the use of a surface water for crop irrigation.

⁷ Agricultural livestock watering (AgL) means the use of a surface water as a water supply for consumption by livestock.

⁸ Aquatic and wildlife (ephemeral) (A&We) means the use of an ephemeral water by animals, plants, or other organisms, excluding fish, for habitation, growth, or propagation.

⁹ Partial-body contact (PBC) means the recreational use of a surface water that may cause the human body to come into direct contact with the water, but normally not to the point of complete submergence, e.g., wading or boating. The use is such that ingestion of the water is not likely and sensitive body organs, such as the eyes, ears, or nose, will not normally be exposed to direct contact with the water.

floodplain. The Federal Emergency Management Agency has identified Special Flood Hazard Areas that are subject to flooding by the 1% annual chance flood (100-year flood) within the Allotment along several streams and rivers including but not limited to the Agua Fria River, Bishop Creek, Silver Creek, and Tank Creek. However, the water-surface elevation of the 1 percent annual chance flood (Base Flood Elevation) and flood depths have not been determined for each of these waterbodies.

Wetlands

Executive Order 11990 was promulgated to avoid adverse impacts associated with destruction or modification of wetlands. Wetlands are defined by this order as "...areas inundated by surface of ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds."

Review of the National Wetlands Inventory (FWS 2020) indicates the presence of wetlands primarily along or near the Agua Fria River within the Allotment.

Riparian Areas

Riparian areas are some of the most ecologically important habitats in rangelands by providing important resources for many species of wild and domestic animals such as abundant forage, cover, and water. Riparian areas are also important for trapping sediment, slowing runoff, and supporting ecologically functioning watersheds. Riparian Proper Functioning Condition (PFC) describes assessing on-the-ground conditions of a riparian area (Table 15). PFC gauges a riparian area's resiliency, or ability to hold together, during high stream flows and are among the first landscape features to reflect damage from improper management or natural events, such as a flood or drought. When riparian areas are not in PFC, they are not in a sustainable condition.

Table 15. Riparian Proper Functioning Condition Ratings within the Allotment.

Waterbody	PFC Rating	Year Rated (Most Current)	Stream Reach
Agua Fria River	Functional at Risk	2013	Northern Allotment boundary to Bishop Creek
Agua Fria River	Functional at Risk	1998	Bishop Creek to western Allotment boundary
Indian Creek	Functional at Risk	2013	Norther Allotment boundary to Agua Fria River
Bishop Creek	Proper Functioning Condition	2006	New Mill pasture to Agua Fria River
Silver Creek	Functional at Risk	2013	Tonto NF boundary to Agua Fria River
Larry Creek	Proper Functioning Condition	2012	North Fork, Section 9 to western Allotment boundary

Source: BLM 2020.

3.7.2 Environmental Consequences - Water Resources

Proposed Action

Livestock grazing can affect water quality and quantity through loss of riparian and other stream bank stabilizing vegetation important for energy dissipation, sediment capture, groundwater

recharge, and stream channel morphology (e.g., gradient, width/depth ratio, channel roughness and sinuosity). In addition, livestock grazing fecal matter contains pathogenic bacteria's including but not limited to *Escherichia Coli* (*E. coli*), which is one of the pollutants responsible for the Agua Fria River not meeting State water quality standards.

Because the impacts of livestock grazing on water resources can extend beyond the Allotment boundary, the affected environment includes the Sycamore Creek – Agua Fria River watershed as the basis for identifying and interpreting potential impacts. In addition, the duration of short- and long-term impacts of livestock grazing can become evident soon after use begins and last indefinitely or until such action is taken to modify or remove the existing use.

Under the Proposed Action livestock grazing would continue along waterbodies within the Allotment including the Agua Fria River. Studies vary on the spatial and temporal influence of cattle grazing and water quality in respect to waterborne pathogenic bacteria typically found in cattle excrement and urine including *E. coli*, *Leptospira interrogans*, *Salmonella* spp., *Campylobacter jejuni* and *Yersinia enterocolitica* (Nader et al. 1998). While stocking rates, grazing patterns, hydrologic regime, and other factors can affect water quality, bacteria such as *E. coli* can survive several months or more in soil or sediment and a year or more inside feces with fecal and total coliform bacteria contamination likely to occur in waterbodies where livestock can defecate within or immediately adjacent to the them (Bauer and Burton 1993, Buckhouse and Gifford 1976, Johnson et al. 1978, Mosley et al. 1997, Nader et al. 1998, Tiedemann et al. 1987).

The 303(d) listed reach of the Agua Fria River within the North and South River pastures for *E. coli* does not imply that livestock are the source of *E. coli*, but is unlikely to improve or be delisted due to the continuing presence and levels of livestock grazing depositing their urine and feces directly into the river or immediately adjacent to it. There is risk of *E. coli* infection by the public that may consume water for drinking purposes or swallow it during swimming.

Livestock grazing and trampling in riparian areas can decrease riparian health and composition, sediment capture, limit infiltration, and increase the energy of water flow. These hydrogeomorphic impacts can magnify peak flows, streambank erosion and down-cutting (which can lead to separation of the streambed from the flood plain and decrease riparian area size), sediment transport and deposition, and channel widening limiting or preventing a functional at risk riparian areas ability to improve to a properly functioning condition riparian area. These changes can also potentially result in modifications to water quality and aquatic habitat. Bank alterations as a result of hoof shear are expected in some areas. Bank alterations would reduce bank stability and remove aquatic emergent vegetation and riparian obligate woody species in these areas.

Of the three proposed wells only the Boone Tank (Indian Creek) well could affect water resources due to its proximity to Indian Creek. The wells including the Boone Tank well either individually or in total will withdraw no more than 150,000 to 200,000 gallons per year or the equivalent of 0.6 to 1.8 acre-feet per year and have a pump capacity of 35 gallons per minute or less. An "exempt" well as defined by Arizona Department of Water Resources is equipped to pump 35 gallons per minute or less. It is unlikely the three proposed wells including Boone Tank well near Indian Creek will have an effect on water resources as they are considered "exempt" wells. Operation of the wells will follow all state statutes, rules, and regulations governing minimum well construction, and are not in close proximity to any other groundwater wells or surface water diversions. Overall

impacts to water resources from livestock grazing would be adverse, negligible to minor, and long-term.

Weed Treatments

Common to All Treatments

Under the Proposed Action weed treatments would be authorized and have similar impacts to the riparian section. Removal of vegetation could temporarily increase water quantity by altering flow rates and frequency of peak flows. Increased soil surface exposure to direct rainfall may increase overland flow which may result in decreased soil storage capacity as soil is eroded from the site. Nutrient cycling may be reduced as soil is removed from a site. Loss of stream cover from the removal of noxious, invasive weeds may allow instream water temperatures to increase temporarily which may adversely impact aquatic and semi-aquatic wildlife. Ground water availability may improve temporarily as water loss through evapotranspiration from plants would be reduced. Noxious, invasive weed also provide increased fire danger due to the accumulation of hazardous fuel loads. Frequent intense fires may alter soil surface properties that could impact water infiltration, soil site stability, and surface water quality from runoff. Over the long-term weed treatments are expected to benefit surface and groundwater resources by reducing sedimentation, improving nutrient cycling, and provide normal fire cycles (BLM 2015). Overall impacts to water resources from weed treatments would be adverse, negligible to minor, and long-term.

Manual Treatments

Manual treatments would involve minimal soil disturbance or vegetation removal due to the small size of areas treated. Crews could trample individual, non-target plant species along stream corridors. Adverse impacts to surface water and groundwater resources would be short-term and minor as plant materials would remain in the treatment areas and exposed soil areas are not anticipated.

Biological Treatments

Biological treatments using livestock could affect water quality and quantity depending on the duration and intensity of grazing and the location proximity to a water body. Grazing could affect surface runoff through trampling, soil disturbance, and soil compaction. Use of grazing animals would follow SOPs to minimize adverse impacts to water quality and quantity.

Chemical Treatments

Herbicide use could indirectly affect surface water quality through drift, runoff, leaching into the soil, and misapplication/spills. Groundwater could be affected only by leaching. Three factors that may contribute to herbicide drift are application technique, weather conditions, and applicator error. Terrestrial applications may also affect surface water and groundwater, primarily as a result of unintentional spills or movement of herbicides from upland sites into aquatic systems, as well as through additional sedimentation stemming from loss of vegetation cover. Herbicides that have low soil adsorption or high-water solubility could leach into the groundwater.

The potential for water body contamination would be minimized by implementing buffers between treatment areas and sensitive water sources, unless the herbicide is approved for aquatic

application as stated by the manufacturer and label application guidelines. Storm size, herbicide properties, soil properties, and downstream mixing and dilution also play a role in potential water body contaminations. If well-vegetated buffers are left between the sensitive water source and treatment site, they can intercept herbicides and reduce the potential for herbicides to reach surface water.

The four proposed active ingredients for herbicide use—2, 4-D (salt formulation), glyphosate, imazapyr, and triclopyr (triethylamine salt and a BEE formulations) —are approved for riparian and aquatic habitats (BLM 2007a). Adverse impacts from herbicide treatments would be minimized by implementing the SOPs and mitigation/conservation. The aquatic labeled herbicides would not impact water quality if used according to label rates of application. Additionally, spot and localized applications of specific weed patches are less likely to result in drift because they are targeted to specific plants and less herbicide is applied.

No Action Alternative

The No Action Alternative would not authorize construction of new range improvement projects and would continue livestock grazing at the currently authorized levels. The continued presence of livestock defecating within or adjacent to rivers and streams would continue with fecal and total coliform bacteria contamination likely to occur in all waterbodies where livestock gather. Overall impacts to water resources from livestock grazing would be adverse, negligible to minor, and long-term.

Weed Treatments

Under this alternative, no weed treatments would be authorized and the impacts would be similar to the Riparian Resources in Section 3.3.2.2. of this document. Salt cedar and other weeds would continue to expand along stream corridors, which could impact ground water levels and modify stream channels. Salt cedar has been shown to use more groundwater resources compared to native plant communities (DeLoach 1991, DeLoach et al 2001).

Indirect effects would be that fuel loadings—woody overgrowth and other over abundant fuels—would continue to increase and more intense wildfires could occur. Salt cedar stands burn more frequently than native mesic plant communities, which could kill and/or damage native vegetation (e.g., cottonwoods; DeLoach et al. 2001). Wildfires, depending on the size and severity, could increase erosion and sediment runoff, resulting in degraded water quality and quantity.

The No Action Alternative would protect water bodies from accidental exposure to herbicides. This alternative would have less impact on weeds than the Proposed Action because no treatments would be authorized. Consequently, weeds would continue to spread at a faster rate and land degradation could accelerate, which could lead to reduced water quality. Overall impacts to water resources from weed treatments would be adverse, negligible to minor, and long-term.

No Grazing Alternative

The removal of livestock from the Allotment would decrease fecal and total coliform bacteria from entering affected waterbodies possibly leading to removal of the Agua Fria River from Section 303(d) list of impaired waterbodies for *E. coli*.

Riparian vegetation would not be trampled or grazed allowing for improvement in the condition and rating of affected riparian areas and natural channel geomorphic processes such as conveyance of flood flows, sediment transport, and energy dissipation. Overall impacts to water resources under the No Grazing Alternative would be beneficial, negligible to minor, and long-term.

Weed Treatments

Under the No Grazing Alternative none of the proposed weed treatments would be authorized under this process. There would be no impacts to water resources from weed treatments because none would be authorized. However, weed treatments could be authorized at any time separately under the IWMP.

3.8.1 Affected Environment – Public Health and Safety

People living in Yavapai County are exposed to a variety of risks common to the U.S. as a whole, including automobile accidents and other injuries; contaminants in the air, water, soil, and food; and risks from smoking, alcohol and various diseases. Risks to workers may differ from those facing the public, depending on the nature of a person's work. Some of these risks may be quantified, but a lack of data allows for only a qualitative description of certain risks.

Nationwide, the chance of developing some form of cancer during one's lifetime is estimated to be about one in three (CDC 2005). There are many causes of cancer development, including genetic, viral, and occupational exposure to carcinogens, environmental contaminants, and substances in food. In the U.S., one-third of all cancers are attributed to tobacco smoking. Work-related cancers are estimated to account for 4 percent to 20 percent of all malignancies. It is difficult to quantify the information because of the long-time intervals between exposure and diagnosis, personal behavior patterns, job changes, and exposure to other carcinogens. The National Institute for Occupational Safety and Health has reported that approximately 20,000 cancer deaths and 40,000 new cases of cancer each year in the U.S. are attributable to occupational hazards (CDC 2009).

Nationwide, cancer accounts for approximately 24 percent of all fatalities (CDC 2007). Generally, males have higher rates of cancer mortality than females, and African Americans have higher rates than Caucasians.

3.8.2 Environmental Consequences – Public Health and Safety

Proposed Action

Effects from Chemical Treatments

Spot applications would be less likely to pose a risk to downwind receptors than boom/broadcast applications. However, spot applications would be more likely to pose a risk to the worker charged with applying the herbicide; because these workers are more likely to come into contact with the herbicide, their exposure doses could be higher. In particular, there would be a low to moderate risk to workers applying herbicides by backpack or horseback from exposure to the herbicide, whereas those applying herbicides at the typical application rate by ATV or truck would not be at risk.

Most of the herbicides do not pose a risk to human receptors when applied at the typical application rate. At the maximum application rate, however, more herbicides, under more exposure scenarios,

have the potential to adversely affect public health. Based on the human health risk assessments, glyphosate and triclopyr would not pose a risk when applied at the typical rate but would pose a risk under one or more exposure scenarios involving applications at the maximum application rate. There would not be risks associated with scenarios involving applications of imazapyr at the maximum (or typical) application rate.

There would be risk to workers treating noxious and invasive weeds with 2,4-D at either the typical or the maximum application rate. 2,4-D pose risks to ground applicators, particularly under scenarios involving the maximum application rate. All occupational receptors would be at risk from applying and triclopyr at the maximum application rate. The rest of the potential occupational exposures would not pose a risk to receptors. Overall impacts to public health and safety from weed treatments would be adverse, negligible to minor, and short-term.

No Action Alternative

Under the No Action Alternative, weed treatments would not be authorized through this livestock grazing renewal process. If determined necessary as a part of livestock operations or other resource management needs, weed treatments could separately be authorized under the IWMP. Risks to the public from the use of herbicides was analyzed in the IWMP, which also included BMPs and SOPs to minimize potential exposure to the public. Under the No Action Alternative there would be no impacts to public health and safety because none would be authorized.

No Grazing Alternative

Under the No Grazing Alternative, livestock grazing would no longer be authorized in the Allotment. If determined necessary for resource management needs, weed treatments could separately be authorized under the IWMP. Risks to the public from the use of herbicides was analyzed in the IWMP, which also included BMPs and SOPs to minimize potential exposure to the public. Under the No Grazing Alternative there would be no impacts to public health and safety because none would be authorized.

3.9 Residual Effects

Residual effects are those effects that remain after mitigation measures have been applied to the Proposed Action or alternatives and had not been previously incorporated into the Proposed Action or alternatives (BLM 2008). No mitigation has been identified for the alternatives; therefore no residual impacts are discussed.

4.0 CUMULATIVE EFFECTS

A cumulative effect is defined under NEPA as “the change in the environment which results from the incremental impact of the action, decision, or project when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other action”. “Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR Part 1508.7). Past, present, and reasonably foreseeable future actions are analyzed to the extent that they are relevant and useful in analyzing whether the reasonably foreseeable effects of the Proposed Action and/or Alternatives may have an additive and significant relationship to those effects.

4.1 Geographic Scope

The geographic scope of the cumulative effects study area (CESA) is the boundary of the Allotment comprising of approximately 32,360 acres of public and private lands (Figure 1).

4.2 Timeframe of Effects

The timeframe evaluated for direct and indirect effects of livestock grazing and range improvement projects is 10-years, the lifespan of the grazing authorization.

4.3 Past and Present Actions

The CESA is dominated by public lands managed within the Allotment. This area is subject to multiple uses including livestock use, recreation activities, road and utility line right-of-way maintenance.

Livestock use has occurred both in the past and currently within the CESA. Within the AFNM, livestock have been limited to riparian areas during the non-growing season (November 1 to March 1) when riparian obligate plant species are dormant. Silver Creek has been excluded from livestock use from 2005 to 2018. The incidence of trespass cattle has been infrequent and typically of limited duration.

The AFNM and surrounding areas are used by many recreationists for activities such as visiting cultural sites, hunting, OHV riding, hiking, and birdwatching. In 2014, 80,000 visitors were estimated to have visited the AFNM with trends increasing each year. Habitat maintenance activities have been carried out by the use of fire. Broadcast burns implemented to maintain tobosa grasslands and reduce woody species have been carried out on nearly 8,000 acres since 2009.

4.4 Reasonably Foreseeable Future Actions

Under the Proposed Action and No Action Alternative, the Allotment will continue to be managed for multiple uses. Traditional uses including livestock grazing would be authorized for a 10-year period, recreation activities, and right-of-way maintenance will likely continue. When and where appropriate, prescribed fire will be used to meet resource objectives as identified in the CRMP. Other reasonably foreseeable future actions (RFFAs) that may be implemented within the cumulative effects analysis area include weed treatments, authorization of special recreation permits, and range/wildlife facilities development (e.g. fence installation/removal/redesign and water developments). No future grazing actions would be expected under the No Grazing Alternative.

4.5 Analysis by Resource

Only those resources directly or indirectly affected by the Proposed Action, No Action Alternative or No Grazing Alternative are considered for cumulative effects.

Vegetation Resources

Proposed Action

Under the Proposed Action, livestock grazing would continue but utilization levels would be lower compared to the No Action Alternative given the triggers and thresholds identified in the CRMP. Range improvements would facilitate improved livestock distribution and rotation throughout the Allotment. This would have a beneficial cumulative effect on vegetation resources by reduced utilization and increased growth potential.

Weed treatments would be authorized under the Proposed Action for upland vegetation. These treatments may have temporary, localized, adverse effects to upland vegetation resources. The long-term benefits associated with control of noxious, invasive weeds are expected to have greater benefits to upland vegetation than the short-term adverse effects. Overall, the cumulative effects of the Proposed Action, in combination with other past, present and RFFAs, would result in long-term, negligible to minor, beneficial impacts to vegetation resources.

No Action Alternative

Under the No Action Alternative, livestock grazing would continue at existing levels. Range improvements would not be constructed, and current vegetation trends would continue. This would have a negligible adverse cumulative effect on vegetation resources.

Weed treatments would not be authorized under the No Action Alternative as a part of this project and potential adverse impacts to upland vegetation resources would continue from noxious, invasive weeds without additional management actions. The adverse impacts from noxious, invasive weeds could prevent that attainment or significant progress toward Arizona Rangeland Health Standards for upland vegetation in the future by altering native bunchgrass communities to annual plant communities that encourage site instability. Overall, the cumulative effects of the No Action Alternative, in combination with other past, present and RFFAs, would result in long-term, negligible to minor, beneficial impacts to vegetation resources.

No Grazing Alternative

Under the No Grazing Alternative, reduced utilization levels on vegetation would cause an increase in vegetative biomass which would help site stability and capture run-off.

Weed treatments would not be authorized under the No Grazing Alternative and potential adverse impacts to upland vegetation resources would continue from noxious, invasive weeds without additional management actions. Weed treatments implemented under the IWMP would provide additional resources to help overall site stability, hydrologic function, and biotic integrity by maintaining the native perennial bunchgrass community associated within the Allotment, especially during drought or after a wildfire. Overall, the cumulative effects of the No Grazing Alternative, in combination with other past, present and RFFAs, would result in long-term, minor, beneficial impacts to vegetation resources.

Riparian Resources

Proposed Action

Under the Proposed Action, when combined with other past, present or reasonably foreseeable actions as listed above, riparian areas should result in reaching desired conditions given environmental conditions. Achievement of desired conditions would occur more slowly than under the No Grazing Alternative due to reduced utilization and increased growth potential.

Weed treatments would be authorized under the Proposed Action and would be similar to upland weed treatments. These treatments may have temporary, localized, adverse effects to riparian vegetation. The long-term benefits associated with control of noxious, invasive weeds are expected to have far greater benefits to riparian vegetation than the short-term adverse effects. Overall, the cumulative effects of the Proposed Action, in combination with other past, present and RFFAs, would result in long-term, negligible to minor, beneficial impacts to riparian resources.

No Action Alternative

Under the No Action Alternative, riparian areas presently not achieving desired conditions should result in reaching desired conditions given environmental conditions. However, this would occur more slowly than under the Proposed Action and No Grazing Alternative. Voluntary restrictions under RMP and No Action have resulted in improved riparian conditions as noted in the LHE (BLM 2018).

Weed treatments would not be authorized under the No Action Alternative and potential adverse impacts to riparian resources would continue from noxious, invasive weeds without additional management actions. Overall, the cumulative effects of the No Action Alternative, in combination with other past, present and RFFAs, would result in long-term, negligible, beneficial impacts to vegetation resources.

No Grazing Alternative

Under the No Grazing Alternative, riparian areas would reach desired conditions given environmental conditions more rapidly than any of the alternatives due to reduced utilization and increased growth potential.

Weed treatments would not be authorized under the No Grazing Alternative and potential adverse impacts to riparian resources would continue from noxious, invasive weeds without additional management actions. Overall, the cumulative effects of the No Grazing Alternative, in combination with other past, present and RFFAs, would result in long-term, negligible to minor, beneficial impacts to vegetation resources.

Wildlife Resources

Proposed Action

Under the Proposed Action, habitat conditions for wildlife species including ESA-listed, BLM sensitive species, and migratory birds would reach desired conditions given environmental conditions, although more slowly than under the No Grazing Alternative due to reduced utilization and increased growth potential.

The Proposed Action, in conjunction with past, present, and foreseeable future actions would lead to short-term impacts to individual animals due to displacement by treatment disturbance and potential reduction in forage and cover habitat for highly mobile species. Short-term, adverse impacts on federally listed wildlife species that are less mobile would be due to stress and disturbance and potential mortality to individuals. The cumulative effects of weed treatments would result in long-term benefits because of a reduction or eradication of weeds, slower weed population spread, and less total weed infestations thus increased total native vegetation compared to existing conditions. In addition, new weeds that invade from adjacent lands would likely be eradicated and invasion of adjacent lands by weeds occurring within the Allotment would be curtailed as weed populations are controlled or eradicated. These would result in cumulatively improved habitat conditions for all federally listed wildlife species within and adjacent to the Allotment.

The Proposed Action would have the greatest long-term beneficial effects for migratory bird habitats because weed treatments would be authorized and benefit bird habitat. Short-term, adverse impacts would include the use of herbicides and their associated risks from drift and ingestion of invertebrates and touching plant materials exposed to herbicides. The cumulative long-term, beneficial impacts to improving migratory bird habitat and overall health of the lands should offset the short-term, adverse impacts.

The Proposed Action would have short-term increase in sediment and erosion to treated drainages. These areas would be subject to erosion until native vegetation becomes re-established, after which sediment and erosion to drainages should be less than existing conditions. However, the cumulative effects of weed treatments would result in long-term benefits to aquatic resources and habitats compared to existing conditions through control, eradication, and containment of weeds. This would result in slower weed population spread, and less total weed infestations thus increased total native vegetation compared to existing conditions.

Overall, the cumulative effects of the Proposed Action, in combination with other past, present and RFFAs, would result in long-term, negligible, beneficial impacts to wildlife resources.

No Action Alternative

Under the No Action, habitat conditions for wildlife species including ESA-listed, BLM sensitive species, and migratory birds would reach desired conditions given environmental conditions. However, desired conditions would be reached more slowly than under the Proposed Action and No Grazing Alternative due to reduced utilization and increased growth potential.

There would be no measurable cumulative effects to wildlife, migratory birds, and their habitat. Past and present actions could have adverse impacts such as displacement of wildlife and birds, loss of foraging or nesting habitat, or reduced air quality from wildfires on adjacent lands. However, weeds and infestations would likely continue to increase. The potential for changing species composition and structure of native plant communities could increase the potential for more frequent and intense wildfires that could remove large tracts of vegetation, reducing the quality and quantity of habitat available.

Past, present, and future livestock grazing on public lands could impact BLM sensitive fish species and other aquatic organisms. Indirect effects could include erosion and degradation of water quality, loss of forage and cover, and removal of water in areas of heavy livestock use that could affect sensitive fishes and other aquatic organisms. Fish species could be indirectly harmed by past, present, and future activities occurring on non-federal lands adjacent to public lands, such as herbicides applied to nearby agricultural lands or rangelands could drift onto public lands.

Overall, the cumulative effects of the No Action Alternative, in combination with other past, present and RFFAs, would result in long-term, negligible, beneficial impacts to wildlife resources.

No Grazing Alternative

Under the No Grazing Alternative, habitat conditions for wildlife species including ESA-listed, BLM sensitive species, and migratory birds would reach desired conditions given environmental conditions more rapidly than any of the alternatives due to reduced utilization and increased growth potential compared to the other alternatives. Utilization levels on vegetation would be light and would cause an increase in vegetative biomass allowing for increased site stability and run-off capture.

Overall, the cumulative effects of the No Grazing Alternative, in combination with other past, present and RFFAs, would result in long-term, minor, beneficial impacts to wildlife resources.

Soil Resources

Proposed Action

Under the Proposed Action, livestock would continue with reduced utilization levels. Soil resources would be maintained or improved by increased vegetative cover and reduced bare ground levels which would increase soil moisture, vegetative productivity, and soil stability which would be a slight beneficial cumulative effect compared to the No Action Alternative. Wildfire and prescribed fires would be less likely to occur in this alternative compared to the No Grazing Alternative but similar to the No Action Alternative.

Weed treatment may have a temporary, localized, adverse impacts to soil resources when compared with the potential effects from noxious, invasive weeds and other influences. Long-term benefits from weed treatments are expected to include restoration of healthy native plant communities, increased soil stability, and reduced potential for frequent intense wildfires. Overall, the cumulative effects of the Proposed Action, in combination with other past, present and RFFAs, would result in long-term, negligible, beneficial impacts to soil resources.

No Action Alternative

Under the No Action Alternative, livestock grazing would continue at existing levels. Soils resources would be maintained which is a negligible adverse cumulative effect to soils without prescribed or wildfire. However, the potential for wildfire, which can eliminate vegetative cover and result in increased soil erosion, is least likely to occur in the No Action Alternative.

Weed treatments would not be authorized under the No Action Alternative and potential adverse impacts to soil resources would continue from noxious, invasive weeds without additional management actions. Overall, the cumulative effects of the No Action Alternative, in combination

with other past, present and RFFAs, would result in long-term, negligible, beneficial impacts to soil resources.

No Grazing Alternative

Under the No Grazing Alternative, livestock grazing would not occur. Removal of livestock would have a negligible beneficial effect to soils compared to the other alternatives. However, potential for wildfire would be the greatest in the No Grazing Alternative which can eliminate vegetative cover and result in increased soil erosion for multiple years. High fuel loads compared to the other alternatives may result in increased burn severity and greater potential for soil erosion.

Weed treatments would not be authorized under the No Grazing Alternative and potential adverse impacts to soil resources would continue from noxious, invasive weeds without additional management actions. Overall, the cumulative effects of the No Grazing Alternative, in combination with other past, present and RFFAs, would result in long-term, minor, beneficial impacts to soil resources.

Noxious and Invasive Weed Resources

Proposed Action

Under the Proposed Action, noxious and invasive weeds would be managed under the IWMP to continue to ensure that the Allotment is or making significant progress toward meeting Standards. Overall, the cumulative effects of the Proposed Action, in combination with other past, present and RFFAs, would result in long-term, negligible, beneficial impacts to noxious and invasive weed species.

No Action Alternative

Under the No Action Alternative, the effects of and mitigation measures to control noxious and invasive weeds on the Allotment would be implemented through this EA. Implementation of weed treatments would be authorized separately under the IWMP and would be similar to the No Grazing Alternative. Overall, the cumulative effects of the No Action Alternative, in combination with other past, present and RFFAs, would result in long-term, negligible, beneficial impacts to noxious and invasive weed species.

No Grazing Alternative

Under the No Grazing Alternative, livestock would be removed from the grazing Allotment. This would have an adverse effect on noxious and invasive weeds within the Allotment. Non-livestock vectors of spread, environmental factors including drought and wildfire, as well as recreational impacts would culminate in the spread of weeds to other federal, state, and private lands. These impacts may occur more slowly without the additional pressure of livestock grazing. Overall, the cumulative effects of the No Grazing Alternative, in combination with other past, present and RFFAs, would result in long-term, negligible, adverse impacts to noxious and invasive weed species.

Water Resources

Proposed Action

Under the Proposed Action, livestock grazing would continue in and along waterbodies throughout the Allotment except for the Silver Creek exclusion area. Upstream activities including urban

development, livestock grazing, and recreational uses would continue. Water quality would not improve under existing conditions or until the ADEQ develops a Total Maximum Daily Load plan with a goal to reduce pollutants and restore water quality.

Weed treatments could have temporary, localized, adverse impacts to water resources. However, long-term, beneficial cumulative impacts are expected from the implementation of weed treatments as noxious, invasive weed populations would be reduced, invasion would be slowed, and more efficient control of current infestation would stabilize current conditions within the Allotment. Overall, the cumulative effects of the Proposed Action, in combination with other past, present and RFFAs, would result in long-term, negligible, adverse impacts to water resources.

No Action Alternative

Under the No Action Alternative, livestock grazing would continue at existing levels. Water resources would be similarly affected as to those discussed in the Proposed Action.

Weed treatments would not be authorized under the No Action Alternative and would continue to adversely impact native plant communities, nutrient cycling, and fire regimes within the Allotment without additional management actions. Overall, the cumulative effects of the No Action Alternative, in combination with other past, present and RFFAs, would result in long-term, negligible, adverse impacts to water resources.

No Grazing Alternative

Under the No Grazing Alternative, livestock grazing would not occur. Removal of livestock would have a beneficial effect to water quality compared to other alternatives by removing one source of *E. coli* contamination within the Agua Fria River inside the Allotment. Other possible sources of *E. coli* contamination within and upstream of the Allotment would remain and possibly prevent the removal or delisting of the Agua Fria River from the Section 303(d) list of impaired waters.

Weed treatments would not be authorized under this No Grazing Alternative and would have similar adverse impacts to the No Action Alternative. Overall, the cumulative effects of the No Grazing Alternative, in combination with other past, present and RFFAs, would result in long-term, negligible to minor, beneficial impacts to water resources.

Public Health and Safety

Proposed Action

Under the Proposed Action, the BLM would treat weed infestations through the use of mechanical, manual, biological, and chemical methods. There would be increased risks to public health and safety in the short-term as a result of increased number of treatments, methods and range of chemicals used to treat noxious and invasive weeds. The use of chemical treatments by ground application would likely increase short-term risks to the recreating public and tribal members collecting plants for traditional uses. Cumulatively in the long-term, risk exposure to the public health and safety would be minor or none. Considering past, present and reasonably foreseeable future actions, overall cumulative effects to public health and safety from treatment of noxious and invasive weeds would be neutral. Overall, the cumulative effects of the Proposed Action, in combination with other past, present and RFFAs, would result in long-term, negligible, adverse impacts to public health and safety.

No Action Alternative

Under the No Action Alternative, no chemical treatments would be authorized as a part of this livestock grazing renewal. Chemical treatments may occur through an authorization process under the IWMP. Overall, the cumulative effects of the No Action Alternative, in combination with other past, present and RFFAs, would result in long-term, negligible, beneficial impacts to public health and safety.

No Grazing Alternative

Under the No Grazing Alternative, no chemical treatments would be authorized as a part of this livestock grazing renewal. Chemical treatments may occur through an authorization process under the IWMP. Although livestock would no longer be a vector to impact weed populations, other ongoing recreational activities and natural conditions such as wildlife would continue to impact the extent of weed populations in the Allotment. Overall, the cumulative effects of the No Grazing Alternative, in combination with other past, present and RFFAs, would result in long-term, negligible, beneficial impacts to public health and safety.

5.0 PERSONS, GROUPS, AND AGENCIES CONSULTED

5.1 List of Preparers

The following individuals were involved in the preparation of this EA:

Bureau of Land Management

Name	Title	Project Expertise
Paul Sitzmann, Sarah Yates	Wildlife Biologist	Wildlife, Riparian
Tim Lyons	Natural Resource Specialist	Vegetation, Soil
Tim Watkins	Archaeologist	Cultural
Brian Buttazoni	Planning & Environmental Specialist	NEPA Compliance
Bill Wells	Hydrologist	Water Resources

5.2 Public Review

This “draft” EA had been made available to the public for review and comment for 15-days. The comment period closed on June 5, 2020. Although not required for an EA by regulation, an agency may respond to and summarize substantive and timely comments received as a part of the Final EA (Appendix 7) (BLM 2008).

5.3 Tribes, Individuals, Organizations or Agencies Consulted

The following were contacted to provide input on this EA:

Individuals

Anderson, M.

Borg, C.

Gregg, K.

Holbrook, J., JH Cattle

Burgess, J.

Spotts, R.

Organizations

Desert Tortoise Council

Center for Biological Diversity

Sierra Club- Grand Canyon Chapter

Western Watersheds Project

Wild Earth Guardians

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