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Environmental Assessment
DOI-BLM-AZ-P010-2014-0038-EA

PROPOSED SKY ARROW COMPLEX GRAZING
PERMIT RENEWAL FOR
Arrow Y Allotment #00084(Formerly #05018)
R&E Park Lease Allotment #00085 (Formerly #05045)
Sky Arrow Allotment #03079
Wickenburg Arrow Y Allotment #00069 (Formerly #3090)
Congress-Sky Arrow Allotment #05014

MARICOPA AND YAVAPAI COUNTIES, ARIZONA

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Chapter 1 – Purpose and Need

Introduction

The Bureau of Land Management (BLM) is proposing to fully process the term grazing authorizations on the Arrow Y allotment (#00084), R&E Park Lease allotment (#00085), Sky Arrow allotment (#03079), and Wickenburg Arrow Y allotment (#00069) (Sky Arrow Complex or Complex), and the Congress-Sky Arrow allotment. A Rangeland Health Evaluation (RHE) was prepared for the Sky Arrow Complex in 2014 (Appendix B) and a Supplemental RHE was prepared for the Congress-Sky Arrow allotment in 2015 (Appendix C).

The Sky Arrow Complex and the Congress-Sky Arrow allotment are located in Sonoran-Mojave shrub mix desert northeast of Wickenburg, Arizona and northeast of Highway 60 and the Hassayampa River. The Complex covers approximately 38,925 acres in Maricopa and Yavapai Counties. The BLM-administered portion of the Complex is approximately 22,722 acres. The remaining acreage is Arizona State Trust Lands (11,178 acres) and privately owned (4,093 acres) (Figure 1). The Congress-Sky Arrow allotment covers approximately 480 acres of BLM managed land located in and west of Box Canyon.

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 Sky Arrow Complex and Congress-Sky Arrow allotment. The analysis was conducted in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations (CFR) 1500-1508), and direction provided under BLM NEPA Handbook H-1790-1 (2008).

Sky Arrow Complex and Congress-Sky Arrow allotment Land Status

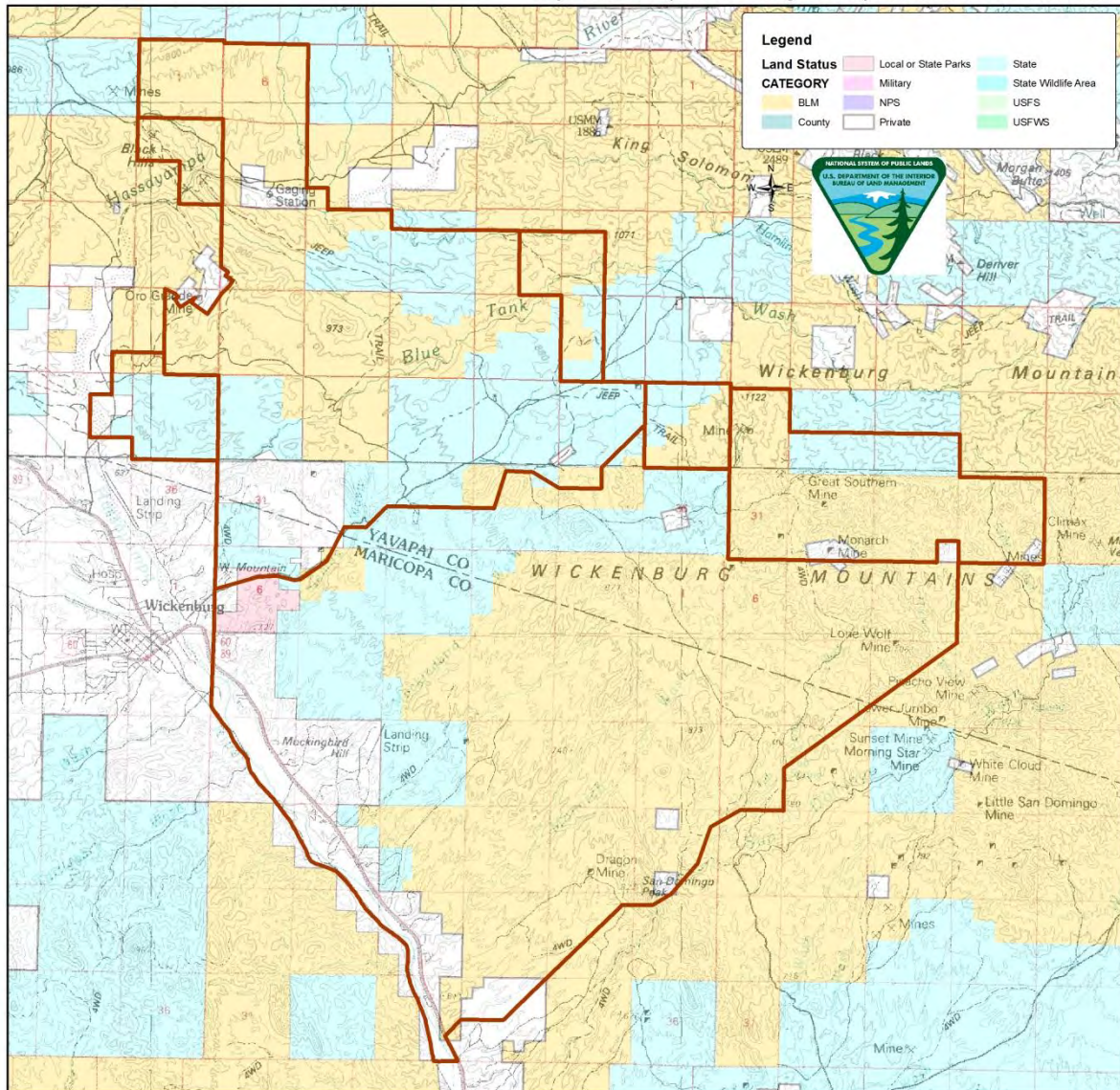


Figure 1

Sky Arrow Complex Profile

In 2000, the Lemons family acquired the base properties and base waters associated with the Complex allotments. Each allotment is fenced along the allotment boundary, with the exception of one of the parcels associated with the R&E Park Lease. There are no internal pasture fences on the allotments, with livestock being moved based on water and forage availability throughout the year. The Complex is used as an informal pasture rotation system, with cattle being moved between and within the allotments. Cattle are well distributed across the allotments due to numerous available livestock waters.

The Lemons family generally applies for full use of their grazing permits and leases. During the 2002-2003 grazing year, the permittee reduced the stocking rate on the Complex due to drought conditions. Since that time, livestock numbers have returned to permitted levels. The Arrow Y, R&E Park lease, and Sky Arrow allotments were returned to full use during the 2003-2004 grazing year. The Wickenburg Arrow Y allotment was returned to full use during the 2010-2011 grazing year. Reference the Sky Arrow Complex RHE in Appendix B for annual stocking rates by allotment.

Table 1 Arrow Y Allotment Profile

Arrow Y Allotment Profile	
Lessee	Lemons Family Trust
Percent/Acres BLM Land	78 percent/2,662 acres
Percent/Acres State Land	18 percent/627 acres
Percent/Acres Private Land	4 percent/106 acres
Grazing Preference	204 Animal Unit Months (AUMs)
Season of Use	Yearlong
Range Classification	Perennial
Management Category	Maintain
Kind and class of livestock use	21 Cattle

Table 2 R&E Park Lease Profile

R&E Park Lease Profile	
Lessee	Lemons Family Trust
Percent/Acres BLM Land	46 percent/1,127 acres
Percent/Acres State Land	49 percent/1,178 acres
Percent/Acres Private Land	5 percent/114 acres
Grazing Preference	144 Animal Unit Months (AUMs)
Season of Use	Yearlong
Range Classification	Perennial
Management Category	Maintain
Kind and class of livestock use	12 Cattle

Table 3 Sky Arrow Allotment Profile

Sky Arrow Allotment Profile	
Lessee	Lemons Family Trust
Percent/Acres BLM Land	43 percent/5,063 acres
Percent/Acres Other Federal Lands	8 percent/932 acres
Percent/Acres State Land	40 percent/4,734 acres
Percent/Acres Private Land	9 percent/1,073 acres
Grazing Preference	684 Animal Unit Months (AUMs)
Season of Use	Yearlong
Range Classification	Perennial
Management Category	Maintain
Kind and class of livestock use	100 Cattle

Table 4 Wickenburg Arrow Y Allotment Profile

Wickenburg Arrow Y Allotment Profile	
Lessee	Lemons Family Trust
Percent/Acres BLM Land	65 percent/13,870 acres
Percent/Acres State Land	22 percent/4,639 acres
Percent/Acres Private Land	13 percent/2,800 acres
Grazing Preference	2151 Animal Unit Months (AUMs)
Season of Use	Yearlong
Range Classification	Perennial
Management Category	Maintain
Kind and class of livestock use	239 Cattle

Range Improvements

The range improvement projects on the Sky Arrow Complex were inspected in 2009, 2011, and 2013. Most of the projects were functioning properly. Fences are maintained on a regular basis and repaired as necessary. Water developments are maintained as necessary. Many of the wells on the complex have been upgraded from windmills to solar powered electric pumps.

Congress-Sky Arrow Allotment Profile

The Grantham family acquired the base property for the Congress-Sky Arrow allotment in 1982. This allotment was initially part of the Sky Arrow allotment until the early 1970s. The lessee has generally paid for full use on the allotment; however, numbers were reduced in the mid to late 2000's due to drought conditions. Reference the Congress-Sky Arrow Supplemental RHE in Appendix C for annual stocking rates by allotment.

Table 5 Congress-Sky Arrow Allotment Profile

Congress-Sky Arrow Allotment Profile	
Lessee	William Grantham
Percent/Acres BLM Land	100 percent/ 480 acres
Grazing Preference	108 Animal Unit Months (AUMs)
Season of Use	Yearlong
Range Classification	Perennial
Management Category	Maintain
Kind and class of livestock use	9 Cattle

Range Improvements

There are currently no authorized range improvements on the Congress-Sky Arrow allotment. There are some old mining features which are capable of holding livestock accessible water on a seasonal basis.

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* (Rangeland Health Standards) (BLM 1997).

The need for this action is established by the Taylor Grazing Act, the Federal Land Policy and Management Act, Fundamentals of Range Health (43 CFR 4180), and the Hassayampa Field Office (FO) Resource Management Plan (RMP) (BLM 2010) to respond to an application for renewal of an expiring livestock grazing lease to graze livestock on public land. In detail, the analysis of the actions is needed because:

- The Bradshaw-Harquahala RMP identifies resource management objectives and management actions that establish guidance for managing a broad spectrum of land uses and allocations for public lands in the Hassayampa FO. The RMP allocated public lands within the Sky Arrow Complex as available for domestic livestock grazing. Where consistent with the goals and objectives of the RMP and Land Health Standards, the issuance of grazing permits or leases to qualified applicants are provided for by the Taylor Grazing Act and the Federal Land Policy and Management Act.
- BLM Arizona adopted the Arizona Rangeland Health Standards (Land Health Standards) and Guidelines for Livestock Grazing Management (Arizona S&Gs) in all Land Use Plans in 1997 (Appendix A). The Land Health Standards and Guidelines for Grazing Administration were also incorporated into the RMP. The Land Health Standards for Rangeland should be achieving or making significant progress toward achieving the standards. Guidelines direct the selection of grazing management practices and, where appropriate, livestock facilities to promote significant progress toward, or the attainment and maintenance of, the standards. The RHEs completed for the Sky Arrow Complex and the Congress-Sky Arrow allotment determined that Standards 1 and 3 are being achieved on upland sites, while Standard 2 and 3 are not being met in the riparian areas of the complex.

Decision to be made

The Hassayampa Field Manager is the authorized officer responsible for the decisions regarding management of public lands within these allotments. Based on the results of the NEPA analysis, the authorized officer will determine whether the impacts of the Proposed Action described in this analysis are significant and would require preparation of an environmental impact statement (EIS). If the authorized officer determines that the impacts are not significant, this analysis will help to inform the decision to renew, renew with modifications, or not renew the leases and permits. If renewed, management actions, mitigation measures, and monitoring requirements will be prescribed for the Sky Arrow Complex and Congress-Sky Arrow allotment to ensure management objectives and Rangeland Health Standards continue to be achieved.

Scoping & Public Participation

Internal scoping was conducted with BLM specialists. External scoping was conducted via letters sent to individuals and organizations on the Consultation, Coordination, and Cooperation list. Recipients were asked to comment on the RHE and the Proposed Action. The scoping period for the Sky Arrow Complex was June 6th through June 23rd, 2014. The scoping period for the Congress-Sky Arrow allotment was February 23rd through March 9th, 2015. No external scoping responses were received.

Issues for Analysis

For the purpose of BLM NEPA analysis, an “issue” is a point of disagreement, debate, or dispute with a Proposed Action based on some anticipated environmental effect. An issue is more than just a position statement, such as disagreement with grazing on public lands. An issue:

- has a cause and effect relationship with the Proposed Action or alternatives;
- is within the scope of the analysis;
- has not been decided by law, regulation, or previous decision; and
- is amenable to scientific analysis rather than conjecture.

For the purposes of this EA, the BLM analyzed issues if the analysis of the issue is necessary to make a reasoned choice between alternatives, or the issue is significant or may have potentially significant effects (BLM H-1790-1 2008). The Interdisciplinary Team (IDT) carefully considered comments by BLM specialists, the permittee, and affected agencies in order to identify issues relevant to issuing a 10-year grazing permit or lease. The issues derived from internal and external scoping on technical recommendations of the Sky Arrow Complex RHE (BLM 2014) are as follows:

Issue 1 – Upland vegetation: How would continued livestock grazing affect the health of upland vegetation?

Issue 2 – Riparian Systems: How would continued livestock grazing impact riparian areas and riparian-dependent species?

Issue 3 – Riparian Systems: How would seasonal use by livestock affect riparian area vegetation?

Issue 4 – Soils: Does livestock grazing affect cryptogamic crust presence?

Issue 5 – Wildlife: How would riparian area fencing affect wildlife use of the riparian area?

Conformance with Land Use Plan

Rangeland management decisions in the Bradshaw-Harquahala RMP that pertain to the Proposed Action include:

Rangeland Management (GM)

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.

Land Use Allocation

GM-4 Administer 93 grazing authorizations within the grazing allotment boundaries shown on Map 13.

GM-5 Public lands without a grazing permit or lease authorization will remain unauthorized for livestock grazing.

Management Actions

GM-6 Build livestock control fences and alternative water sources where needed to meet natural resource objectives. Fence construction and maintenance will follow guidance provided in BLM's Handbook on Fencing No. 1741-1.

GM-8 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-9 Implement grazing management changes as needed to produce riparian areas that are in or making progress toward proper functioning condition.

GM-11 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-12 Vehicular access to repair range improvements by the grazing permittee or lessee is considered administrative access. Use of vehicle routes closed to public use, but limited to administrative uses, will be allowed to maintain or repair range improvements. Off-route vehicle use will require prior authorization unless the needed access is to resolve an immediate risk to human health, safety, or property.

GM-13 One-time travel off designated routes to access or retrieve sick or injured livestock would be authorized as an administrative use for transporting the animal to obtain medical help.

GM-14 Management practices to achieve Desired Plant Communities (DPCs) will consider protecting and conserving known cultural resources, including historical sites, prehistoric sites, and plants of significance to Native American people.

GM-15 Apply management actions outlined in the Arizona Standards for Rangeland Health and Guidelines for Grazing Administration (*Arizona Standards for Rangeland Health*) 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 United States Fish and Wildlife Service (USFWS).

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, and 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-27 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.

Travel Management (TM)

Motorized and Mechanized Travel and Public Access (TM)

TM-8 All motorized and mechanized travel is limited to existing roads and trails, according to the BLM inventory of routes, until final route designations are made. Where inventories are not complete, use is limited to existing routes. Inventoried routes may be updated with new information from BLM, citizens, or partners. Livestock and game trails are not considered existing routes or trails.

TM-9 Cross-country travel is prohibited away from existing, inventoried routes. This prohibition will continue after routes are formally designated. The following exceptions apply in both cases

- Public health, safety, and law enforcement emergencies;
- Administrative uses; or
- BLM-authorized tasks approved by the authorized officer.

TM-13 Motorized vehicles may not be used off designated routes to retrieve game. The cross-country use of wheeled game carriers is permitted, except in wilderness areas. Permittees, including livestock operators, may not use motorized vehicles off designated routes without express permission from the Field Manager.

Relationship to Statutes, Regulations, or other Plans

The Taylor Grazing Act and the Federal Land Policy and Management Act (FLPMA) recognize grazing as a valid use of the public lands and require BLM to manage livestock grazing in the context of multiple use and sustained yield. Additionally, livestock grazing on public lands is managed according to grazing regulations found in the Code of Federal Regulations (at 43 CFR Part 4100).

The Taylor Grazing Act of 1934 provides for two types of authorized use: (1) A grazing permit, which is a document authorizing use of the public lands within an established grazing district, and are administered in accordance with Section 3 of the Taylor Grazing Act; and (2) a grazing lease, which is a document authorizing use of the public lands outside an established grazing district, and are administered in accordance with Section 15 of the Taylor Grazing Act. The Sky Arrow and Wickenburg Arrow Y allotments are Section 3 grazing permits; the Arrow Y, R&E Park Lease, and Congress-Sky Arrow allotments are Section 15 grazing leases.

Title 43 CFR 4100.0-8 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.” Title 43 CFR 4130.2(a) 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 is 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. These standards and guidelines address watersheds, ecological condition, water quality, and habitat for special status species. These resources are addressed later in this document.

The Biological Opinion for the Bradshaw-Harquahala RMP (2006, 22410-05-F-0785) provides USFWS review of the continued implementation of the RMP. The opinion provides terms and conditions and/or conservation measures for individual threatened or endangered species found within the boundaries of the Bradshaw-Harquahala management area.

Additionally, the following pertinent laws and/or agency regulations also apply:

- 43 CFR 4100 Grazing Administration - Exclusive of Alaska
- 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
- Clean Water Act of 1972, as amended
- Clean Air Act of 1970, as amended
- Endangered Species Act of 1973, as amended
- Section 106 of the National Historic Preservation Act of 1966, as amended
- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001-3013; 104 Stat. 3048-3058)
- National Environmental Policy Act of 1969
- Wild Free Roaming Horse and Burro Act of 1971
- Migratory Bird Treaty Act of 1917, and Executive Order 13186 – *Responsibilities of Federal Agencies to Protect Migratory Birds*

Chapter 2: Alternatives

This chapter describes the alternatives to be analyzed in detail in Chapter 3. The IDT developed three alternatives – Proposed Action, No Action, and No Grazing – based on the analysis and technical recommendations presented in the Sky Arrow Complex RHE (Appendix B) and Congress-Sky Arrow Supplemental RHE (Appendix C), and 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 three 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.

Stipulations

No road construction would be permitted in conjunction with the Proposed Action. Routine maintenance would be performed on existing range improvements as required.

Alternative A – Proposed Action

The Proposed Action is to renew the Sky Arrow Complex and Congress-Sky Arrow allotment permits and leases for a period of 10 years with the following terms and conditions (Table 6). These terms and conditions represent a recalculation of the % Public Land based on the current BLM and Arizona State Land Department permitted stocking rates. AUMs on public lands remain the same as the prior permits and leases.

Table 6 Sky Arrow Complex Terms and Conditions

Allotment	Livestock Number and Kind	Grazing Period	AUMs	% Public Land
Arrow Y (15)	24 Cattle	3/01 – 2/28	204	71% Active
R&E Park Lease	24 Cattle	3/01 – 2/28	144	50% Active
Sky Arrow	100 Cattle	3/01 – 2/28	684	57% Active
Wickenburg Arrow Y (3)	232 Cattle	3/01-2/28	2151	77% Active
Congress-Sky Arrow	9 Cattle	3/1-2/28	108	100

Other Terms and Conditions

Sky Arrow and Wickenburg Arrow Y permit and the Congress-Sky Arrow lease:

Standard terms and conditions are found on Grazing Permit/Lease Form 4130-2a. In addition to the mandatory terms and conditions, other terms and conditions would be added to the permit under the Proposed Action:

1. Supplemental 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 one-eighth (1/8) mile away from major drainages and washes and sensitive wildlife habitat.
2. The permittee/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)).
3. 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.
4. Livestock grazing in the Box Canyon riparian area is limited to November 1st through March 1st annually. Season of use dates may be modified by the authorized officer as riparian conditions warrant. These modifications include delaying turn in dates by up to 28 days, advancing turn out dates by up to 28 days, or closure of the riparian area to grazing for the duration of the grazing authorization.

Arrow Y and R&E Park Lease allotments:

Standard terms and conditions are found on Grazing Permit/Lease Form 4130-2a. In addition to the mandatory terms and conditions, other terms and conditions would be added to the lease under the Proposed Action:

5. Supplemental 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 one-eighth (1/8) mile away from major drainages and washes and sensitive wildlife habitat.
6. 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)).
7. 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.”

Range Improvements

Riparian areas within the Sky Arrow and the Congress-Sky Arrow allotments would be fenced for seasonal livestock use from November 1 through March 1 annually. Fencing would be installed per BLM standards in BLM Handbook 1741-1 (BLM 1989). Enclosures to restrict cattle from the Box Canyon area and the Hassayampa River, east of Box Canyon, would be constructed using a combination of 4-strand barbed and barbless wire in the uplands and hanging rebar panels crossing the channel bed. Range fence will be constructed consisting of barbless wire on the top and bottom strands. Channel crossings would be suspended wire rope with 10ft by 4ft rebar panels that are wired together. The location of the enclosures is shown on Figure 2 below. Combined length of the barriers would be 6,000 feet long. The permanent footprint of the barriers would be 3 feet wide x 6,000 feet long totaling 0.41 acres. Construction would not be done between May 1 and September 30 to prevent disturbance to nesting birds. All cultural resources would be avoided.

Box Canyon Proposed Exclosure Fencing

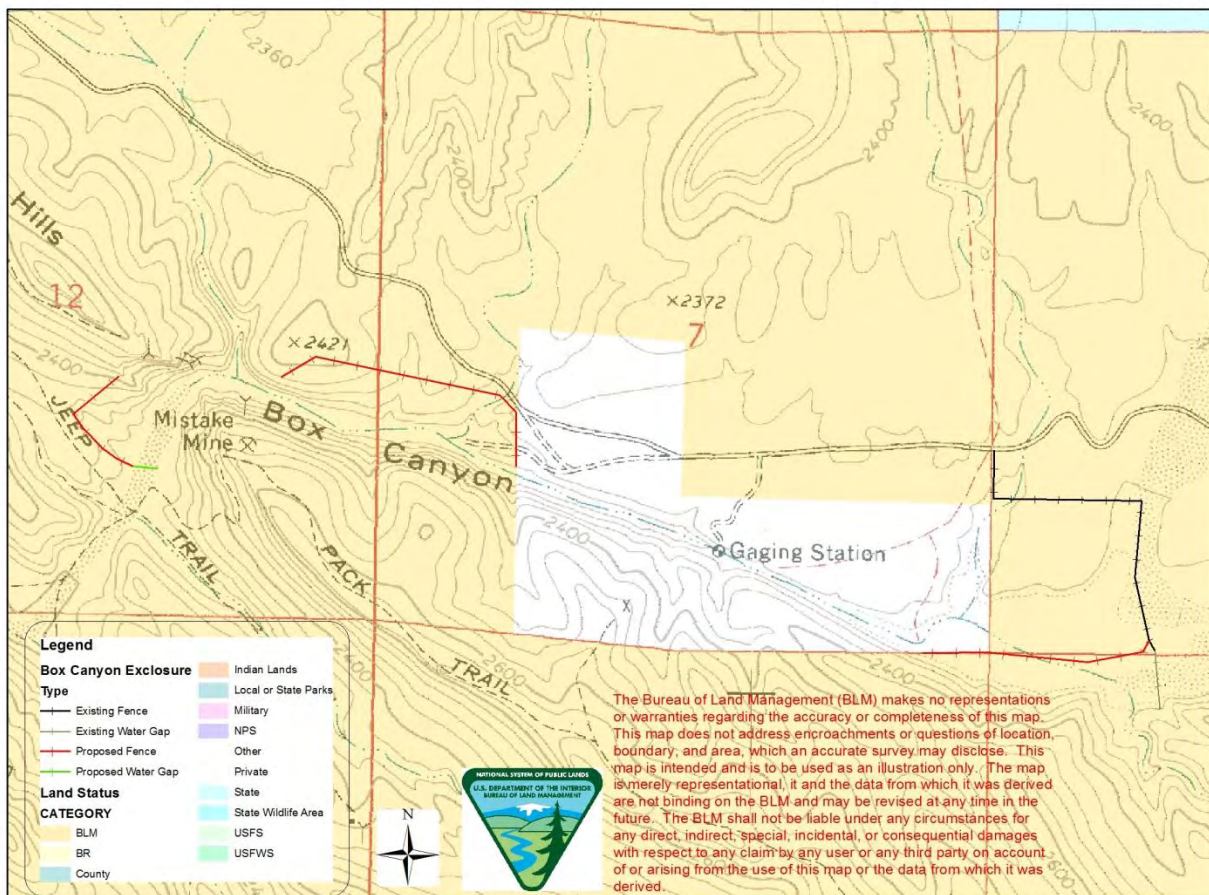


Figure 2 Proposed riparian exclosure fencing

Riparian Management in the Box Canyon Area

The following conservation measures would be implemented to improve riparian condition and reduce potential impacts to yellow-billed cuckoo and its habitat:

- The Box Canyon area would be closed to livestock grazing from March 1st to November 1st. This would reduce disturbance to birds that may be present during the migration/breeding season and would aid in the recruitment and cover of riparian vegetation.
- Proper functioning condition would be assessed annually. The desired management outcome is

for the riparian area to be in proper functioning condition as defined in BLM Technical Reference 1737-15.

- Bank alteration and woody species utilization would be measured annually according to the “Multiple Indicator Monitoring” (MIM) protocol (BLM Technical Reference 1737-23) near the end, or shortly after the end, of the livestock season of use (between February 14th and March 15th).
- Riparian vegetation would be monitored once every 3 years according to the MIM protocol (BLM Technical Reference 1737-23). To better assess the woody riparian plant species component, belt transects would be surveyed annually according to protocol described in the “Greenline Riparian-Wetland Monitoring” (BLM Technical Reference 1727-8). Proper functioning condition would be assessed annually according to “A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas” (BLM Technical Reference 1737-15). These monitoring protocols would measure herbaceous riparian vegetation composition, woody riparian vegetation composition, stubble height of herbaceous vegetation, woody species utilization, woody species height class, woody species age class, greenline to greenline width, and streambank alteration. All of the above mentioned BLM Technical References are available online at the following web address: http://www.blm.gov/wo/st/en/info/blm-library/publications/blm_publications/tech_refs.html. The desired riparian plant community consists of stream banks dominated (>50%) by native riparian plant species. To ensure recruitment and retention of native riparian obligate tree species, the desired age class distribution is >15% seedling, >15% young, and >15% mature trees. If the desired plant community objectives are not met, or are not making progress toward being met, within three years because of livestock use, additional actions would be required such as, but not limited to, reducing the livestock season of use, and temporary or permanent closure to livestock use. Livestock use would be considered to be the causal factor for the riparian area not meeting, or making progress toward meeting, the desired plant community objectives if bank alteration exceeds 30%; and/or if woody species utilization exceeds 40%. The desired plant community objectives would be considered to be making progress toward meeting objectives if:
 - Within 3 years the riparian seedling age class represents > 15% distribution, and native riparian obligate herbaceous cover is greater than 10%.
 - Within 6 years the riparian tree seedling age class represents > 15% distribution, and native riparian obligate herbaceous cover is greater than 20%.
 - Within 9 years the riparian tree seedling age class represents > 15% distribution, the riparian tree young age class represents >15% distribution, and native riparian obligate herbaceous cover is greater than 30%.
- The BLM would survey the riparian habitat in the Box Canyon area for yellow-billed cuckoos according to established protocols (call-playback survey) once every three years, beginning the first breeding season after the permit is issued.
- The BLM would complete at least two compliance checks annually to ensure that the livestock exclosure fence is effective at excluding the livestock and that the grazing permittee is meeting the terms and conditions of the permit.
- The water gap fences would be inspected at least two times per year by BLM staff. The water gap fences would also be inspected after rain events by BLM staff.
- The exclosure fence and water gap maintenance responsibilities would be assigned to the grazing permittee in the cooperative range improvement agreement.

Alternative B – No Action

A no action alternative is developed for two reasons. First, the no action alternative represents a viable and feasible choice in the range of management alternatives. Second, because a no action alternative represents the continuation of current management actions, it provides a benchmark of existing impacts continued into the future against which to compare the impacts of the other proposed management alternatives.

The No Action alternative would renew the Sky Arrow and Wickenburg Arrow Y permit and the Arrow Y, R&E Park Lease, and Congress-Sky Arrow leases for a period of 10 years with the same terms and conditions as shown in Tables 1-6. Riparian area fencing would not be constructed. No restrictions would be placed on supplement placement or season of use in riparian areas. Actual use reporting would not be required.

Alternative C – No Grazing

This alternative was developed to address unresolved conflicts concerning alternative uses of available resources, in this case, alternative uses of forage (40 CFR 1501.2(c)). Under the No Grazing alternative, the BLM would not authorize grazing in the Arrow Y, R&E Park lease, Sky Arrow, Wickenburg Arrow Y, and Congress-Sky Arrow allotments (Sky Arrow Complex) for a ten-year term and all Animal Unit Months (AUMs) for active preference would not be available for livestock grazing on public lands (i.e., livestock grazing would be deferred for the ten-year permit period). No new range improvement projects would be constructed and no modifications would be made to existing projects.

Alternatives Considered but Dismissed from Detailed Analysis

Alternatives may be dismissed from detailed analysis under the following conditions (BLM 2008):

- The alternative is ineffective and would not respond to the Purpose and Need
- It's technically or economically infeasible
- It's inconsistent with the land use plan
- Implementation is remote or speculative
- It's substantially similar to another alternative that is analyzed
- It would have substantially similar effects as an alternative that is being analyzed.

Reduced Grazing Alternative

The IDT reviewed a “reduced grazing” alternative. The purpose of the alternative was to consider whether reducing the livestock stocking rate on the allotment presented a viable means of meeting the purpose and need for this action.

Rather than select an arbitrary number or percentage of reduction, the BLM typically uses a “desired stocking rate analysis”¹ to estimate livestock carrying capacity on the allotments. A stocking rate analysis provides a non-arbitrary method to identify alternative possible stocking rates on an allotment. This analysis identifies stocking rates based on a desired utilization percent of key forage species.

¹ The desired stocking rate analysis was conducted in conformance with TR-4400-07, “Analysis, Interpretation, and Evaluation”, as given in Appendix 2 of the TR.

The stocking rate analysis used Key Area utilization data from 2009, 2013, and 2014. Actual use numbers provided by the grazing permittee were available for all years of utilization data. To generate the desired stocking rate, the actual use was multiplied by the desired utilization percent, and then divided by the observed utilization percent to yield desired use.

Desired Stocking Rate Formula

$$\frac{(\text{Actual Use}) (\text{Desired Utilization Percent})}{\text{Observed Utilization Percent}} = \text{Desired Stocking Rate}$$

Desired or objective utilization levels for the allotment were calculated using 40 percent for herbaceous and grass species and 30 percent for palatable shrubs. All data were used for years that both actual use and utilization data were available in the initial calculations (see project file). When utilization levels were recorded for more than one species, the highest use level was used. This method uses the concept of “limiting factor” which recognizes that the species used the most will determine the level of grazing use that will best manage for maintenance of the key forage species.

For shrubs, a utilization limit of 30 percent was used based on Mule deer guidelines provided by Heffelfinger (2006), who recommended utilization limits between 25 percent and 35 percent based on range condition. To generate the stocking rate, actual use was multiplied by the desired utilization percent; this factor was then divided by the actual utilization percent to find desired use, or stocking rate potential.

Based on the calculated potential stocking rate analysis, no reduction in stocking rate is necessary to meet objectives. Areas showing reduced stocking rate potential are offset with many areas within the complex showing increased stocking rate potential due to recovery of palatable vegetation. The table below shows the calculated average stocking rate potential by allotment within the complex. This table is based on the lowest calculated potential stocking rate for each Key Area.

Allotment	Current Authorized AUMs	Stocking Rate Analysis
Arrow Y	204	282
Congress-Sky Arrow	108	108
R&E Park Lease	144	192
Sky Arrow	684	605
Wickenburg Arrow Y	2151	2007

The analysis shows a reduced stocking rate potential on the both the Sky Arrow and the Wickenburg Arrow Y allotments, while showing an increased potential stocking rate on the Arrow Y and R&E Park Lease allotments. The complex currently has an authorization of 3,183 AUMs. The calculated potential stocking rate for the Sky Arrow complex is 3,086 AUMs. The difference between these stocking rates is approximately 8 cattle, out of a potential complex-wide herd of 380 head. This reduction would be less than 2% of the grazing operation. Based on herd size fluctuations due to death loss, current livestock market rates, and availability of privately owned irrigated pasture land within the allotments, a reduced grazing alternative is substantially similar to the proposed action and was not evaluated.

Chapter 3: Affected Environment and Environmental Consequences

For each resource analyzed in detail, this chapter first provides a succinct description of the conditions and trends of issue-related elements of the human environment, and then analyzes and describes the potential environmental consequences, or impacts, that would occur as a result of implementing the alternatives. Topics analyzed in this chapter are listed in Chapter 1 (see Issues for Analysis) and include upland vegetation, riparian vegetation, invasive plants, soil resources, riparian and groundwater resources, and wildlife resources. Resources that may exist within the project area, but would not be impacted by the Proposed Action, are described under the section titled “Resources Dismissed from Further Analysis” below.

General Project Setting

The Sky Arrow Complex and Congress-Sky Arrow allotment are comprised of 5 contiguous parcels of public rangeland administered by the Bureau of Land Management, Hassayampa Field Office. The Complex is located in Sonoran-Mojave shrub mix desert northeast to east of the town of Wickenburg, AZ. The Complex is roughly bisected by Constellation Road, which runs northeast out of Wickenburg approximately a mile east of the US60/US93 interchange and spans from the Hassayampa River on the west boundary to San Domingo Wash on the eastern boundary. The BLM administered portion of the complex is approximately 23,202 acres. The remaining acreage is Arizona State Trust Lands (11,178 acres), privately owned (4,093 acres), or other Federal Acres (932 acres). The Congress-Sky Arrow allotment covers approximately 480 acres of BLM managed land located in and west of Box Canyon. The allotments are located in Maricopa and Yavapai counties. The terrain is gently rolling to steep hills and mountains that are bisected by numerous drainage ways, including the Hassayampa River, San Domingo wash, and Monarch wash. The legal descriptions of the allotments are given in Table 6, below.

Table 7. Legal Descriptions of permitted and leased public lands

Allotment	Township	Range	Sections
Arrow Y	8N	3W	30, 31, 34 and portions of 32, 33
Congress- Sky Arrow	8N	5W	Portions of 12
R&E Park Lease	8N	4W	Portions of 14, 15, 23, 25
	8N	5W	Portions of 23, 24
Sky Arrow	8N	4W	6, 19, 20, 29 and portions of 7, 18, 15, 21, 22, 30, 33, 34, 35
Wickenburg Arrow Y	7N	3W	4,5,6,7,18 and portions of 8, 9, 17, 19
	7N	4W	1, 2, 10, 11, 12, 13, 14, 15, 22, 23, 27 and portions of 3, 5, 9, 20, 21, 24, 26, 33, 34
	8N	3W	Portions of 33
	8N	4W	Portions of 34, 35

Upland Vegetation

Affected Environment

This section discloses the impacts of livestock grazing on upland vegetation within the allotment. This section also responds to the following issues identified in Chapter 1:

Issue 1 – Upland vegetation: How would continued livestock grazing affect the health of upland vegetation?

The BLM develops RHEs to determine whether standards are being achieved on a grazing allotment and to determine if livestock grazing is a causal factor for not achieving, or failing to make significant progress toward achieving, land health standards.

In general, the BLM reported that the Complex exhibited a positive plant community structure in the Sonoran Desert environment. The most dominant plant species found across the Complex were whitethorn and catclaw acacia, tobosagrass, flattop buckwheat, paloverde, calliandra, and globemallow, many of which are key forage species. In most instances, these species were in very good condition, with little utilization. Their abundance and vigor across the Complex attest to the good condition of the rangeland and the success of the current grazing management system. If overgrazing was occurring, these species would be much less abundant, and less desirable species, such as snakeweed and triangle bursage, would dominate instead.

Key areas were monitored and analyzed in 2008/2009, and again in 2013/2014 to determine whether indicators of ecological processes conform to the Rangeland Health Standards. A key area is an indicator area that represents a larger ecological site. Key areas reflect the current grazing management over similar areas in the unit and serve as representative samples of range condition, trend, use and production. A total of 11 key areas have been established across the Sky Arrow Complex: six key areas on the Wickenburg Arrow Y allotment, two key areas on the Sky Arrow allotment, two key areas on the Arrow Y allotment, and one key area on the R&E Park Lease allotment (RHE Section 7.1). There is one key area located on the Congress-Sky Arrow allotment.

All key areas on the Complex have attribute ratings of “None to Slight” or “Slight to Moderate” departure from the Ecological Site Description (ESD) Reference Sheets. These ratings do not appear to be caused by overgrazing by livestock based on the utilization levels (Sky Arrow Complex RHE in AppendixB). Departures from the applicable reference sheets are within the tolerances listed in the RHE.

Desired Plant Community (DPC) objectives are established for each Key Area within the Sky Arrow Complex. All DPC objectives are being achieved at R&E Park Lease Key Area 1, at Wickenburg Arrow Y Key Areas 3, 4, and 5, and at Congress-Sky Arrow Key Area 1. DPC objectives are partially achieved at all other key areas. Perennial grass composition objectives are not achieved at Arrow Y Key Area 1, Sky Arrow Key Area 1, and Wickenburg Arrow Y Key Areas 1 and 6. Palatable browse composition objectives are not achieved at Wickenburg Arrow Y Key Area 2. Vegetative foliar cover objectives are not met at Arrow Y Key Areas 1 and 2, Sky Arrow Key Area 2, and Wickenburg Arrow Y Key Area 6. Bare ground cover class objectives are not met at Wickenburg Arrow Y Key Area 6. However, data indicate that progress is being made toward meeting these objectives. With the exception of Arrow Y Key Area 1 and Wickenburg Arrow Y Key Area 6, all key areas currently meet Land Health Standard 3. (Sky Arrow Complex RHE Section 7).

Utilization data do not indicate that current levels of livestock use are a causal factor for not achieving the DPC objectives. Utilization levels at all key areas did not exceed the “light” use category of 21-40% utilization with the exceptions of Sky Arrow Key Area 1, which showed a “Moderate” browse use category for Ephedera species, at 42.9% utilization, and Wickenburg Arrow Y Key Area 1, which showed

a “Heavy” browse use category for Ephedera species, at 70% utilization, and a “Moderate” browse use category for Jojoba species, at 53% utilization. Both of these key areas are currently meeting browse composition requirements. (Sky Arrow RHE Section 7)

Overall, the RHE reported that the Sky Arrow Complex and the Congress-Sky Arrow allotment are meeting all Rangeland Health Standards in the upland areas. All twelve sites across the Complex and Congress-Sky Arrow allotment are consistent with ESDs in soil/site stability, hydrologic function, and biotic integrity and meet Standard 1. Ten sites across the Complex are consistent with DPC objectives and meet Standard 3.

Environmental Consequences

Alternative A – Proposed Action

The Proposed Action was designed to address the areas of potential concern noted in the RHE, specifically the findings that the perennial grass component was not achieved at Arrow Y Key Area 1, Sky Arrow Key Area 1, and Wickenburg Arrow Y Key Areas 1 and 6, and that the vegetative foliar cover requirements are not met at Arrow Y Key Areas 1 and 2, Sky Arrow Key Area 2, and Wickenburg Arrow Y Key Area 6.

The Proposed Action “Other Terms and Conditions” stating that “Supplements would be restricted within 1/4 mile of watering facilities or 1/8 mile upslope from drainages and dry washes” will improve livestock distribution within the allotments, allowing for recruitment of native vegetation. Given adequate climatic conditions, grasses will be expected to recolonize sites. This is expected to increase vegetative foliar cover within the allotments.

The current stocking rate would be maintained under this alternative. The lessee has the flexibility to maintain current livestock numbers even through periods of drought that may cause a reduction in the carrying capacity of upland vegetation. The stocking rate analysis showed there would be adequate carrying capacity in the Complex to maintain current stock rates under drought conditions in the northern areas of the Wickenburg Arrow Y and Sky Arrow allotments.

In conclusion, under the Proposed Action, Rangeland Health Standards for upland vegetation would continue to be met. DPC objectives at most of the key areas would continue to be met, with improvements expected due to mineral placement and fencing that would improve livestock distribution.

Alternative B – No Action

Currently, the Sky Arrow Complex meets applicable Arizona Standards for Rangeland Health for upland vegetation. Nine of the eleven sites meet Standard 3. All sites are consistent with ESDs in soil/site stability, hydrologic function, and biotic integrity, and meet Standard 3.

Under this alternative, no restrictions would be placed on locating mineral supplements. As a result it is expected that under the No Action scenario more trampling would occur near water developments and within drainages when compared to the Proposed Action. Overall, livestock distribution would not be expected to change.

Recruitment of vegetation will be limited by current use patterns. Areas that currently show moderate or greater levels of utilization would continue to receive these levels of utilization without modification of current livestock distributions.

Alternative C – No Grazing

Upland vegetation would have the most rest and recovery under a no grazing scenario. Although the Complex is meeting all applicable standards for rangeland health in the uplands, plant communities would still benefit from rest. Because no livestock grazing would occur, plants would remain ungrazed by livestock, with the only browse pressure coming from wildlife. Grasses would see greater benefits as compared to the other alternatives because grazing pressure would not impede their ability to fix a significant amount of carbon and produce and set seed.

The plants that would most benefit from no grazing are shrub species. Current year's growth – the leaves and young stems that are important for photosynthesis – is the most digestible part of the plant and is the portion generally removed by browsing animals. The buds are especially important to protect from grazing because they will be the source of new stems.

Under this alternative, upland vegetation would improve the most in productivity, vigor, species composition, and formation of new stems compared to the other alternatives.

Riparian Vegetation

The analysis of riparian systems responds to two issues identified during scoping that could have impacts from the various alternatives:

Issue 2 – Riparian Systems: How would continued livestock grazing impact riparian areas and riparian-dependent species?

Issue 3 – Riparian Systems: How would seasonal use by livestock affect riparian area vegetation?

Affected Environment

There are two riparian reaches on the Sky Arrow complex, both located along the Hassayampa River in the Box Canyon area (Appendix B, Map 5). One reach lies on both the Sky Arrow and Congress-Sky Arrow allotments. The vegetative community along these two reaches consists of Goodding's willow (*Salix gooddingii*), seep willow (*Baccharis salicifolia*), velvet mesquite (*Prosopis velutina*), desert broom (*Baccharis sarothroides*), tree tobacco (*Nicotiana glauca*), salt cedar (*Tamarix ramosissima*), Bermuda grass (*Cynodon dactylon*) and spike rush (*Eleocharis palustris*).

Riparian monitoring was carried out using BLM Technical Reference 1711-23 Multiple Indicator Monitoring (MIM) of Stream Channels and Streamside Vegetation and BLM Technical Reference 1737-9 Process for Assessing Proper Functioning Condition (PFC). The MIM protocol is designed for monitoring streambanks, stream channels, and streamside riparian vegetation. Indicators and procedures in this protocol were selected and developed primarily to monitor impacts of livestock and other large herbivores on wadable streams (usually less than 10 m wide). The MIM protocol integrates annual grazing use and long-term trend indicators allowing for evaluation of livestock grazing management. The PFC assessment refers to a consistent approach for considering hydrology, vegetation, and erosion/deposition (soils) attributes and processes to assess the condition of riparian-wetland areas. A checklist is used for the PFC assessment (Appendix D in BLM Technical reference 1737-9), which synthesizes information that is foundational to determining the overall health of a riparian-wetland system. The on-the-ground condition termed PFC refers to how well the physical processes are functioning. PFC is a state of resiliency that will allow a riparian-wetland area to hold together during high-flow events with a high degree of reliability. This resiliency allows an area to then produce desired values, such as fish habitat, neotropical bird habitat, or forage, over time. Riparian-wetland areas that are not functioning properly cannot sustain these values.

The riparian areas within the Complex were evaluated in 2013 using the Proper Functioning Condition methodology, as defined in BLM Technical References 1737-9 and 1737-15. Riparian areas are evaluated,

and categorized as Proper Functioning Condition (PFC), Functional At Risk (FAR), or Non-Functional. In the case of riparian areas classified as FAR, an apparent trend rating of upward, downward, or not apparent is assigned.

PFC Assessments

Hassayampa River Riparian Segment 14C

PFC was assessed at this segment of the Hassayampa River on 10-22-13. This is a narrow reach bounded by steep canyon walls. Mature Goodding's willow (*Salix gooddingii*) trees were present, but no seedlings were observed along the reach. Seep willow (*Baccharis salicifolia*) is also present along much of this reach, as was velvet mesquite (*Prosopis velutina*) and desert broom (*Baccharis sarothroides*). The only perennial herbaceous plant species located along the streambanks was Bermuda grass (*Cynodon dactylon*). Evidence of light cattle use and heavy recreational use of off-highway vehicles was noted along the reach. The stream channel was dry along this reach at the time of the assessment. This riparian reach was rated as functional-at-risk, therefore this reach did not achieve Standard 2 of the Arizona Standards for Rangeland Health. The rationale for this rating includes the lack of recruitment of riparian tree species, the lack of cover of riparian obligate herbaceous species and the overall sparse cover of riparian vegetation to protect banks and dissipate energy during high flow events. Heavy vehicle traffic in the riparian corridor appeared to be limiting the establishment of riparian vegetation. Reference Section 4.1.1 of Appendix B.

Hassayampa River Riparian Segment 14D

PFC was assessed at this segment of the Hassayampa River on 10-22-13. This is also a narrow reach bounded by steep-sided canyon walls. Vegetation consisted of scattered Goodding's willow, seep willow, velvet mesquite and Bermuda grass. Evidence of heavy vehicle use and light cattle use was noted. At the time of the assessment the upstream end of the reach had surface flow and the downstream end of the reach was dry. Evidence of down-cutting was observed in the upper end of the reach. This reach was rated as functional-at-risk, therefore this reach did not achieve Standard 2 of the Arizona Standards for Rangeland Health. The rationale for this rating was that there was sparse cover of perennial riparian obligate species, lack of recruitment of riparian tree species and evidence of recent down-cutting. Tire tracks covered much of the width of the riparian corridor in this reach. Vehicle use in the riparian area appeared to be limiting the establishment of vegetation and may have contributed to down-cutting. Reference Section 4.1.2 of Appendix B.

Multiple Indicator Monitoring

A representative Designated Monitoring Area (DMA) was selected in each of the riparian segments to install a Multiple Indicator Monitoring (MIM) plot. These DMAs were chosen due to the presence of sensitive resources that are important to maintaining bank stability and because they have open access to cattle. Sensitive resources include native riparian obligate plant species and stream banks with well-developed soils.

Hassayampa River Riparian Segment 14C

The greenline plant composition is listed in Section 4.1.1 in Appendix B. The greenline is defined as the lineal assemblage of perennial vegetation on or near the water's edge. The only herbaceous species present in the reach was Bermuda grass (CYDA). Only two native riparian obligate species were present along the greenline: Goodding's willow (SAGO) and seep willow (BASA4). Reference Section 4.1.1 of Appendix B.

Goodding's willow was the only native riparian obligate tree species detected in the belt transects. No seedling or young age-class Goodding's willow trees were found in the survey. One tamarisk, an invasive nonnative tree species, was found in the transects. To achieve a proper functioning condition and improve

fish and wildlife habitat, the desired plant community consists of stream banks dominated (>50%) by native riparian herbaceous plant species; and, to ensure recruitment and retention of native riparian obligate tree species, the desired age class distribution is >15% seedling, >15% young, and >15% mature trees. The desired plant community objectives were not met in this reach; therefore this reach did not achieve Standard 3 of the Arizona Standards for Rangeland Health. Reference Section 4.1.1 of Appendix B.

Hassayampa River Riparian Segment14D

The only herbaceous species recorded in the reach was one occurrence of common spikerush (ELPA3). Two other native riparian obligate species were present along the greenline: Goodding's willow (SAGO) and seep willow (BASA4). Reference Section 4.1.2 of Appendix B.

Two mature Goodding's willow trees were detected in the woody species belt transects, but no seedling or young age classes were found. Tree tobacco, a non-native facultative wetland tree species, was also found at the site. To achieve a proper functioning condition and improve fish and wildlife habitat, the desired plant community consists of stream banks dominated (>50%) by native riparian herbaceous plant species; and, to ensure recruitment and retention of native riparian obligate tree species, the desired age class distribution is >15% seedling, >15% young, and >15% mature trees. The desired plant community objectives were not met in this reach; therefore this reach did not achieve Standard 3 of the Arizona Standards for Rangeland Health. Reference Section 4.1.2 of Appendix B.

Environmental Consequences

Alternative A – Proposed Action

Under the Proposed Action riparian vegetation in the Sky Arrow Complex would only be grazed in the winter months, from November 1 to March 1, when riparian species become dormant and are not actively growing. This proposed change in the grazing season would remove livestock during the warmer months when riparian-dependent species actively grow.

Winter-only grazing of riparian systems would help with recruitment and survival of native riparian trees such as Fremont cottonwood (*Populus fremontii*) and Goodding's willow. It would also reduce livestock loafing along creek bottoms, which degrades streambanks and alters channel morphology. Over time, the removal of livestock from creek bottoms during the vegetation growing season should help increase the channel width-to-depth ratio and create a deeper channel with more pools. In addition, the change in grazing seasons should allow the accumulation of vegetation in the herbaceous layer that protects the natural function of streams. These effects would be expected to increase the diversity and abundance of riparian-dependent species and their complexity.

Proposed restrictions on supplement placement (outside 1/8 mile from drainages) and riparian fencing would help move livestock away from washes and would reduce grazing pressure in and near riparian areas.

Alternative B – No Action

Under this alternative, the riparian systems in the Sky Arrow Complex would continue to be grazed during the spring and summer months when riparian dependent species would be actively growing. Without riparian fencing, livestock would continue impacting the riparian reaches in the Box Canyon year round. With grazing occurring during the spring and summer and the lack of protection from fencing to limit the intensity of livestock grazing, vegetative cover along streambanks and recruitment of riparian obligate trees would not be expected to increase. With limited riparian obligate vegetative cover to stabilize the soil along the streambanks, down-cutting would be expected to continue. Under the No Action alternative, riparian systems in Box Canyon would not be expected to reach PFC and DPC objectives.

Alternative C – No Grazing

With the total exclusion of livestock, this alternative would provide the greatest improvement of the riparian conditions on the Sky Arrow Complex systems when compared to the other alternatives. Except for some browsing by wildlife, the riparian obligate species would be rested from grazing, and would improve in vigor. Recruitment of riparian dependent species would be expected to increase, and establishment of seedling and young age class trees would take place. Plant diversity and habitat complexity should increase over time, and streambanks should become more stable. Both riparian reaches in Box Canyon would be expected to reach PFC and meet DPC objectives more rapidly than in the other alternatives.

Invasive Plants

Affected Environment

This section addresses public comments received regarding the presence of invasive plant species within the Sky Arrow Complex. The comments resulted in the following:

Issue 5: How would continued livestock grazing contribute to the spread of non-native, invasive plants? If a positive correlation exists, would invasive species affect the ecological function of native plant communities, such as natural fire regimes?

Red brome (*Bromus rubens*) is present on the Complex and was noted at Arrow Y Key Areas 1 and 2, R&E Park Lease Key Area 1, Wickenburg Arrow Y Key Area 1, and along the riparian areas in the Hassayampa River. The species is likely present across most of the complex. A non-native, invasive plant, red brome is an annual bunchgrass that is frequent to abundant across Arizona and is naturalized across the Western U.S. Red brome is not highly competitive with established perennials, especially native grasses (Halvorson and Guertin 2003, USDA 2012). The plant has a short growing season and low palatability.

Red brome can alter the fire regime in native desert plant communities by increasing fuel loads and shortening the fire return interval (Simonin 2001). This increased fire activity can adversely affect native species. The presence of red brome is variable depending upon the amount and seasonal distribution of rainfall, becoming more widespread after winters with moderate to high rainfalls. However, the abundance of red brome in the project area is limited due to low precipitation. During dry seasons, red brome is typically only found in shaded areas, and not in the interspace areas between vegetation. This patchiness does not support continuous fuel loading to carry wildfire.

Red brome cannot be eradicated from desert ecosystems. However, proper grazing management to maintain the desired plant communities for the ecological site will aid in suppression of red brome and other undesirable plant species (USFS 2012). Studies have demonstrated that an intermediate level of cattle grazing may maintain greater levels of native plant diversity, while cattle removal resulted in little increase in native plant cover and reduced plant species richness relative to the moderate grazing control (Loeser et al. 2007). Establishing and maintaining competitive grasses can minimize the invasion and spread of rangeland weeds (Sheley 1995).

Monitoring results at the key areas on the Complex do not indicate a problem with the presence of invasive plant species. Bare ground, canopy cover, and litter – factors that can affect the presence of invasive species – were within expected ranges for all key areas. For five of the key areas, monitoring found that departure from the ESD for invasive species was “none to slight”.

The RHE reported that key areas were as expected for their ecological site descriptions for plant species composition, cover, and frequency, and that ground litter was within expected surface cover range for the ecological sites. Species composition data showed a relatively high percentage of perennial grasses and

palatable shrubs: the presence of herbaceous and perennial plants is recommended to help control invasive plants like red brome (USDA 2012).

DPC objectives were only partially met at some of the key areas. Specifically, the desired perennial grass component was not met at Arrow Y Key Area 1, Sky Arrow Key Area 1, Wickenburg Arrow Y Key Areas 1 and 6, and the desired vegetative cover was not achieved at Arrow Y Key Area 1 and 2, Sky Arrow Key Area 2, and Wickenburg Arrow Y Key Area 6. However, data indicate that progress is being made toward meeting these objectives. At Arrow Y Key Area 1, Sky Arrow Key Area 1, and Wickenburg Arrow Y Key Area 1, the high browse component helped offset the lack of perennial grasses. In contrast, Wickenburg Arrow Y Key Area 2 lacked the desired browse component for deer habitat, but had sufficient perennial grasses and browse for desert tortoise habitat on site. However, departure from ESD for invasive plants was 'none to slight' for these key areas.

The Hassayampa FO is not managing for eradication of red brome. No noxious weeds have been identified on the allotment.

Environmental Consequences

Alternative A – Proposed Action

The Proposed Action is designed to maintain or improve conditions favorable to meeting DPC objectives and Rangeland Health Standards.

Under the Proposed Action, vegetative cover and perennial grass composition should improve, which would help prevent the introduction and spread of invasive plants.

As stated above, red brome in abundance can alter the fire regime in desert plant communities. However, the spread and distribution of red brome would remain dependent on annual precipitation. Maintaining DPC objectives would provide conditions under which native plant species would continue to outcompete red brome, and therefore maintain the existing fire regime.

The Complex is currently meeting standards for upland conditions. As the BLM continues to monitor utilization of upland key forage species over time to ensure average utilization of key herbaceous forage species does not exceed 40 percent, which is light moderate use, it is expected that renewing the grazing permit would not contribute to spread of non-native, invasive plants.

Alternative B – No Action

Under the No Action alternative, the season of use and livestock distribution (riparian fencing and mineral placement restrictions) would remain unchanged from the present. As such, present conditions in terms of soil litter and vegetation composition and cover would remain unchanged. Because the current management of livestock does not indicate a declining trend in expected ecological site conditions based on the monitoring data, a change in the presence or distribution of invasive, non-native plant species is not expected.

Alternative C – No Grazing

Removal of grazing by domestic livestock would not automatically lead to disappearance of invasive plant species (Young and Clements 2007), and would not be expected to affect the presence or distribution of red brome within the allotments.

Although livestock grazing is observed to be one of the disturbance types that influence the invasive potential of the species (USGS 2003), red brome can be found across both disturbed and undisturbed landscapes (USDA 2012). While the No Grazing alternative may provide benefits by removing cattle and, therefore, one form of disturbance to soils and vegetative cover within the allotment, this alone would not

be expected to affect the presence of red brome in the allotments. Further, there is no indication that the spread and distribution of the invasive can be controlled or eradicated outside of active management.

Competition by crowding has been shown to reduce the reproductive success of red brome (Halvorson 2003). Under the No Grazing alternative, upland vegetation would improve the most in productivity, vigor, species composition, and formation of new stems compared to the other alternatives. The expected effect would be a reduction in the presence of red brome across the allotments.

Soil Resources

This section responds to Issue 4: *Does livestock grazing affect cryptogamic crust presence?*

Affected Environment

The erosional context across the allotment is stable. Historical erosion from land use practices over the past century has produced high erosion rates with shifts in vegetation along with soil redistribution and loss by wind and water. The result of these practices left a dominant shrubland and soils with gravel and rock surfaces armored against erosion.

Soil mapping shows a low to moderate risk for erosion by wind. The wind erodibility index scores soils from 0 tons to 56 tons per acre per year assuming no groundcover, with the exception of some soils on the first terrace above the Hassayampa River, which have a potential for 86 tons per acre assuming no ground cover (see NRCS 2008).

Water erosion within the allotment occurs during intense summer thunderstorms. Soils have well drained conditions but intense rainfall can overwhelm soil infiltration capacity and create overland flow. The 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 is mostly localized around livestock water sources on the complex.

RHE findings did not note substantial departure from expected abiotic and biotic conditions outlined in the ESDs. The very rocky soils resist active erosion. All twelve key areas showed only slight sign of active surface erosion suggesting stable soils. These areas showed either a none to slight or slight to moderate departures from the reference state for rilling, with the exception on Wickenburg Arrow Y Key Areas 3 and 4, which showed a moderate departure. Wickenburg Arrow Y Key Area 3 showed a moderate departure from reference state for pedestalling that indicates some loss or movement of topsoil. The RHE findings did not suggest impaired conditions given the expected shrub abundance at the site.

The biotic conditions that can indicate soil productive capacity did not show signs of substantial deviation from expected plant community composition, abundance, and annual crop.

Desert soils have known contributions from biological soil crusts, also called cryptogamic crusts, for soil biologic function. The particular ecological province of the project area with a thermic climate is expected to favor cyanobacteria that have a flat appearance. A byproduct of crust presence is aggregation that binds soil particles. Using the RHE measures, the soil aggregate stability tests did not find aggregation substantially departed.

The ESDs for the key areas do not indicate a large presence of soil crusts. The absence of crusts in the sampling may be attributed to the period of sampling and crust species composition. The organisms shrink and swell according to available water, being able to quickly take advantage of short precipitation episodes (Cable and Huxman 2004). Sampling during dry periods will produce less frequency scores. In addition, gravel and rock conditions do not promote the formation of macroscopic crusts, favoring smaller organisms. A third factor for the low recorded crust presence is the inverse relationship with vascular

plant cover. Vegetation across the Complex was shrub-dominated and had a foliar cover of 10-60% across all sites.

Livestock grazing does affect soil productivity by removing a portion of the standing crop. Annually produced biomass serves both a physical and biological role. 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.

The litter on the allotment is primarily produced from shrubs. The rocky soils favor shrubs and cacti that compose 54 percent to 80 percent of the total vegetation. Litter from grasses and forbs is sparse since the soils and climatic setting do not favor their production. Grasses and some forbs rely on fine soil textures since rooting concentrates in the top 10 centimeters. Since grazing targets primarily herbaceous species, the impact of the grazing on annual crop will be difficult to detect. The litter from the allotment plant communities consists of shrub and herbaceous leaves, twigs and roots. Grasses and herbs which livestock target consist of a minor part of the plant community on most of these ecological sites. Monitoring measured litter to be 21 percent to 39 percent total groundcover at the key areas. The litter fraction of groundcover was not found departed from expected conditions.

Environmental Consequences

Alternative A – Proposed Action

The Proposed Action would improve soil conditions by improving livestock distribution. The greatest change would result from increased dispersal by use of mineral blocks, which would lower the pressure on forage vegetation in livestock concentrating areas. Although noticeable improvements in soil conditions would be slight to none, the added dispersal would curtail concentrated grazing pressure that affects soil and vegetation communities. Improved fencing and implementing seasonal use would further enhance livestock dispersal and alleviate concentrated grazing pressure around riparian areas.

The current stocking rates would likely have a low effect on erosion since the grazed vegetation makes up a small fraction of the overall canopy cover. Canopy cover intercepts and disperses rainfall and disrupts overland flow generation. Measured vegetation cover ranged from 10 percent to 60 percent with less than 10 percent expected grasses on the majority of these ecosites. The monitoring showed bare soils ranged from 1 percent to 28 percent, largely because of the rocky surface conditions. Gravel and stone ranged from 32 percent to 62 percent. Given the low numbers and armored soils and considering the stable conditions suggested by the monitoring, continuation of the grazing permit would not result in further degradation from erosion.

The impacts of grazing on soil biotic crusts are difficult to discern because within this environment, cyanobacteria type crusts may exist below the gravel surface and would be difficult to detect.

Alternative B – No Action

The No Action and Proposed Action would result in similar effects to soil resources. The primary difference is that this alternative would take no actions to increase livestock dispersal across the Complex. Although present impacts to soils are minor, grazing pressure, and therefore soil impacts, would continue in areas of concentrated use. However, continuing present livestock management practices on the Complex would not result in impaired soil conditions given the findings of the RHE.

Alternative C – No Grazing

The removal of livestock from the Complex would increase the litter for soil processes and reduce compaction and bare soil exposure from livestock trampling. Impacts would be highest where groundcover slowly re-establishes at grazing congregation areas.

The impacts to vegetation and soils across the range would be slow and depend on the level of forage that livestock grazing previously impacted. Potentially, an increase in annual crop would boost substrate available for soil functional processes. However, the response from livestock removal would be low since rangeland forage makes up a small percentage of the annual crop. Changes would be highest where grasses and forbs thrive.

Using Michunas's (2006) review of plant community response to livestock grazing, we would expect a very slow vegetation response to livestock removal in arid and semi-arid environments. In reviews of long-term studies on Chihuahua desert scrub with similar precipitation patterns to the Complex, findings indicate very little change in perennial grass cover after 16 to 25 years. In addition, because grass and forb communities are reaching late seral composition, it's likely that eliminating grazing pressure would result in a slow response.

Finally, the response from no grazing may be small since less change is associated with reductions from moderate compared to heavy grazing levels. 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 (Loesser et al. 2006).

Wildlife Resources

This section provides site-specific analysis of potential impacts to wildlife resources and addresses the following issues:

Issue 5: How would riparian area fencing affect wildlife use of the riparian area?

Affected Environment

General Wildlife Species

Wildlife species that occur within the Sky Arrow Complex are typical and representative of the vegetative communities present in the area. Species present include, but are not limited to, mule deer, coyote, javelina, mountain lion, bobcat, gray fox, raccoon, desert cottontail, black-tailed jackrabbits, Gambel's quail, great horned owls, and various reptiles, small mammals, and migratory birds.

The Sky Arrow Complex is located within the Arizona Game and Fish Department management unit 20B. Javelina (*Pecari tajacu*) and desert mule deer (*Odocoileus hemionus*) are two big game species that utilize the Sky Arrow Complex. Mule deer rely heavily on browse and forbs, which make up the majority of their diet (greater than 90%). Grasses and succulents were generally less than 5 percent of mule deer diet (Krausman et al. 1997, Heffelfinger et al. 2006). Desired key forage species for mule deer and javelina that exist in the Complex include the ephedra species, slender janusia, range and white ratany, jojoba, the eriogonum species, calliandra, desert globemallow, and succulents including prickly pear, barrel, and hedgehog cacti.

Both cattle and wildlife utilize herbaceous vegetation. Various wildlife species (e.g., mule deer, some migratory birds) depend on forbs and shrubs for forage and concealment. Insectivore species such as bats or some migratory birds are indirectly dependent on herbaceous vegetation to support their insect population diet or to provide a substrate for nesting, roosting, or concealment. Larger predator species are indirectly dependent on herbaceous vegetation to provide forage and cover for prey species such as small mammals and birds. The presence and movement of livestock between areas can result in the direct disturbance or displacement of individual wildlife species from areas providing cover and forage.

Across all ecological sites, current vegetative species composition and structure provides cover and forage to support a diverse wildlife community. Abundant trees, shrubs and cacti are available to provide forage, cover, and nesting opportunity for many bird species as well as cover and palatable browse for mule deer

and javelina. The mix of trees/shrubs/cactus and grasses/forbs present on the allotment provides a diversity of habitats suitable for a variety of wildlife species from reptiles and small mammals to various birds, and game species as well as predators that depend on these species groups.

Migratory Birds

All migratory birds are protected under the 1918 Migratory Bird Treaty Act (16 USC 703), which prohibits the taking of any migratory birds, their parts, nests, or eggs unless specifically permitted by regulation. Additional protection is provided by the Neotropical Migratory Bird Conservation Act of 2000 (16 USC Chapter 80). Executive Order 13186 requires the BLM and other federal agencies to work with the USFWS to provide protection for migratory birds, primarily in the form of habitat protection to avoid migratory pattern disruption. Migratory birds found within the allotment are typical of Sonoran desert habitat such as ash-throated flycatcher, brown-crested flycatchers, Scott's oriole, white-winged dove and western kingbirds. Within riparian areas along the Hassayampa River species such as summer tanager, Lucy's warbler, yellow warbler, yellow-breasted chat, and black phoebe also occur.

Special Status Species

Special status species include federally listed, candidate and proposed species as well as BLM sensitive species. One Endangered Species Act (ESA) threatened species, the yellow-billed cuckoo (*Coccyzus americanus occidentalis*), has been detected on the Sky Arrow Complex. Critical habitat for the yellow-billed cuckoo has been proposed along the Hassayampa River in the Sky Arrow and Congress-Sky Arrow allotments. One ESA candidate species, Sonoran desert tortoise (*Gopherus morafkai*) is known to occur on the Sky Arrow Complex. BLM sensitive species that are known to occur on the Complex include longfin dace (*Agosia chrysogaster*) and lowland leopard frog (*Rana yavapaiensis*). No other federally listed, proposed or candidate species have been recorded on the Sky Arrow Complex. The endangered southwestern willow flycatcher (*Empidonax traillii extimus*), has been documented on private lands near the Complex.

The yellow-billed cuckoo is a neotropical migratory bird species that nests and forages in riparian habitat. Cuckoos typically arrive in Arizona in mid to late May. Nesting activities continue into August or September, and cuckoos typically depart Arizona by mid-September (Corman 2005). Yellow-billed cuckoos have been detected in the Box Canyon riparian area along the Hassayampa River.

Sonoran desert tortoises occupy much of the upland areas in the Sky Arrow Complex. The desert tortoise distribution within the Complex is not uniform. Tortoises tend to occupy hillsides and ridges with outcrops of large boulders as well as areas with incised washes and caliche caves, but may be found in lower densities throughout the area. Tortoises generally use natural and excavated cover sites between or under boulders and in caliche caves along washes wherever they occur. Their diet consists of annual forbs (30.1%), perennial forbs (18.3%), grasses (27.4%), woody plants (23.2%) and prickly pear fruit (1.1%) (Van Devender, et al. 2002). These forage species are available for Sonoran desert tortoise throughout the Complex. The Sky Arrow Complex contains 19,755 acres of category II desert tortoise habitat and 3,868 acres of category III desert tortoise habitat (Reference Section 2.3.5, Appendix A). Category II habitat is defined as: 1) Habitat that may be essential to the maintenance of viable populations; 2) Habitat where most conflicts are resolvable; and 3) Habitat that contains medium to high densities of tortoises or low densities contiguous with medium or high densities. Category III habitat is defined as: 1) Habitat that is not considered essential to the maintenance of viable populations; 2) Habitat where most conflicts are not resolvable; and 3) Habitat that contains low to medium densities of tortoises not contiguous with medium or high densities.

Longfin dace and lowland leopard frog are aquatic obligate species, only known to occur in the Complex in the Hassayampa River, Box Canyon Area.

Environmental Consequences

Alternative A – Proposed Action

Wildlife and Migratory Birds

Presently, Rangeland Health Standards for upland habitat are being met, and DPC objectives at most of the key areas are being met across the Complex. The Proposed Action is designed to improve conditions for upland vegetation near livestock water sources, major drainages and washes through restrictions on supplement placement. This would maintain or improve upland vegetation productivity over current conditions in the vicinity of drainages and washes across the Complex, providing increased forage opportunities and cover for wildlife species in important desert wash habitat. This would be expected to benefit mule deer, desert tortoise and a variety of migratory birds. This would also be expected to increase seed production in these areas for seed-eating species and residual forage for insects, providing important prey for bats, insectivorous migratory birds, and raptors.

The construction of riparian fencing in the Box Canyon area to limit livestock season of use would allow recruitment of riparian trees and an increase in riparian herbaceous species cover, trending the area toward meeting Standards 2 and 3 of the Arizona Rangeland Health Standards. This would improve cover and forage availability for wildlife, particularly riparian-obligate migratory birds such as the yellow-billed cuckoo. Increased vegetation density and streambank stability would be expected to improve aquatic habitat by improving flood water retention and ground-water recharge and promoting complex pooling and diverse channel characteristics (Prichard et al. 1998). This would benefit longfin dace and lowland leopard frog by increasing habitat volume and diversity. Fence installation would cause a temporary disturbance to wildlife individuals but displacement effects for most species would be minimal and normal use would continue once construction activities were completed. The fence would be constructed to meet BLM fencing manual 1741-1 standards to restrict livestock access but facilitate wildlife movement. The fencing would be discontinuous, using natural barriers to cattle, but allowing wildlife movement. The fence construction would be expected to increase wildlife use of the riparian area during livestock exclusion periods as the vegetation improves and disturbance effects are minimized.

Routine maintenance of water sources (springs, tanks and troughs) on the allotment would continue to benefit wildlife species in this arid environment. Individual wildlife species could be displaced when cattle are present at water sources, but would be expected to return once livestock moved to other locations within the allotment.

Special Status Species

The BLM consulted with the US Fish and Wildlife Service (FWS) on the effects of the proposed action on yellow-billed cuckoo and proposed critical habitat. Through this consultation the conservation measures that are included in the “Riparian Management in the Box Canyon Area” section of Chapter 2 were established. The FWS concurred with the BLM that the proposed action may affect, but is not likely to adversely affect the yellow-billed cuckoo. This concurrence was based on the following:

- 1) Livestock will not be admitted into the riparian areas in Box Canyon during the yellow-billed cuckoo breeding and nesting season (March 1 to November 1 of each year). This will reduce disturbance to birds that may be present during the migration/breeding season and will aid in the recruitment and cover of riparian vegetation.
- 2) Noise and activity disturbance from construction is discountable given that project construction activities will occur outside the breeding and nesting season, and it is highly improbable that birds will be in the area during that time.

- 3) Noise and activity from maintenance of the trail and barriers will result in minimal disturbance over a short duration and will be insignificant to any birds present because it is unlikely to affect basic life history functions.
- 4) The BLM has outlined conservation measures, as described above, with the goal that such measures will aid in the recovery of the yellow-billed cuckoo.

The FWS also concurred with the BLM that the proposed action may affect, but is not likely to adversely affect proposed critical habitat for the yellow-billed cuckoo. This concurrence was based on the following:

- 1) Livestock will be excluded from the Box Canyon riparian area during the warm, growing season. By limiting livestock in this area, which is currently grazed year-round, we expect an improvement in the quality and quantity of riparian woody vegetation which may result in improved yellow-billed cuckoo habitat, for migration and breeding, and minimize effects on the PCE's.
- 2) The size of each patch of riparian vegetation in the proposed action area is smaller than 37 ac (15 ha). Laymon and Halterman (1998) outline that 200 acres of riparian vegetation are considered optimum and patches less than 37 ac are considered unsuitable for nesting.
- 3) The BLM will use adaptive management techniques outlined in the BA (these techniques are included in the "Riparian Management in the Box Canyon Area" section of Chapter 2) to monitor the function of the range and riparian vegetative community. Monitoring will occur at regular intervals and if standards are not met, adjustments will be made to grazing practices, which may result in additional restrictions to livestock presence in riparian areas.

Potential impacts to southwestern willow flycatcher from livestock grazing were addressed in the Biological Assessment/BO (22410-05-F-0785, USFWS 2005) developed for the *Bradshaw-Harquahala RMP EIS* (BLM 2010). This assessment concluded that livestock grazing on the allotments within five miles of the Hassayampa may affect, but is not likely to adversely affect, the southwestern willow flycatcher.

Alternative B – No Action

For upland areas, the No Action alternative would not provide the additional benefits to key wildlife forage species expected under the Proposed Action. Rangeland Health Standards and DPC objectives would continue to be met at most key areas, but the improvements in upland vegetation condition expected in the Proposed Action would not be expected to occur in this alternative. Overall, livestock distribution would not be expected to change.

Continued yearlong livestock use of the riparian areas in Box Canyon would not allow rest to recover overstory and herbaceous vegetation. There would be no trend toward meeting Standards 2 and 3 and habitat conditions for aquatic and riparian obligate species would not be expected to improve. Under this alternative, no restrictions would be placed on locating mineral supplements. As a result it is expected that more trampling would occur near water sources and desert wash habitat compared to the Proposed Action. Habitat conditions for yellow-billed cuckoo would not be expected to improve.

General livestock grazing disturbance and displacement effects to wildlife in upland habitat would be similar to the Proposed Action, but there would be no disturbance related to fence construction.

Alternative C – No Grazing

In the absence of livestock grazing, competition for wildlife forage vegetation would be reduced, providing more forage for wildlife and insect populations. The absence of livestock grazing could result in cover canopy increasing over time, benefiting cover-dependent species. Water developments would not be maintained or could be turned off, reducing water availability for wildlife in the allotment over time. Livestock disturbance/displacement effects would not occur, benefiting nesting migratory birds and other wildlife individuals. The improvements in riparian and aquatic habitat mentioned in the proposed action alternative would also be expected to occur. With the absence of grazing year round, these improvements in riparian habitat conditions would be expected to occur more rapidly. The recruitment of riparian trees and increase in riparian herbaceous species cover would be expected to be greater under this alternative, further benefiting riparian and aquatic obligate species such as the yellow-billed cuckoo and longfin dace.

Cumulative Actions

The CEQ defines cumulative effects (also known as cumulative impacts) as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what (federal or non-federal) agency or person undertakes such actions” (40 CFR 1508.7).

The intensity, or severity, of the cumulative effects considers the magnitude, geographic extent, duration, and frequency of the effects. The magnitude of the effect reflects the relative size or amount of the effect; the geographic extent considers how widespread the effect may be; and the duration and frequency refer to whether the effect is a one-time, intermittent, or chronic event.

If there is no net effect to a particular resource from an action, then there is no potential for cumulative effects. In addition, if effects that do not overlap in time and/or space, they do not contribute to cumulative effects. The temporal frame for analysis of cumulative effects is 10 years, which is the time period for the grazing lease. The spatial scale is the 39,405 acre Sky Arrow Complex and Congress-Sky Arrow allotment.

The past, present, and reasonably foreseeable future actions considered in the cumulative effects analysis are summarized below.

A wide variety of land uses and activities are possible on the Sky Arrow Complex and Congress-Sky Arrow allotment, including travel, recreation, mineral development, grazing, and others. Specifically, the BLM issued a decision in 2014 for the Wickenburg Community Travel Management Plan, which encompasses this area. Specific actions that are occurring, or are likely to occur in the reasonably foreseeable and contribute to cumulative effects include:

Livestock Grazing

The Sky Arrow Complex has been actively grazed for decades, and livestock grazing has occurred in some form on the allotment areas for over a century. The environmental effects of past grazing practices are reflected in the current description of the affected environment for the allotment. If left unchanged (No Action), current grazing practices are not expected to contribute toward downward trends in upland

vegetation resource conditions on the central and western pastures within the allotments. A downward trend may occur in riparian areas if current grazing practices continue. The action alternatives analyzed in this EA are designed to address riparian conditions in the Hassayampa River. Under the No Grazing scenario, improvement in resource conditions are expected to be mild to moderate over the long-term as soil, vegetative conditions, and riparian areas slowly recover from long-term livestock grazing on the allotment. Continued livestock grazing is not anticipated to result in cumulative effects to non-native, invasive vegetation. Continued livestock grazing is not anticipated to result in any cumulative effects to wildlife species or habitat in the project area.

Soils

No substantial cumulative effects to soils were identified. Proposed range improvements have a minimal footprint. Localized fence effects from livestock and recreation are expected to occur but be highly localized. There may be increased trailing to new salt and supplement locations, but effects are expected to be negligible and highly localized. Compaction is expected to continue on established routes with increased recreational use in the area due to the expansion of Wickenburg and surrounding communities. Although heavy vehicle use of Box Canyon and surrounding areas is expected to continue in the future, the incremental impact of livestock grazing is not anticipated to result in a significant impact to soils.

Developments

No new or proposed developments or projects were identified within the project area. A number of existing rights-of-way (ROWs), including roads, pipelines, and public utilities, intersect portions of the Sky Arrow Complex. Owners/operators are authorized to access ROWs for routine maintenance and repair. Minor disturbances or impacts to resources may occur due to vehicle access and maintenance activities, such as brush clearing, within the ROWs. These past and continuing actions associated with ROWs are not expected to contribute additional incremental impacts beyond those described in Chapter 3 of this EA.

Resources Dismissed from Detailed Analysis

This section lists and describes the issues, resources, and concerns dismissed from analysis in this EA. These potential issues were identified during project scoping, and include elements of the environment that by statute, regulation, or EO must be considered in all EAs (BLM 2008, Appendix 1).

The purpose for dismissing issues in an EA is to focus the environmental analysis on issues that are truly significant to the proposed action, and to avoid amassing needless detail in accordance with CEQ regulations (40 CFR 1500.1(b)). CEQ requires that impacts shall be discussed in proportion to their significance, and for non-significant issues, there should be only enough discussion to show why more study is not warranted (40 CFR 1502.2). The following issues are dismissed from further analysis with explanation because (1) they do not exist in the project area, or (2) they would not be impacted by the proposed action(s), or (3) the potential impacts are not measurable or are negligible.

Air Quality – Present, Not Impacted

The Clean Air Act of 1970 and subsequent amendments required the Environmental Protection Agency to establish National Ambient Air Quality Standards (NAAQS), which specify maximum levels for six criteria pollutants: carbon monoxide, nitrogen dioxide, ozone, particulate matter (PM), sulfur dioxide, and lead. Livestock operations have the potential to release fugitive dust and carbon monoxide associated with cattle trailing, range improvements, and vehicle use. Yavapai County is classified by EPA as “attainment” for the purposes of NAAQS.

Range improvements would be authorized under the proposed action (Alternative A), but they would not result in the use of mechanized equipment. Further, the RHE for the Sky Arrow Complex found that conditions on the allotment are meeting rangeland health standards for vegetation cover (Standard 3) and for soil conditions (Standard 1) (BLM 2013). Because none of the actions considered in this EA would increase grazing activities, there is no expectation that the actions would measurably impact air quality or lead to non-attainment of NAAQS.

Accommodation of Sacred Sites – Not Present

EO 13007, *Indian Sacred Sites* (1996), requires Federal agencies to (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and (2) avoid adversely affecting the physical integrity of such sacred sites. No known sacred sites are present in the project area, and during consultations with the American Indian Tribes that claim cultural affiliation to the area, no Native American religious concerns were identified in relation to livestock grazing within this allotment.

Areas of Critical Environmental Concern – Not Present

No Areas of Critical Environmental Concern are present within the project area.

Cultural Resources

Cultural and heritage resources within the Hassayampa Field Office represent evidence of more than 10,000 years of human occupation of the region. The majority of the cultural resources on public lands are archaeological sites reflecting both pre-Columbian and post-contact occupation.

According to Arizona BLM Handbook H-8110, Guidelines for Identifying Cultural Resources (BLM 1999), livestock grazing permit renewals are generally exempt from cultural resources surveys. Range improvements, however, are land disturbing activities that require site-specific survey. Based on the proposed installation of new fencing, which would involve ground disturbing activities, the BLM conducted a Class I Literature Search and a Class III intensive archaeological survey in 2014.

A Class I survey (literature search) was conducted to identify whether previously recorded cultural resources or archaeological projects occur within or adjacent to the proposed project area. The parameters of the literature search included the locations of the proposed fence installation and a 1/4 mile search

boundary. The Class I survey revealed that eight cultural resources surveys have been conducted with the Sky Arrow allotment. None of these Class III surveys identified any cultural resources. None of the previously conducted surveys are located within the location of the proposed fence installation alignment.

A site-specific Class III intensive cultural resources survey was conducted by BLM archaeologist Bryan M. Lausten on December 11, 2014. The Class III Survey focused along the proposed fence line which included a survey buffer of 5 meters (16 feet) on either side of the proposed fence centerline, resulting in a survey area measuring approximately 10 m (32 feet wide) x 1828 m (6,000 feet long) and totaling 4 acres. The Class III survey resulted in the identification of a single historic site, which included a partial concrete foundation and is most likely a habitation site near the mouth of the Box Canyon. The proposed fence alignment was modified to avoid the newly discovered historic site. No additional cultural resources were identified during the survey. No impacts to cultural resources are expected from this action.

Energy Conservation/Energy Requirements and Conservation Potential

The CEQ's NEPA Guidelines Section 1502.2(e) indicates that the discussion of environmental consequences must include analysis of the ". . . [e]nergy requirements and conservation potential of various alternatives and mitigation measures." Proposed range improvements include approximately 6,000 feet of fencing to exclude the Box Canyon area from livestock use seasonally, which would involve standard fence construction methods. While energy would be expended, the effects to energy conservation are negligible. Therefore, the topic is dismissed from further analysis.

Environmental Justice – Not Present

EO 12898, *General Actions to Address Environmental Justice in Minority Populations and Low Income Populations* (1994), requires all Federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low income populations. The proposed action would not result in disproportionate health or environmental effects on minorities or low income populations or communities. Nothing inherent in the alternatives considered would cause any statistically significant changes to ethnic composition of the resident populations and there is no indication that there would be any adverse economic effects on any particular ethnic group or any particular income group under any alternative.

Hazardous and Solid Wastes – Not Present

No known hazardous or solid waste issues occur in the allotment (BLM 2007 p. 437).

Floodplains or Wetlands – Not Present

EO 11988, *Floodplain Management* (1977) and EO 11990, *Protection of Wetlands* (1977), require all Federal agencies to avoid construction within the 100-year floodplain unless no practicable alternative exists, and to minimize the destruction, degradation, or loss of wetlands. The proposed action does not result in any impacts to floodplains or wetlands.

Paleontological Resources – Not Present

Bedrock exposures within the allotments are composed of igneous intrusive and volcanic extrusive rocks of Proterozoic and Phanerozoic age. Paleontological resources never occur in igneous rocks and only very rarely in some types of volcanic rocks. Cenozoic age unconsolidated sediments of fluvial and colluvial origin comprise the non-bedrock areas within valleys and drainages and generally have a low potential for the occurrence of paleontological resources. There are no paleontological resources known to exist within the allotments. Management actions are designed to inventory and protect fossil sites if they are discovered in the course of normal management activities (BLM 2007 (FEIS)).

Prime and Unique Farmlands – Not Present

Under the *Farmland Protection Act* of 1981, Federal agencies seek to minimize the unnecessary or irreversible conversion of farmland to nonagricultural uses. No unique or prime farmlands exist within the project area; therefore, the proposed action would have no impact on this resource (BLM 2007, p. 437).

Recreation – Present, Not Impacted

Recreation opportunities within the project area are classified in the Bradshaw-Harquahala RMP. The Sky Arrow Complex falls within the Hassayampa Management Unit. The San Domingo Wash Recreation Management Zone is within the allotments. Continued livestock use would not affect the availability of recreational opportunities within the allotment. In many instances, recreationists use the same roads, primitive roads, and trails as grazing permittees where little or no conflict has occurred.

Visual Resources – Present, Not Impacted

Under the RMP, the Sky Arrow Complex is allocated to Visual Resource Management (VRM) Classes III. VRM Class III objective is to partially retain the existing character of the landscape, with a moderate level of change. None of the proposed actions would alter the landscape beyond the objectives of the VRM Class. Grazing practices would continue as they have in the past. The proposed action would authorize construction of the riparian fence; however, this would not change the character of the existing landscape. VRM objectives for the allotment would be met under all alternatives.

Urban Quality, Historic and Cultural Resources, and the Design of the Built Environment – Not Present

CEQ requires that analysis of environmental consequences must discuss potential effects to urban quality, historic and cultural resources, and the design of the built environment, including the reuse and conservation potential of various alternatives and mitigation measures (40 CFR 1502.16(g)). The proposed action would have no impact on these resources.

Wild Horses and Burros – Present, Not Impacted

Wild burros are present on the Complex, but no herd management area is associated with the project area. No impacts to wild burros are expected.

Wild and Scenic Rivers – Not Present

There are no river segments within the allotment that are designated, eligible, or suitable, as wild, scenic, or recreational under the Wild and Scenic Rivers Act.

Wilderness – Not Present

No designated wilderness or wilderness study areas are present within the project area.

Chapter 4: Consultation

The BLM conducts scoping to solicit internal and external input on the potential issues, impacts, and alternatives that may be addressed in an EIS or EA. The BLM conducted scoping on this EA concurrently with taking comments on the 2014 Sky Arrow Complex RHE and 2015 Congress-Sky Arrow allotment supplemental RHE. External scoping was conducted via letter sent to the Consultation, Coordination, and Cooperation list, including State agencies, Federal agencies, and interested publics. Recipients were asked to comment on the draft RHEs as well as the Proposed Action presented in this EA. The scoping period for the Sky Arrow Complex was June 6th through June 23rd, 2014. The scoping period for the Congress-Sky Arrow allotment was February 23rd through March 9th, 2015. No external scoping responses were received.

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Literature Cited

Bureau of Land Management (BLM) 1989. Technical Reference (TR) H-1741-1, Fencing.

BLM 1997. Arizona Standards for Rangeland Health and Guidelines for Grazing Administration. United States Department of the Interior, Bureau of Land Management, Arizona State Office.

BLM 2001. Technical Reference 1734-7. *Ecological Site Inventory*. Natural Science and Technology Center, Bureau of Land Management. Denver, Colorado.

BLM 2005. Interpreting Indicators of Rangeland Health, Version 4. Technical Reference 1734-6.

BLM 2005. Technical Reference 1730-1. *Measuring and Monitoring Plant Populations*. Bureau of Land Management National Applied Resource Sciences Center. Denver, Colorado.

BLM 2008. U.S. Department of the Interior, Bureau of Land Management. National Environmental Policy Act Handbook. Handbook H-1790-1. January 2008.

BLM 2010. U.S. Department of the Interior, Bureau of Land Management. Bradshaw –Harquahala Record of Decision, Approved Resource Management Plan. April 2010.

BLM 2012. U.S. Department of the Interior, Bureau of Land Management. Lower Sonoran Decision Area Record of Decision and Approved Resource Management Plan. September 2012.

BLM 2014. Rangeland Health Evaluation, Sky Arrow Complex. Hassayampa Field Office, Phoenix District Office. Phoenix, AZ. 33p.

BLM 2015. Supplemental Rangeland Health Evaluation, Congress-Sky Arrow Allotment. Hassayampa Field Office, Phoenix District Office. Phoenix, AZ. 13p.

Cable, J. M., & Huxman, T. E. 2004. Precipitation pulse size effects on Sonoran Desert soil microbial crusts. *Oecologia*. 141(2): 317-324

Dyer, James. 2010. User's Guide for Water Balance Toolbox for ArcGIS (Revised August 2010). Department of Geography, Ohio University.

Halvorson, W. L.; Guertin, P., 2003. Factsheet for *Bromus rubens*. USGS Weeds in the West project: Status of Introduced Plants in Southern Arizona Parks.

Heffelfinger, J. R., C. Brewer, C. H. Alcalá-Galván, B. Hale, D. L. Weybright, B. F. Wakeling, L. H. Carpenter, and N. L. Dodd. 2006. Habitat Guidelines for Mule Deer: Southwest Deserts Ecoregion. Mule Deer Working Group, Western Association of Fish and Wildlife Agencies.

Holechek, J.L. 1981. *Livestock Grazing Impacts on Public Lands: A Viewpoint*. *Journal of Range Management* 34(3): 251-254.

Holechek, J.L. 1988. *An Approach for Setting the Stocking Rate*. *Rangelands* 10: 10-14

Krausman, P. R., A. J. Kuenzi, R. C. Etchberger, K. R. Rautenstrauch, L. L. Ordway, and J. J. Hervert. 1997. Diets of desert mule deer. *Journal of Range Management* 50:513-522.

Loeser, M.R., T.D. Sisk, T.E. Crews. 2007. *Impact of grazing intensity during drought in an Arizona grassland*. *Conservation Biology* 21(1): 87-97.

Milchunas, D. G. 2006. Responses of plant communities to grazing in the southwestern United States. General Technical Report RMRS-GTR-169. US Department of Agriculture, Forest Service, Rocky Mountain Research Station. 132p, 46 DOI-BLM-AZ-P010-2014-0046-EA

NCDC 2013. National Climatic Data Center website: <http://www.ncdc.noaa.gov/>

Natural Resource Conservation Service (NRCS). 2008. Soil Survey Geographic (SSURGO) database for Yavapai County, Arizona, Western Part. AZ637. Available [ONLINE] @ <http://websoilsurvey.nrcs.usda.gov> [Nov. 30, 2013].

PRISM 2013. PRISM Climate Group. website: <http://www.prism.oregonstate.edu/>

Prichard, Dan 1998. Riparian Area Management. US Dept of Interior Bureau of Land Management Denver, CO. for 1737-15

Sheley, R. L. 1995. Integrated rangeland weed management. *Rangelands* 17: 222-223.

Simonin, Kevin A. 2001. *Bromus rubens*, *Bromus madritensis*. In: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/> [2014, January 8].

State of Arizona. 2010. Table of Arizona's Impaired waters. Arizona Department of Environmental Quality.

State of Arizona. 2013. State geology GIS layer website: <http://www.azgs.az.gov/> . Arizona Geological Survey.

State of Arizona, 2014. Arizona Department of Water Resources. *Arizona Water Atlas, Volumes 1 -8*. Available online at:
http://www.azwater.gov/AzDWR/StatewidePlanning/WaterAtlas/ActiveManagementAreas/documents/Volume_8_PHX_final.pdf

U.S. Department of Agriculture (USDA) Forest Service 2012. Field Guide for Managing Red Brome in the Southwest. Southwest Region. TP-R3-16-19

U.S. Fish and Wildlife Service (USFWS) 2006a. Biological Opinion on the Effects of the Agua Fria National Monument and Bradshaw-Harquahala RMP on Federally-Listed Species. USFWS 22410-05-F-0785, December 18, 2006. Phoenix, AZ.

USFWS 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. [Online version available at <<http://www.fws.gov/migratorybirds/>>]

U.S. Geological Survey (USGS). 2013. US Geological Survey Surface Water website:
<http://waterdata.usgs.gov/usa/nwis/sw>

Van Devender, T. R., et al. 2002. Grasses, Mallows, Desert Vine, and More: Diet of the Desert Tortoise in Arizona and Sonora. pp.159-193 in T. R. Van Devender. ed. *The Sonoran Desert Tortoise: Natural History, Biology, and Conservation*. University of Arizona Press

Winward, Alma H. 2000. *Monitoring the vegetation resources in riparian areas*. Gen. Tech. Rep. RMRS-GTR-47. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station for 1737-8 (2nd edition)

WRCC. 2013. Western Regional Climate Center website: <http://www.wrcc.dri.edu/>

Young, J.A. and C.D. Clements. 2007. Cheatgrass and Grazing Rangelands. *Rangelands* 29(6):15-20.

Appendix A: Arizona's Standards for Rangeland Health and Guidelines for Grazing Administration

INTRODUCTION

The Department of the Interior's final rule for Grazing Administration, issued on February 22, 1995, and effective August 21, 1995, requires that Bureau of Land Management (BLM) State Directors develop State or regional standards and guidelines for grazing administration in consultation with BLM Resource Advisory Councils (RAC), other agencies and the public. The final rule provides that fallback standards and guidelines be implemented, if State standards and guidelines are not developed by February 12, 1997. Arizona Standards and Guidelines and the final rule apply to grazing administration on public lands as indicated by the following quotation from the Federal Register, Volume 60, Number 35, page 9955.

"The fundamentals of rangeland health, guiding principles for standards and the fallback standards address ecological components that are affected by all uses of public rangelands, not just livestock grazing. However, the scope of this final rule, and therefore the fundamentals of rangeland health of §4180.1, and the standards and guidelines to be made effective under §4180.2, are limited to grazing administration."

Although the process of developing standards and guidelines applies to grazing administration, present rangeland health is the result of the interaction of many factors in addition to grazing by livestock. Other contributing factors may include, but are not limited to, past land uses, land use restrictions, recreation, wildlife, rights-of-way, wild horses and burros, mining, fire, weather, and insects and disease. With the commitment of BLM to ecosystem and interdisciplinary resource management, the standards for rangeland health as developed in this current process will be incorporated into management goals and objectives. The standards and guidelines for rangeland health for grazing administration, however, are not the only considerations in resolving resource issues.

The following quotations from the Federal Register, Vol. 60, No. 35, page 9956, February 22, 1995, describe the purpose of standards and guidelines and their implementation:

"The guiding principles for standards and guidelines require that State or regional standards and guidelines address the basic components of healthy rangelands. The Department believes that by implementing grazing-related actions that are consistent with the fundamentals of §4180.1 and the guiding principles of §4180.2, the long-term health of public rangelands can be ensured.

"Standards and guidelines will be implemented through terms and conditions of grazing permits, leases, and other authorizations, grazing-related portions of activity plans (including Allotment Management Plans), and through range improvement-related activities.

"The Department anticipates that in most cases the standards and guidelines themselves will not be terms and conditions of various authorizations but that the terms and conditions will reflect the standards and guidelines.

"The Department intends that assessments and corrective actions will be undertaken in priority order as determined by BLM.

"The Department will use a variety of data including monitoring records, assessments, and knowledge of the locale to assist in making the "significant progress" determination. It is anticipated that in many cases it will take numerous grazing seasons to determine direction and magnitude of trend. However, actions will be taken to establish significant progress toward conformance as soon as sufficient data are available to make informed changes in grazing practices."

FUNDAMENTALS AND DEFINITION OF RANGELAND HEALTH

The Grazing Administration Regulations, at §4180.1 (43 Code of Federal Regulation [CFR] 4180.1), Federal Register Vol. 60, No. 35, pg. 9970, direct that the authorized officer ensures that the following conditions of rangeland health exist:

(a) Watersheds are in, or are making significant progress toward, properly functioning physical condition, including their upland, riparian-wetland, and aquatic components; soil and plant conditions support infiltration, soil moisture storage, and the release of water that are in balance with climate and landform and maintain or improve water quality, water quantity, and timing and duration of flow.

(b) Ecological processes, including the hydrologic cycle, nutrient cycle, and energy flow, are maintained, or there is significant progress toward their attainment, in order to support healthy biotic populations and communities.

(c) 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.

(d) Habitats are, or are making significant progress toward being, restored or maintained for Federal threatened and endangered species, Federal Proposed, Category 1 and 2 Federal candidate and other special status species.

These fundamentals focus on sustaining productivity of a rangeland rather than its uses. Emphasizing the physical and biological functioning of ecosystems to determine rangeland health is consistent with the definition of rangeland health as proposed by the Committee on Rangeland Classification, Board of Agriculture, National Research Council (Rangeland Health, 1994, pg. 4 and 5). This Committee defined Rangeland Health ". . . as the degree to which the integrity of the soil and the ecological processes of rangeland ecosystems are sustained." This committee emphasized ". . . the degree of integrity of the soil and ecological processes that are most important in sustaining the capacity of rangelands to satisfy values and produce commodities." The Committee also recommended that "The determination of whether a rangeland is healthy, at risk, or unhealthy should be based on the evaluation of three criteria: degree of soil stability and watershed function, integrity of nutrient cycles and energy flow, and presence of functioning mechanisms" (Rangeland Health, 1994, pg. 97-98).

Standards describe conditions necessary to encourage proper functioning of ecological processes on specific ecological sites. An ecological site is the logical and practical ecosystem unit upon which to base an interpretation of rangeland health. Ecological site is defined as:

". . . a kind of land with specific physical characteristics which differs from other kinds of land in its ability to produce distinctive kinds and amounts of vegetation and in its response to management" (Journal of Range Management, 48:279, 1995). Ecological sites result from the interaction of climate, soils, and landform (slope, topographic position). The importance of this concept is that the "health" of different kinds of rangeland must be judged by standards specific to the potential of the ecological site. Acceptable erosion rates, water quality, productivity of plants and animals, and other features are different on each ecological site.

Since there is wide variation of ecological sites in Arizona, standards and guidelines covering these sites must be general. To make standards and guidelines too specific would reduce the ability of BLM and interested publics to select specific objectives, monitoring strategies, and grazing permit terms and conditions appropriate to specific land forms.

Ecological sites have the potential to support several different plant communities. Existing communities are the result of the combination of historical and recent uses and natural events. Management actions may be used to modify plant communities on a site. The desired plant community for a site is defined as follows: "Of the several plant communities that may occupy a site, the one that has been identified

through a management plan to best meet the plan's objectives for the site. It must protect the site as a minimum." (Journal of Range Management, 48:279, 1995.)

Fundamentals (a) and (b) define physical and biological components of rangeland health and are consistent with the definition of rangeland health as defined by the Committee on Rangeland Classification, Board on Agriculture, National Research Council, as discussed in the paragraph above. These fundamentals provide the basis for sustainable rangelands.

Fundamentals (c) and (d) emphasize compliance with existing laws and regulation and, therefore, define social and political components of rangeland health. Compliance with Fundamentals (c) and (d) is accomplished by managing to attain a specific plant community and associated wildlife species present on ecological sites. These desired plant communities are determined in the BLM planning process, or, where the desired plant community is not identified, a community may be selected that will meet the conditions of Fundamentals (a) and (b) and also adhere to laws and regulations. Arizona Standard 3 is written to comply with Fundamentals (c) and (d) and provide a logical combination of Standards and Guidelines for planning and management purposes.

STANDARD AND GUIDELINE DEFINITIONS

Standards are goals for the desired condition of the biological and physical components and characteristics of rangelands. Standards:

- (1) are measurable and attainable; and
- (2) comply with various Federal and State statutes, policies, and directives applicable to BLM Rangelands.

Guidelines are management approaches, methods, and practices that are intended to achieve a standard. Guidelines:

- (1) typically identify and prescribe methods of influencing or controlling specific public land uses;
- (2) are developed and applied consistent with the desired condition and within site capability; and
- (3) may be adjusted over time.

IMPLEMENTING STANDARDS AND GUIDELINES

The authorized officer will review existing permitted livestock use, allotment management plans, or other activity plans which identify terms and conditions for management on public land. Existing management practices and levels of use on grazing allotments will be reviewed and evaluated on a priority basis to determine if they meet, or are making significant progress toward meeting, the standards and are in conformance with the guidelines. The review will be interdisciplinary and conducted under existing rules which provide for cooperation, coordination, and consultation with affected individuals, federal, state, and local agencies, tribal governments, private landowners, and interested publics.

This review will use a variety of data, including monitoring records, assessments, and knowledge of the locale to assist in making the significant progress determination. Significance will be determined on a case by case basis, considering site potential, site condition, weather and financial commitment. It is anticipated there will be cases where numerous years will be needed to determine direction and magnitude of trend.

Upon completion of review, the authorized officer shall take appropriate action as soon as practicable but no later than the start of the next grazing year upon determining that the existing grazing management practices or level of use on public land are significant factors contributing to failure to achieve the standards and conform with the guidelines that are made effective under 43 CFR 4180.2. Appropriate

action means implementing actions that will result in significant progress toward fulfillment of the standards and significant progress toward conformance with guidelines.

Livestock grazing will continue where significant progress toward meeting standards is being made. Additional activities and practices would not be needed on such allotments. Where new activities or practices are required to assure significant progress toward meeting standards, livestock grazing use can continue contingent upon determinations from monitoring data that the implemented actions are effective in making significant progress toward meeting the standards. In some cases, additional action may be needed as determined by monitoring data over time.

New plans will incorporate an interdisciplinary team approach (Arizona BLM Interdisciplinary Resource Management Handbook, April 1995). The terms and conditions for permitted grazing in these areas will be developed to comply with the goals and objectives of these plans which will be consistent with the standards and guidelines.

ARIZONA STANDARDS AND GUIDELINES

Arizona Standards and Guidelines (S&G) for grazing administration have been developed through a collaborative process involving the Bureau of Land Management State S&G Team and the Arizona Resource Advisory Council. Together, through meetings, conference calls, correspondence, and Open Houses with the public, the BLM State Team and RAC prepared Standards and Guidelines to address the minimum requirements outlined in the grazing regulations. The Standards and Guidelines, criteria for meeting Standards, and indicators are an integrated document that conforms to the fundamentals of rangeland health and the requirements of the regulations when taken as a whole.

Upland sites, riparian-wetland areas, and desired resource conditions are each addressed by a standard and associated guidelines.

Standard 1: Upland Sites

Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate and landform (ecological site).

Criteria for meeting Standard 1:

Soil conditions support proper functioning of hydrologic, energy, and nutrient cycles. Many factors interact to maintain stable soils and healthy soil conditions, including appropriate amounts of vegetative cover, litter, and soil porosity and organic matter. Under proper functioning conditions, rates of soil loss and infiltration are consistent with the potential of the site.

Ground cover in the form of plants, litter or rock is present in pattern, kind, and amount sufficient to prevent accelerated erosion for the ecological site; or ground cover is increasing as determined by monitoring over an established period of time.

Signs of accelerated erosion are minimal or diminishing for the ecological site as determined by monitoring over an established period of time.

As indicated by such factors as:

Ground Cover

- litter
- live vegetation, amount and type (e.g., grass, shrubs, trees, etc.)
- rock

Signs of erosion

- flow pattern
- gullies
- rills
- plant pedestaling

Exceptions and exemptions (where applicable):

None

Guidelines:

1-1. 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 within management units. The ground cover should maintain soil organisms and 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.

1-2. When grazing practices alone are not likely to restore areas of low infiltration or permeability, land management treatments may be designed and implemented to attain improvement.

Standard 2: Riparian-Wetland Sites

Riparian-wetland areas are in properly functioning condition.

Criteria for meeting Standard 2:

Stream channel morphology and functions are appropriate for proper functioning condition for existing climate, landform, and channel reach characteristics. Riparian-wetland areas are functioning properly when adequate vegetation, land form, or large woody debris is present to dissipate stream energy associated with high water flows.

Riparian-wetland functioning condition assessments are based on examination of hydrologic, vegetative, soil and erosion-deposition factors. BLM has developed a standard checklist to address these factors and make functional assessments. Riparian-wetland areas are functioning properly as indicated by the results of the application of the appropriate checklist.

The checklist for riparian areas is in Technical Reference 1737-9 "Process for Assessing Proper Functioning Condition." The checklist for wetlands is in Technical Reference 1737-11 "Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas."

As indicated by such factors as:

- Gradient
- Width/depth ratio
- Channel roughness and sinuosity of stream channel
- Bank stabilization
- Reduced erosion
- Captured sediment
- Ground-water recharge
- Dissipation of energy by vegetation

Exceptions and exemptions (where applicable):

- Dirt tanks, wells, and other water facilities constructed or placed at a location for the purpose of providing water for livestock and/or wildlife and which have not been determined through local planning efforts to provide for riparian or wetland habitat are exempt.
- Water impoundments permitted for construction, mining, or other similar activities are exempt.

Guidelines:

2-1. Management practices maintain or promote sufficient vegetation to maintain, improve or restore riparian-wetland functions of energy dissipation, sediment capture, groundwater recharge and stream bank stability, thus promoting stream channel morphology (e.g., gradient, width/depth ratio, channel roughness and sinuosity) and functions appropriate to climate and landform.

2-2. New facilities are located away from riparian-wetland areas if they conflict with achieving or maintaining riparian-wetland function. Existing facilities are used in a way that does not conflict with riparian-wetland functions or are relocated or modified when incompatible with riparian-wetland functions.

2-3. The development of springs and seeps or other projects affecting water and associated resources shall be designed to protect ecological functions and processes.

Standard 3: Desired Resource Conditions

Productive and diverse upland and riparian-wetland plant communities of native species exist and are maintained.

Criteria for meeting Standard 3:

Upland and riparian-wetland plant communities meet desired plant community objectives. Plant community objectives are determined with consideration for all multiple uses. Objectives also address native species, and the requirements of the Taylor Grazing Act, Federal Land Policy and Management Act, Endangered Species Act, Clean Water Act, and appropriate laws, regulations, and policies.

Desired plant community objectives will be developed to assure that soil conditions and ecosystem function described in Standards 1 and 2 are met. They detail a site-specific plant community, which when obtained, will assure rangeland health, State water quality standards, and habitat for endangered, threatened, and sensitive species. Thus, desired plant community objectives will be used as an indicator of ecosystem function and rangeland health.

As indicated by such factors as:

- Composition
- Structure
- Distribution

Exceptions and exemptions (where applicable):

Ecological sites or stream reaches on which a change in existing vegetation is physically, biologically, or economically impractical.

Guidelines:

3-1. The use and perpetuation of native species will be emphasized. However, when restoring or rehabilitating disturbed or degraded rangelands, non-intrusive, non-native plant species are appropriate for use where native species (a) are not available, (b) are not economically feasible, (c) cannot achieve ecological objectives as well as non-native species, and/or (d) cannot compete with already established non-native species.

3-2. Conservation of Federal threatened or endangered, proposed, candidate, and other special status species is promoted by the maintenance or restoration of their habitats.

3-3. Management practices maintain, restore, or enhance water quality in conformance with State or Federal standards.

3-4. Intensity, season and frequency of use, and distribution of grazing use should provide for growth and reproduction of those plant species needed to reach desired plant community objectives.

3-5. Grazing on designated ephemeral (annual and perennial) rangeland may be authorized if the following conditions are met:

- ephemeral vegetation is present in draws, washes, and under shrubs and has grown to useable levels at the time grazing begins;
- sufficient surface and subsurface soil moisture exists for continued plant growth;
- serviceable waters are capable of providing for proper grazing distribution;
- sufficient annual vegetation will remain on site to satisfy other resource concerns, (i.e., watershed, wildlife, wild horses and burros); and
- monitoring is conducted during grazing to determine if objectives are being met.

3-6. Management practices will target those populations of noxious weeds which can be controlled or eliminated by approved methods.

3-7. Management practices to achieve desired plant communities will consider protection and conservation of known cultural resources, including historical sites, and prehistoric sites and plants of significance to Native American peoples.

Appendix B

Rangeland Health Evaluation
Arrow Y Allotment #00084(Formerly #05018)
R&E Park Lease Allotment #00085 (Formerly #05045)
Sky Arrow Allotment #03079
Wickenburg Arrow Y Allotment #00069 (Formerly #3090)

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Abstract

This Rangeland Health Evaluation is a stand-alone report designed to ascertain compliance with the Arizona Standards for Rangeland Health on the Arrow Y, R&E Park Lease, Sky Arrow, and Wickenburg Arrow Y grazing allotments.

Standard One is achieved on this complex of allotments.

Standard Two is not achieved on this complex of allotments. The causal factor for this is vehicle use in the Hassayampa River and year-long livestock grazing access.

Standard Three is achieved on this complex of allotments.

1.0 Introduction:

The purpose of this draft land health evaluation is to gauge whether the Arizona Standards of Rangeland Health (Standards) are being achieved on the Arrow Y, R&E Park Lease, Sky Arrow and Wickenburg Arrow Y grazing allotments (hereafter the “Sky Arrow Complex”) and to determine if livestock are the causal factor for either not achieving or not making significant progress towards achieving land health standards in the case of non-achievement of Standards. An evaluation is not a decision document, but a standalone report that clearly records the analysis and interpretation of the available inventory and monitoring data. As part of the land health assessment process Desired Plant Community (DPC) objectives were established for the Biological Resources (biological objects within the boundaries of the allotments). The DPC objectives will assure that soil condition and ecosystem function described in Standards 1 and 2 are met.

The Secretary of the Interior approved Arizona’s Standards for Rangeland Health and Guidelines for Grazing Administration (Guidelines) in April 1997. The Decision Record, signed by the BLM State Director (April 1997) provides for full implementation of the Standards and Guides in Arizona BLM Land Use Plans. See Appendix B for Arizona’s Standards for Rangeland Health.

Land Health Standards are measurable and attainable goals for the desired condition of the biological resources and physical components/characteristics of the desert ecosystems found within the boundaries of these grazing allotments.

This evaluation seeks to ascertain: 1) if standards are being achieved, not achieved, and, in cases of not achieved, if significant progress is being made towards achievement of land health. 2) Where it is ascertained that land health standards are not being achieved, determine whether livestock grazing is a significant factor causing that non-achievement.

2.0 Allotment Profile

2.1 Allotment Location

The Sky Arrow Complex is located Northeast to East of the town of Wickenburg, AZ. The complex is roughly bisected by Constellation Road, which runs northeast out of Wickenburg approximately a mile east of the US60/US93 interchange and spans from the Hassayampa River on the west boundary to San Domingo Wash on the eastern boundary. Acreages for the allotments within the complex are given below, in section 2.2. A map of the Complex allotments is available in Appendix A.

2.2 Physical Description

2.2.1 Allotment Acreages

The acreages of the allotments within the Sky Arrow Complex are given below.

Land Classification	Arrow Y Allotment	R&E Park Lease Allotment	Sky Arrow Allotment	Wickenburg Arrow Y Allotment	Complex Totals
Public Acres	2,662	1,127	5,063	13,870	22,722
Other Federal Acres	0	0	932		932
State Acres	627	1,178	4,734	4,639	11,178
Private Land Acres	106	114	1,073	2,800	4,093
Total Acres	3,395	2,419	11,802	21,309	38,925

2.2.2 Climate Data

Climate data for this allotment are taken from the Western Regional Climate Center data available at www.wrcc.dri.edu. The data are based on the National Oceanic and Atmospheric Administration (NOAA) site located in Wickenburg, AZ due west of the allotment. Average mean air temperature at this site is 65.7°F, with an average of 150.4 days per year at a daily maximum temperature above 90°F and 61.2 days a year with a daily minimum below 32°F. This is consistent with the Natural Resource Conservation Service (NRCS) Agricultural Handbook 296, which describes the climate of the area as:

“The average annual air temperature is 58 to 74 degrees F (15 to 23 degrees C). The freeze-free period averages 285 days and ranges from 205 to 365 days, decreasing in length with increasing elevation.” (USDA 2006)

2.2.3 Precipitation

Precipitation data for the Sky Arrow Complex is taken from the Maricopa County Flood Control District (MCFCD). MCFCD maintains a network of rain, streamflow, and weather stations within the watersheds in and surrounding Maricopa County, with publicly available historic station data. The stations below were used in the calculation of precipitation on the Complex:

Station Name	Station Number	Latitude	Longitude	Years of Record	Mean Annual Rainfall
Constellation Road	7100	33.9759	112.7036	19	8.21
O'Brien Gulch	5320	34.1033	112.5751	32	12.68
Castle Hot Springs	5490	33.9293	112.5298	32	9.75
Stanton	7000	34.1647	112.7293	19	11.56
Mid-Martinez Creek	7005	34.1156	112.7969	18	9.87
Upper Trilby Wash	5485	33.9604	112.5293	12	10.71
Martinez Creek	7010	34.0291	112.791	19	8.51
Hassayampa River @ Box Canyon	5305	34.045	112.7101	30	9.28

To estimate rainfall on the allotment, the above stations were used to create an ArcMap layer file. These points were then used to create a raster file of expected rainfall. The raster file is based on an Ordinary Kriging calculation with a Gaussian semivariogram model. This model does not take into account elevational rainfall effects and is used as a general guideline for expected precipitation values across the Complex. This expected rainfall map is provided in Appendix A, Map 4.

2.2.4 Soils Data

The soil information for the BLM portion of Sky Arrow Complex was derived from the NRCS soil surveys of Yavapai County (1976) and the Aguila-Carefree Area (1986). The soils of Sky Arrow Complex are classified primarily as Aridisols and Entisols across 27 different soil map units. However, three soil map units make up 46% of the area.

The most dominant soil map unit within the complex is the Cellar very rocky sandy loam, 15-60 percent slopes making up 28% of the area. These soils are well drained with a surface covered with cobbles, stones or boulders and exist primarily on hills or mountains. The soil is derived from granite and/or colluvium derived from granite with a depth ranging from 4 to 15 inches to lithic rock. The ecological site associated with these soils is the Granitic Hills 10-13”pz (R040XA131AZ).

The Eba-Pinaleno complex, low precipitation, 20 to 40 percent slopes occupies 10% of the Sky Arrow Complex. This map unit is approximately 45% Eba very gravelly loam and 35% Pinaleno very gravelly clay loam with the remaining 20% comprised of Anthony and Arizo soils in drainageways. The Eba soil is deep and well drained formed from alluvium derived primarily from igneous rock and is calcareous below 11 inches in depth. Eba soil has slow permeability, low water capacity, and moderate water erosion hazard. Pinaleno soil is also deep and well drained formed from alluvium derived primarily from igneous rock but is calcareous below 12 inches in depth, on average. The permeability of the Pinaleno soil is moderately slow with low to moderate water capacity and has a moderate water erosion hazard. The ecological site associated with these soils is the Loamy Hills 7-10”pz (R040XXC314AZ).

The third most common soil map unit is the Eba-Nickel-Cave association, 3 to 25 percent slopes which occupies 8% of the Sky Arrow Complex. This map unit is about 30% Eba very gravelly loam dominantly on tops of terraces, 25% Nickel gravelly sandy loam on side slopes, and 25% Cave gravelly loam also on side slopes. The remaining 20% of the association includes Rock outcrops in drainageways, Arizo soils on flood plains and Pinaleno, Suncity Varian, Greyeagle, and Ohaco soils on fan terraces. The Eba soil is deep and well drained formed from alluvium derived primarily from igneous rock and is calcareous below 11 inches in depth. Eba soil has slow permeability, low water capacity, and moderate water erosion hazard. The Nickel soil is also deep and well drained formed from alluvium derived primarily from igneous rock and is typically calcareous throughout. Nickel soil has moderately slow permeability, medium runoff, and a slight water erosion hazard. Lastly, the Cave soil is very shallow, well drained, and derived primarily from igneous rock and is also calcareous throughout. Cave soil has moderate permeability, very low water capacity, and a slight water erosion hazard. Cave soil is one of the poorest forage-producing soils in the survey area and responds very slowly to rangeland management. The ecological site associated with these soils is Clay Loam Upland 7-10”pz (040XC305AZ).

The following nine map units make up 45% Sky Arrow Complex and occupy about five percent of the total area each: Cave-Continental gravelly sandy loams on 2 to 30 percent slopes, Cellar very gravelly sandy loam on 8 to 30 percent slopes, Cellar very rocky sandy loam on 2 to 15 percent slopes, Continental gravelly sandy loam on 2 to 15 percent slopes, Continental soils on 3 to 30 percent slopes, Eba-Continental-Cave association with low precipitation on 3 to 30 percent slopes, Lehman extremely rocky

clay loam on 8 to 60 percent slopes, Lehmans gravelly clay loam on 8 to 45 percent slopes, and Rock outcrop-Lehmans complex with low precipitation on 15 to 65 percent slopes.

The remaining 15 map units are less than four percent each and comprise eight percent of the total area within the Sky Arrow Complex.

2.3 Biological Resources

2.3.1 Major Land Resource Areas

The Sky Arrow Complex lies within Major Land Resource Area (MLRA) 40, Sonoran Basin and Range. MLRAs are described in USDA NRCS Agriculture Handbook 296: “Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin” (2006). MRLAs describe, on a large-landscape scale, the physiography, geology, climate, water, soils, biological resources and general land use.

Ecological Site Descriptions produced by the NRCS are organized by MLRA for reference purposes.

2.3.2 Ecological Sites

An ecological site is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation. It is the product of all the environmental factors responsible for its development, and it has a set of key characteristics (soils, hydrology, and vegetation) that are included in the ecological site description. Development of the soils, hydrology, and vegetation are all interrelated. Each is influenced by the other and influences the development of the others. (TR 1734-07, Ecological Site Inventory)

Ecological sites are named and classified based on soil parent material or soil texture and precipitation. There are several ecological sites that occur within the Sky Arrow Complex. The dominant ecological sites on Public lands within the complex are described below. Reference Map 3, Appendix A, for ecological sites occurring on the complex.

NRCS provides Ecological Site Descriptions online at <https://esis.sc.egov.usda.gov/>.

Granitic Hills 7-10”p.z. R040XB206AZ

This site occurs on hills and ridge tops with slopes ranging from 15-65% and elevations from 900’ to 2050’. Soils are shallow and formed on acidic igneous materials. Soils are non-calcareous, coarse textured and well developed covers of rock and gravel. Rock outcrop can account for up to 25% of the area. Plant-soil moisture relationships on this site are fair. The potential plant community is a mixture of desert trees, shrubs and cacti, with limited grasses present. Annual vegetative production is expected to be between 400-625lbs air-dry weight per acre.

Granitic Hills 10-13”p.z. R040XA131AZ

This site occurs as rough hills and low mountains with slopes ranging from 15-80% and elevations from 2000’ to 4000’. Soils are shallow to moderately deep over highly weathered granitic and diabase bedrock. Soils are gravelly and/or cobbly on the surface with rock outcrop expected on 5-25% of the area. Plant-soil moisture relationships on this site are fair. The potential plant community is a mix of perennial grasses, forbs, and desert shrubs. Annual vegetative production is expected to be between 528-643lbs air-dry weight per acre.

Clay Loam Upland 7-10”p.z. R040XB205AZ

This site occurs on fan and stream terraces with slopes ranging from 1-3% and elevations from 1000’ to 2050’. Soils are deep and formed in clayey alluvium of mixed origins. Plant-soil moisture relationships on

this site are fair. The potential plant community is a mix of grass, forbs, desert shrubs and cacti. Annual vegetative production is expected to be between 300-460lbs air-dry weight per acre.

Loamy Hills 7-10”p.z. 040XB212AZ

NRCS has not produced an Ecological Site Description for the Loamy Hills 7-10”p.z. ecological site. The best available description is taken from the 1992 “Loamy Hills” Range Site Guide. Soils are moderately deep to deep formed in old alluvium from mixed origins. Plant-soil moisture relationships on this site are fair to good. The potential plant community is a diverse mixture of perennial and annual grasses and forbs, shrubs, desert trees and cacti with a shrubland aspect. Annual vegetative production is expected to be between 300-600lbs air-dry weight per acre.

Volcanic Hills 7-10”p.z. R040XB222AZ

This site occurs on hillslopes and ridge tops with slopes ranging from 15-65% and elevations from 1000’ to 2500’. Soils are shallow and formed on intermediate igneous material. Soils are slightly calcareous, loamy textured and have very well developed covers of cobble, stones and gravel. Rock outcrops can account for up to 35% of the area. Plant-soil moisture relationships are fair to good. The potential plant community is a diverse mixture of desert shrubs, trees and cacti with limited perennial grass. Annual vegetative production is expected to be between 450-575lbs air-dry weight per acre.

Volcanic Hills 10-13”p.z. R040XA123AZ

This site occurs on steep hillslopes and ridge tops with slopes from 15-75% and elevations from 2200’ to 4000’. Soils are shallow and formed on intermediate igneous material. Soils are non to slightly calcareous, loamy textured and have well developed covers of gravel, cobble, and stone with rock outcrop expected on up to 35% of the site. Plant-soil moisture relationships are fair to good. The potential plant community is a mix of desert shrubs, trees, cacti, perennial grasses and forbs. Annual vegetative production is expected to be between 242-1850lbs air-dry weight per acre.

2.3.3 Vegetation Communities

Riparian - Wetland Sites

Riparian areas are defined by the BLM manual as “a form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil.”

There are two riparian reaches on the Sky Arrow complex, both located along the Hassayampa River in the Box Canyon area. The vegetative community along these two reaches consists of Goodding’s willow (*Salix gooddingii*), seep willow (*Baccharis salicifolia*), velvet mesquite (*Prosopis velutina*), desert broom (*Baccharis sarothroides*), tree tobacco (*Nicotiana glauca*), salt cedar (*Tamarix ramosissima*), Bermuda grass (*Cynodon dactylon*) and spike rush (*Eleocharis palustris*). Reference Map 5, Appendix A, “Sky Arrow Complex Riparian Areas”.

2.3.4 General Wildlife Resources

Wildlife species that occur within the Sky Arrow Complex are typical and representative of the vegetative communities present in the area. Species present include, but are not limited to, mule deer, coyote, javelina, mountain lion, bobcat, gray fox, raccoon, desert cottontail, black-tailed jackrabbits, Gambel’s quail, great horned owls, and various reptiles, small mammals and migratory birds.

2.3.5 Special Status Species, T&E

Yellow-billed cuckoo (*Coccyzus americanus*) proposed threatened under the Endangered Species Act (ESA), has been detected along the riparian corridor in Box Canyon. Longfin dace (*Agosia chrysogaster*) and lowland leopard frog (*Rana yavapaiensis*) (both BLM sensitive species) occupy habitat in the Hassayampa River in Box Canyon where surface water is present.

Sonoran desert tortoises (*Gopherus morafkai*), an ESA candidate species, occupy much of the upland areas in the Sky Arrow Complex. The desert tortoise distribution within the Complex is not uniform. Tortoises tend to occupy hillsides and ridges with outcrops of large boulders as well as areas with incised washes and caliche caves, but may be found in lower densities throughout the area. Tortoises generally use natural and excavated cover sites between or under boulders and in caliche caves along washes wherever they occur. Their diet consists of annual forbs (30.1%), perennial forbs (18.3%), grasses (27.4%), woody plants (23.2%) and prickly pear fruit (1.1%) (Van Devender, et al. 2002).

The Sky Arrow complex contains category II and category III desert tortoise habitat. Category II habitat is defined as: 1) Habitat that may be essential to the maintenance of viable populations; 2) Habitat where most conflicts are resolvable; and 3) Habitat that contains medium to high densities of tortoises or low densities contiguous with medium or high densities. Category III habitat is defined as: 1) Habitat that is not considered essential to the maintenance of viable populations; 2) Habitat where most conflicts are not resolvable; and 3) Habitat that contains low to medium densities of tortoises not contiguous with medium or high densities. The table below shows the acreages of desert tortoise habitat within the complex.

Allotment	Category II Acres	Category III Acres
Arrow Y	2,662	0
R&E Park Lease	419	616
Sky Arrow	3,218	2,820
Wickenburg Arrow Y	13,456	432
Complex Totals	19,755	3,868

2.4 Special Management Areas

No Special Management Areas are contained within the Sky Arrow Complex boundaries.

2.5 Recreational Resources

The complex contains 180.2 miles of existing routes, which are all currently open to all travel modes. Route designations are pending for the entire allotment complex, which would close some of the existing routes while authorizing some new ATV width primitive roads and expanding the Red Top Trail System for non-motorized uses. Access for range management by motor vehicle would be authorized by permit, however, coordination with the pending travel management plan is desired for better multiple use management.

By allotment, miles of routes in each are as follows:

Wickenburg Arrow Y	82.75
Sky Arrow	69.79
Arrow Y	16.17
R&E Park Lease	11.50

General public access

Public access generally coincides with routes permitted for use the grazing permittee. Minor maintenance of the existing routes is generally welcomed by the public, while major upgrades to the existing routes are less welcome due to the recreational nature of primitive roads. Improving roads to a higher standard is generally perceived by the public, and BLM, to invite vandals and new uses which may leave trash or displace authorized use. Improving access can have the effect of increasing use of an area which was previously lightly used, leading to increased litter and increasing impacts to vegetation and water quality.

Riparian area access

A route is in the Hassayampa River bottom where public use is currently allowed. Public vehicle use will be ended in the canyon when the trailhead just south of the Black Hills is constructed. During route analysis, this route was numbered 35019.

3.0 Grazing Management

3.1 Grazing History

The current permit and lease holder for the Sky Arrow complex is the Lemon’s Family Trust. The Lemons family acquired the permit and lease to this group of allotments in 2000, originally under the name of Carson Construction. The Complex is used as an informal pasture rotation system, with cattle being moved between and within the allotments based on water availability and forage conditions.

BLM billing records show continuous use on these grazing allotments since the late 1960s.

3.2 Mandatory Terms and Conditions for Permitted Use

All four allotments within the Sky Arrow Complex are classified as Perennial allotments. Grazing occurs year-long at varying levels of intensity. The Wickenburg Arrow Y allotment is called the “Arrow Y (3)” allotment in the Rangeland Administration System database. The Mandatory Terms and Conditions of the permits and leases are listed below:

Allotment Name	Allotment Number	Livestock Number	Livestock Kind	%PL	Type Use	AUMs
Arrow Y (15)	00084	21	Cattle	81	Active	204
R&E Park Lease	00085	12	Cattle	100	Active	144
Sky Arrow	03079	100	Cattle	57	Active	684
Arrow Y (3)	00069	239	Cattle	75	Active	2151

4.0 Objectives

4.1 Relevant Planning and Environmental Documents

The Taylor Grazing Act of 1934 provides for two types of authorized use: (1) A *grazing permit*, which is a document authorizing use of the public lands within an established grazing district, and are administered in accordance with Section 3 of the Taylor Grazing Act; and (2) a *grazing lease*, which is a

document authorizing use of the public lands outside an established grazing district, and are administered in accordance with Section 15 of the Taylor Grazing Act. The Sky Arrow and Wickenburg Arrow Y allotments are Section 3 grazing permit; the Arrow Y and R&E Park Lease allotments are Section 15 grazing leases.

The BLM is responsible for establishing the appropriate levels and management strategies for livestock grazing in this allotment. Grazing permits issued must be in compliance with the multiple use and sustained yield concepts of FLPMA and the Fundamentals of Rangeland Health (43 CFR 4180), and be in accordance with the Guidelines for Grazing Administration while continuing to achieve Arizona Standards for Rangeland Health.

Land Health Standards:

On April 28, 1997, the Secretary of Interior approved the implementation of the *Arizona Standards for Rangeland Health and Guidelines for Grazing Administration* for all Land Use Plans in Arizona. The purpose of the Standards and Guidelines is to maintain or improve the health of the public rangelands. Standards and guidelines are intended to help the Bureau, rangeland users and others focus on a common understanding of acceptable resource conditions and work together to achieve that vision. Standards and Guidelines were incorporated into Phoenix District land use plans in 1997 and into the *Bradshaw-Harquahala RMP* in 2010.

As defined by the Arizona Resource Advisory Council, “Standards” are goals for the desired condition of the biological and physical components and characteristics of rangelands. “Guidelines” are management approaches, methods, and practices that are intended to achieve a standard. Guidelines are developed and applied consistent with the desired condition and within the site’s capability and specific public land uses, and may be adjusted over time. Arizona S&Gs are defined as the following:

Standard 1 - Upland Sites

Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate and landform (ecological site).

Standard 2 - Riparian - Wetland Site

Riparian-wetland areas are in proper functioning condition.

Standard 3 - Desired Resource Conditions

Productive and diverse upland and riparian-wetland communities of native species exist and are maintained.

The Bradshaw-Harquahala Resource Management Plan (2010) contains additional desired future condition objectives for wildlife special status species. For the Sky Arrow Complex, the desired future condition objectives for Sonoran desert tortoise are applicable. These objectives are given below:

“TE-3. In Category I and II areas, vegetation will consist of at least 5 percent native perennial grasses, at least 10 percent native perennial forbs or subshrubs, at least 30 percent native trees and cacti, by dry weight, as limited by the potential of the ecological site as described by the Natural Resource Conservation Service (NRCS) ecological site guides.”

4.2 Key Area Objectives

Specific Key Area objectives step down from the Desired Future Condition objectives found in the Bradshaw-Harquahala RMP (2010). These Key Area specific objectives are designed to assess Public Land conformance to the Arizona Standards for Rangeland Health on the Sky Arrow Complex.

There are 11 active Key Areas on the Sky Arrow Complex. The Arrow Y allotment and the Sky Arrow allotment each contain 2 Key Areas. The R&E Park Lease allotment contains 1 Key Area. The Wickenburg Arrow Y allotment contains 6 Key Areas. The table below shows the active key areas on the complex:

Allotment	Key Area	Ecological Site
Arrow Y	KA1	Granitic Hills 10-13”
	KA2	Granitic Hills 10-13”
R&E Park Lease	KA1	Granitic Hills 10-13”
Sky Arrow	KA1	Granitic Hills 10-13”
	KA2	Loamy Upland 10-13”
Wickenburg Arrow Y	KA1	Granitic Hills 10-13”
	KA2	Volcanic Hills 10-13
	KA3	Loamy Hills 7-10”
	KA4	Volcanic Hills 7-10”
	KA5	Granitic Uplands 10-13”
	KA6	Sandy Wash 10-13”

Desired Plant Community (DPC) Objectives were developed for each Key Area within the Complex by an interdisciplinary team of BLM resource specialists and biologists. These objectives are designed to maintain or improve the biotic integrity of the Public Lands, provide for wildlife habitat, and provide for usable forage as limited by the potential of the ecological site. These objectives, and the rationale for each objective, are given below.

4.2.1 Standard 1- Upland Sites, applies to all key areas.

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site). (Bradshaw-Harquahala RMP decision LH-1)

Soil erosion on the key area is appropriate to the ecological site on which it is located. Factors indicating conformance to Standard 1 include ground cover, litter, vegetative foliar cover, flow patterns, rills, and plant pedestalling in accordance to developed NRCS Ecological Site Guides and/or Reference Sheets. Deviations that are “slight” or “slight to moderate” from the appropriate site guide or reference are considered meeting the Standard. Departures of Moderate or greater will not meet the Standard except in cases where the departure is documented as showing an improvement of land health over what is expected on a reference site.

4.2.2 Standard 3- Desired Resource Condition Objectives

Objective: Productive, diverse upland and riparian-wetland plant communities exist and are maintained.

DPC objectives detail a site-specific plant community, which, when obtained, will assure rangeland health, State water quality standards, and habitat for endangered, threatened and sensitive species.

Because DPC objectives are site-specific, Key Areas located on similar stratum may have difference DPC objectives. This is due to differences in slope, elevation, aspect and rainfall factors, as well as other site potential limiting factors such as prior disturbance, rock outcroppings, or heavy gravel cover. The recommended palatable shrub and grass compositions will provide for adequate wildlife forage on the site for species such as Sonoran desert tortoise, mule deer, quail, and other non-game wildlife species. The foliar cover and bare ground cover class objectives will provide thermal and hiding cover for wildlife species and will prevent accelerated erosion on the sites.

Sonoran desert tortoise habitat requirements are listed in the Bradshaw-Harquahala RMP. The DPC objectives for each key area are consistent with the Sonoran desert tortoise habitat requirements based on the potential for the site.

Key Area specific DPC objectives:

Arrow Y Allotment:

Arrow Y Key Area 1:

Key Area 1, Granitic Hills 10-13” precipitation zone ecological site

- Maintain a perennial grass composition of $\geq 10\%$
- Maintain a palatable shrub composition of $\geq 30\%$
- Maintain vegetative foliar cover at $\geq 15\%$.
- Maintain a Bare Ground cover class of $\leq 10\%$

Rationale:

This Key Area is located above a major drainage on a northwest facing hillslope at an elevation of approximately 3080’.

NRCS has not developed an ecological site reference key for the Granitic Hills 10-13”pz ecological site. The reference sheet used for this Key Area is the Granitic Hills 7-10”pz with higher expected vegetative cover values due to the increased rainfall. Maintaining a perennial grass composition of 10% on this site complies with Sonoran desert tortoise habitat requirements and is appropriate for the site based on its aspect and elevation. Palatable shrub composition of 30% or greater is appropriate for the site based on its aspect and elevation and complies with the expected ranges of shrub production in the Ecological Site Guide. Foliar cover is expected to be between 15% and 20% as per the reference sheet. Due to the steepness of the slope and the high percentage of gravel and rock cover, a vegetative foliar cover of 15% or greater should serve to prevent accelerated erosion beyond what is expected in the reference state.

Arrow Y Key Area 2:

Key Area 2, Granitic hills 10-13” precipitation zone ecological site

- Maintain perennial grass composition of $\geq 5\%$
- Maintain palatable shrub composition of $\geq 30\%$
- Maintain vegetative foliar cover of $\geq 25\%$
- Maintain a Bare Ground cover class of $\leq 10\%$

Rationale:

This key area is located on an eastern facing hillslope at an elevation of approximately 3440’.

NRCS has not developed an ecological site reference key for the Granitic Hills 10-13”pz ecological site. The reference sheet used for this Key Area is the Granitic Hills 7-10”pz with higher expected vegetative cover values due to the increased rainfall. Maintaining a perennial grass composition of 5% on this site complies with Sonoran desert tortoise habitat requirements and is appropriate for the site based on its

aspect and elevation. Palatable shrub composition of 30% or greater is appropriate for the site based on its aspect and elevation and complies with the expected ranges of shrub production in the Ecological Site Guide. Foliar cover is expected to be between 15% and 20% as per the reference sheet. A vegetative foliar cover of 25% or greater should serve to prevent accelerated erosion beyond what is expected in the reference state. The range of bare ground cover class on the site ranges from 1% to 15% based on the reference sheet. Maintaining a bare ground cover class of 10% or less will ensure that soil erosion on the site is consistent with the expected erosion rate of the reference state.

R&E Park Lease allotment:

R&E Park Lease Key Area 1:

Key Area 1, Granitic Hills 10-13” precipitation zone ecological site

- Maintain perennial grass composition of $\geq 30\%$
- Maintain a palatable shrub composition of $\geq 30\%$
- Maintain vegetative foliar cover at $\geq 25\%$
- Maintain a Bare Ground cover class of $\leq 15\%$

Rationale:

This key area is located on a southern facing hillslope at an elevation of approximately 3040’.

NRCS has not developed an ecological site reference key for the Granitic Hills 10-13”pz ecological site. The reference sheet used for this Key Area is the Granitic Hills 7-10”pz with higher expected vegetative cover values due to the increased rainfall. Maintaining a perennial grass composition of 30% on this site complies with Sonoran desert tortoise habitat requirements and is appropriate for the site based on its aspect and elevation. The site currently has a higher perennial grass component than other Granitic Hills sites in the complex. Palatable shrub composition of 30% or greater is appropriate for the site based on its aspect and elevation and complies with the expected ranges of shrub production in the Ecological Site Guide. Foliar cover is expected to be between 15% and 20% as per the reference sheet. A vegetative foliar cover of 25% or greater should serve to prevent accelerated erosion beyond what is expected in the reference state. The range of bare ground cover class on the site ranges from 1% to 15% based on the reference sheet. Maintaining a bare ground cover class of 15% or less will ensure that soil erosion on the site is consistent with the expected erosion rate of the reference state.

Sky Arrow Allotment:

Sky Arrow Key Area 1:

Key Area 1, Granitic Hills 10-13” precipitation zone ecological site

- Maintain a perennial grass composition of $\geq 5\%$
- Maintain a palatable shrub composition of $\geq 35\%$
- Maintain vegetative foliar cover of $\geq 15\%$
- Maintain a Bare Ground cover class of $\leq 5\%$

This key area is located on an east-northeast facing hillslope at an elevation of approximately 2770’.

NRCS has not developed an ecological site reference key for the Granitic Hills 10-13”pz ecological site. The reference sheet used for this Key Area is the Granitic Hills 7-10”pz with higher expected vegetative cover values due to the increased rainfall. Maintaining a perennial grass composition of 5% on this site complies with Sonoran desert tortoise habitat requirements and is appropriate for the site based on its aspect and elevation. Palatable shrub composition of 35% or greater is appropriate for the site based on its aspect and elevation and complies with the expected ranges of shrub production in the Ecological Site

Guide. Foliar cover is expected to be between 15% and 20% as per the reference sheet. A vegetative foliar cover of 15% or greater should serve to prevent accelerated erosion beyond what is expected in the reference state. The range of bare ground cover class on the site ranges from 1% to 15% based on the reference sheet. Maintaining a bare ground cover class of 5% or less will ensure that soil erosion on the site is consistent with the expected erosion rate of the reference state.

Sky Arrow Key Area 2

Key Area 2, Loamy Upland 10-13” precipitation zone ecological site

- Maintain perennial grass composition of $\geq 50\%$
- Maintain palatable shrub composition of $\geq 10\%$
- Maintain vegetative foliar cover of $\geq 10\%$
- Maintain Bare Ground cover class of $\leq 10\%$

Rationale:

This key area is located on a western facing hillslope at an elevation of approximately 2460’.

Rationale for the DPCs listed above is taken from the NRCS Loamy Upland 10-13”pz Reference Sheet (R040XA114AZ). The reference sheet shows an expected foliar cover of 1-2% perennial grasses and 7-10% shrubs. This site contains significantly more perennial grass than expected in the reference state. Due to this large grass composition percentage, palatable shrub composition requirements have been reduced. Both grass and shrub DPC objectives meet or exceed Sonoran desert tortoise habitat requirements. The reference sheet estimates foliar cover at 18%. Maintaining vegetative foliar cover at 10% or greater should serve to prevent accelerated erosion of the site. Bare ground cover class in the reference state is expected to be between 20-70% stipulating that “moist areas with higher slopes the gravel cover is higher and bare ground cover lower”. This site falls within that stipulation and contains a high gravel and rock cover class component. The Bare Ground cover class DPC of 10% or less will ensure that soil erosion on the site is consistent with, or lower than, the expected erosion rate at the reference site.

Wickenburg Arrow Y Allotment:

Wickenburg Arrow Y Key Area 1:

Key Area 1, Granitic Hills 10-13” precipitation zone ecological site

- Maintain perennial grass species composition at $\geq 5\%$
- Maintain palatable shrub composition at $\geq 30\%$
- Maintain vegetative foliar cover at $\geq 15\%$
- Maintain a Bare Ground cover class of $\leq 15\%$

This key area is located on an eastern facing hillslope at an approximate elevation of 3020’.

NRCS has not developed an ecological site reference key for the Granitic Hills 10-13”pz ecological site. The reference sheet used for this Key Area is the Granitic Hills 7-10”pz with higher expected vegetative cover values due to the increased rainfall. Maintaining a perennial grass composition of 5% on this site complies with Sonoran desert tortoise habitat requirements and is appropriate for the site based on its aspect and elevation. Palatable shrub composition of 30% or greater is appropriate for the site based on its aspect and elevation and complies with the expected ranges of shrub production in the Ecological Site Guide. Foliar cover is expected to be between 15% and 20% as per the reference sheet. A vegetative foliar cover of 15% or greater should serve to prevent accelerated erosion beyond what is expected in the reference state. The range of bare ground cover class on the site ranges from 1% to 15% based on the reference sheet. Maintaining a bare ground cover class of 15% or less will ensure that soil erosion on the site is consistent with the expected erosion rate of the reference state.

Wickenburg Arrow Y Key Area 2:

Key Area 2, Volcanic Hills 10-13" precipitation zone ecological site

- Maintain perennial grass species composition at $\geq 10\%$
- Maintain palatable shrub species composition at $\geq 10\%$
- Maintain vegetative foliar cover of $\geq 20\%$
- Maintain Bare Ground cover class of $\leq 5\%$

Rationale:

This key area is located on a southeast facing hillslope at an elevation of approximately 2560'.

Rationale for DPC objectives is taken from the NRCS Volcanic Hills 10-13"p.z. Reference Sheet (R040XA123AZ). This site is mapped as a Volcanic Hills 7-10"p.z. ecological site, however, the elevation and soil characteristics of the site identify it as a Volcanic Hills 10-13"p.z. ecological site. The reference sheet has an expected foliar cover of 26%, of which 35-40% is shrubs, 20-25% is half shrubs, and 3-4% is perennial grasses. The species composition DPCs meet or exceed the expected conditions of the reference site. The foliar cover objective of 20% or greater is appropriate to the site and will prevent accelerated erosion of the site in comparison to the reference state. The reference site shows a bare ground cover class of 1-2%. Maintaining a bare ground cover class of 5% or less is appropriate to the site due to the site being on the lower end of the rainfall regime, and will prevent accelerated erosion of the site in comparison to the reference state.

Wickenburg Arrow Y Key Area 3:

Key Area 3, Loamy Hills 7-10" precipitation zone ecological site

- Maintain perennial grass species composition at $\geq 5\%$
- Maintain palatable shrub species composition at $\geq 15\%$
- Maintain vegetative foliar cover of $\geq 20\%$
- Maintain a Bare Ground cover class of $\leq 15\%$

This key area is located on a southwest facing stream terrace/hillslope at an elevation of approximately 2220'.

Rationale for DPC objectives is taken from the NRCS Loamy Hills 7-10"p.z. Ecological Reference Worksheet. This worksheet is available from the NRCS electronic Field Office Technical Guide, labeled as 40-2 Loamy Hills. The reference sheet does not indicate the presence of perennial grass on this site. The range site guide shows a grass and grass-like plant community category of 10-25%. The DPC objective is slightly lower than this potential plant community, but complies with habitat requirements for Sonoran desert tortoise. The reference sheet calls for 20-25% foliar cover with 50% of foliar cover being shrubs, 35-40% cover of trees, 3-5% half shrubs and 0-1% succulents. The palatable shrub species composition is appropriate to the site. Foliar cover objectives are appropriate to the site based on landform and aspect as well as the reference state. Bare ground is expected to be between 5-10% in the reference state. A Bare Ground cover class of 15% or less is appropriate to the site due to its low slope, and will prevent accelerated erosion of the site in comparison to the reference state.

Wickenburg Arrow Y Key Area 4:

Key Area 4, Volcanic Hills 7-10" precipitation zone ecological site

- Maintain palatable browse species composition at $\geq 20\%$
- Maintain vegetative foliar cover of $\geq 20\%$
- Maintain a Bare Ground cover class of $\leq 10\%$

Rationale:

This key area is located on a southeastern facing slope at an elevation of approximately 2360'.

Rationale for DPC objectives is taken from the NRCS Volcanic Hills 7-10" p.z. Reference Sheet (R040XB222AZ). The reference sheet shows an expected foliar cover of 10-20%, of which 2-5% is shrubs and 1-2% is half shrubs. There is no expected grass foliar cover on the site per the reference sheet. Maintaining a vegetative foliar cover of 20% or greater is appropriate to the site due to its aspect and low slope gradient which is expected to catch slightly more rainfall than the reference state, and will prevent accelerated erosion of the site. Maintaining a palatable browse composition of 20% or greater will provide adequate forage on the site. Bare ground cover class is expected to be between 1-5% in the reference state. Maintaining a bare ground cover class of 10% or less is appropriate to this site due to its low slope gradient and will prevent accelerated erosion of the site above what is expected in the reference state.

Wickenburg Arrow Y Key Area 5

Key Area 5, Granitic Uplands 10-13" precipitation zone ecological site

- Maintain perennial grass species composition at $\geq 5\%$
- Maintain palatable browse species composition at $\geq 20\%$
- Maintain vegetative foliar cover of $\geq 15\%$
- Maintain a Bare Ground cover class of $\leq 5\%$

Rationale:

This key area is located on a southeastern facing slope at an elevation of approximately 2840'.

Rationale for DPC objectives is taken from the NRCS Granitic Upland 10-13" p.z. Reference Sheet (R040XA121AZ). The reference sheet shows an expected foliar cover of 15-20%, of which 2-5% is perennial grasses and 50-65% is shrubs. Maintaining a vegetative foliar cover of 15% or greater is appropriate to the site and will prevent accelerated erosion of the site. The compositions for perennial grasses and shrubs meet wildlife habitat requirements and conform to expected conditions in the reference state. The reference sheet calls for a bare ground cover class from 10-60%, however, due to the higher rock cover present on this site, maintaining a bare ground cover class of 5% or less is appropriate to the site and will prevent accelerated erosion.

Wickenburg Arrow Y Key Area 6

Key Area 6, Sandy Wash 10-13" precipitation zone ecological site

- Maintain perennial grass species composition at $\geq 5\%$
- Maintain palatable browse species composition at $\geq 20\%$
- Maintain vegetative foliar cover at $\geq 50\%$
- Maintain a Bare Ground cover class of $\leq 25\%$

Rationale:

This key area is located along the green line of a dry wash at an elevation of approximately 2720'.

Rationale for DPC objectives is taken from the NRCS Sandy Wash 10-13" p.z. reference sheet (R040XA115AZ). The reference sheet shows a foliar cover of 60-70%, of which 10-30% is perennial grass, 40% is shrubs, and 5-10% trees. When comparing the site to the Sandy Wash 10-13" p.z. Ecological Site Guide (R040XA115AZ), the data indicates that a state change to a tree-dominated state has potentially occurred. The perennial grass and palatable browse species compositions reflect the potential of the site due to this, and are appropriate to the site. The reference sheet shows a bare ground cover class

of 15-40%. Maintaining the bare ground cover class at 25% or less will prevent accelerated erosion of the site.

5.0 Inventory and Monitoring Data

5.1 Rangeland Survey Data

Rangeland Inventory was completed on the Sky Arrow Complex in 1981. This inventory was completed using the Modified Soil Vegetation Inventory Methodology based on BLM Handbook H-4410-1, "National Range Handbook" and Technical Reference 1734-7, "Ecological Site Inventory". The inventory was used to determine range condition and apparent trend as described in the 1982 Lower Gila North Draft Grazing Environmental Impact Statement.

5.2 Monitoring Protocols

5.2.1 Upland Health Monitoring Protocols

Monitoring protocols used at the upland Key Areas on the allotment include a variety of study methods. Compliance with Standard One is completed using the Interpreting Indicators of Rangeland Health study method, as described in BLM Technical Reference 1734-6 Version 4 (2005). This study method is supplemented with quantitative data collected in the methods described below.

Compliance with Standard Three is completed using a variety of upland study methods. Primarily, Dry Weight Rank, Point Cover, and Pace Frequency are used for vegetative monitoring. These methods are described in detail in BLM Technical Reference 1734-4, "Sampling Vegetation Attributes". For these methods, a 40X40 centimeter quadrat was used, with a single point located along the rear edge of the frame for point cover data.

Utilization data was collected at each Key Area using the Key Species method. This method is described in BLM Technical Reference 1734-3, "Utilization Studies and Residual Measurements".

5.2.2 Riparian Health Monitoring Protocols

Riparian monitoring was carried out using BLM Technical Reference 1711-23 Multiple Indicator Monitoring (MIM) of Stream Channels and Streamside Vegetation and BLM Technical Reference 1737-9 Process for Assessing Proper Functioning Condition (PFC). The MIM protocol is designed for monitoring streambanks, stream channels, and streamside riparian vegetation. Indicators and procedures in this protocol were selected and developed primarily to monitor impacts of livestock and other large herbivores on wadable streams (usually less than 10 m wide). The MIM protocol integrates annual grazing use and long-term trend indicators allowing for evaluation of livestock grazing management. The PFC assessment refers to a consistent approach for considering hydrology, vegetation, and erosion/deposition (soils) attributes and processes to assess the condition of riparian-wetland areas. A checklist is used for the PFC assessment (Appendix D in BLM Technical reference 1737-9), which synthesizes information that is foundational to determining the overall health of a riparian-wetland system. The on-the-ground condition termed PFC refers to how well the physical processes are functioning. PFC is a state of resiliency that will allow a riparian-wetland area to hold together during high-flow events with a high degree of reliability. This resiliency allows an area to then

produce desired values, such as fish habitat, neotropical bird habitat, or forage, over time. Riparian-wetland areas that are not functioning properly cannot sustain these values.

6.0 Management Evaluation and Summary of Studies Data

6.1 Actual Use

Actual Use reporting is not required on any of the allotments in the Sky Arrow Complex. The current grazing permittee/lessee has voluntarily turned in Actual Use reports yearly, beginning in 2009. Prior to this, actual use is based on billed use.

6.1.1 Arrow Y Allotment

<u>Number of Active Livestock</u>	<u>Kind</u>	<u>Grazing Begin</u>	<u>Period End</u>	<u>%PL</u>	<u>AUM" s</u>
21	Cattle	3/1/2013	2/28/2014	81	204
21	Cattle	3/1/2012	2/28/2013	81	204
21	Cattle	3/1/2011	2/29/2012	81	204
21	Cattle	3/1/2010	2/28/2011	81	204
21	Cattle	3/1/2009	2/28/2010	81	204
21	Cattle	3/1/2008	2/28/2009	81	204
21	Cattle	3/1/2007	2/29/2008	81	204
21	Cattle	3/1/2006	2/28/2007	81	204
21	Cattle	3/1/2005	2/28/2006	81	204
21	Cattle	3/1/2004	2/28/2005	81	204
21	Cattle	3/1/2003	2/29/2004	81	204
10	Cattle	3/1/2002	2/28/2003	81	97
21	Cattle	3/1/2001	2/28/2002	81	204
21	Cattle	3/1/2000	2/28/2001	81	204

6.1.2 R&E Park Lease allotment

<u>Number of Active Livestock</u>	<u>Kind</u>	<u>Grazing Begin</u>	<u>Period End</u>	<u>%PL</u>	<u>AUM" s</u>
12	Cattle	3/1/2013	2/28/2014	100	144
12	Cattle	3/1/2012	2/28/2013	100	144
12	Cattle	3/1/2011	2/29/2012	100	144
12	Cattle	3/1/2010	2/28/2011	100	144
12	Cattle	3/1/2009	2/28/2010	100	144
12	Cattle	3/1/2008	2/28/2009	100	144
12	Cattle	3/1/2007	2/29/2008	100	144
12	Cattle	3/1/2006	2/28/2007	100	144
12	Cattle	3/1/2005	2/28/2006	100	144
12	Cattle	3/1/2004	2/28/2005	100	144

12	Cattle	3/1/2003	2/29/2004	100	144
2	Cattle	6/1/2002	2/28/2003	100	18
12	Cattle	3/1/2002	5/31/2002	100	36
12	Cattle	3/1/2001	2/28/2002	100	144
0	Cattle	3/1/2000	2/28/2001	100	0

6.1.3 Sky Arrow allotment

<u>Number of Active Livestock</u>	<u>Kind</u>	<u>Grazing Begin</u>	<u>Period End</u>	<u>%PL</u>	<u>AUM" s</u>
100	Cattle	3/1/2013	2/28/2014	57	684
100	Cattle	3/1/2012	2/28/2013	57	684
100	Cattle	3/1/2011	2/28/2012	57	684
100	Cattle	3/1/2010	2/28/2011	57	684
100	Cattle	3/1/2009	2/28/2010	57	684
100	Cattle	3/1/2008	2/28/2009	57	684
100	Cattle	3/1/2007	2/28/2008	57	684
100	Cattle	3/1/2006	2/28/2007	57	684
100	Cattle	3/1/2005	2/28/2006	57	684
100	Cattle	3/1/2004	2/28/2005	57	684
100	Cattle	3/1/2003	2/28/2004	57	684
36	Cattle	3/1/2002	2/28/2003	57	246
100	Cattle	3/1/2001	2/28/2002	57	684

6.1.4 Wickenburg Arrow Y allotment

<u>Number of Active Livestock</u>	<u>Kind</u>	<u>Grazing Begin</u>	<u>Period End</u>	<u>%PL</u>	<u>AUM" s</u>
239	Cattle	3/1/2013	2/28/2014	75	2151
239	Cattle	3/1/2012	2/28/2013	75	2151
239	Cattle	3/1/2011	2/28/2012	75	2151
239	Cattle	3/1/2010	2/28/2011	75	2151
161	Cattle	3/1/2009	2/28/2010	75	1449
155	Cattle	3/1/2008	2/28/2009	75	1395
155	Cattle	3/1/2007	2/28/2008	75	1395
155	Cattle	3/1/2006	2/28/2007	75	1395
155	Cattle	3/1/2005	2/28/2006	75	1395
125	Cattle	3/1/2004	2/28/2005	75	1125
125	Cattle	3/1/2003	2/28/2004	75	1125
87	Cattle	3/1/2002	2/28/2003	75	783
0	-	3/1/2001	2/28/2002	75	0
0	-	3/1/2000	2/28/2001	75	0

6.2 Critical Management Area Data

Riparian Assessments and Monitoring

PFC Assessments

Hassayampa River Riparian Segment 14C

PFC was assessed at this segment of the Hassayampa River on 10-22-13. This is a narrow reach bounded by steep canyon walls. Mature Goodding's willow (*Salix gooddingii*) trees were present, but no seedlings were observed along the reach. Seep willow (*Baccharis salicifolia*) is also present along much of this reach, as was velvet mesquite (*Prosopis velutina*) and desert broom (*Baccharis sarothroides*). The only perennial herbaceous plant species located along the streambanks was Bermuda grass (*Cynodon dactylon*). Evidence of light cattle use and heavy recreational use of off-highway vehicles was noted along the reach. The stream channel was dry along this reach at the time of the assessment. This riparian reach was rated as functional-at-risk. The rationale for this rating includes the lack of recruitment of riparian tree species, the lack of cover of riparian obligate herbaceous species and the overall sparse cover of riparian vegetation to protect banks and dissipate energy during high flow events. Heavy vehicle traffic in the riparian corridor appeared to be limiting the establishment of riparian vegetation. Reference Section 4.1.1 of Appendix A.

Hassayampa River Riparian Segment 14D

PFC was assessed at this segment of the Hassayampa River on 10-22-13. This is also a narrow reach bounded by steep-sided canyon walls. Vegetation consisted of scattered Goodding's willow, seep willow, velvet mesquite and Bermuda grass. Evidence of heavy vehicle use and light cattle use was noted. At the time of the assessment the upstream end of the reach had surface flow and the downstream end of the reach was dry. Evidence of down-cutting was observed in the upper end of the reach. This reach was rated as functional-at-risk. The rationale for this rating was that there was sparse cover of perennial riparian obligate species, lack of recruitment of riparian tree species and evidence of recent down-cutting. Tire tracks covered much of the width of the riparian corridor in this reach. Vehicle use in the riparian area appeared to be limiting the establishment of vegetation and may have contributed to down-cutting. Reference Section 4.1.2 of Appendix A.

Multiple Indicator Monitoring

A representative Designated Monitoring Area (DMA) was selected in each of the riparian segments to install a Multiple Indicator Monitoring (MIM) plot. These DMAs were chosen due to the presence of sensitive resources that are important to maintaining bank stability and because they have open access to cattle. Sensitive resources include native riparian obligate plant species and stream banks with well-developed soils.

Hassayampa River Riparian Segment 14C

The greenline plant composition is listed in Table 1 by Natural Resource Conservation Service (NRCS) plant species code. The greenline is defined as the lineal assemblage of perennial vegetation on or near the water's edge. The only herbaceous species present in the reach was Bermuda grass (CYDA). Only two native riparian obligate species were present along the greenline: Goodding's willow (SAGO) and seep willow (BASA4). Reference Section 4.1.1 of Appendix A.

Cross-section belt transects results are listed in Table 2. Goodding's willow was the only native riparian obligate tree species detected in the belt transects. No seedling or young age-class Goodding's willow trees were found in the survey. One tamarisk, an invasive nonnative tree species, was found in the transects. Reference Section 4.1.1 of Appendix A.

Hassayampa River Riparian Segment14D

The greenline plant composition is listed in Table 3 by Natural Resource Conservation Service (NRCS) plant species code. The only herbaceous species recorded in the reach was one occurrence of common spikerush (ELPA3). Two other native riparian obligate species were present along the greenline: Gooding’s willow (SAGO) and seep willow (BASA4). Reference Section 3.1.2 of Appendix A.

Two mature Gooding’s willow trees were detected in the woody species belt transects, but no seedling or young age classes were found. Tree tobacco, a non-native facultative wetland tree species, was also found at the site. Reference Section 3.1.2 of Appendix A.

7.0 Conclusions

7.1 Upland Health Conclusions

Summary of Standard Achievement or Non-achievement for all Key Areas:

Allotment	Key Area	Standard One	Standard Three
Arrow Y	KA1	Achieved	Not Achieved
	KA2	Achieved	Achieved
R&E Park Lease	KA1	Achieved	Achieved
Sky Arrow	KA1	Achieved	Achieved
	KA2	Achieved	Achieved
Wickenburg Arrow Y	KA1	Achieved	Achieved
	KA2	Achieved	Achieved
	KA3	Achieved	Achieved
	KA4	Achieved	Achieved
	KA5	Achieved	Achieved
	KA6	Achieved	Not Achieved

Upland Health Conclusions are based on the analysis of the current monitoring data for each key area. Standard Three analysis is based on Dry Weight Rank and Point Cover study methods. Grass composition results are based on the sum composition percent for all grass species occurring on the study area. Palatable shrub composition results are based on the sum composition percent for all palatable browse species as listed, by animal species, in Appendix A, Section 3, “Sky Arrow Complex Plant List”. Vegetative foliar cover and bare ground cover class results are based on point cover data.

Utilization data is used to determine if livestock are a potential causal factor for non-achievement of Standards. Based on Holechek (1988), livestock utilization levels in this precipitation zone should be between 30-40% for moderate use without producing deleterious effects to the ecological site. Based on Heffelfinger(2006), browse utilization in this precipitation zone should be limited to 35% to prevent deleterious effects to deer habitat.

7.1.1 Arrow Y allotment

Key Area 1

Standard One: Upland Site Achieves Standard

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability and Hydrologic Function ratings are both categorized as a “None to Slight Departure” from the reference state. Reference Section 2.1.1 of Appendix A.

Standard Three: Standard is not achieved on this site.

- | | |
|---|---------------------|
| • Maintain a perennial grass composition of $\geq 10\%$ | <u>NOT ACHIEVED</u> |
| • Maintain a palatable shrub composition of $\geq 30\%$ | <u>ACHIEVED</u> |
| • Maintain vegetative foliar cover at $\geq 15\%$. | <u>NOT ACHIEVED</u> |
| • Maintain a bare ground cover class of $\leq 10\%$. | <u>ACHIEVED</u> |

Rationale:

The perennial grass composition objective is not being met at this Key Area. The most current long-term monitoring data shows a grass composition of slightly more than 8% total. Palatable shrub composition on the site is met for Sonoran desert tortoise with a palatable browse (Van Devender, et al. 2002) (Oftedal 2002) of slightly more than 74% of the plant community. The perennial grass species present at the site is also known to be palatable to desert tortoise (Van Devender, et al. 2002) (Oftedal 2002). Palatable shrub composition is met for mule deer (Heffelfinger, et al. 2006) with a palatable browse of slightly less than 68% of the plant community. The vegetative foliar cover objective is not being met at this site, with foliar cover of 10%. The bare ground cover class objective is met on this site, with a bare ground cover class of 7%. Data gathered in 2003 show a more diverse plant community, however, while these data are provided in Appendix A, they cannot be directly compared to 2012 monitoring data. The transect layout used in 2003 was not documented and was not repeated in 2012.

Utilization data on this key area shows use of big galleta grass at 29% and fairy duster browse at 18%. It is unlikely that current livestock grazing use on this site is a causal factor for partial non-achievement of Standard 3.

Key Area 2

Standard One: Upland Site Achieves Standard

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability is classified as a “None to Slight Departure” from the reference state. Hydrologic Function is classified as a “Slight to Moderate Departure” from the reference state due to increased soil movement on the site above the expected state due to the slope on the site. Reference Section 2.1.2 of Appendix A.

Standard Three: Standard is met on this site.

- | | |
|---|---------------------|
| • Maintain perennial grass composition of $\geq 5\%$ | <u>ACHIEVED</u> |
| • Maintain palatable shrub composition of $\geq 30\%$ | <u>ACHIEVED</u> |
| • Maintain vegetative foliar cover of $\geq 25\%$ | <u>NOT ACHIEVED</u> |
| • Maintain a Bare Ground cover class of $\leq 10\%$ | <u>ACHIEVED</u> |

Rationale:

The perennial grass composition objective is met at this Key Area. Current long-term monitoring data shows a perennial grass component of slightly more than 8% composition. Palatable shrub composition on the site is met for Sonoran desert tortoise with a palatable browse (Van Devender, et al. 2002) (Oftedal 2002) composition of slightly less than 77%. The perennial grass species present at the site is also known to be palatable to desert tortoise (Oftedal 2002) (Van Devender, et al. 2002). Palatable shrub composition

is met for mule deer (Heffelfinger, et al. 2006) with a palatable browse composition of slightly more than 83%. The vegetative foliar cover requirement is not being met at this site, with a vegetative foliar cover of 17%. This is likely due to drought effect and canopy die-back as noted on the Interpreting Indicators sheet. The Bare Ground cover class objective is met on this site, with a bare ground cover class of 7%. Data gathered in 2003 show a more diverse plant community, however, while these data are provided in Appendix A, they cannot be directly compared to 2012 monitoring data. The transect layout used in 2003 was not documented and was not repeated in 2012.

Utilization data on this key area shows a use of bush muhly grass of 34% and of fairy duster browse at 22%. It is unlikely that current livestock grazing use on this site is a causal factor for partial non-achievement of Standard Three.

7.1.2 R&E Park Lease Allotment

Key Area 1

Standard One: Upland Site Achieves Standard

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability is classified as a “None to Slight Departure” from the reference state. Hydrologic Function is classified as a “Slight to Moderate Departure” from the reference state. This is due to a lower bare ground cover class and higher perennial grass composition than expected in the reference state. Reference Section 2.2.1 of Appendix A.

Standard Three: Standard is met.

- | | |
|---|-----------------|
| • Maintain perennial grass composition of $\geq 30\%$ | <u>ACHIEVED</u> |
| • Maintain a palatable shrub composition of $\geq 30\%$ | <u>ACHIEVED</u> |
| • Maintain vegetative foliar cover at $\geq 25\%$ | <u>ACHIEVED</u> |
| • Maintain a Bare Ground cover class of $\leq 15\%$ | <u>ACHIEVED</u> |

Rationale:

The perennial grass composition objective is met at this Key Area. Current long-term monitoring data shows a perennial grass component at 54% of site composition. Palatable shrub composition on the site is met for Sonoran desert tortoise with a palatable browse (Van Devender, et al. 2002) (Oftedal 2002) composition of slightly more than 57%. The majority (greater than 98%) of the perennial grass composition at this key area is known to be palatable to Sonoran desert tortoises (Oftedal 2002) (Van Devender, et al. 2002). Palatable shrub composition on the site is met for mule deer with a palatable browse (Heffelfinger, et al. 2006) composition of 51%. Vegetative foliar cover objectives are met on the site, with a vegetative foliar cover of 25%. The Bare Ground cover class objective is met on the site, with a bare ground cover class of 3%.

Utilization data on this key area shows a use of tobosa grass of 29% and of fairy duster browse at 15%.

7.1.3 Sky Arrow Allotment

Key Area 1

Standard One: Upland Site Achieves Standard

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability is classified as a “None to Slight Departure” from the reference state. Hydrologic Function is classified as a “Slight to Moderate Departure” from the reference state. This departure is due to a patchy plant distribution and the slope of the site when compared to the reference state. Reference Section 2.3.1 of Appendix A.

Standard Three: Standard is met.

- | | |
|---|---------------------|
| • Maintain a perennial grass composition of $\geq 5\%$ | <u>NOT ACHIEVED</u> |
| • Maintain a palatable shrub composition of $\geq 35\%$ | <u>ACHIEVED</u> |
| • Maintain vegetative foliar cover of $\geq 15\%$ | <u>ACHIEVED</u> |
| • Maintain a Bare Ground cover class of $\leq 5\%$ | <u>ACHIEVED</u> |

Rationale:

The perennial grass component on this site is not met. Current long-term monitoring data shows a perennial grass composition of 1%. Palatable shrub composition on the site is met for Sonoran desert tortoise with a palatable browse (Van Devender, et al. 2002) (Ofstedal 2002) composition of 90%. Palatable shrub composition on the site is met for mule deer with a palatable browse (Heffelfinger, et al. 2006) composition of slightly more than 77%. The vegetative foliar cover requirement is being met at this site, with a foliar cover of 19%. The bare ground cover class requirement is being met at this site, with a bare ground cover class of 3.5%.

Utilization data on this key area shows a use of big galleta grass at 29.8%, ephedra browse at 43%, and janusia browse at 38% (2013). Current livestock use levels are not likely to be a causal factor for partial non-achievement of Standard Three.

Key Area 2

Standard One: Upland Site Achieves Standard

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability is classified as a “Slight to Moderate” from the reference state. This departure is due to gully erosion occurring along the site transition zones. Hydrologic Function is classified as a “Slight to Moderate Departure” from the reference state. This departure is due to water flow patterns and gully erosion occurring on the site transition zones. Reference Section 2.3.2 of Appendix A.

Standard Three: Standard is met.

- | | |
|---|---------------------|
| • Maintain perennial grass composition of $\geq 50\%$ | <u>ACHIEVED</u> |
| • Maintain palatable shrub composition of $\geq 10\%$ | <u>ACHIEVED</u> |
| • Maintain vegetative foliar cover of $\geq 10\%$ | <u>NOT ACHIEVED</u> |
| • Maintain Bare Ground cover class of $\leq 10\%$ | <u>ACHIEVED</u> |

Rationale:

The perennial grass composition objective is met on this site, with slightly less than 64% perennial grass composition on the site. Palatable shrub composition on the site is met for Sonoran desert tortoise with a palatable browse (Van Devender, et al. 2002) (Ofstedal 2002) composition of slightly less than 30%. The majority (greater than 97%) of the perennial grass composition at this key area is known to be palatable to Sonoran desert tortoises (Ofstedal 2002) (Van Devender, et al. 2002). Palatable shrub composition on the site is met for mule deer with a palatable browse (Heffelfinger, et al. 2006) composition of slightly more than 36%. The vegetative foliar cover objective is not being met at this site, with a foliar cover class of

8%. The bare ground cover class objective is being achieved at this site, with a bare ground cover class of 8.5%.

Utilization data for this key area shows a use of tobosa grass at 23% (2014) and 37% (2013) and of range ratany at 25% (2014) and 28% (2013). It is unlikely that current livestock use on this site is a causal factor for the non-achievement of Standard Three for vegetative cover class requirements.

7.1.4 Wickenburg Arrow Y Allotment

Key Area 1

Standard One: Upland Site Achieves Standard

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability is classified as a “Slight to Moderate Departure” from the reference state. This departure is due to increased soil and litter movement on the site above what is expected in the reference state, and is due to the steepness of the hill slope. Hydrologic Function is classified as a “Slight to Moderate Departure” from the reference state. This departure is also likely due to increase soil movement on the site above what is expected in the reference state. Reference Section 2.4.1 of Appendix A.

Standard Three: Standard is met.

- Maintain perennial grass species composition at $\geq 5\%$ NOT ACHIEVED
- Maintain palatable shrub composition at $\geq 30\%$ ACHIEVED
- Maintain vegetative foliar cover at $\geq 15\%$ ACHIEVED
- Maintain a Bare Ground cover class of $\leq 15\%$ ACHIEVED

Rationale:

The perennial grass species composition objective is not met at this site, with a perennial grass species composition of 3%. Palatable shrub composition on the site is met for Sonoran desert tortoise with a palatable browse (Van Devender, et al. 2002) (Ofedal 2002) composition of 81%. Palatable shrub composition on the site is met for mule deer with a palatable browse (Heffelfinger, et al. 2006) composition of 67%. The vegetative foliar cover objective is being met at this site, with a vegetative foliar cover of 16%. The bare ground cover class objective is being met at this site, with a bare ground cover class of 13%.

Utilization data at this key area shows a use of Ephedra browse at 70%, flat-top buckwheat browse at 22%, jojoba browse at 53%, and globemallow browse at 25%. Substantial deer use was noted in the area. Because utilization cannot be documented by species, it is possible that current livestock grazing use in this area is a causal factor for the partial non-achievement of Standard Three.

Key Area 2

Standard One: Upland Site Achieves Standard

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability is classified as a “Slight to Moderate Departure” from the reference state. This departure is due old gullies on the site that are revegetating and are not active. Hydrologic Function is classified as a “Slight to Moderate Departure” from the reference state. This departure is also due to old gullies on the site, as well as a slightly higher shrub component than what is expected in the reference state. Reference Section 2.4.2 of Appendix A.

Standard Three: Standard is met.

- | | |
|---|---------------------|
| • Maintain perennial grass species composition at $\geq 10\%$ | <u>ACHIEVED</u> |
| • Maintain palatable shrub species composition at $\geq 10\%$
(deer) | <u>NOT ACHIEVED</u> |
| • Maintain vegetative foliar cover of $\geq 20\%$ | <u>ACHIEVED</u> |
| • Maintain Bare Ground cover class of $\leq 5\%$ | <u>ACHIEVED</u> |

Rationale:

The perennial grass species composition objective is met at this site, with a perennial grass species composition of 13%. Palatable shrub composition on the site is met for Sonoran desert tortoise, with a palatable browse (Van Devender, et al. 2002) (Ofstedal 2002) composition of slightly less than 75%. The perennial grass species present at the site is also known to be palatable to desert tortoise (Ofstedal 2002) (Van Devender, et al. 2002). Palatable shrub composition on the site is not being met for mule deer, with a palatable browse (Heffelfinger, et al. 2006) composition of slightly more than 5%. The vegetative foliar cover objective is being met on the site, with a vegetative foliar cover of 25%. The bare ground cover class objective is being met at the site, with a bare ground cover class of 1%.

Utilization at this key area shows a use of tobosa grass at 2.5% (2009) and 40% (2014) and of range ratany browse at 35% (2014). It is unlikely that current livestock grazing use of this site is a causal factor for the partial non-achievement of Standard Three for mule deer habitat requirements.

Key Area 3

Standard One: Upland Site Achieves Standard

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability is classified as a “Slight to Moderate Departure” from the reference state. This departure is due old gullies on the site that are revegetating and are not active. Hydrologic Function is classified as a “Slight to Moderate Departure” from the reference state. This departure is also due to old gullies on the site, as well as a slightly higher shrub component than what is expected in the reference state. Reference Section 2.4.3 of Appendix A.

Standard Three: Standard is met.

- | | |
|---|-----------------|
| • Maintain perennial grass species composition at $\geq 5\%$ | <u>ACHIEVED</u> |
| • Maintain palatable shrub species composition at $\geq 15\%$ | <u>ACHIEVED</u> |
| • Maintain vegetative foliar cover of $\geq 20\%$ | <u>ACHIEVED</u> |
| • Maintain a Bare Ground cover class of $\leq 15\%$ | <u>ACHIEVED</u> |

Rationale:

The perennial grass species objective on this site is nearly met, with a perennial grass composition of slightly more than 4%. The palatable shrub composition objective is being met on the site for Sonoran Desert tortoise, with a palatable browse (Van Devender, et al. 2002) (Ofstedal 2002) composition of slightly less than 88%. The perennial grass species present at the site is also known to be palatable to desert tortoise (Ofstedal 2002) (Van Devender, et al. 2002). The palatable shrub composition objective is being met for mule deer, with a palatable browse (Heffelfinger, et al. 2006) composition of slightly more than 32%. The vegetative foliar cover objective is being met, with a vegetative foliar cover class of 25%. The bare ground cover class objective is being met, with a bare ground cover class of 15%.

Utilization at this key area shows a use of range ratany browse of 13% (2013) and 18% (2014) and of flattop buckwheat browse at 5% (2013) and 13% (2014). At these utilization levels, it is unlikely that current livestock grazing use is a causal factor for the partial non-achievement of Standard Three.

Key Area 4

Standard One: Upland Site Achieves Standard

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability is classified as a “Slight to Moderate Departure” from the reference state. This departure is due to increased water flow across the site above what is expected in the reference state. Hydrologic Function is classified as a “Slight to Moderate Departure” from the reference state. This departure is due to increased water flow across the site and a patchy vegetation distribution above what is expected in the reference state. Reference Section 2.4.4 of Appendix A.

Standard Three: Standard is met.

- Maintain palatable browse species composition at $\geq 20\%$ ACHIEVED
- Maintain vegetative foliar cover of $\geq 20\%$ ACHIEVED
- Maintain a Bare Ground cover class of $\leq 10\%$ ACHIEVED

Rationale:

The palatable shrub composition objective is met on the site for Sonoran desert tortoise, with a palatable browse (Van Devender, et al. 2002) (Ofstedal 2002) composition of slightly less than 88%. The palatable shrub composition objective is met on the site for mule deer, with a palatable browse (Heffelfinger, et al. 2006) composition of slightly more than 42%. The vegetative foliar cover objective on this site is met, with a vegetative foliar cover class of 30%. The bare ground cover class objective on this site is met, with a bare ground cover class of 9%.

Utilization at this key area shows a use of big galleta grass at 25% (2009) and 18% (2014), of range ratany browse at 15% (2009) and 25% (2014), and of ephedra browse at 15% (2009) and 35% (2014).

Key Area 5

Standard One: Upland Site Achieves Standard

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability and Hydrologic Function ratings are both categorized as a “None to Slight Departure” from the reference state. Reference Section 2.4.5 of Appendix A.

Standard Three: Standard is met.

- Maintain perennial grass species composition at $\geq 5\%$ ACHIEVED
- Maintain palatable browse species composition at $\geq 20\%$ ACHIEVED
- Maintain vegetative foliar cover of $\geq 15\%$ ACHIEVED
- Maintain a Bare Ground cover class of $\leq 5\%$ ACHIEVED

Rationale:

The perennial grass species composition objective is met at this site, with a composition of slightly less than 6%. The palatable shrub (Van Devender, et al. 2002) (Ofstedal 2002) composition objective at this

site is met for Sonoran desert tortoise, with a composition of slightly less than 84%. The perennial grass species present at the site is also known to be palatable to desert tortoise (Ofstedal 2002) (Van Devender, et al. 2002). The palatable shrub (Heffelfinger, et al. 2006) composition objective at this site is met for mule deer, with a composition of slightly more than 34%. The vegetative foliar cover objective is met at this site, with a vegetative foliar cover class of 18.5%. The bare ground cover class objective is met at this site, with a bare ground cover class of 3.5%.

Utilization at this key area shows a big galleta grass use of 24% (2009) and 37% (2014), of jojoba browse at 9% (2009) and 36% (2014), of fairy duster browse at 10% (2009), and of ephedra browse at 24% (2009).

Key Area 6

Standard One: Upland Site Achieves Standard

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability and Hydrologic Function ratings are both categorized as a “None to Slight Departure” from the reference state. Reference Section 2.4.6 of Appendix A.

Standard Three: Standard is not met.

- | | |
|--|---------------------|
| • Maintain perennial grass species composition at $\geq 5\%$ | <u>NOT ACHIEVED</u> |
| • Maintain palatable browse species composition at $\geq 20\%$ | <u>ACHIEVED</u> |
| • Maintain vegetative foliar cover at $\geq 50\%$ | <u>NOT ACHIEVED</u> |
| • Maintain a Bare Ground cover class of $\leq 25\%$ | <u>NOT ACHIEVED</u> |

Rationale:

The perennial grass species composition objective is not met at this site, with a perennial grass composition of slightly less than 3%. The palatable shrub composition objective at this site is met for Sonoran desert tortoise, with a palatable browse (Van Devender, et al. 2002) (Ofstedal 2002) composition of slightly less than 32%. The palatable shrub (Heffelfinger, et al. 2006) composition objective at this site is being met for mule deer, with a composition of slightly more than 56%. The vegetative foliar cover class objective is not being met at this site, with a vegetative foliar cover class of 12%. The bare ground cover class objective is not being met at this site, with a bare ground cover class of 28%.

Utilization at this key area shows a use of range ratany browse at 19% (2009) and 25% (2014), and of jojoba browse at 15% (2009 and 2014). Due to the high vehicle traffic in this dry wash, and the low observed utilization at this site, it is unlikely that current livestock grazing use is a causal factor for the non-achievement of Standard Three.

7.2 Riparian Health Conclusions

The two riparian reaches on the Sky arrow complex are lacking sufficient cover of riparian obligate plant species to stabilize banks and promote complex pooling and diverse channel characteristics. Diverse channel characteristics would benefit native aquatic obligate species such as longfin dace (*Agosia chrysogaster*) and lowland leopard frog (*Rana yavapaiensis*), both BLM sensitive species. Due to scouring high-flow events that occur in these narrow, canyon-bound reaches, riparian tree species are crucial to stabilize banks and dissipate the energy of flood flows. Native riparian tree species also provide high quality nesting and foraging habitat for migratory birds, such as the proposed threatened yellow-billed cuckoo. To achieve a proper functioning condition and improve fish and wildlife habitat, the desired plant community consists of stream banks dominated (>50%) by native riparian herbaceous plant

species; and, to ensure recruitment and retention of native riparian obligate tree species, the desired age class distribution is >15% seedling, >15% young, and >15% mature trees.

8.0 Recommended Management Actions

8.1 Recommended Management Actions for Uplands in the Complex

Based on the data presented in Section 8 of this document, the Complex is meeting Standard One. Standard Three is met on the majority of objectives across the Complex, with the most common non-achievement on uplands being low composition percentages of perennial grasses in the lower rainfall regime areas of the complex. Wickenburg Arrow Y Key Area 6, located in a Sandy Wash ecological site, is the furthest from fully achieving Standard Three based on its current cover classes and vegetative composition.

In order to reduce grazing pressure on Sandy Wash sites within the complex, any salt or supplement blocks placed on the public lands should be located at least one-quarter of a mile from available water sources, and should be located at least one-eighth of a mile above major drainages. Given the number of active livestock waters and number of major drainages within the complex, this is expected to more evenly distribute livestock across the uplands, reducing grazing pressure along the banks of washes.

Lower composition of perennial grass and lower foliar cover is expected in lower rainfall regime areas of the complex. Recruitment of grass species, and the resulting increases to foliar cover, on these sites is best done utilizing monsoonal rain patterns, due to the high component of warm-season grasses (*Pleuraphis* sp.). Livestock should be rotated to the higher elevation areas of the complex in mid-summer, within a week of the official monsoon season start date. The allotments of the complex do not contain interior pasture fencing, but due to the size of the allotments in general, active herding to the higher elevations and natural livestock movement will be sufficient to accomplish these goals.

To facilitate orderly management of the range, Actual Use reporting should be added to the terms and conditions of the permit. The permittee has voluntarily submitted Actual Use for several years, however, adding the reporting requirement will ensure appropriate use levels have been maintained during drought years, and will facilitate desired stocking rate calculations in years that Utilization data is collected.

8.2 Recommended Management Actions for Riparian Areas in the Complex

To allow for maintenance and recruitment of native riparian trees and native riparian herbaceous species, limit livestock use in riparian areas to the winter season when vegetation is dormant (approximately December 1 to February 1). If the desired plant community is not achieved, or if the riparian area is not in proper functioning condition within five years due to livestock use, additional actions would be required such as, but not limited to, temporary or permanent closure to livestock use.

9.0 List of Preparers

Name	Title
James Holden	Rangeland Management Specialist
Codey Carter	Wildlife Biologist
Steve Bird	Wild Horse and Burro Specialist

Name	Title
Mary Skordinsky	Recreation Specialist
Tom Bickauskas	Travel Management Specialist

10.0 References

Butler, Larry D., et al. 2003. *National Range and Pasture Handbook*. Natural Resources Conservation Service. Grazing Lands Technology Institute. Revision 1. Fort Worth, Texas.

Heffelfinger, J.R., et al. 2006. *Habitat Guidelines for Mule Deer: Southwest Deserts Ecoregion*. Mule Deer Working Group. Western Association of Fish and Wildlife Agencies.

Holechek, Jerry L. 1988. An Approach for Setting the Stocking Rate. *Rangelands* Volume 10(1):10-14. Denver, Colorado.

Krausman, Paul R., et al. 1997. Diets of Desert Mule Deer. *Journal of Range Management*. Vol 50:512-522. Lakewood, Colorado.

Oftedal, O.T. 2002. Nutritional Ecology of the Desert Tortoise in Mojave and Sonoran Deserts. Pp. 194-241 in T. R. Van Devender. ed. *The Sonoran Desert Tortoise: Natural History, Biology, and Conservation*. University of Arizona Press and The Arizona-Sonora Desert Museum, Tucson.

Technical Reference 4400, 1996. *Sampling Vegetation Attributes*. Interagency Technical Reference, Cooperative Extension Services. National Applied Resources Sciences Center. Bureau of Land Management. Denver, Colorado.

Technical Reference 4400, 1996. *Utilization Studies and Residual Measurements*. Interagency Technical Reference, Cooperative Extension Services. National Applied Resources Sciences Center. Bureau of Land Management. Denver, Colorado.

Technical Reference 1734-6. 2001. *Interpreting Indicators of Rangeland Health*. Natural Science and Technology Center, Bureau of Land Management. Denver, Colorado.

Technical Reference 1734-7. 2001. *Ecological Site Inventory*. Natural Science and Technology Center, Bureau of Land Management. Denver, Colorado.

Van Devender, T. R., et al. 2002. Grasses, Mallows, Desert Vine, and More: Diet of the Desert Tortoise in Arizona and Sonora. Pp.159-193 in T. R. Van Devender. ed. *The Sonoran Desert Tortoise: Natural History, Biology, and Conservation*. University of Arizona Press and The Arizona-Sonora Desert Museum, Tucson.

Appendix A to the Sky Arrow Complex RHE
Data Appendices

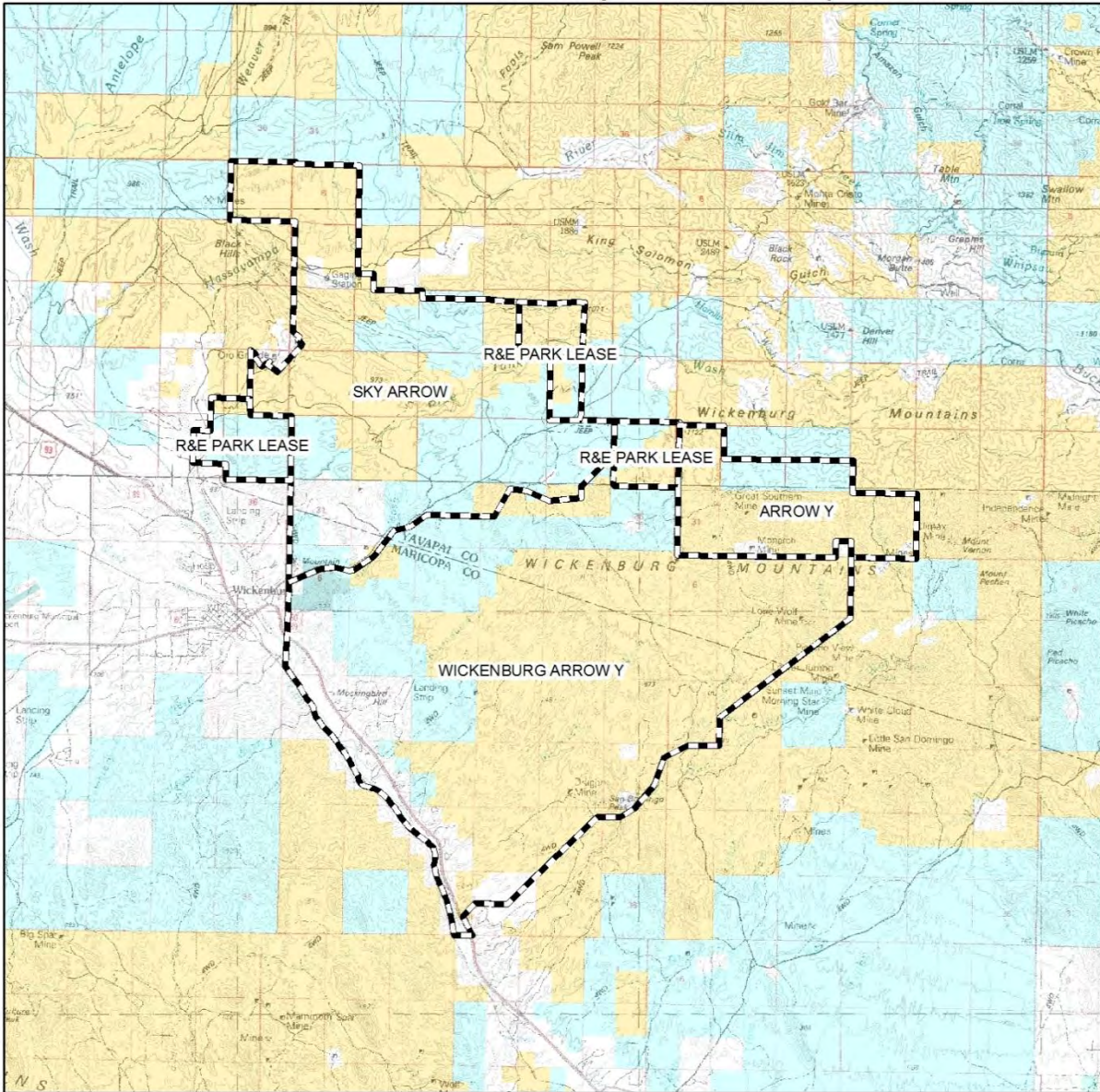
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1.0 Complex Maps

Map 1, Sky Arrow Complex Boundaries

Sky Arrow Complex Boundaries



Legend

Sky Arrow Complex Bounds

Land Status

CATEGORY	Color
BLM	Yellow
BR	Light Yellow
County	Light Blue
Indian Lands	Orange
Local or State Parks	Light Green
Military	Pink
NPS	Purple
Private	White
State	Light Cyan
State Wildlife Area	Light Blue
USFS	Light Green
USFWS	Light Green

N

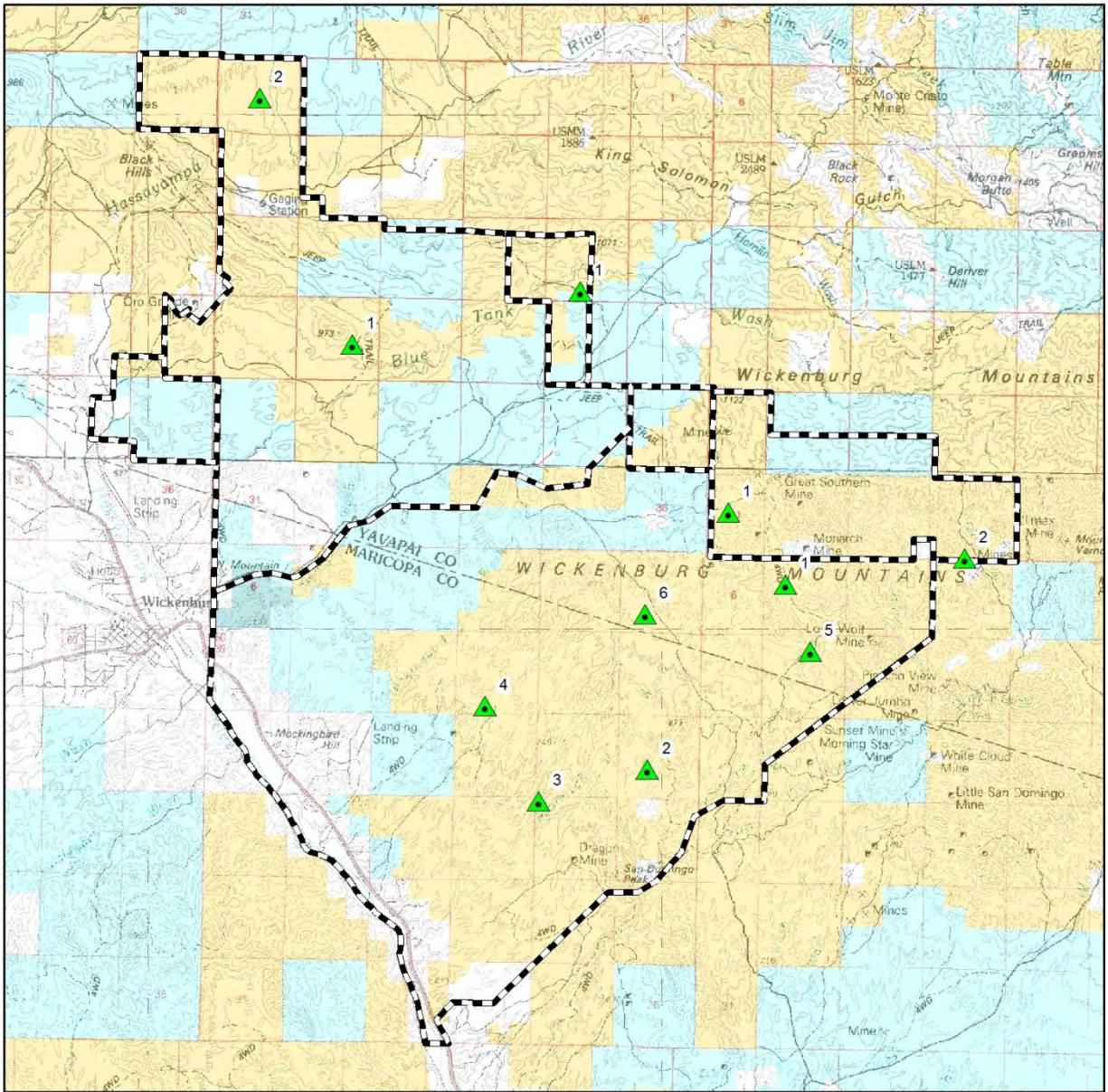
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Sky Arrow Complex Key Areas



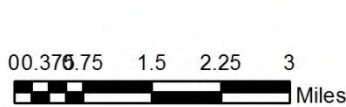
Legend

Key_Areas_Sky_Arrow_Complex

Land Status CATEGORY	Military
BLM	NPS
BR	Private
County	State
Indian Lands	State Wildlife Area
Local or State Parks	USFS
	USFWS

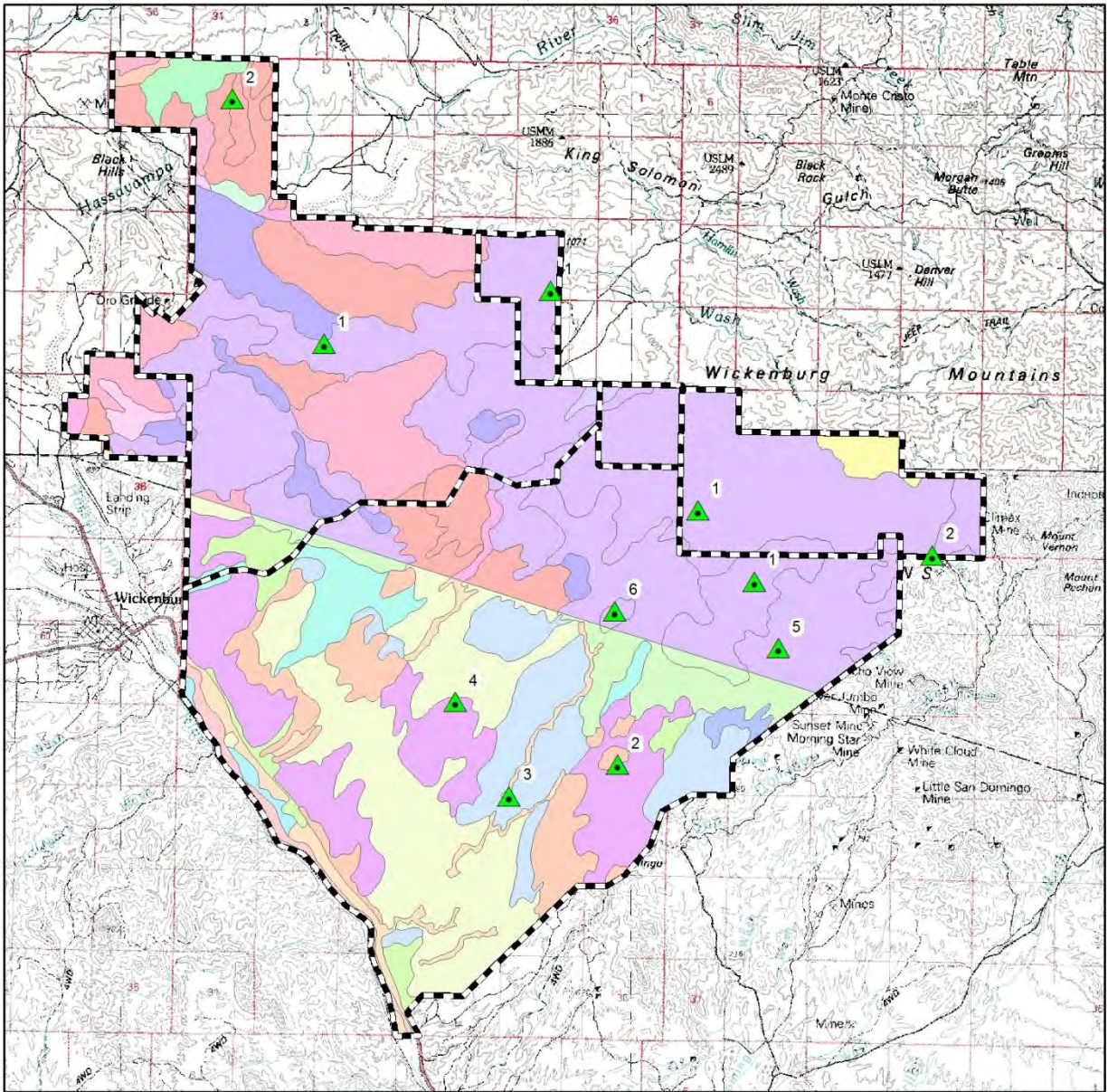


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Sky Arrow Complex Ecological Sites



- Legend**
- | | |
|------------------------------|------------------------------------|
| Liny Upland 10-12' p.z. | Sandy Loam Slopes 7-10' p.z. Liny |
| Liny Upland 10-12' p.z. Deep | Sandy Loam Upland 10-12' p.z. Fine |
| Loamy Hills 10-12' p.z. | Sandy Loam Upland 7-10' p.z. Fine |
| Basalt Hills 10-12' p.z. | Schist Hills 10-12' p.z. |
| Clay Loam Upland 7-10' p.z. | Shallow Upland 7-10' p.z. |
| Clayey Slopes 12-16' p.z. | Loamy Upland 10-12' p.z. |
| Granite Hills 10-12' p.z. | Sandy Bottom 10-12' p.z. |
| Granite Hills 7-10' p.z. | Sandy Bottom 16-20' p.z. |
| | Sandy Loam 7-10' p.z. Deep |
| | Volcanic Hills 10-13' p.z. |
| | Volcanic Hills 7-10' p.z. |

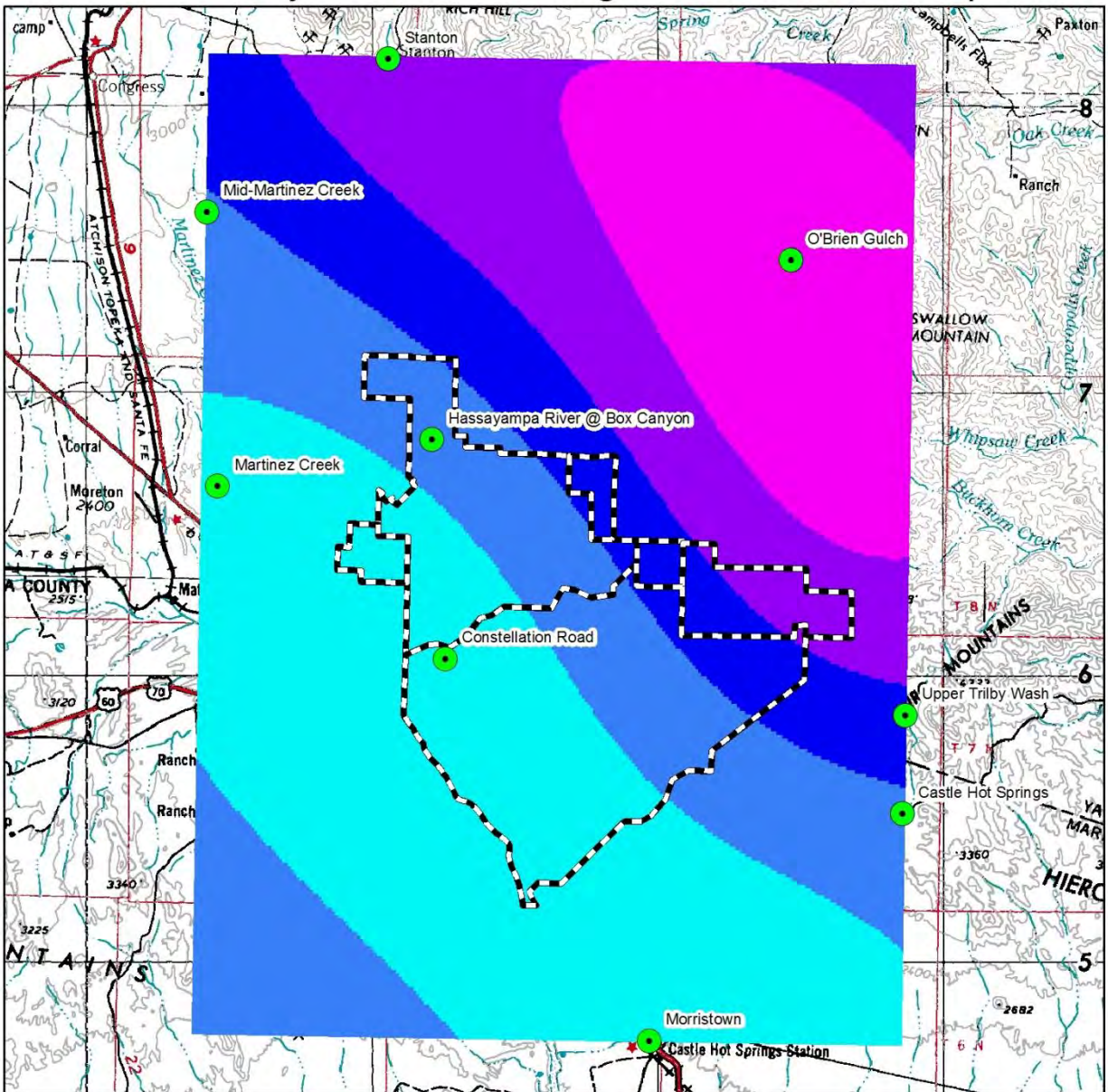


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Sky Arrow Rain Gauges and Rainfall Interpolation



Legend

- Sky Arrow Rain Gauges
- Sky Arrow Complex Bounds

Rainfall Kriging

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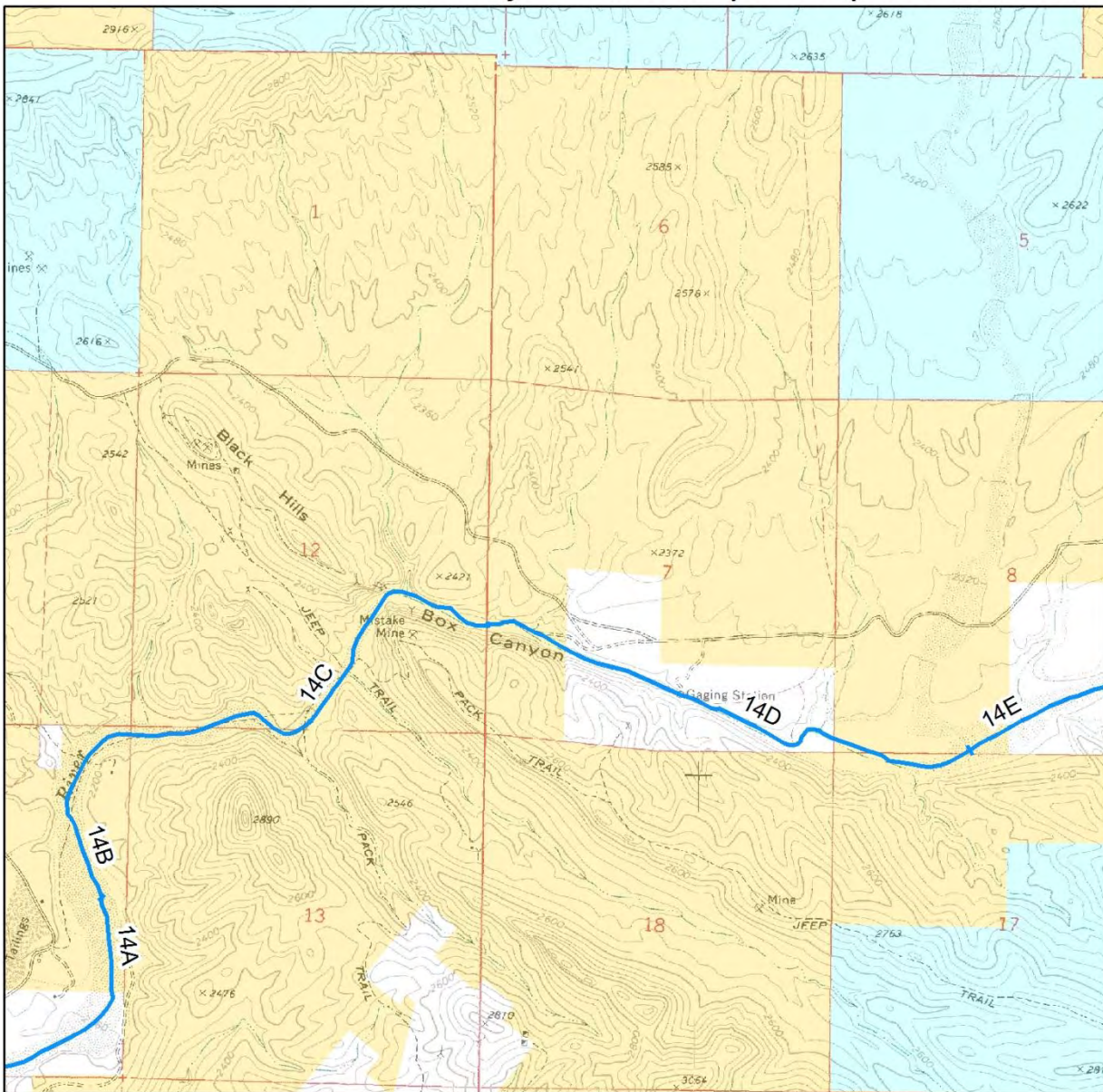
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Sky Arrow Complex Riparian Reaches

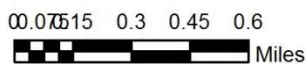


Legend

Land Status	Category
Blue line	Riparian
Yellow	BLM
Orange	BR
Light Blue	County
Dark Blue	Indian Lands
Light Green	Local or State Parks
Pink	Military
Purple	NPS
Light Purple	Private
Light Cyan	State
Dark Cyan	State Wildlife Area
Light Green	USFS
Dark Green	USFWS



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2.0 Key Area Data

2.1 Arrow Y (15) Allotment

2.1.1 Key Area 1

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with expected conditions on the site.
Hydrologic Function (H):	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site.
Biotic Integrity (B):	None to Slight Departure. The indicators observed, when compared to the reference state, are consistent with the expected conditions on the site.

Codes: N-S (None to Slight) S-M (Slight to Moderate) M (Moderate) M-E (Moderate to Extreme) E-T (Extreme to Total)

Ground Cover Data:

Ground Cover data were collected as point cover data in conjunction with Dry Weight Rank and Frequency data. The percent cover by cover class is given below:

Year	Site	Bare Ground	Herb. Cover	Litter	Rock >= 1/2"
2012	1	6.67%	10%	28%	56.19%

Frequency and Composition Data:

Composition data is relative composition based on the Dry Weight Rank study method.

Plant Species KA1 2014	Symbol	2014		2003
		Frequency (%)	Composition (%)	Compositon (%)
Tree and Shrub Species				
Acacia greggii	ACGR	1.9	2.76	-
Adenophyllum porophylloides	ADPO	-	-	T
Aloysia wrightii	ALWR	0.95	1.21	0
Calliandra eriophylla	CAER	0.95	1.72	15
Canotia holacantah	CAHO3	-	-	1
Cylindropuntia acanthocarpa var. acanthocarpa	CYACA2	1.9	2.24	1
Encelia farinosa	ENFA	1.9	3.28	T
Eriogonum fasciculatum	ERFA2	3.81	4.14	6
Eriogonum wrightii	ERWR	-	-	8
Fouquieria splendens	FOSP2	5.17	10.34	T
Gutierrezia microcephala	GUSA	-	-	T
Janusia gracilis	JAGR	1.9	1.9	5
Krameria erecta	KRER	3.81	6.9	2
Larrea tridentata	LATRT	-	-	T
Opuntia chlorotica	OPCH	-	-	1
Porophyllum gracile	POGR5	-	-	T
Prosopis velutina	PRVE	-	-	T

Simmondsia chinensis	SICH	16.19	22.07	17
Ephedra	EPHED	1.9	0.69	-
Ferocactus	FEROC	0.95	0.34	-
Total		41.33	57.59	56
Grasses-Perennial				
Achnatherum speciosum	ACSP12	-	-	T
Aristida sp.	ARIST	-	-	2
Bouteloua curtipendula	BOCU	-	-	T
Muhlenbergia porter	MUPO2	-	-	T
Pleuraphis mutica	PLMU3	-	-	16
Pleuraphis rigida	PLRI3	4.76	8.1	13
Total		4.76	8.1	31
Forbs- Perennial/Biennial				
Euphorbia sp.	EUPHO	-	-	4
Galium sp.	GALIU	-	-	T
Lotus rigidus	LORI3	0.95	1.72	-
Machaeranthera pinnatifida ssp. pinnatifida var. pinnatifida	MAPIP4	7.62	12.24	-
Menodora scabra	MESC	1.9	3.1	-
Senna covesii	SECO10	0.95	1.72	-
Sphaeralcea ambigua	SPAM2	-	-	1
Tragia ramosa	TRRA5	-	-	2
Unknown 1-umbrella leaf	UNKN 1	0.95	0.17	T
Viguiera dentata	VIDE3	10.48	15.34	3
Total		22.85	34.29	9

Utilization Data:

KA1 Utilization		2014	2003
SPECIES	SYMBOL	% USE	% USE
Big Galleta	PLRI3	29%	-
Fairy duster	CAER	18%	5%

2.1.2 Key Area 2

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	None to Slight Departure. Most indicators are within the tolerances given in the reference state.
Hydrologic Function (H):	Slight to Moderate Departure. Some increased soil movement due to slope of site and plant distribution on site above expected in reference state.
Biotic Integrity (B):	Slight to Moderate Departure. Drought effect on some species observed.

Codes: N-S (None to Slight) S-M (Slight to Moderate) M (Moderate) M-E (Moderate to Extreme) E-T (Extreme to Total)

Ground Cover Data:

Year	Bare Ground	Herb. Cover	Litter	Rock >= 1/2"
2012	7%	17%	39%	37%

Frequency and Composition Data:

Plant Species KA2 2012	Symbol	2012		2003
		Frequency (%)	Composition (%)	Composition (%)
Tree and Shrub Species				
Acacia constricta	ACCO2	6	8.18	T
Acacia greggii	ACGR	11	12.73	2
Brickellia coulteri	BRCO	-	-	T
Baccharis brachyphylla	BABR	1	1.36	-
Calliandra eriophylla	CAER	20	24.85	18
Canotia holacantha	CAHO3	2	1.67	1
Cylindropuntia acanthocarpa var. acanthocarpa	CYACA2	4	1.67	4
Echinocereus engelmannii	ECEN	1	0.15	1
Encelia farinosa	ENFA	1	1.21	T
Eriogonum fasciculatum	ERFA2	8	9.09	6
Eriogonum wrightii	ERWR	1	0.15	1
Ferocactus wislizeni	FEWI	-	-	T
Fouquieria splendens	FOSP2	4	3.18	3
Gutierrezia sarothrae	GUSA2	-	-	T
Hyptis emoryi	HYEM	-	-	1
Janusia gracilis	JAGR	-	-	1
Krameria erecta	KRER	-	-	1
Mimosa aculeaticarpa	MIACB	-	-	1
Opuntia	OPUNT	1	0.3	T
Parkinsonia microphylla	PAMI5	2	2.58	2
Porophyllum gracile	POGR5	-	-	1
Salazaria mexicana	SAME	-	-	1
Thamnosma montana	THMO	-	-	1
Simmondsia chinensis	SICH	1	1.36	-
Ephedra	EPHED	2	1.52	3
Total		65	70	48
Grasses-Perennial				

Achnatherum speciosum	ACSP12	-	-	1
Aristida sp.	ARIST	-	-	1
Bouteloua eriopoda	BOER4	-	-	3
Dasyochloa pulchella	DAPU7	-	-	T
Digitaria californica	DICA8	-	-	T
Muhlenbergia porteri	MUPO2	4.76	8.1	8
Pleuraphis mutica	PLMU3	-	-	1
Pleuraphis rigida	PLRI3	-	-	1
Total		4.76	8.1	15
Forbs- Perennial/Biennial				
Adenophyllum porophylloides	ADPO	-	-	T
Allionia incarnata	ALIN	-	-	1
Argythamnia lanceolata	ARLA12	-	-	1
Galium stellatum	GAST	-	-	1
Heliotropium procumbens	HEPR3	-	-	3
Lotus rigidus	LORI3	-	-	T
Marina parryi	MAPA7	-	-	1
Melampodium leucanthum	MELE2	-	-	2
Sphaeralcea ambigua	SPAM2	2	0.3	T
Stephanomeria pauciflora	STPA4	-	-	1
Euphorbia (Chamaesyce melanadenia)	EUPHO	2	1.67	5
Machaeranthera pinnatifida ssp. pinnatifida var. pinnatifida	MAPIP4	5	3.79	-
Tragia ramosa	TRRA5	-	-	5
Unknown 1	UNKN1	5	2.73	-
Viguiera dentata	VIDE3	22	17.42	10
Total		36	25.91	30

Utilization Data:

KA2 Utilization		2014	2003
SPECIES	SYMBOL	% USE	% USE
Fairy duster	CAER	22%	11%
bush muhly	MUPO2	34%	-

2.2 R&E Park Lease Allotment

2.2.1 Key Area 1

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.
Hydrologic Function (H):	Slight to Moderate Departure. Departure is due to lower bare ground, lack of water flow patterns and a high grass component on site compared to the reference state.
Biotic Integrity (B):	Slight to Moderate Departure. Departures are due to a high grass component and invasive species presence on the site compared to the reference state.

Codes: N-S (None to Slight) S-M (Slight to Moderate) M (Moderate) M-E (Moderate to Extreme) E-T (Extreme to Total)

Ground Cover Data:

Year	Bare Ground	Gravel (>2mm-3")	Herb. Canopy	Litter	Rock >3"	Live Basal Veg.
2014	3.00%	21.00%	25%	21%	28.00%	3.00%

Frequency and Composition Data:

Plant Species KA1 2014?	Symbol	Frequency (%)	Composition (%)
Tree and Shrub Species			
Acacia constricta	ACCO	2	1.55
Acacia greggii	ACGR	3.5	1.27
Calliandra eriophylla	CAER	38.5	25.08
Castela emoryi	CAEM4	1	0.99
Cylindropuntia versicolor	CYVE3	14	8.29
Fouquieria splendens	FOSP2	1.5	1.16
Gutierrezia sarothrae	GUSA2	3	1.05
Krameria erecta	KRER	3.5	1.6
Opuntia	OPUNT	9.5	4.64
Parkinsonia microphylla	PAMI5	14.5	12.27
Prosopis velutina	PRVE	2.5	1.71
Echinocactus	ECHIN	3.5	2.32
Ephedra	EPHED	0.5	0.5
Unknown 1-light stemmed shrub	UNKN1	0.5	0.55
<i>Total</i>		98	62.98
Grasses-Perennial			
Aristida	ARIST	9	2.71
Bouteloua eriopoda	BOER4	0.5	0.55
Pleuraphis mutica	PLMU3	44.5	30.99
<i>Total</i>		54	34.25

Forbs- Perennial/Biennial			
Dichelostemma capitatum	DICA14	11	1.49
Euphorbia	EUPHO	4	0
Penstemon	<i>PENST</i>	0.5	0.06
Viguiera	VIGUI	2	1.22
<i>Total</i>		<i>17.5</i>	<i>2.77</i>

Utilization Data:

KA1 Utilization, 2014		
SPECIES	SYMBOL	% USE
Tobosagrass	PLMU3	29%
Fairy duster	CAER	15%

2.3 Sky Arrow Allotment

2.3.1 Key Area 1

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.
Hydrologic Function (H):	Slight to Moderate Departure. Departure is due to patchy plant distribution and slope on the site when compared to the reference state.
Biotic Integrity (B):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.

Codes: N-S (None to Slight) S-M (Slight to Moderate) M (Moderate) M-E (Moderate to Extreme) E-T (Extreme to Total)

Ground Cover Data:

Ground Cover data were collected as point cover data in conjunction with Dry Weight Rank and Frequency data. The percent cover by cover class is given below:

Year	Site	Bare Ground	Herb. Cover	Litter	Rock >= 1/2"
2012	1	3.50%	19%	25%	52.50%

Frequency and Composition Data:

Composition data is relative composition based on the Dry Weight Rank study method.

KA1 2012 Plant Species	Symbol	Frequency (%)	Composition (%)
Tree and Shrub Species			
Acacia greggii	ACGR	1.5	2.4
Bebbia juncea	BEJU	1.5	1.68
Calliandra eriophylla	CAER	8.5	7.2
Canotia holacantha	CAHO3	0.5	0.24
Carnegiea gigantea	CAGI10	1	0.8
Cylindropuntia acanthocarpa var. acanthocarpa	CYACA2	3	3.44
Cylindropuntia bigelovii	CYBI9	2	1.76
Echinocereus engelmannii	ECEN2	1	0.56
Encelia farinosa	ENFA	3	4.72
Eriogonum fasciculatum	ERFA2	1.5	1.76
Fouquieria splendens	FOSP2	10	12.08
Janusia gracilis	JAGR	14	18.4
Larrea tridentata	LATR2	0.5	0.8
Lycium	LYCIU	1.5	2.4
Parkinsonia microphylla	PAMI5	17.5	24
Simmondsia chinensis	SICH	9	11.44
Trixis californica	TRCA8	0.5	0.56

<i>Total</i>		76.5	94.24
Grasses-Perennial			
Pleuraphis rigida	PLRI3	1	1.6
<i>Total</i>		1	1.6
Forbs- Perennial/Biennial			
Funastrum hirtellum	FUHI	0.5	0.24
Menodora scabra	MESC	1	0.4
<i>Total</i>		1.5	0.64

Utilization Data:

Key Area 1

SA1 Utilization		2013	2014
SPECIES	SYMBOL	% USE	% USE
Ephedra	EPVI	40%	42.9%
Janusia	JANUS	38%	-
Galleta	PLRI3	-	29.8%

2.3.2 Key Area 2 (SA2)

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	Slight to Moderate Departure. Departure is due to gully erosion occurring along transition zones with other soil types more susceptible to erosion.
Hydrologic Function (H):	Slight to Moderate Departure. Departure is due to water flow patterns and erosion occurring along transition zones with other soil types.
Biotic Integrity (B):	Slight to Moderate Departure. Departure is due to plant community composition containing significantly more perennial grass species than the reference state.

Codes:N-S (None to Slight)S-M (Slight to Moderate)M (Moderate)M-E (Moderate to Extreme) E-T (Extreme to Total)

Ground Cover Data:

Ground Cover data were collected as point cover data in conjunction with Dry Weight Rank and Frequency data. The percent cover by cover class is given below:

Year	Site	Bare Ground	Herb. Cover	Litter	Rock >= 1/2"
2012	2	8.50%	8%	21%	62.50%

Frequency and Composition Data:

Composition data is relative composition based on the Dry Weight Rank study method.

Plant Species KA2 YEAR?	Symbol	Frequency (%)	Composition (%)
Tree and Shrub Species			
Acacia constricta	ACCO2	2	2.08

Adenophyllum porophylloides	ADPO	4	4.99
Calliandra eriophylla	CAER	8.5	7.2
Cylindropuntia versicolor	CYVE3	0.5	0.24
Encelia farinosa	ENFA	0.5	0.83
Krameria erecta	KRER	3	4.16
Parkinsonia florida	PAFL6	7	9.57
Prosopis velutina	PRVE	1.5	2
Ziziphus obtusifolia	ZIBO	0.5	0.25
Ephedra	EPHED	1	0.92
<i>Total</i>		<i>28.5</i>	<i>32.24</i>
Grasses-Perennial			
Dasyochloa pulchella	DAPU7	1	1.66
Hilaria belangeri	HIBE	25	35.19
Pleuraphis mutica	PLMU3	4.5	6.49
Pleuraphis rigida	PLRI3	13	20.38
<i>Total</i>		<i>43.5</i>	<i>63.72</i>
Forbs- Perennial/Biennial			
Eriogonum inflatum	ERIN4	7.5	10.4
<i>Total</i>		<i>7.5</i>	<i>10.4</i>

Key Area 2 Utilization

SA2 Utilization		2013	2014
SPECIES	SYMBOL	% USE	% USE
Range Ratany	KRER	28%	25%
Tobosa	PLMU3	37%	23%

2.4 Wickenburg Arrow Y Allotment

2.4.1 Key Area 1

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	Slight to Moderate Departure. Departure is due to increased soil and litter movement on hillslope above what is expected in the reference state.
Hydrologic Function (H):	Slight to Moderate Departure. Departure is due to increased soil and litter movement on hillslope above what is expected in the reference state.
Biotic Integrity (B):	Slight to Moderate Departure. Departure is due to plant community composition and distribution being more clumpy and shrubby than expected in the reference state.

Codes: N-S (None to Slight) S-M (Slight to Moderate) M (Moderate) M-E (Moderate to Extreme) E-T (Extreme to Total)

Ground Cover Data:

Ground Cover data were collected as point cover data in conjunction with Dry Weight Rank and Frequency data. The percent cover by cover class is given below:

Year	Bare Ground	GRAVEL / STONE	LITTER	VEG CANOPY
2014??	13%	44%	28%	16%

Frequency and Composition Data:

Composition data is relative composition based on the Dry Weight Rank study method.

Plant Species KA1 2014	Symbol	Frequency (%)	Composition (%)
Tree and Shrub Species			
catclaw	ACGR	3.1	2
San Felipe Dogweed	ADPO	2.0	2
fairyduster	CAER	8.9	11
crucifixion thorn	CAHO3	3.7	3
cholla	CYOP	1.6	1
brittlebush	ENFA	3.7	4
flattop buckwheat	ERFA2	7.3	8
ocotillo	FOSP	9.4	9
burrobrush	HYSA	.5	1
range ratany	KRER	.5	1
creosote	LATR	7.8	10
wolfberry	LYBE	5.8	7
Palo Verde	PAFL	10.5	11
jojoba	SICH	18.8	19
turpentine broom	THMO	1.6	1
triangleleaf goldeneye	VIDE3	3.7	3
<i>Total</i>		<i>170</i>	<i>93</i>

Grasses/Forbs			
3-awn	ARIST	.5	1
Ditaxis	ARNE2	1.6	1
fluffgrass	DAPU7	3.7	1
desert trumpet	ERIN4	.5	1
Spurge	EUPHO	.5	1
Bush muhly	MUPO2	1.0	1
globemallow	SPAM2	.5	1
<i>Total</i>		<i>16</i>	<i>7</i>

Utilization Data:

KA1 Utilization		2014
SPECIES	SYMBOL	% USE
Ephedra	EPHED	70%
Flat-top buckwheat	ERFA2	22%
Globemallow	SPAM2	25%
Jojoba	SICH	53%

2.4.2 Key Area 2

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	Slight to Moderate Departure. Departure is due to old gullies on site that are revegetating and water movement across site.
Hydrologic Function (H):	Slight to Moderate Departure. Departure is due to old gullies on site that are revegetating, water movement across the site, and a slightly higher shrub component than expected in the reference state.
Biotic Integrity (B):	None to Slight Departure. Most indicators are within the tolerances given in the reference state.

Codes: N-S (None to Slight) S-M (Slight to Moderate) M (Moderate) M-E (Moderate to Extreme) E-T (Extreme to Total)

Ground Cover Data:

Ground Cover data were collected as point cover data in conjunction with Dry Weight Rank and Frequency data. The percent cover by cover class is given below:

Year	BARE GROUND	GRAVEL / STONE	LITTER	VEG CANOPY
2009	1%	35%	39%	25%

Frequency and Composition Data:

Composition data is relative composition based on the Dry Weight Rank study method.

Plant Species KA2 2014	Symbol	Frequency (%)	Composition (%)
Tree and Shrub Species			

Triangleleaf Bursage	AMDE4	51.3	55.1
saguaro	CAGI10	.6	.2
cholla	CYOP	8.9	5.6
brittlebush	ENFA	7.6	7.7
fishhook barrel	FEWI	1.9	.4
creosote	LATR2	.6	.8
fishhook pincushion	MAMMI	1.3	.2
Palo Verde	PAMI5	8.9	4.9
<i>Total</i>		<i>81.1</i>	<i>74.9</i>
Grasses-Perennial			
tobosagrass	PLMU3	14.6	14.0
<i>Total</i>		<i>14.6</i>	<i>14</i>
Forbs- Perennial/Biennial			
bluedicks	DICAC5	12.7	11.1
<i>Total</i>		<i>12.7</i>	<i>11.1</i>

Utilization Data:

KA2 Utilization		2009	2014
SPECIES	SYMBOL	% USE	% USE
Tobosa	PLMU3	2.5%	39.6%
Ratany	KRER	-	34.7%

2.4.3 Key Area 3

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	Slight to Moderate Departure. Departure is due to water and soil movement on the site above what is expected in the reference state.
Hydrologic Function (H):	Slight to Moderate Departure. Departure is due to water and soil movement on the site above what is expected in the reference state.
Biotic Integrity (B):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.

Codes: N-S (None to Slight) S-M (Slight to Moderate) M (Moderate)M-E (Moderate to Extreme) E-T (Extreme to Total)

Ground Cover Data:

Ground Cover data were collected as point cover data in conjunction with Dry Weight Rank and Frequency data. The percent cover by cover class is given below:

Year	BARE GROUND	GRAVEL / STONE	LITTER	VEG CANOPY
2009	15%	40%	21%	25%

Frequency and Composition Data:

Composition data is relative composition based on the Dry Weight Rank study method.

Plant Species KA3	Symbol	Frequency (%)	Composition (%)
Tree and Shrub Species			
whitethorn acacia	ACCO2	2.7	0.6
catclaw	ACGR	1.3	0.2
triangleleaf bursage	AMDE4	20.7	25.8
saguaro	CAGI10	0.7	0.1
cholla	CYOP	4.7	5.4
brittlebush	ENFA	4.7	1.8
bastardsage	ERWR	2.7	4.0
snakeweed	GUSA2	0.7	1.0
range ratany	KRER	2.7	3.0
creosote	LATR2	14.0	17.5
wolfberry	LYBE	4.0	4.8
fishhook pincushion	MAMMI	0.7	0.1
Palo Verde	PAMI5	16.0	21.5
mistletoe	PHCA8	1.3	0.6
turpentine broom	THMO	2.7	3.1
<i>Total</i>		<i>79.6</i>	<i>89.5</i>
Grasses-Perennial			
3-awn	ARIST	1.3	1.6
fluffgrass	DAPU7	0.7	1.0
big galleta	PLRI3	1.3	1.6
<i>Total</i>		<i>3.3</i>	<i>4.2</i>
Forbs- Perennial/Biennial			
San Filipe dogweed	ADPO	1.3	1.4
ditaxis	ARNE2	0.7	0.3
bluedicks	DICA14	1.3	0.7
Desert Trumpet	ERIN4	2.7	2.1
spurge	EUPHO	0.7	1.0
yerba de venado	POGR5	0.7	0.9
<i>Total</i>		<i>7.4</i>	<i>6.4</i>

Utilization Data:

KA3 Utilization, 2014		2009	2014
SPECIES	SYMBOL	% USE	% USE
Range ratany	KRER	13%	18%
Flattop buckwheat	ERFA2	5%	13%

2.4.4 Key Area 4

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	Slight to Moderate Departure. Departure is due to rilling and increased water flow across the site above what is expected in the reference state.
Hydrologic Function (H):	Slight to Moderate. Departure is due to rilling and increased water flow across the site, as well as patchy vegetation distribution above what is expected in the reference state.
Biotic Integrity (B):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with the expected conditions on the site.

Codes: N-S (None to Slight) S-M (Slight to Moderate) M (Moderate) M-E (Moderate to Extreme) E-T (Extreme to Total)

Ground Cover Data:

Ground Cover data were collected as point cover data in conjunction with Dry Weight Rank and Frequency data. The percent cover by cover class is given below:

Year	BARE GROUND	GRAVEL / STONE	LITTER	VEG CANOPY
2008	9%	35%	25%	30%

Frequency and Composition Data:

Composition data is relative composition based on the Dry Weight Rank study method.

Plant Species KA4 2008	Symbol	Frequency (%)	Composition (%)
Tree and Shrub Species			
whitethorn acacia	ACCO2	6.7	5.4
catclaw acacia	ACGR	1.7	1.1
triangleleaf bursage	AMDE4	30.2	28.2
fairyduster	CAER	0.8	0.2
cholla	CYOP	1.7	0.8
hedgehog	ECEN	2.5	0.3
ephedra	EPHED	7	
barrel cactus	FEWI	1.7	1.0
snakeweed	GUSA2	7.6	1.6
range ratany	KRER	9.2	8.2
creosote	LATR2	22.7	20.6
wolfberry	LYBE	0.8	0.1
menodora MESC	MESC	1.7	0.6
Palo Verde	PAMI5	25.2	26.3
yerba de venado POGR	POGR5	1.7	1.0
turpentine broom	THMO	0.8	0.7
ratear coldenia	TILA6	0.8	1.0
graythorn	ZIOB	0.8	1.0
<i>Total</i>		<i>123.6</i>	<i>98.1</i>

Forbs- Perennial/Biennial			
bluedicks	DICAC5	2.5	1.1
perezia	PEREZ2	2.5	0.6
<i>Total</i>		5	1.7

Utilization Data:

KA4 Utilization		2009	2014
SPECIES	SYMBOL	% USE	% USE
Big galleta	PLRI3	25%	18%
Range ratany	KRER	15%	25%
Ephedra	EPHED	15%	35%

2.4.5 Key Area 5

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with expected conditions on the site.
Hydrologic Function (H):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with expected conditions on the site
Biotic Integrity (B):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with expected conditions on the site

Codes: N-S (None to Slight) S-M (Slight to Moderate)M (Moderate)M-E (Moderate to Extreme) E-T (Extreme to Total)

Ground Cover Data:

Ground Cover data were collected as point cover data in conjunction with Dry Weight Rank and Frequency data. The percent cover by cover class is given below:

YEAR	BARE GROUND	GRAVEL / STONE	LITTER	VEG CANOPY
2009	3.5%	49.5%	28.5%	18.5%

Frequency and Composition Data:

Composition data is relative composition based on the Dry Weight Rank study method.

Plant Species KA5	Symbol	Frequency (%)	Composition (%)
Tree and Shrub Species			
catclaw acacia	ACGR	1	0.6
dogweed	ADPO	1	0.7
triangleleaf bursage	AMDE4	32.5	29.0
fairyduster	CAER	10	7.8
buckhorn cholla	CYACA2	8	7.4
hedgehog	ECEN	6	4.9

flattop buckwheat	ERFA2	3	2.2
Ephedra	EPHED	0	0.3
ocotillo	FOSP2	3	1.7
range ratany	KRER	2	1.6
rock pea	LORI3	0.5	0.1
wolfberry	LYBE	0.5	0.4
menodora	MESC	1.5	0.9
prickly pear	OPUNT	2	0.8
palo verde	PAMI5	14	12.7
yerba de venado	POGR5	1.5	0.3
coues' cassia	SECO10	0.5	0.6
jojoba	SICH	6	4.4
toothleaf goldeneye	VIDE3	0.5	0.1
<i>Total</i>		93.5	76.5
Grasses/ Forbs			
3-awn	ARIST	3	1.5
ayenia	AYMI	15.5	8.3
fluffgrass	DAPU7	1	1.3
spurge	EUPHO	6.5	5.4
janusia	JAGR	5	4.4
tobosa	PLMU3	1	0.8
big galleta	PLRI3	2	1.8
<i>Total</i>		34	23.5

Utilization Data:

KA5 Utilization		2009	2014
SPECIES	SYMBOL	% USE	% USE
Big galleta		24%	37%
Jojoba		9%	36%
Fairy duster		10%	-
Ephedra		24%	-

2.4.6 Key Area 6

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with expected conditions on the site.
Hydrologic Function (H):	None to Slight Departure. The observed indicators, when compared to the reference state, are consistent with expected conditions on the site.
Biotic Integrity (B):	None to Slight Departure. The observed indicators, when compared to the reference state,

are consistent with expected conditions on the site

Codes:N-S (None to Slight) S-M (Slight to Moderate) M (Moderate) M-E (Moderate to Extreme) E-T (Extreme to Total)

Ground Cover Data:

Ground Cover data were collected as point cover data in conjunction with Dry Weight Rank and Frequency data. The percent cover by cover class is given below:

Year	BARE GROUND	GRAVEL / STONE	LITTER	VEG CANOPY
2009	28%	32%	28%	12%

Frequency and Composition Data:

Composition data is relative composition based on the Dry Weight Rank study method.

Plant Species KA6	Symbol	Frequency (%)	Composition (%)
Tree and Shrub Species			
whitethorn acacia	ACCR	1.3	1.5
catclaw	ACGR	20.5	8.6
brittlebush	ENFA	1.3	1.1
ephedra	EPHED	1.3	0.3
flattop buckwheat	ERFA2	15.4	14.5
bastardsage	ERWR	3.8	3.4
burrobrush	HYSA	7.7	6.9
creosote	LATR2	16.7	12.5
wolfberry	LYBE	10.3	9.1
Palo Verde	PAFL6	6.4	3.1
mesquite	PRVE	18.0	17.4
wire lettuce	STPA4	5.1	2.8
turpentine broom	THMO	2.6	0.5
triangleleaf goldeneye	VIDE3	9.0	8.0
greythorn	ZIOB	1.3	0.2
<i>Total</i>		<i>120.7</i>	<i>89.9</i>
Grasses-Perennial			
bush muly	MUPO	1.3	1.1
tobosa	PLMU3	1.3	1.5
<i>Total</i>		<i>2.6</i>	<i>2.6</i>
Forbs- Perennial/Biennial			
globemalow	SPAM2	1.3	1.5
thistle	CINE	3.4	1.7
spiny forb 1	UNK1	3.8	4.5
<i>Total</i>		<i>8.5</i>	<i>7.7</i>

Utilization Data:

KA6 Utilization		2009	2014
SPECIES	SYMBOL	% USE	CLASS
Range ratany	KRER	19%	25%
Jojoba	SICH	15%	15%

3.0 Sky Arrow Complex Plant List

The following plant list comprises all the plant species identified on long-term monitoring transects. This list is not exhaustive nor all inclusive of the plants on the Complex. Plant species on the list are identified by common name, scientific name, and NRCS Plants Database symbol. Palatable plants are identified, by species, for Sonoran desert tortoise, mule deer, and domestic livestock (cattle). Palatability of plant species for Sonoran desert tortoise is taken from VanDevender, et al (2002) and Oftedal (2002). Palatability of plant species for mule deer is taken from the “Habitat Guidelines for Mule Deer: Southwest Deserts Ecoregion” (Heffelfinger 2006). Livestock plant palatability is taken from the Complex-associated Ecological Site Descriptions.

Common Name	Scientific Name	Symb ol	Sonoran Tortoise	Mule Deer	Livest ock
Palmer's indian mallow	<i>Abutilon palmeri</i>	ABPA	X		
White Thorn Acacia	<i>Acacia constricta</i>	ACC O2		X	
Catclaw Acacia	<i>Acacia greggii</i>	ACG R	X	X	
San Felipe dogweed	<i>Adenophyllum porophylloides</i>	ADP O	X		
Dogweed	<i>Adenophyllum spp.</i>	ADEN O5	X		
Wright's beebrush	<i>Aloysia wrightii</i>	ALW R			
Triangle bursage	<i>Ambrosia deltoidea</i>	AMD E4	X		
New mexico silverbush	<i>Argythamnia neomexicana ditaxis</i>	ARN E2	X	X	
Three awn	<i>Aristida</i>	ARIS T	X		X
Dense ayenia	<i>Ayenia microphylla</i>	AYMI	X		
Shortleaf baccharis	<i>Baccharis brachyphylla</i>	BAB R			
Sweetbush	<i>Bebbia juncea</i>	BEJU			
Black grama	<i>Bouteloua eriopoda</i>	BOER 4			X
Fairyduster	<i>Calliandra eriophylla</i>	CAER	X	X	
Crucifixion thorn	<i>Canotia holacantha</i>	CAH			

		O3			
Saguaro	<i>Carnegiea gigantea</i>	CAGI 10	X		
Crucifixion thorn	<i>Castela emoryi</i>	CAE M4			
New mexico thistle	<i>Cirsium neomexicanum</i>	CINE	X		
Buckhorn cholla	<i>Cylindropuntia acanthocarpa</i> var. <i>acanthocarpa SH</i>	CYA CA2	X		X
Teddybear cholla	<i>Cylindropuntia bigelovii</i>	CYBI 9			X
Staghorn cholla	<i>Cylindropuntia versicolor</i>	CYV E3	X		X
Low wollygrass	<i>Dasyochloa pulchella</i>	DAP U7	X		
Bluedicks	<i>Dichelostemma capitatum</i>	DICA 14			
Hedgehog cactus	<i>Echinocactus spp</i>	ECHI N3	X		
Engelmann's hedgehog cactus	<i>Echinocereus engelmannii</i>	ECEN			
Brittlebush	<i>Encelia farinosa</i>	ENFA	X		
Moron tea	<i>Ephedra viridis</i>	EPVI		X	X
Easatern Mojave buckwheat	<i>Eriogonum fasciculatum</i>	ERFA 2	X	X	
Desert trumpet	<i>Eriogonum inflatum</i>	ERIN 4	X	X	
Bastardsage	<i>Eriogonum wrightii</i>	ERW R	X	X	
Spurge	<i>Euphorbia</i>	EUPH O	X	X	
Barrel cactus	<i>Ferocactus</i>	FERO C	X	X	
Ocotillo	<i>Fouquieria splendens</i>	FOSP 2	X	X	
Hairy milkweed	<i>Funastrum hirtellum</i>	FUHI			

Broom snakeweed	<i>Gutierrezia sarothrae</i>	GUS A2			
Curly-mesquite	<i>Hilaria belangeri</i>	HIBE	X		
Burrobrush	<i>Hymenoclea salsola</i>	HYS A			
Slender janusia	<i>Janusia gracilis</i>	JAGR	X	X	X
Littleleaf ratany	<i>Krameria erecta</i>	KRER	X	X	X
Creosote bush	<i>Larrea tridentata</i>	LATR 2	X		
Shrubby deervetch	<i>Lotus rigidus</i>	LORI 3	X	X	
Desert-thorn	<i>Lycium</i>	LYCI U	X		
Wolfberry	<i>Lycium berlandieri</i>	LYBE	X		
Lacy tansyaster	<i>Machaeranthera pinnatifida</i> ssp. <i>pinnatifida</i> var. <i>pinnatifida</i>	MAPI P4			X
Rough menodora	<i>Menodora scabra</i>	MES C			
Mesquite	<i>Mesquite spp</i>	PRJU	X	X	
Bush muhly	<i>Muhlenbergia porteri</i>	MUP O2	X		X
Pricklypear	<i>Opuntia</i>	OPU NT	X	X	
Blue paloverde	<i>Parkinsonia florida</i>	PAFL 6		X	X
Yellow paloverde	<i>Parkinsonia microphylla</i>	PAMI 5	X	X	X
Beardtongue	<i>Penstemon</i>	PENS T			
perezia	<i>Perezia</i>	PERE Z2			
mistletoe	<i>Phoradendron californicum</i>	PHCA 8			
Tobosagrass	<i>Pleuraphis mutica</i>	PLM U3	X		
Big galleta	<i>Pleuraphis rigida</i>	PLR13	X		

Yerba de venado	<i>Porophyllum gracile</i>	POGR 5	X		
Velvet mesquite	<i>Prosopis velutina</i>	PRVE	X	X	X
Coues' cassia	<i>Senna covesii</i>	SECO 10	X		
Jojoba	<i>Simmondsia chinensis</i>	SICH	X	X	
Desert globemallow	<i>Sphaeralcea ambigua</i>	SPAM2	X	X	X
Wirelettuce	<i>Stephanomeria</i>	STEP H	X		
Rat ear coldenia	<i>Tiquilia latior</i>	TILA 6			
Turpentinebroom	<i>Thamnosma montana</i>	THM O			
American threefold	<i>Trixis californica</i>	TRCA 8	X		
Goldeneye	<i>Viguiera</i>	VIGU I	X	X	
Toothleaf goldeneye	<i>Viguiera dentata</i>	VIDE 3	X	X	
Lotebush	<i>Ziziphus obtusifolia</i>	ZIOB			

4.0 Riparian Data

4.1 Sky Arrow Allotment

4.1.1 Hassayampa River Reach 14C

PFC Assessments

PFC assessments at Hassayampa Reach 14C

Year	Proper Functioning Condition	Functional - At Risk	Nonfunctional
1999		X	
2003		X	
2004		X	
2013		X	

MIM Data

Greenline composition along segment 14C

Species Plant Code	Species Name	Greenline Composition
BASA4	Baccharis salicifolia	7.3%
RK	Rock	27.6%
SAGO	Salix gooddingii	13.5%
CYDA	Cynodon dactylon	25.5%
PRVE	Prosopis velutina	10.4%
BASA2	Baccharis sarothroides	14.6%
ACGR	Acacia greggii	1.0%

Woody Species Cross-section stem counts by age class for segment 14C.

Species	Seedling	Young	Mature
Gooding's Willow (<i>Salix gooddingii</i>)			7
Seep Willow (<i>Baccharis salicifolia</i>)		5	
Velvet Mesquite (<i>Prosopis velutina</i>)		5	7
Tamarisk (<i>Tamarix ramosissima</i>)		1	

4.1.2 Hassayampa River Reach 14D

PFC Data

PFC assessments at Hassayampa Reach 14D

Year	Proper Functioning Condition	Functional - At Risk	Nonfunctional
1999		X	
2004		X	
2013		X	

MIM Data

Greenline composition along segment 14D

Species Plant Code	Species Name	Greenline Composition
BASA4	Baccharis salicifolia	10.6%
ELPA3	Eleocharis palustris	0.6%
MS	Mesic shrub	2.9%
RK	Rock	27.7%
SAGO	Salix gooddingii	32.2%
TARA	Tamarix ramosissima	0.4%
WD	Embedded wood	4.7%
PRVE	Prosopis velutina	17.1%
NIGL	Nicotiana glauca	3.5%
BASA2	Baccharis sarothroides	0.4%

Woody Species Cross-section stem counts by age class for segment 14D.

Species	Seedling	Young	Mature
Gooding's Willow (<i>Salix gooddingii</i>)			2
Seep Willow (<i>Baccharis salicifolia</i>)	4	11	5
Velvet Mesquite (<i>Prosopis velutina</i>)		1	4
Tree Tobacco (<i>Nicotiana glauca</i>)		1	1

Appendix C

Supplemental Rangeland Health Evaluation Congress-Sky Arrow Allotment #5014

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Abstract

This Rangeland Health Evaluation is a stand-alone report designed to ascertain compliance with the Arizona Standards for Rangeland Health on the Congress-Sky Arrow grazing allotment.

Standard One is achieved on this allotment.

Standard Two is not achieved on this allotment. The causal factor for this is vehicle use in the Hassayampa River and year-long livestock grazing access.

Standard Three is achieved on this allotment in the uplands and not achieved in the riparian areas.

1.0 Introduction

The purpose of this draft land health evaluation is to gauge whether the Arizona Standards of Rangeland Health (Standards) are being achieved on Congress-Sky Arrow allotment and to determine if livestock are the causal factor for either not achieving or not making significant progress towards achieving land health standards in the case of non-achievement of Standards. An evaluation is not a decision document, but a standalone report that clearly records the analysis and interpretation of the available inventory and monitoring data. As part of the land health assessment process Desired Plant Community (DPC) objectives were established for the Biological Resources (biological objects within the boundaries of the allotment). The DPC objectives will assure that soil condition and ecosystem function described in Standards 1 and 2 are met.

The Secretary of the Interior approved Arizona's Standards for Rangeland Health and Guidelines for Grazing Administration (Guidelines) in April 1997. The Decision Record, signed by the BLM State Director (April 1997) provides for full implementation of the Standards and Guides in Arizona BLM Land Use Plans.

Land Health Standards are measurable and attainable goals for the desired condition of the biological resources and physical components/characteristics of the desert ecosystems found within the boundaries of these grazing allotments.

This evaluation seeks to ascertain: 1) if standards are being achieved, not achieved, and, in cases of not achieved, if significant progress is being made towards achievement of land health; 2) where it is ascertained that land health standards are not being achieved, determine whether livestock grazing is a significant factor causing that non-achievement.

This Congress-Sky Arrow Rangeland Health Evaluation is being issued as a supplement to the Sky Arrow Complex Rangeland Health evaluation. This allotment is contiguous with the Sky Arrow Complex allotments and is unfenced along the shared boundary, mostly delineated by the cliffs lining Box Canyon in the Hassayampa River. Due to livestock use concerns within Riparian Reach 14C, it was determined through the NEPA scoping process for the Sky Arrow Complex that the design features of riparian livestock enclosure fencing would be most effective if implemented on both the Sky Arrow and the Congress Sky Arrow allotments.

2.0 Allotment Profile

2.1 Allotment Location

The Congress-Sky Arrow allotment is located North-Northeast of Wickenburg, AZ. The allotment lies between Scenic Loop Road and Box Canyon in the Black Hills. The allotment encompasses approximately 480 acres of Public Lands with no State Trust or privately held lands within the allotment.

2.2 Physical Description

Climate, precipitation, biological resources, Major Land Resource Area, general wildlife resource, vegetation communities, and Special Status and T&E data are described in detail in the Sky Arrow Complex Rangeland Health Evaluation, Section 2.

2.2.1 Soils

Five soil units occur on the Congress-Sky Arrow allotment. These soil units are given in Table 2.2.1.1 below:

Soil Type	Acreage
House Mountain Soils, 15-40% slope	295
Lehmans extremely rocky clay loam, 8-60% slope	91
Continental gravelly sandy loam, 2-15% slope	64
Sandy and Gravelly alluvial land	16
Cave-Continental gravelly sandy loams, 2-30% slope	14

The major soil type within the allotment are House Mountain soils (61%). These are well drained soils that are very shallow to shallow over basalt. These soils are formed in place on rolling to steep basalt hills and mountains with slopes ranging from 15-40% and elevations ranging from 1,800 to 4,500'. Annual precipitation is expected to be between 8-12". Permeability of these soils is moderate, and available water capacity is low, with effective rooting depths of less than 20". Runoff on these sites is medium to rapid with a moderate to high erosion potential. The ecological site associated with these soils is the Basalt Hills 10-12"pz (R40XA101AZ).

The Lehmans extremely rocky clay loam soil occupies 19% of the Congress-Sky Arrow allotment. These are well-drained shallow soils forming in material weathered from andesite of related tuff and agglomerate. Slopes range from 8-60% with elevations ranging from 1,800 to 4,000'. Annual precipitation is expected to be between 8-11". Permeability of these soils is slow, and available water capacity is low, with effective rooting depths of less than 20". Runoff on these sites is medium to rapid with a moderate to high erosion potential. The ecological site associated with these soils is the Volcanic Hills 10-13"pz (R040XA123AZ).

The Continental gravelly sandy loam soil occupies 13% of the Congress-Sky Arrow allotment. These are well-drained deep soils formed in mixed alluvium. Slopes range from 2-15% with elevations from 2,000 to 4,500'. Annual precipitation is expected to be between 8-12". Permeability of these soils is slow, and available water capacity is moderate to high, with an effective rooting depths of 60 or more inches. Runoff on these sites is medium with a moderate erosion potential. The ecological site associated with these soils is the Loamy Upland 10-12" pz (R40XA114AZ).

The remaining soil types on the allotment are a minor soil component. The Cave-Continental soil is associated with the Limy Upland ecological site in the Cave soil and the Loamy Upland ecological site in the Continental soil. The Sandy and Gravelly alluvial land soil type is not listed as associated with any ecological site by the USDA Natural Resource Conservation Service (NRCS).

2.2.2 Ecological Sites

Volcanic Hills 10-13”p.z. R040XA123AZ

This site occurs on steep hillslopes and ridge tops with slopes from 15-75% and elevations from 2200’ to 4000’. Soils are shallow and formed on intermediate igneous material. Soils are non to slightly calcareous, loamy textured and have well developed covers of gravel, cobble, and stone with rock outcrop expected on up to 35% of the site. Plant-soil moisture relationships are fair to good. The potential plant community is a mix of desert shrubs, trees, cacti, perennial grasses and forbs. Annual vegetative production is expected to be between 242-1850 lbs air-dry weight per acre.

Basalt Hills 10-13”p.z. R040XA123AZ

This site occurs on hillslopes, ridgetops, and mesas with slopes from 15-60% and elevations from 2,200’ to 4,000’. Soils are shallow and formed on basic igneous parent material and related conglomerates. Soils are calcareous, loamy texted with well-developed cobble and stone covers with rock outcrops expected on up to 20% of the site. Plant-soil moisture relationships are fair. The potential plant community is a mix of desert trees, shrubs, cacti, grasses and forbs. Annual vegetative production is expected to be between 206-2100 lbs air-dry weight per acre.

Loamy Upland 10-13”p.z. R040XA114AZ

This site occurs on fan terraces and old stream terraces with slopes from 1-15% and elevations from 1900’ to 3400’. Soils are deep and formed in loamy alluvium of mixed origin. Soils are non to slightly calcareous, loamy, with argillic horizons near the surface. Plant-soil moisture relationships are fairly good. The potential plant community is an open stand of desert trees with an understory of low shrubs, cacti and perennial grasses and forbs with a shrubby aspect. Annual vegetative production is expected to be between 228-1100 lbs air-dry weight per acre.

2.3 Special Management Areas

The portions of the Congress-Sky Arrow allotment that encompass the Hassayampa River lie within The Box Recreation Management Zone, a subdivision of the larger Hassayampa Special Recreation Management Area. Recreation development is planned within the allotment including a trailhead facility along the Mistake Mine Road (route analysis #35031) focused primarily on equestrian use. It would be located between Scenic Loop Road and the Hassayampa River. A minimally developed picnic area on the uplands at the intersection of Mistake Mine Road (route analysis # 35006) and the Hassayampa River is conceptually approved, as is a foot trail connecting the trailhead with the picnic area and river bottom. The final locations for the staging area, foot trail and picnic area will be analyzed and planned through a public process beginning in 2015.

Access throughout Box Canyon using motor vehicles is desired by some members of the public and supported by the Town of Wickenburg. Additional planning will determine if and where vehicle use would be allowed. Access for non-motorized uses would also be evaluated at the same time.

2.4 Recreation Resources

The allotment contains 6.5 miles of existing routes. 5.9 miles of the 6.5 miles has been designated through the Wickenburg Community Travel Management Plan (BLM, May 2014). The primitive road in the Hassayampa River bottom north of the intersection with Mistake Mine Road (analysis number 35031) is

currently open as an existing road and will go through travel planning again to determine if it will be opened, closed, or limited in some way. Table 1 shows the status of the routes within the allotment.

An equestrian trail system called the Red Top Trail System has been developed and accesses the Hassayampa River via Dinosaur Wash (Route analysis #35007). The narrows of Box Canyon are a main destination of trail rides. Access to Boyd Ranch to the north is a destination for local equestrians. Camping in the narrows of Box Canyon on BLM land is common and currently allowed. Physical access to camping on private land just north the canyon currently exists along with a primitive road which accesses BLM and private land in Box Canyon. Both the camping and canyon access are popular year-round. A side canyon to the Box, referred to locally as The Cove, attracts campers, hikers and ATV riders who explore the dead-end canyon. Most people access The Cove by motor vehicle.

By designation, miles of routes are as follows:

	Miles
Allotment total of routes	6.5

Open - to all uses, all the time (Scenic Loop Road, Primitive Roads)	2.2
Closed - to all uses (decommission)	2.4
Open - Primitive Road in Hassayampa River bottom (limited to existing routes until designation is completed)	0.6
Limited - Primitive Road (Hassayampa River is limited to dry weather use only)	0.2
Limited - for 60" wide vehicles or narrower (Mistake Mine Road)	0.8
Limited - to non-motorized use (Dinosaur Wash closed to motor vehicles)	0.3

General public access

Public access generally coincides with routes permitted for use by the grazing permittee. Hand tool maintenance of the existing routes is occasionally performed by the public, while major upgrades to the existing routes are not currently done due to the recreational nature of primitive roads. Some maintenance activities will be undertaken as a result of BLM's designation of Roads, Primitive roads and Trails. Maintenance will be performed to correct safety and erosion hazards and to provide the desired level of public and administrative access.

Riparian area access

Public motor vehicle use on the primitive road in the Hassayampa River bottom (route analysis #35019) is currently allowed. Public vehicle use will be addressed in a future plan. Possible designation as a BLM Primitive Road asset would be addressed at that time.

Access for range management by motor vehicle would be authorized by permit, however, coordination with the travel management plan remains necessary for comprehensive travel management.

3.0 Grazing Management

3.1 Grazing History

The current lease holder for the Congress-Sky Arrow allotment is William Grantham. The Grantham family acquired the lease in 1982. BLM billing records show continuous use on this allotment since 1975, when it was split from the Sky Arrow allotment.

3.2 Mandatory Terms and Conditions for Permitted Use.

The Congress-Sky Arrow allotment is classified as a perennial allotment. Grazing occurs year-long at varying levels of intensity. The mandatory terms and conditions of the lease are listed below:

Allotment Name	Allotment Number	Livestock Number	Livestock Kind	%PL	Type Use	AUMs
Congress-Sky Arrow	05014	9	Cattle	100	Active	108

4.0 Objectives

4.1 Relevant Planning and Environmental Documents

Reference section 4.1 of the Sky Arrow Complex RHE for the relevant planning and environmental documents associated with the Congress-Sky Arrow allotment. All three Arizona Standards for Rangeland Health apply to this allotment.

4.2 Key Area Objectives

Specific Key Area objectives step down from the Desired Future Condition objectives found in the Bradshaw-Harquahala RMP (2010). These Key Area specific objectives are designed to assess Public Land conformance to the Arizona Standards for Rangeland Health on the Sky Arrow Complex.

There is 1 Key Area located on the Congress-Sky Arrow Allotment. Desired Plant Community objectives were developed for this key area by an interdisciplinary team of BLM resource specialists and biologists. These objectives are designed to maintain or improve the biotic integrity of the Public Lands, provide for wildlife habitat, and provide for usable forage as limited by the potential of the ecological site. These objectives, and the rationale for each objective, are given below.

4.2.1 Standard 1- Upland Sites

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site). (Bradshaw-Harquahala RMP decision LH-1)

Soil erosion on the key area is appropriate to the ecological site on which it is located. Factors indicating conformance to Standard 1 include ground cover, litter, vegetative foliar cover, flow patterns, rills, and plant pedestalling in accordance to developed NRCS Ecological Site Guides and/or Reference Sheets. Deviations that are “slight” or “slight to moderate” from the appropriate site guide or reference are

considered meeting the Standard. Departures of Moderate or greater will not meet the Standard except in cases where the departure is documented as showing an improvement of land health over what is expected on a reference site.

4.2.2 Standard 3- Desired Resource Condition Objectives

Objective: Productive, diverse upland and riparian-wetland plant communities exist and are maintained.

DPC objectives detail a site-specific plant community, which, when obtained, will assure rangeland health, State water quality standards, and habitat for endangered, threatened and sensitive species. Because DPC objectives are site-specific, Key Areas located on similar stratum may have difference DPC objectives. This is due to differences in slope, elevation, aspect and rainfall factors, as well as other site potential limiting factors such as prior disturbance, rock outcroppings, or heavy gravel cover. The recommended palatable shrub and grass compositions will provide for adequate wildlife forage on the site for species such as Sonoran desert tortoise, mule deer, quail, and other non-game wildlife species. The foliar cover and bare ground cover class objectives will provide thermal and hiding cover for wildlife species and will prevent accelerated erosion on the sites.

Sonoran desert tortoise habitat requirements are listed in the Bradshaw-Harquahala RMP. The DPC objectives for each key area are consistent with the Sonoran desert tortoise habitat requirements based on the potential for the site.

The DPC objectives for the Congress-Sky Arrow allotment are given below.

Congress-Sky Arrow Key Area 1,
Basalt Hills 10-13” precipitation zone ecological site

- Maintain a perennial grass composition of $\geq 5\%$
- Maintain a palatable shrub composition of $\geq 30\%$
- Maintain vegetative foliar cover at $\geq 25\%$.
- Maintain a Bare Ground cover class of $\leq 10\%$

Rationale:

This key area is located on a western facing hillslope at an elevation of approximately 2480’.

NRCS has not developed an ecological site reference key for the Basalt Hills 10-13”pz ecological site. The reference sheet used for this Key Area is the Basalt Hills 7-10”pz with higher expected vegetative cover values due to the increased rainfall. Maintaining a perennial grass composition of 5% on this site complies with Sonoran desert tortoise habitat requirements and is appropriate for the site based on its aspect and elevation. Palatable shrub composition of 30% or greater is appropriate for the site based on its aspect and elevation and complies with the expected ranges of shrub production in the Ecological Site Guide. Foliar cover is expected to be between 10-15%, however, given the increased rainfall on this site maintaining foliar cover of 25% or greater should serve to prevent accelerated erosion beyond what is expected in the reference state. The range of bare ground cover class on the site ranges from 1-5% per the reference sheet, however, this site exhibits lower gravel and rock cover than expected from the Ecological Site Guide. Maintaining a bare ground cover class of 10% or less will ensure that soil erosion on the site in consistent with the expected erosion rate of the reference state.

5.0 Monitoring Data

For a discussion on the monitoring methods used in the uplands and riparian areas on the Congress-Sky Arrow allotment, refer to Section 5 of the Sky Arrow Complex RHE.

6.0 Management Evaluation and Summary of Studies Data

6.1 Actual Use

Actual Use Reporting is not a stipulation on the current lease. Actual use numbers provided in the table below are based on billed use.

<u>Number of Active Livestock</u>	<u>Kind</u>	<u>Grazing Begin</u>	<u>Period End</u>	<u>%PL</u>	<u>AUMs</u>
9	Cattle	3/1/2014	2/28/2015	100	108
2	Cattle	3/1/2013	2/28/2014	100	24
9	Cattle	3/1/2012	2/28/2013	100	108
3	Cattle	3/1/2011	2/28/2012	100	36
3	Cattle	3/1/2010	2/28/2011	100	36
2	Cattle	3/1/2009	2/28/2010	100	24
4	Cattle	3/1/2008	2/28/2009	100	48
9	Cattle	3/1/2007	2/28/2008	100	108
3	Cattle	3/1/2006	2/28/2007	100	36
9	Cattle	3/1/2005	2/28/2006	100	108

6.2 Critical Management Area Data

For a discussion of PFC and MIM assessments on the Congress-Sky Arrow allotment, refer to Section 6.2 of the Sky Arrow Complex RHE. The portion of the Hassayampa river which lies in the Congress-Sky Arrow allotment is part of Riparian Segment 14C.

7.0 Conclusions

7.1 Upland Health Conclusions

Upland Health Conclusions are based on the analysis of the current monitoring data at the Key Area. Standard Three analysis is based on Dry Weight Rank and Point Cover study methods. Grass composition results are based on the sum composition percent for all grass species occurring on the study area. Palatable shrub composition results are based on the sum composition percent for all palatable browse species. For a list of palatable browse by animal species, reference the Sky Arrow Complex Appendix A, Section 3, "Sky Arrow Complex Plant List". Vegetative foliar cover and bare ground cover class results are based on point cover data.

Utilization data is used to determine if livestock are a potential causal factor for non-achievement of Standards. Based on Holechek (1988), livestock utilization levels in this precipitation zone should be between 30-40% for moderate use without producing deleterious effects to the ecological site. Based on Heffelfinger(2006), browse utilization in this precipitation zone should be limited to 35% to prevent deleterious effects to deer habitat.

Congress-Sky Arrow Key Area 1

Standard One: Upland Site Achieves Standard

Objective: Upland soils exhibit infiltration, permeability, and erosion rates that are appropriate to soil type, climate, and landform (ecological site).

Signs of accelerated erosion are minimal and are consistent with the site reference state. Soil and Site Stability and Hydrologic Function ratings are both categorized as a “None to Slight Departure” from the reference state. Results from the Interpreting Indicators of Rangeland Health are summarized in the table below:

Interpreting Indicators of Rangeland Health:

Attribute Rating:	Rationale:
Soil and Site Stability (S): N-S	None to Slight Departure. Most indicators are within the tolerances given in the reference state.
Hydrologic Function (H): N-S	None to Slight Departure. Most indicators are within the tolerances given in the reference state.
Biotic Integrity (B): N-S	None to Slight Departure. Most indicators are within the tolerances given in the reference state.

Codes: N-S (None to Slight) S-M (Slight to Moderate) M (Moderate) M-E (Moderate to Extreme) E-T (Extreme to Total)

Standard Three: Standard is met on this site.

- Maintain a perennial grass composition of $\geq 5\%$ ACHIEVED
- Maintain a palatable shrub composition of $\geq 30\%$ ACHIEVED
- Maintain vegetative foliar cover at $\geq 25\%$. ACHIEVED
- Maintain a Bare Ground cover class of $\leq 10\%$ ACHIEVED

Rationale:

The perennial grass composition objective is met at this Key Area. Current long-term monitoring data shows a perennial grass component of slightly more than 7% composition. Palatable shrub composition on the site is met for Sonoran desert tortoise with a palatable browse (Van Devender, et al. 2002) (Oftedal 2002) composition of slightly more than 63%. The perennial grass species present at the site are also known to be palatable to desert tortoise (Oftedal 2002) (Van Devender, et al. 2002). Palatable shrub composition is met for mule deer (Heffelfinger, et al. 2006) with a palatable browse composition of slightly more than 38%. The vegetative foliar cover requirement is met at this site, with a vegetative foliar cover of 33%. The Bare Ground cover class objective is met on this site, with a bare ground cover class of 7%. A summary of the studies data is given below.

Ground Cover Data:

Year	Bare Ground	Herb. Cover	Litter	Rock $\geq 1/2"$
2014	7%	33%	15%	45%

Frequency and Composition Data:

Plant Species KA2 2012	Symbol	2014	
		Frequency (%)	Composition (%)
Tree and Shrub Species			
Acacia constricta	ACCO2	14	14.8
Acacia greggii	ACGR	2	1.2
Atriplex hymenelytra	ATHY	1	0.6

Cylindropuntia acanthocarpa var. acanthocarpa	CYACA2	5	3.7
Cylindropuntia leptocaulis	CYLE8	9	5.5
Echinocereus engelmannii	ECEN	1	0.1
Encelia farinosa	ENFA	1	0.6
Ephedra	EPVI	2	1.8
Eriogonum wrightii	ERWR	1	0.4
Janusia gracilis	JAGR	1	0.5
Larrea tridentata	LATR2	1	0.8
Parkinsonia microphylla	PAMI5	7	6.4
Psilotrophe cooperi	PSCO2	1	1.0
Thamnosma montana	THMO	5	4.4
Ziziphus obtusifolia	ZIOB	1	0.6
Total			42.4
Grasses-Perennial			
Aristida sp.	ARIST	6	6.4
Muhlenbergia porteri	MUPO2	1	0.8
Total			7.2
Forbs- Perennial/Biennial			
Argythamnia neomexicana	ARNE2	1	0.4
Eriogonum inflatum	ERIN4	7	6.4
Euphorbia	EUPHO	10	5.8
Funastrum cynanchiodes	FUCY	1	T
Lewquerella gordonii	LEGO	1	T
Senna covesii	SECO10	38	37.2
Sphaeralcea ambigua	SPAM2	1	0.6
Total			50.4

Congress-Sky Arrow Key Area 1 Utilization

Utilization data on this key area shows a use of bush muhly grass of slightly less than 4% and of ephedra browse at 30%. Current utilization levels are not expected cause future degradation to the plant community.

Utilization Data:

KA2 Utilization		2014
SPECIES	SYMBOL	% USE
Ephedra	EPHED	30.0%
bush muhly	MUPO2	3.8%

7.2 Riparian Health Conclusions

The riparian reach on the Congress-Sky Arrow allotment is lacking sufficient cover of riparian obligate plant species to stabilize banks and promote complex pooling and diverse channel characteristics. Diverse channel characteristics would benefit native aquatic obligate species such as longfin dace (*Agosia chrysogaster*) and lowland leopard frog (*Rana yavapaiensis*), both BLM sensitive species. Due to scouring high-flow events that occur in these narrow, canyon-bound reaches, riparian tree species are crucial to stabilize banks and dissipate the energy of flood flows. Native riparian tree species also provide high quality nesting and foraging habitat for migratory birds, such as the proposed threatened yellow-billed cuckoo. To achieve a proper functioning condition and improve fish and wildlife habitat, the desired plant community consists of stream banks dominated (>50%) by native riparian herbaceous plant species; and, to ensure recruitment and retention of native riparian obligate tree species, the desired age class distribution is >15% seedling, >15% young, and >15% mature trees.

8.0 Recommended Management Actions

8.1 Recommended Management Actions for Uplands in the Complex

Based on the data presented in Section 7 of this document, the Congress-Sky Arrow allotment is meeting both Standard One and Standard Three in the uplands.

In order to reduce grazing pressure on water sources within the allotment, any salt or supplement blocks placed on the public lands should be located at least one-quarter of a mile from available water sources, and should be located at least one-eighth of a mile above major drainages.

To facilitate orderly management of the range, Actual Use reporting should be added to the terms and conditions of the permit. Adding the reporting requirement will ensure appropriate use levels have been maintained during drought years, and will facilitate desired stocking rate calculations in years that Utilization data is collected.

8.2 Recommended Management Actions for Riparian Area 14C

To allow for maintenance and recruitment of native riparian trees and native riparian herbaceous species, limit livestock use in riparian area to the winter season when vegetation is dormant (approximately December 1 to February 1). If the desired plant community is not achieved, or if the riparian area is not in proper functioning condition within five years due to livestock use, additional actions would be required such as, but not limited to, temporary or permanent closure to livestock use.

9.0 List of Preparers

Name	Title
James Holden	Rangeland Management Specialist
Paul Sitzmann	Wildlife Biologist

Mary Skordinsky	Recreation Specialist
Thomas Bickauskas	Travel Management / Natural Resource Specialist

10.0 References

For a complete list of references, refer to Section 10 of the Sky Arrow Complex RHE.

Bureau of Land Management (BLM), Wickenburg Community Trail Master Plan and Travel Management Plan and Environmental Assessment (DOI-BLM-AZ-P010-2011-023-EA) and Record of Decision, May 2014, 203pgs