

Horseshoe Ranch Operation & Management Plan



Arizona Game and Fish Department
5000 W. Carefree Highway
Phoenix, AZ 85086

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Executive Summary

The Horseshoe Ranch (Ranch) is located in the Agua Fria National Monument along Bloody Basin Road, about 5 miles east of I-17 and approximately nine miles southeast of Cordes Junction in Yavapai County, Arizona.

The Ranch now consists of 198.8 acres of deeded, previously private land. Approximately 40 acres of that land has been or is in current irrigated crop production. Crops produced historically included alfalfa, fruit trees, and turf grass. The irrigation of the property is provided by several different water sources that have the structural ability to deliver water to different places of use and for different purposes. The Ranch property itself is actively managed for the benefit of wildlife. In addition, the Ranch has grazing preferences on the adjacent ~70,000 acres of federal lands. The Department works with a lessee to manage grazing on those lands.

1. Introduction and Background

A. Purpose and Need

The Ranch property as well as the adjacent federal grazing lands are actively managed by the Department for the benefit of native wildlife. Several beneficial projects have been undertaken to date, and others are in the planning phase. The Ranch provides limited value in and of itself as an opportunity to enhance and manage wildlife habitat due to its small size in acreage. The larger value of the ranch in a wildlife management framework rests on the federal grazing lands that are attached to the ranch via grazing preferences established with the two federal land management agencies--the Bureau of Land Management (BLM) and Tonto National Forest (TNF). Each agency administers about half of the total attached acreage and has established, through a Cooperative Agreement, ensuring that Horseshoe Ranch will continue to hold base property preferences for the two allotments known as the Horseshoe Allotment (BLM) and Copper Creek Allotment (FS). Working with the two land management agencies in an operational land management role on these allotments offers the Department the most compelling opportunity to effect significant fish and wildlife management.

B. Property Description

1) Location and Size

The Ranch is located in Yavapai County, Arizona, within the Agua Fria National Monument and directly off Bloody Basin Road, about 5 miles east of I-17 and approximately nine miles southeast of Cordes Junction in Yavapai County, Arizona (Figure 1). The Ranch consists of about 198.8 acres (Figure 2) of deeded land and includes grazing preferences on ~70,000 acres of federal lands. The Ranch was purchased on March 11, 2011, by the Trust for Public Land (TPL) with a concurrent closing between TPL and the Commission.

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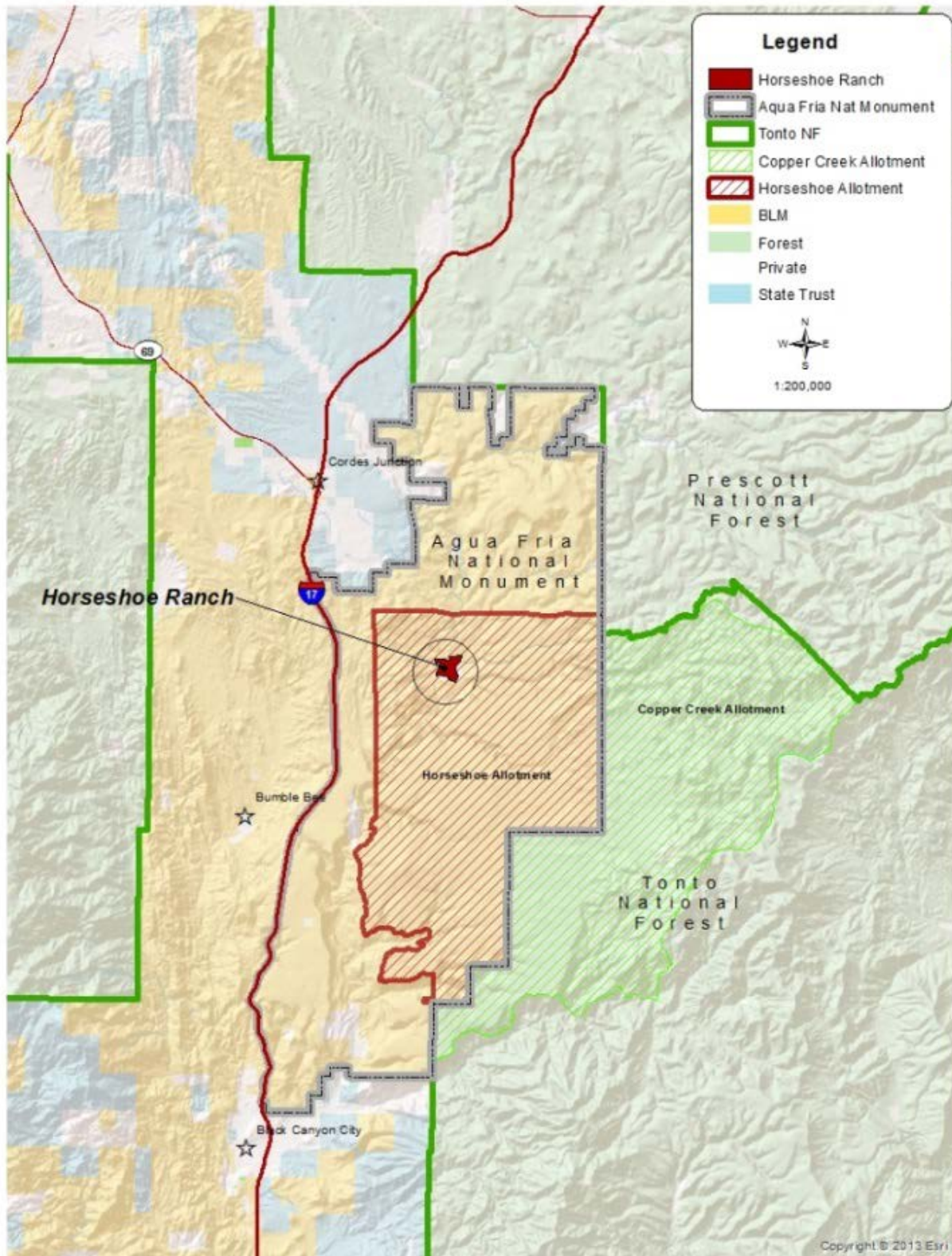


Figure 1. Vicinity Map.

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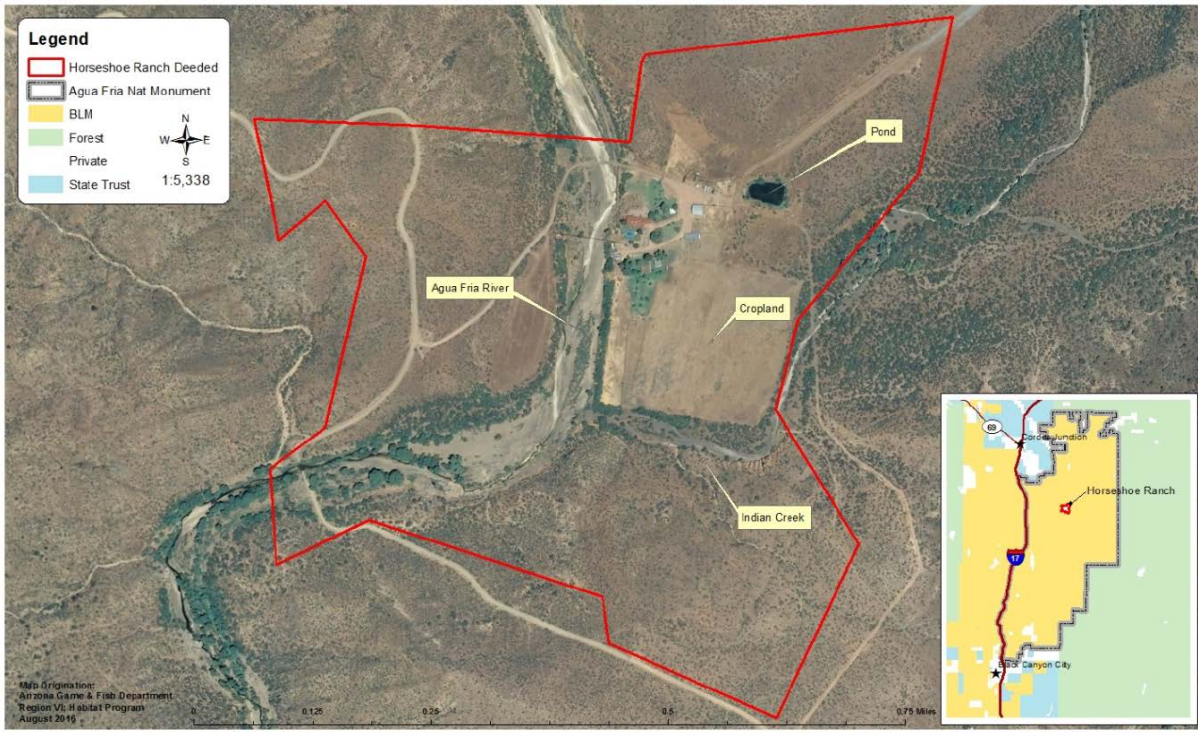


Figure 2. Horseshoe Ranch Deeded Property boundary.

2) Geographic Description, Setting

The Horseshoe Ranch is located as an inholding within the Agua Fria National Monument along Bloody Basin Road, about 5 miles east of I-17 and approximately nine miles southeast of Cordes Junction in Yavapai County, Arizona. The property is located in Township 10 North, Range 3 East, Sections 8 and 9, and lies within the Agua Fria National Monument. The elevation at the Ranch is 3,266 feet. The address is 22600 E Bloody Basin East Rd, Mayer, AZ. The ranch headquarters lies in the upstream triangle of the confluence of the Agua Fria River and Indian Creek, with a surrounding upland buffer. This location presents a flat alluvial floodplain for small-scale farming and a relative abundance of surface and subsurface water.

3) Existing Infrastructure and Improvements

Infrastructure and improvements at the Ranch fall under several categories as follows:

Dwellings

Main house, which is currently occupied by the onsite manager and includes 3 large bedrooms, bathrooms, office, kitchen, etc.

Bunkhouse, which was formerly occupied by the previous onsite manager and is in need of some minor work to accommodate up to 8 people overnight, the bunkhouse has a kitchen and bathroom.

Casitas, which provide four separate lodging spaces of various sizes - each with a bathroom. This building also contains a laundry room with a washer and dryer.

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Cook shack, which includes a larger kitchen and dining room as well as one larger bedroom with a bathroom.

Doll house, which consists of a single room for overnight stays for 1-2 people.

Outbuildings.

Barn, which is currently used by the lessee and AGFD for covered hay and temporary storage.

Holding Pens, used occasionally by the lessee.

Shop, which consists of an open sided shade structure and a small covered area with a work bench. The covered/enclosed area is to be demolished once construction of a new shop is completed. The shade structure will be retained.

River House. Formerly an occupied structure - now used for storage. This building will also be demolished once construction of a new shop is completed.

Battery House. This building contains the batteries, inverters, and distribution hardware for the property's electrical system.

Generator Building. A large generator and supporting hardware is housed here. This generator, in conjunction with the Ranch's solar array, provides electrical power for the property.

Water House. The pumps, filters, and storage tank for the Ranch's potable (well) water are housed here.

Other Improvements

Agricultural well, pump, and generator. Located to the south of the well house, this well provides water to the east field pivot and the cottonwood garden irrigation system. It will also provide water to the west field via an above-grade pipeline which is to be constructed. The generator uses propane from the large storage tank located nearby to generate power to run the well pump.

Mower Shed. Small equipment and tools storage. This structure is in moderate disrepair but serves its intended purpose.

Corrals. Utilized by the lessee for ranching operations.

Pond. Utilized by AGFD to provide an enclosed refugium for several listed species.

4) General Habitat Description

Habitats found on the 200 acre Horseshoe Ranch include a 0.6 mi reach of the Agua Fria River and a 0.2 mi reach of Indian Creek, a tributary to the Agua Fria. The Agua Fria River flows are seasonal, and the Indian Creek flows are ephemeral during precipitation events. Habitats along the river corridors include both Interior Riparian Deciduous Woodland habitat and the more xeric Sonoran Riparian Scrubland. Undeveloped upland habitat on the Ranch is predominantly Arizona Uplands Sonoran Desert scrub/Semi-desert grassland transition. Developed areas of the Ranch include fallow croplands, livestock facilities and various housing and ranch building structures (Table 1 and Figure 3).

On the subject property and across the associated allotments transition from Arizona Uplands Sonoran Desertscrub to Great Basin Conifer Woodlands (Brown 1994). The habitat is characterized primarily as semi-desert grassland across broad expanses of

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mesas and rolling hills. These grasslands are bisected by steep canyons that have Sonoran Desertscrub, Great Basin Conifer Woodland and Interior Chaparral species. Canyons with intermittent or perennial water have native Interior Riparian Deciduous Forests and Woodlands. More xeric canyons in the lower elevations are characterized by Sonoran Riparian Scrubland. Tree species associated with the native riparian woodlands include: cottonwood (*Populus Fremontii*), willow spp., Arizona Sycamore, Desert and Netleaf Hackberry, Velvet Ash, Arizona Walnut, Desert-willow and mesquite species. Tobosa grass dominates the mesas in heavy clay soils with many other grasses such as grama (*Bouteloua* spp.) and three-awn (*Aristida* spp.) occurring on gravelly upland sites.

Landcover Type	Acres ²
Rock Outcrop	0.4
Pond	0.5
Pond Enclosure	1.2
Experimental Garden	3.4
Interior Riparian Deciduous Forest and Woodland	6.7
Sonoran Riparian Scrubland	13.7
Sonoran Riparian Scrubland-disclimax	15.5
Cropland	18.6
Developed	21.5
Sonoran Desertscrub-Grassland Transition	117.3

Table 1. Acreages of Land Cover Types on the Ranch

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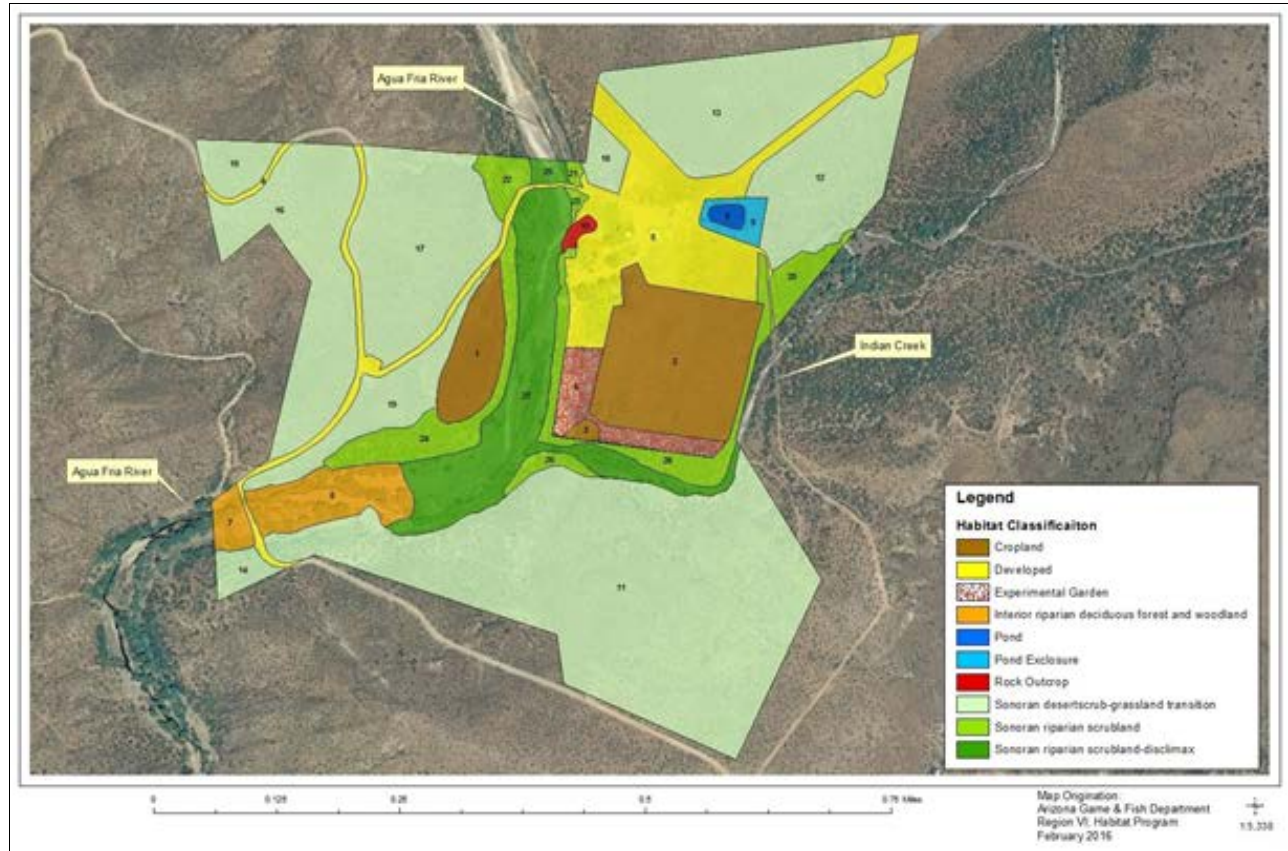


Figure 3. Distribution of Land Cover Types on the Ranch.

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5) General Biological Description

Sensitive or otherwise important wildlife species are limited in number on the deeded ranch. Yellow-billed cuckoo is a summer resident in the riparian areas of the Agua Fria River and its tributaries, and has been detected on the property. Lowland leopard frog have been detected on the property, and bald and golden eagles have been seen flying. The pond on the property has been developed and is managed for Mexican garter snake, lowland leopard frog, Gila topminnow, pupfish, and Gila chub. Riparian habitat enhancement has the potential to develop habitat for yellow-billed cuckoo, SW willow flycatcher, black hawk and other neotropical migrant species.

6) Water Rights

The water rights portfolio includes several types of filings which all relate to administrative requirements by the Arizona Department of Water Resources (ADWR) that have changed over time. Water use from one individual source may have multiple types of filings. The ultimate goal for all filings is to either secure a Certificate of Water Right or have all the filings in place for the pending Gila Adjudication, at which time water rights will be settled. Public water code provides that beneficial use shall be the basis, measure and limit to the use of water within the state. A.R.S. § 45-1411(B). This also applies to wells on the Ranch because they fall outside all State Active Management Areas (AMA's) which regulate groundwater use. The types of filings are listed below and additional information on the types of filings is provided within the report.

- Applications for Permit to Appropriate Public Water of the State of Arizona or to Construct a Reservoir (under various Statement of Claimant applications, which include 33's, 4A's, 3R's).
- Claim of Water Right for a Stockpond and Application for Certification (38's)
- Statement of Claim (SOC) of Rights to Use Public Waters of the State of Arizona filed under the Water Rights Registration Act (36's)
- Statement of Claimant (SOC) of Rights to Use Public Waters of the State of Arizona (39's) filed for the pending Gila Adjudication to quantify and prioritize surface water rights within the watershed
- Well Registrations (55's)
- Certificate of Water Right (CWR) – perfected water rights

The overarching recommendations for water management on the Deeded property include:

1. Develop a water management/conservation plan for the property. Knowledge of how the property will be utilized in the future is essential to proper filing and use of water rights claims.
2. Evaluate the feasibility and options for additional and/or alternative water supply and storage to meet water demand on the Ranch; and pursue options that reduce reliance on and/or impacts to surface water flows from Long Gulch, Silver Creek Spring and the Agua Fria River; and that meet water quality standards for domestic use. Taking such action would ensure a more reliable water supply of a higher water quality than what currently exists, and would

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facilitate wildlife habitat conservation actions associated with the purpose of the Ranch acquisition.

3. Work with members of the Land and Water program staff to ensure that all water rights filings with ADWR, for each water source, meet the administrative requirements for inclusion in future water rights adjudication hearings. Identify errors, omissions and/or amendments and file required documentation with ADWR.

The overarching recommendations for water management on the Horseshoe and Copper Creek Allotments include working with the Bureau of Land Management and the US Forest Service to ensure that all water rights filings with ADWR, for each water source, meet the administrative requirements for inclusion in future water rights adjudication hearings. Identify errors, omissions and/or amendments and file required documentation with ADWR.

7) Cultural/archaeological features

Cultural artefacts and/or remains are known to be present on the Ranch. The Cultural Resources Compliance Manager should be contacted before any ground-disturbing activities are performed.

8) Known Environmental Hazards and Risks

Aplomado Environmental LLC completed a Phase I Environmental Site Assessment on October 26, 2009. The Department submitted the Phase I ESA to the Arizona Department of Administration for their review. ADOA reviewed the Phase I ESA and had a subsequent on-site visit.

In order to address Department and ADOA concerns, follow-up environmental studies were conducted by Western Technologies and included asbestos and lead sampling in the six structures, soil samples in the corral and pasture areas and the disposal area known as the Boneyard, and water samples in the main house.

The five on-site above ground fuel tanks will be retained and maintained by the Department. After acquisition, the Department will ensure the tanks and retention structures will comply with the State Fire Marshal's office, the International Fire Code (IFC 2003) requirements, and the EPA Oil Spill Prevention Program (40 CFR 112). In addition, the Department will implement a Spill Prevention, Control and Countermeasure Plan.

Underground Storage Tank

During the subsequent environmental survey performed by Western Technologies Inc. (Job No. 2180JQ375 dated 1-5-11), a locator could not locate the UST. During hand excavation to a shallow depth at this location, a small concrete pad with a potential fill pipe and a section of metal piping approximately 12 inches below ground surface were found. Soil samples were taken at 10, 13, and 15 feet below ground surface. The 10 and

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15 foot soil samples were analyzed for petroleum hydrocarbons in the C₁₀ to C₃₂ carbon range using ADHS Method 8015AZR.1 and polynuclear aromatic hydrocarbons using EPA Method 8270 in accordance with the Arizona Department of Environmental Quality closure guidance for diesel UST's. Results showed no presence of HC or PAH in either sample at concentrations exceeding the laboratory reporting limits. There are no indications of a fuel release in the vicinity of the purported UST location. Based on this information, additional testing of the UST location is not warranted. The Department will take no further action on this situation.

Asbestos and Lead

Asbestos was found in five of the six structures. The asbestos was identified as non-friable and does not pose a significant risk of fiber release in the current condition. The results of these tests will be incorporated into the management of the property after acquisition. Prior to any abatement, renovation or demolition activities the Department will follow the necessary procedures to handle the asbestos materials.

Lead was found only in the tin house. This structure will not be utilized in the operation of the property. Prior to any renovation or demolition activities, the Department will follow the necessary procedures to handle lead-containing paint.

Soil Samples

Two soil samples were taken from the corral areas and two from the pasture areas. All soil samples were analyzed for chlorinated pesticides using EPA Method 8081. The two soil samples from the pasture area were also analyzed for chlorinated herbicides using EPA Method 8081. Results did not indicate the presence of chlorinated pesticides in concentrations exceeding the laboratory reporting limits in either area. In addition, chlorinated herbicides were not detected at concentrations exceeding the laboratory reporting limits in the soil samples collected from the pasture areas.

Soil samples in the corral and pasture areas did not indicate the presence of chlorinated pesticides in either area or chlorinated herbicides in the pasture area. The soil samples in the disposal area did not warrant further sampling.

Disposal Area

The disposal area known as the Boneyard was sampled by Western Technologies Inc. (Job No. 2180JQ375 dated 1-5-11). The soil samples collected were biased towards the burned or discolored soil areas and analyzed for VOC's using EPA Method 8260B, PAH's using EPA Method 8270 and the 8 RCRA metals using EPA Method 6010/7470. Five soil samples were taken from this area. Based on the results of the sampling, additional assessment does not appear to be warranted. The Department has not determined the future use of the landing strip. Once a determination of use is made, the Department will follow the appropriate procedures.

Water Samples

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The Department contracted Western Technologies Inc. (Job No. 2180JQ375 dated 1-5-11) to have the water in the main house analyzed for potential contaminants exceeding the U.S. Environmental Protection Agency Primary and Secondary Drinking Water Standards, in accordance with the State of Arizona New Source guidance. Water samples from the other structures were analyzed for E. Coli using EPA SM 9223B.

Water sampling in the main house showed the water was suitable for public consumption without treatment. Periodic testing should be incorporated into the management especially after monsoon events.

2. Acquisition Funding

A. Acquisition Funding Sources

Appraised Amounts

Deeded \$2,000,000

Buildings \$595,000

Copper Creek Allotment \$290,000

Horseshoe Allotment \$420,000

Personal Property \$40,000

Deeded Funds

Heritage - \$1,590,000

Section 6 Recovery Land Acquisition Grant - \$1,000,000

The land and resource values associated with this acquisition provide opportunities to meet objectives of Arizona's Heritage Fund Program and Section 6 Funds for Threatened, Endangered and Sensitive (TES) species and their habitats, as well as provide benefits for other wildlife species and the public.

Acquisition funding with Heritage and USFWS Section 6 grants require meeting wildlife conservation goals on both deeded and allotment lands for the eligible special status species.

Allotment Funds

Habitat Partnership Committee

Arizona Antelope Foundation - \$214,150

Arizona Deer Association and Mule Deer Foundation - \$5,000

National Wild Turkey Federation - \$1,000

Arizona Wildlife Federation - \$2,500

Sonoran Audubon Society - \$3,355

Bring Back the Natives - \$200,000

The Nature Conservancy - \$50,000

WCF - \$233,995

Acquisition Costs

TPL

Appraisal - \$3,000

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Appraisal Update - \$1,430
ALTA Survey - \$16,124
Phase I Environmental Site Assessment - \$5,355
Title Insurance - \$905

Department

Additional Environmental Surveys - \$18,162.87
Appraisal Review - \$900
Appraisal Review Update - \$375
Title Search for Bloody Basin Road - \$98
Sub Escrow Service to First American Title Insurance Company National Commercial Service - \$1,000
Recording - \$100
Cultural Survey - \$14,789
Water Right Assignments on Deeded - \$2,240

The Department expended \$1,627,664.87 of Heritage funds on the deeded property, buildings, and due diligence with \$1,590,000 on the purchase price of the deeded and buildings, and \$38,164.87 on the due diligence.

B. Funding Issues/Restrictions

Monies received pursuant to § 5-572 shall be spent as follows:

1. Five percent on public access, including maintenance and operation expenses.
2. Sixty percent on the identification, inventory, acquisition, protection and management, including maintenance and operations, of property with sensitive habitat. At least twenty percent of the monies available under this paragraph shall be spent to acquire property with sensitive habitat used by endangered, threatened and candidate species. Not more than twenty percent of the monies available under this paragraph may be spent on the operation and maintenance of the acquired property, including the acquired property's infrastructure. The commission may dispose of any lands acquired for use as habitat by an endangered, threatened or candidate species under this paragraph when the species no longer qualifies as an endangered, threatened or candidate species. The Arizona game and fish commission shall dispose of the land in a manner consistent with the preservation of the species of concern. The disposal may include conservation easements and fee simple transfers with associated instruments of protection. The commission shall follow the guidelines established pursuant to § 37-803 relating to the disposition of real property by a state agency. In addition, disposal shall include a written agreement between the commission and the purchaser requiring the purchaser to incorporate management actions to ensure proper maintenance of the species of concern. Management actions may include maintenance of habitat, selective control of nonnative species, maintenance of genetic viability, monitoring of populations and habitat, coordinating conservation activities, funding conservation actions and assessing conservation progress.

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3. Fifteen percent on habitat evaluation or habitat protection.
4. Fifteen percent on urban wildlife and urban wildlife habitat programs.
5. Five percent on environmental education.

3. Applicable Regulations and Encumbrances

A. Regulations (e.g., municipal, federal, state, AGFD, political, etc.)

The Section 6 proposal specifies that we address these species: Gila chub (*Gila intermedia*), Gila topminnow (*Poeciliopsis occidentalis occidentalis*), Desert pupfish (*Cyprinodon macularius*), and Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*). The specific management actions include:

Successful acquisition, development of a management plan for conservation of eligible species listed under the ESA and commitment to ensure that the property is managed in perpetuity for conservation of listed species.

These additional primary actions contributed to grant eligibility scoring and failure to undertake may jeopardize our contractual commitments to Section 6.

Improve riparian and stream habitat quality by reducing or eliminating livestock grazing impacts to Indian and Silver Creeks and the Agua Fria River.

Renovate a 2 acre pond for propagation of eligible fish species

Remove nonnative species and reintroduce eligible species where deemed appropriate and/or augment extant populations when deemed appropriate

Protect deeded property from urban/rural subdivision or development

B. Encumbrances (e.g., easements, covenants, other restrictions)

N/A

4. Management Direction and Objectives

A. Past Management

The Ranch was previously managed for livestock use and for use as a dude ranch. Joshua Edwards has compiled a brief history of the ranch, which can be found here: <https://www.cornerstone-environmental.com/publications/item/a-brief-history-of-horseshoe-ranch>. An excerpt is included below.

“Horseshoe Ranch was first established in the early 1880s by Philadelphia cattle rancher William N. Mitchell, who moved to the Bloody Basin area in 1877. Grandrud (n.d.:2) describes Horseshoe Ranch as a “large and well-stocked cattle ranch” on the banks of the lower Agua Fria River near Antelope Station (now known as Cordes). The ranch was an itinerant operation for many years and received its name from the use of a “U” or horseshoe-shaped brand.”

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B. Current Management Direction

The goals for the Ranch are multifaceted. They can be segregated into about four (4) subsets:

- Special Status Species population and habitat management on the deeded ranch property and on the associated allotments that meet the objectives of the Heritage Fund (Title 17, Chapter 2, Article 6) program for the Identification, Inventory, Acquisition, Protection, and Management (IIPAM) of sensitive species and their habitats and Section 6 Recovery Land Acquisition Grant.
- Game Species and general wildlife population and habitat management, primarily on the allotments associated with the Horseshoe Ranch property.
- Wildlife and outdoor recreational instruction and outreach activities, including both organized instructional activities and passive informational outreach. Some cultural outreach activities will also fit into this category incorporating both pre-settlement cultural interpretation and outreach regarding the history of the Horseshoe Ranch and the livestock industry associated with it. This goal is largely accomplished on the Ranch deeded property, but some activities extend onto adjacent public lands.
- Development of the Ranch as a “Destination” location for agency and non-governmental organizations to use for meetings, events, banquets, retreats and the like. The Ranch may also serve as a base of operations for researchers and administrators from other agencies or organizations.

C. Current Actions and Improvements

Wildlife habitat enhancements on the Ranch are focused on the Ranch stock pond and fallow cropland. Management objectives for the stock pond are the ongoing maintenance of a captive to semi-captive breeding population of Northern Mexican Gartersnake and a replicate population of Roundtail Chub. The management objectives for the fallow cropland are a three acre experimental cottonwood garden for use in climate change and genetics research; as well as establishment of a native grass and forb plant community and annual upland game bird seed crops on 15 acres of fallow cropland to benefit upland game birds and pollinator species.

The primary reason for habitat enhancement projects is to either benefit wildlife, including species listed under the ESA, or facilitate research that could be valuable to habitat restoration. Habitat enhancement projects do not preclude other Ranch uses detailed in the operational plan (AGFD 2012b). In this plan, the Department describes management of a stock pond which supported a breeding population of nonnative bullfrogs into a pond which now supports Northern Mexican Gartersnake and Roundtail Chub. Likewise, the Department has taken what was fallow cropland and, in conjunction with researchers from Northern Arizona University, has planted an experimental garden of cottonwood trees, which may be used in the future by Yellow-billed Cuckoo and perhaps by migrant Southwestern Willow Flycatcher. This plan also indicates establishment of a native grass/forb possible improvements to riparian vegetation in the Agua Fria River channel, perhaps to include removal of Tamarix and planting of cottonwood, willow, and other native species, if future funding allows.

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The Department currently intends to maintain the pond improvements, experimental garden and native grassland indefinitely into the future. It is anticipated that the pond will eventually include replicate populations of Northern Mexican Gartersnake, Gila Chub, Gila Topminnow (*Poeciliopsis occidentalis*), and Desert Pupfish; and that these populations may serve as source populations for translocations to other sites. It is anticipated that the experimental garden, though specifically planted as part of a large-scale climate change research project, could provide foraging and perhaps nesting habitat for Yellow-billed Cuckoo; and potential stop-over habitat for migrant Southwestern Willow Flycatcher. However, the actions described in this plan, or others which result in increased number of any of the four ESA-listed species using the deeded lands may be abandoned or un-done; thus potentially returning habitat conditions for the listed species to conditions similar to that at the time of Ranch acquisition.

D. Property Vision

In line with the current management direction, the property vision includes four broad categories:

- Implementation and ongoing maintenance of projects that support special status species and meet the objectives of the Heritage Fund (Title 17, Chapter 2, Article 6) program for the Identification, Inventory, Acquisition, Protection, and Management (IIPAM) of sensitive species and their habitats and Section 6 Recovery Land Acquisition Grant.
- Game Species and general wildlife population and habitat management, primarily on the allotments associated with the Horseshoe Ranch property.
- Foster wildlife and outdoor education opportunities. To date, the Ranch has hosted several volunteer work days to benefit wildlife habitat. Future plans include the installation of interpretive signage and a wildlife viewing platform.
- Potential development of the Ranch as a “Destination” location for agency and non-governmental organizations to use for meetings, events, banquets, retreats and the like. The Ranch may also serve as a base of operations for researchers and administrators from other agencies or organizations.

E. Management of Sub-Areas

- Discussions are underway with NAU regarding ongoing management of the cottonwood garden. Options may include thinning or harvesting plants for use in restoration projects, installation of bird boxes, or management in support of further research.
- The pond and enclosure are to continue to be managed for listed species. A pilot project, to inhibit growth of cattail in portions of the pond perimeter, was installed in October 2019. The project uses non-woven weed control fabric covered with gravel to exclude the growth of plants in discrete patches with the goal of creating a mosaic of shallow habitat types within the pond.
- Repairs to the west field irrigation system (pivot) are nearly completed. The field will be planted with a mix of food crops and native plants for the benefit of native fauna.

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- A new irrigation line will be installed by early 2020 to supply water to the east field. The east field will be planted with native species to benefit pollinators. In particular, milkweed will be planted to benefit monarch butterflies.
- A new shop is in the design phase. The shop will provide 1,200 ft² of secure covered storage and work area. The shop will be located adjacent to the existing barn.
- A replacement septic system is in the design phase and is due to be installed in 2020.

F. Recommended Property Acquisitions

None

G. Recommended Property Parcel Disposal(s)

None

5. Site Development/Specific Management Objectives

A. Proposed Specific Projects

The Department intends to manage the pond to provide suitable habitat for Gila Chub and Northern Mexican Gartersnake. A net conservation benefit will be provided for Northern Mexican Gartersnake through establishment of a replicate, captive population, likely of Verde River snakes. Although Northern Mexican Gartersnake appears to be relatively well distributed along the middle portion of the Verde River drainage, there is currently no captive breeding population of Verde River snakes.

Likewise, the pond is intended to provide a replicate, breeding population of Gila Chub. One of the possible source populations being considered for replication is Indian Creek, which is one of the nearest to the Ranch, and as noted in the 2015 Gila Chub Draft Recovery Plan (USFWS 2015), Indian Creek is among the smaller populations and it is not yet replicated. The pond on the Ranch could serve as insurance against catastrophic loss of that native population, and as a source for future reestablishment efforts. If another population other than Indian Creek is decided upon, similar benefits would occur.

Following translocation of Gila Chub and Northern Mexican Gartersnake into the pond, the Department will conduct annual surveys to determine continued presence/absence of those species for at least three years following the first introduction of each species. Additional surveys will be conducted as needed to determine success or failure of the establishment of chub and gartersnake.

Lowland leopard frogs were translocated from wild populations existing nearby. Source populations for completed and future translocations are the Agua Fria, Roundtree Canyon, Silver Creek, Lousy Creek, Larry Creek, and Long Gulch (EAC M12-02282231).

- Efforts will be made to move egg masses from one or multiple donor sites listed above. This will lessen the potential loss to the wild populations. This will occur in the

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months of March through May, and/or during times when these egg masses are present. Egg masses will be collected and placed in wetted buckets or coolers and taken directly to the pond where they will be placed in the pond around aquatic vegetation where they will likely have the best possible chance to be successful (EAC M12-02282231).

- In addition to the egg masses, if leopard frog tadpoles are located at one of the donor sites, they will be collected and placed in buckets with aerators and moved directly to the pond and released. These collections would most likely occur during the summer months (EAC M12-02282231).

- If needed, adult leopard frogs would be collected at night using spotlights and hand/net capture. This could be done throughout the year but is most effective from March through October. Adults will be held in damp pillow cases, held in buckets and/or coolers and taken directly to the pond and released (EAC M12-02282231).

- Three month, six month, and annual surveys will be completed. These survey activities are covered in our programmatic EA checklists (EAC M12-02282231).

- Augmentations may be completed annually as needed based upon surveys (EAC M12-02282231).

Gila Topminnow and Desert Pupfish were stocked as an additional replicate population for these species (EAC M12-02282231). They will serve as a replicate population under the Department's Safe Harbor Agreement (AGFD 2007), as well as for mosquito control and provide a secondary prey base for other species in the pond.

- Gila Topminnow were collected from the Department's refuge site at Robbins Butte (EAC M12-02282231).

- 1,000 Gila Topminnow were collected and transferred directly from the refuge to the pond. The fish were triple sorted to ensure no non-targets were transferred (EAC M12-02282231).

- Desert Pupfish were collected from the Phoenix Zoo, Deer Valley High School, or Robbins Butte (EAC M12-02282231).

- 500 Desert Pupfish were transferred directly from the refuge to the pond. The fish were triple sorted to ensure no non-targets were transferred (EAC M12-02282231).

- Three month, six month, and annual surveys will be completed. These survey activities are covered in our programmatic EA checklists (EAC M12-02282231).

- Augmentations may be completed annually as needed based upon survey results (EAC M12-02282231).

Longfin Dace were collected from wild populations existing nearby and stocked into the pond to provide a secondary prey base for other species in the pond. Source populations for completed and future translocations are the Agua Fria, Silver Creek, Lousy Creek, Larry Creek, and Long Gulch.

- 1,000 dace were collected and transferred directly from one or multiple wild sites to the pond. The fish were triple sorted to ensure no non-targets are transferred (EAC M12-02282231).

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- Three month, six month, and annual surveys will be completed. These survey activities are covered in our programmatic EA checklists (EAC M12-02282231).
- Augmentations may be completed annually as needed based upon surveys (EAC M1202282231).

Northern Mexican Gartersnake will be introduced to the pond in the future.

- Prior to snakes being translocated, both lowland leopard frog and native fish populations must be established to provide sufficient food source (EAC M12-02282231).
- This will be the first ever wild to wild translocation of northern Mexican Gartersnake ever conducted. Due to this, there are currently no translocation protocols for this action; therefore we will directly coordinate this activity through the Terrestrial Wildlife program and other experts (EAC M12-02282231).
- The Northern Mexican Gartersnake will come from their nearest neighbor population, which is Bubbling Ponds Fish Hatchery (EAC M12-02282231).
- The initial efforts will be focused on collection of neonates and juveniles that have not established a home range and are expected to acclimate better when translocated. We will collect neonates as close to the normal birthing season as possible, typically around June (EAC M12-02282231).
- We will make every attempt to minimize handling (EAC M12-02282231).
- Snakes will be placed in damp pillow cases and transported in coolers directly to the pond and released (EAC M12-02282231).
- Three month, six month, and annual surveys will be completed. These survey activities are covered in our programmatic EA checklists (EAC M12-02282231).
- Augmentations may be completed annually as needed based upon surveys (EAC M1202282231).

White Amur will be stocked for aquatic vegetation control.

- The fish will be bought from Mr. Fish, a sole source vendor for fish purchasing (EAC M12-02282231).
- These fish are certified disease free and certified triploid, which prevents any reproduction in the pond (EAC M12-02282231).
- Three month, six month, and annual surveys will be completed. These survey activities are covered in our programmatic EA checklists (EAC M12-02282231).
- Augmentations may be completed annually as needed based upon surveys (EAC M1202282231).

Gila Chub will be stocked into the pond as an additional refugium for the Indian Creek lineage.

- Indian Creek is thought to contain less than 500 individual chub and is currently replicated only at the Phoenix Zoo. Since the Indian Creek

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population is less than 500 it is imperative that collection efforts are coordinated between the AGFD, USFWS, USFS, BLM, and the Phoenix Zoo, prior to collections. The purpose is to make sure all agencies and the Phoenix Zoo are aware of and agree with the source (Indian Creek or the Phoenix Zoo refuge) and the number of chub collected. The goal is to reach up to 500 individuals over the course of five years; however, given the small population size it may take longer to reach this goal. The fish will be triple sorted to ensure no non-target species are transferred.

- Three month, six month, and annual surveys will be completed. These survey activities are covered in our programmatic EA checklists.
- Augmentations may be completed as needed based upon surveys.

Chemical nonnative and native vegetation control will be used to manage aquatic and terrestrial (upland) vegetation to optimize habitat conditions for native wildlife species. The ability for long-term vegetation control is crucial to the success of the pond and its wildlife.

- Approved herbicides for removal/control of weeds and noxious plants will be used around the upland perimeter of the pond. The herbicides will be applied according to label by an authorized applicator (EAC M10-08025232).
- Rodeo Aquatic Herbicide will be applied per the label to control aquatic vegetation, including cattail regeneration, in select areas of the pond. Cattail plants have the ability to fill in the complete perimeter of the pond, reducing vital habitat for various life stages of fish, frogs, and snakes.
- Triclopyr, Clopyralid, and Picloram Herbicides will be used on woody upland vegetation including mesquite (*Prosopis* spp.), catclaw (*Acacia* spp.) and *Mimosa* species. Herbicides will be applied per the label by an authorized applicator to control woody vegetation that is currently growing along the fence surrounding the pond. These plants are causing buried parts of the fence to be pulled to the surface and exposing holes where nonnative species such as bullfrogs can enter. These herbicides have been approved by the Bureau of Land Management (BLM 2007) and Prescott National Forest (Forest Service 2015) to use for woody plant species management, in addition to other plant species, on nearby public lands.

Native vegetation will be planted as needed to enhance habitat diversity and structure within the emergent zone of the pond and/or the terrestrial (upland) zone around the pond (EAC M1202282231).

- Native aquatic vegetation, including but not limited to sedges and rushes, may be hand dug from the Agua Fria channel in the active flood plain on deeded land in map areas: 7, 8, 25, and 27 (Figure A1). Vegetation may be translocated for establishment in the pond for additional aquatic habitat enhancement.
- Native plant seed or potted transplants may be used to enhance upland vegetation surrounding the pond.

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Bullfrog and crayfish will be actively removed from the pond (EAC M12-01193810).

- Effort will be made to promptly eliminate the crayfish or bullfrogs by netting, trapping, or shooting if either species are detected in the pond.
- The pond may be drained using a pump in the event of a severe nonnative species invasion. Care to minimize negative impacts to the native aquatic species would be taken if this action occurs.

Phase II of the “Horseshoe Ranch Adaptive Restoration and Community Stewardship Project”, if implemented, would involve Tamarix removal within the Agua Fria and Indian Creek drainages, native plant (e.g. cottonwood and willow) re-vegetation through pole and/or pot plantings, and implementation of practices to stabilize stream banks along Ranch lands with threatened infrastructure. It is anticipated that the experimental garden may become the source of cottonwood and possibly other native plant species stock or cuttings for these future in-channel restoration activities on the Ranch and elsewhere in the Agua Fria watershed.

Operation and maintenance of the experimental garden during the spring/summer/fall growing season includes: planting and/or removal of trees, understory weed management, fence and water infrastructure maintenance, and biological monitoring and research. All of these activities require access to the experimental garden area by multiple researchers and maintenance staff year-round, including during the cuckoo and willow flycatcher breeding season.

Research and monitoring conducted by NAU within the experimental garden includes: measurement of plant growth, phenology, morphology and chemical characteristics including tree survivorship, height/diameter, below ground root growth, bud set and leaf nutrient resorption; monitoring soil properties (nutrients and carbon availability) soil moisture and temperature; monitoring plant water stress through rates of gas exchange, transpiration and water potential; monitoring weather using a portable weather station; and monitoring tree litter using a portable 2 ft x 2 ft litter-trap. Monitoring also includes use of pitfall traps and flight-intercept traps to estimate invertebrate diversity (pitfall trap dimensions: 4 in diameter x 5 in soil depth; flight intercept trap dimensions are 6 ft tall x 1 ft wide x 1 ft high) (EAC M14-0403020406).

NAU researchers are currently using an octocopter UAV equipped with a hyperspectral sensor to acquire spectral reflectance data on the plant species growing within the 3-acre experimental garden at Horseshoe Ranch. The purpose of their work is to determine if spectral differences exist among the different genotypes and establish baseline data for successful phenotyping. Repeat images acquired at varying frequency will be used to estimate growth rates via change detection (EAC M14-0403020406 Amendment I).

- NAU expects to perform one flight session (three flights) per year during the growing season.
- The UAV flights will occur during the leaf-on growing season as the plant leaves provide the key component of the spectral reflectance data. However, images can be

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acquired only once a year. The hyperspectral and multispectral images need to be acquired midday close to solar noon under clear sky conditions to avoid shadow effects.

- Only one UAV will be in the air at a time to keep logistics simple, avoid collision, and comply with the Federal Aviation Administration regulations.
- The UAV flights will occur only over the garden covering approximately one acre in spatial extent per battery charge. Maximum flight altitude for the UAV is 230 ft (70 m) above ground due to the lidar sensor operational requirement, although the maximum altitude authorized by the FAA is <400 ft.
- Each octocopter UAV flight lasts for approximately nine minutes including take-off and landing to photograph the garden; given that three flights will be required to cover the entire 3-acre cottonwood garden, total flight time each season would be approximately 27 minutes.

The experimental garden is watered with approximately five gallons of water per tree, three days per week during the growing season (April-October), totaling approximately six acre-feet of water per year. The intent is to drip irrigate during the summer growing season until roots reach groundwater (~3-5 years). If the tree roots do not reach the water table after five years of irrigation, the project design would be re-evaluated to determine if a change in amount and/or timing of irrigation is necessary, or if it is necessary to thin the plot to reduce tree competition for water (EAC M14-0403020406).

The experimental garden is cleared of competing vegetation with a hand mower and gasoline powered weed-eater to control understory grasses and weeds (EAC M14-0403020406 and EAC M10-08025232). Occasionally gopher traps are used to eradicate gophers depredating seedling trees, and insecticide is used to control harvester ant colonies that are harvesting seedling tree leaves.

The garden is currently fenced with 7ft high wildlife exclusion fencing. Activities may include fence repair and fence removal or fence replacement to a standard barbed-wire type fence once the garden is well established and trees are mature, i.e. when the trees have grown to a sufficient size such that ungulate browsing would not cause mortality (EAC M14-0403020406).

In the future, there may be a need to cut and remove mature dead and/or live cottonwood trees or other native species established in the experimental garden for the purpose of: thinning to improve stand health, thinning to plant other species, thinning to alter age class composition, and/or thinning to remove dead tree safety hazards. There may also be the desire to remove the experimental garden in entirety due to significant management constraints related to sustainability (e.g. reduced water supply or downstream impacts to Agua Fria riparian habitat as a result of watering practices) or change in management direction (EAC M14-0403020406).

In the future, the understory of the experimental garden may be enhanced by seeding and/or potted plants or plugs of native upland grasses, forbs or shrubs appropriate for the site and native to the surrounding landscape. Consultation with ecological site guides,

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AFNM floristic studies (Southwest Environmental Information Network 2016) and other expert sources will be utilized to identify appropriate species. Planting of one liter or larger pots will be done by drilling holes approximately 12 in deep, with a gas-powered auger operated manually, or with an auger attachment to a bobcat tractor (EAC M14-0403020406).

Three erosional head-cuts (5-10 ft long) are present along the southern boundary of the experimental garden, north of Indian Creek. These head-cuts may present a threat to the garden if they continue to erode north into the fields. The experimental garden was set back approximately 10 ft from the edge of the cropland and Indian Creek stream bank to avoid the head-cuts. In the future, the head-cuts may be filled in with rip/rap and soil, and native grasses may be planted to provide a buffer between the experimental garden and the head-cuts, and to help stabilize the soil on and around the erosion (EAC M14-0403020406).

Two piezometers were installed in the experimental garden to evaluate subsurface water table levels and which estimate depth to groundwater (EAC M14-0403020406). The information is being used to help evaluate long-term site suitability, how many years irrigation may be required until tree roots reach ground water levels, and potential changes in local water table levels. Water levels are measured each month in the piezometer well locations with a Solinst water level meter, which requires access to the garden during the cuckoo breeding season. Subsurface water table levels are also monitored upstream of the experimental garden on the Ranch utilizing the Horseshoe “old” well (ADWR well registration # 55-623448) located adjacent to the Agua Fria River channel; and the Horseshoe Irrigation Well (ADWR well registration # 55-623446).

The Department intends to establish a native grass and forb plant community and annual upland game bird seed crops on approximately 15 ac of fallow cropland adjacent to the cottonwood garden (Figure 2, AI and Figure 3). The cropland is currently used periodically to hold horses and cows for shipping and pasturing. The site has been impacted by past plowing and other farming, truck and quad traffic, as well as livestock grazing and trampling.

The cropland will be planted with an interior area of cool and warm season annual grain seed crops such as oats, barley, wheat, triticale and cereal rye, or forage type sorghums, to provide cover and forage for upland game bird species and other wildlife. A 50-75 ft buffer of native grasses, forbs and pollinator plants will surround the annual grain seed crop. This buffer area will comprise native warm and cool season plant species known to occur throughout the surrounding semi-desert grasslands of the AFNM. Plant species important to native pollinators such as the Monarch Butterfly (*Danaus plexippus*) will be established, including several species of milkweed (*Asclepias* spp.) that occur throughout central Arizona.

The intent is to achieve a habitat mosaic that benefits common wildlife throughout the area; benefits upland game bird populations and hunting opportunities throughout the

region; and contributes to conservation goals for threatened pollinator species by establishing a waystation (breeding, shelter and/or foraging habitat patch). Further, the plantings will comprise native flora appropriate for the ecological site and/or sterile annual grain crops that will not colonize in the surrounding landscape; and once established will require lower levels of irrigation than traditional ranch crops such as alfalfa.

Although cropland management is not directly beneficial to the ESA-listed species described in this plan; due to the immediate adjacency to the experimental cottonwood garden management actions are described further below. Farming and livestock management activities within the cropland will be conducted as needed based on the phenology of the cropland species and standard farming practices. Typically, activities such as tilling and planting would be conducted for a short period in fall, winter and spring, outside of the breeding season for Yellow-billed Cuckoo. Mechanized activities of any type would be of limited duration due to the small size of the cropland. Currently, the cropland is approved for planting to occur spring 2017 (EAC M1008025232). The anticipated time for mechanized equipment use for tilling and planting would be approximately one hour per planting period. The cropland will be planted in phases, according to funding and compliance documentation.

Figure 3. Fallow cropland on Ranch deeded lands.

Management Actions

Two farming practices have been identified to manage the cropland, no-till drill or a traditional 3-step farming practice of till, landplane and grain drill. Both alternatives would also include continued use by livestock and occasional vehicle access (truck, tractor and quad) to repair fencing or conduct farming activities. Both alternatives may be implemented as a periodic annual management action to establish and maintain the native plant buffer and annual grain seed crops (EAC M10-08025232).

- No-Till Drill (<6 in depth of ground disturbance): the cropland is planted with a no-till seed drill; the drill has variable widths (would use a 10-12 ft wide) and is pulled by a tractor; with additional row of discs that cut through compact ground like a knife up to 34 in (round rolling knife blades); with second row of round disc blades that are angled to open soil like a grain drill and a seed is dropped into the slice and then there are packer wheels that roll over and close the slice around the seed. That is the end of the planting process.
- Traditional 3-step process of till, landplane, grain drill (plant) and irrigation (up to ~18 in ground disturbance): the cropland is tilled using a tractor to pull a ~12 ft wide disc with rotating round individual disc blades that till up to a depth of 12 in (and is adjustable to zero inches); the front row cuts the ground and throws dirt to the left and the back row throws dirt to right – so it rolls the soil over. After disking, a “landplane” pulled by a tractor would be used to smooth the surface of uneven valleys/berms in preparation for seeding and more efficient planting and germination. Subsequent planting would use a grain drill, similar to a no-till drill ~12 ft wide with one disc blade that opens soil like a knife at an adjustable depth for the seed mix (0-3 in; most likely <1/2 in for native

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grasses) and then it has a chain that covers the seed by dragging over the ground and moving soil over the top of seed.

- Farming practices will utilize mechanized tractors and planting implements, as well as motorized UTV, quad, trucks and trailers throughout the cropland area as needed.

To improve soil condition and reduce weeds an annual cover crop may be planted prior to establishing the native plant buffer and annual grain seed crops. Annual cover crops improve soil condition through the addition of organic matter (roots and above ground biomass). Cover crops also compete with weeds for soil moisture and shade the soil, reducing the amount of sunlight needed by typical farm weeds to germinate. Use of cover crops is a temporary strategy to help establish a native semi-desert grassland species assemblage (EAC M10-08025232).

- Cool season small grain annual cover crops which may be planted include oats, barley, wheat, Triticale and cereal rye. Typical planting rates are 50-70 lbs per acre. Planting depths will vary from 0.5-2 in depending on soil textures.
- Warm season annual grain cover crops which may be planted include Sudan grass and forage type sorghums. Typical planting rates are 10-35 lbs per acre. Planting depths vary from 0.5-1 in.

To help with the establishment of the annual grain seed crops and native plant buffer an above ground irrigation system will be put in place. The irrigation system would be a portable system of pipes and sprinklers (EAC M10-08025232).

The water source for irrigation is the Horseshoe Irrigation Well (ADWR well registration # 55623446). This is the same well used to irrigate the cottonwood garden. The irrigation strategy is to supplement natural rainfall and minimize water use. For example, irrigation will be used to establish native plant buffers, but once the buffer plants are established irrigation will be limited to supplementing natural rainfall if there are periods of drought stress. Irrigation will be routine for portions of the cropland planted with annual grain seed crops.

B. Buildings, Fences, and Other Structures

A new shop is currently in the design phase and is scheduled for construction in the 2019-2020 FYs. The new shop will be located adjacent to the existing historic barn building and will provide 1,200 ft² of sheltered, secure storage. Existing shop facilities consist of a covered area containing work benches and an adjacent shade structure over a concrete pad. The existing facilities are in poor condition and proximal to the banks of the Agua Fria river. They are at risk of flooding and do not provide secure storage. To date, secure storage has been found in the nearby river house (a previously inhabited structure). However, the river house is known to contain asbestos and is also at risk of flooding. Therefore, the new shop will meet the present and future needs of the Ranch and allow for the demolition of two structures that are unsuitable for the purpose (the existing shop and river house). The existing shade structure will be preserved as it still has utility as a covered vehicle parking, being directly adjacent to the diesel/gasoline storage tanks.

C. Roads and Trail Maintenance/Development

An elevated observation platform may be constructed adjacent to the pond enclosure to facilitate wildlife viewing. The platform would be accessible to the public, either during daylight hours or by appointment.

D. Parking Lots and Barriers

There are currently no plans to modify the existing layout of parking lots and barriers. Signage and temporary line marking may be utilized in the main parking lot (by the barn) for events.

E. Safety Infrastructure

No proposed work to report.

F. Wells, Canals, Pumps, Etc.

The irrigation pivot on the west field has been repaired and is operable. A new irrigation connection to the East field is in the planning phase. The new connection will require installation of a new pipeline from the irrigation wellhead, along the river bank and across the existing pedestrian bridge. The mode of final water delivery on the field as well as the load capacity of the bridge will determine the design and layout of the pipeline. This project should be implemented in early 2020.

G. Utilities

All new connections to the Ranch's electrical grid will be in compliance with applicable building codes. In the case of the new shop, a study has been requested to determine the additional infrastructure upgrades needed to achieve a safe connection.

A new (upgraded replacement) septic field is in the planning phase. It will be located beneath the east agricultural field. This project is to be implemented in 2020.

H. Signage

In the future, an interpretive display may be installed along Bloody Basin Road, where it overlooks the Ranch property. The display would provide historic and operational information to the public.

6. Budget and Funding

A. Base Budget Needed For Maintaining Current Status

The base operating budget was \$70,000 for FY 2019-20.

B. Potential Funding Sources For Base Management and Essential Actions

Heritage and PR funds, as appropriate.

C. Potential Funding Sources For Future Development/Enhancements

- PR Grant Funds

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- WCF or other available state funds
- NGO Funding that may include Quail Forever
- Private Donations or Sponsor Funding

D. Identify Potential Property Income Strategies

Agreements with honey companies. Agreements with dog trial groups.

7. Staffing and Administration

A. Management Staffing Needs (e.g., property steward, etc.)

The Ranch has a full time property steward who lives onsite, in the main Ranch house. The property steward is responsible for the day to day operation of the Ranch with support from the Region VI Habitat branch. Currently, one part time employee provides assistance to the property steward, which consists mainly of groundskeeping duties and other tasks at the direction of the steward. Larger projects undertaken at the Ranch are typically contracted to outside entities or completed with assistance from other Department staff. The current staffing levels at the Ranch are appropriate and adequate.

B. Law Enforcement Needs

The Ranch is within Game Management Unit 21 (Region VI). The Ranch property is not open to the public. However, the adjacent Bloody Basin Road gets heavy use for outdoor recreation, OHV, hunting, etc. Therefore, occasional trespassing has been an issue in the past. The Ranch has no special law enforcement needs.

C. Volunteer Groups, Site Hosts, Docents, and Event Staffing Needs

The Ranch hosts occasional volunteer events, particularly within the pond habitat enclosure. Events are typically coordinated by an appropriate Department proponent, with support from the property steward as needed.

8. Habitat Management

A. Habitat Maintenance

As described in Section 5 above, there are several ongoing habitat projects at the Ranch. The cottonwood garden is actively managed for research goals by NAU. The management emphasis for the garden may shift in the future toward habitat goals. The pond has been colonized aggressively by non-native and/or hybrid *Typha* (cattail) which has required periodic removal. In 2019 a new approach was implemented, where small sections of cattail were cut to grade and the area covered with a non-woven polypropylene weed barrier fabric and then gravel. It is hoped that the treated areas will remain free of emergent aquatic vegetation, creating greater habitat diversity within the pond and reducing/eliminating the need for ongoing removal of cattail. There are also several quail drinkers on the Ranch, each of which require periodic maintenance and occasional additions of water.

B. Habitat Restoration Objectives and Opportunities

Restoration activities currently underway include planting of the east field with annual grain crops, installation of irrigation water supply to the west field, and planting of the west field with milkweed and other pollinator plants.

C. Habitat Enhancement Objectives and Opportunities

Trees in the cottonwood garden are approaching maturity and may therefore be used as a propagule source for restoration/enhancement projects. One potential project is to enhance the streambanks of the Agua Fria River by removing saltcedar and planting native willows, cottonwoods, shrubs, and forbs. See attached habitat enhancement plan.

9. Wildlife Management

A. Special Status Species Management Objectives and Opportunities

Currently Southwest Willow Flycatcher, Northern Mexican Gartersnake, and Gila Chub are not extant on the Ranch deeded lands for reasons noted below. Yellow-billed Cuckoo is regularly detected in summer months along the Agua Fria River and intermittently on the Ranch. There is a 6.7-acre patch of riparian habitat along the Agua Fria River on the Ranch that is suitable as a nesting habitat for Yellow-billed cuckoo when combined with adjacent habitat extending downstream of the deeded lands. See attached habitat enhancement plan.

B. Game Management Objectives and Opportunities

Crops grown on the east field are intended to benefit small game species as well as non-game species. Several nearby quail drinkers further enhance habitat for small game in the vicinity of the Ranch.

C. Nongame Management Objectives and Opportunities

No specific management goals exist at this time.

D. Furbearer Management Objectives and Opportunities

No specific management goals exist at this time.

E. Predator Management Objectives and Opportunities

No specific management goals exist at this time.

10. Cultural Resources

A. Cultural Resources Survey(s)

Cultural resource surveys have been completed on 100% of the Ranch property. For further information, contact Jon Shumaker (the Department's Cultural Resources Compliance Manager).

B. Existing Cultural Resources

Cultural resources are known to exist in several locations on the Ranch property. Further information regarding cultural resources are made available on a case by case basis.

C. Historic Structure Inventory

Several of the Ranch structures are historic, including the barn and main house. The barn is in moderate, serviceable condition. The main house is in good condition, with a newer roof.

D. Cultural Resource Protection

No grading or ground disturbance should occur at the Ranch without prior consultation with the cultural resources manager.

E. Tribal Considerations

The Ranch is not located in proximity to any tribal lands. However, artifacts and/or remains may be present on the Ranch.

11. Public Access, Use and Recreation

A. Designated Route System

The Ranch is not currently open to the public except with prior approval for events.

B. Public Use Facilities

None at this time. In the future, interpretive signage and a wildlife viewing platform may be constructed. In addition, the Ranch master plan includes a designated meeting/events building which is yet to be designed/funded.

C. OHV Use

There is not currently any approved OHV use on the Ranch.

D. Firearm Use

More than 50% of the Ranch property is within ¼ mile of the ranch house. In addition, the property is not open to the public. Therefore the use of firearms is prohibited on the property at all times. One possible exception to this may be the use of firearms by Department staff to remove bullfrogs from the pond.

E. Hunting and Fishing

There is no public access to the Ranch property for hunting and fishing. Furthermore, there are no suitable areas for fishing on the property.

F. Wildlife Viewing

A wildlife viewing platform may be constructed in the future. That platform, and an accessway, would be available for public use. This project has not yet advanced past the preliminary discussion phase.

G. Disallowed Activities

All proposed uses/activities by the public and by volunteer groups are subject to review and approval by the Department.

12. Community and Agency Coordination

A. Information and Education Opportunities

Development of signage and wildlife viewing opportunities may occur in the future but for now the Ranch is not open to the general public. Several volunteer events with local scout troops have been held in recent years. Volunteer outreach will continue.

B. Community Liaison Needs

None at this time.

C. Local Government and Adjacent Landowners

The Ranch maintains use of its grazing allotments on the Horseshoe and Copper Creek allotments via a lessee. Those allotments are located on land managed by the BLM and USFS respectively. The three agencies have entered into an agreement concerning the management of the Horseshoe Ranch grazing allotments.

D. Potential Partners

The Department is currently partnered with NAU, who are conducting a large scale cottonwood research project on the Ranch.

13. Figures

A. Maps

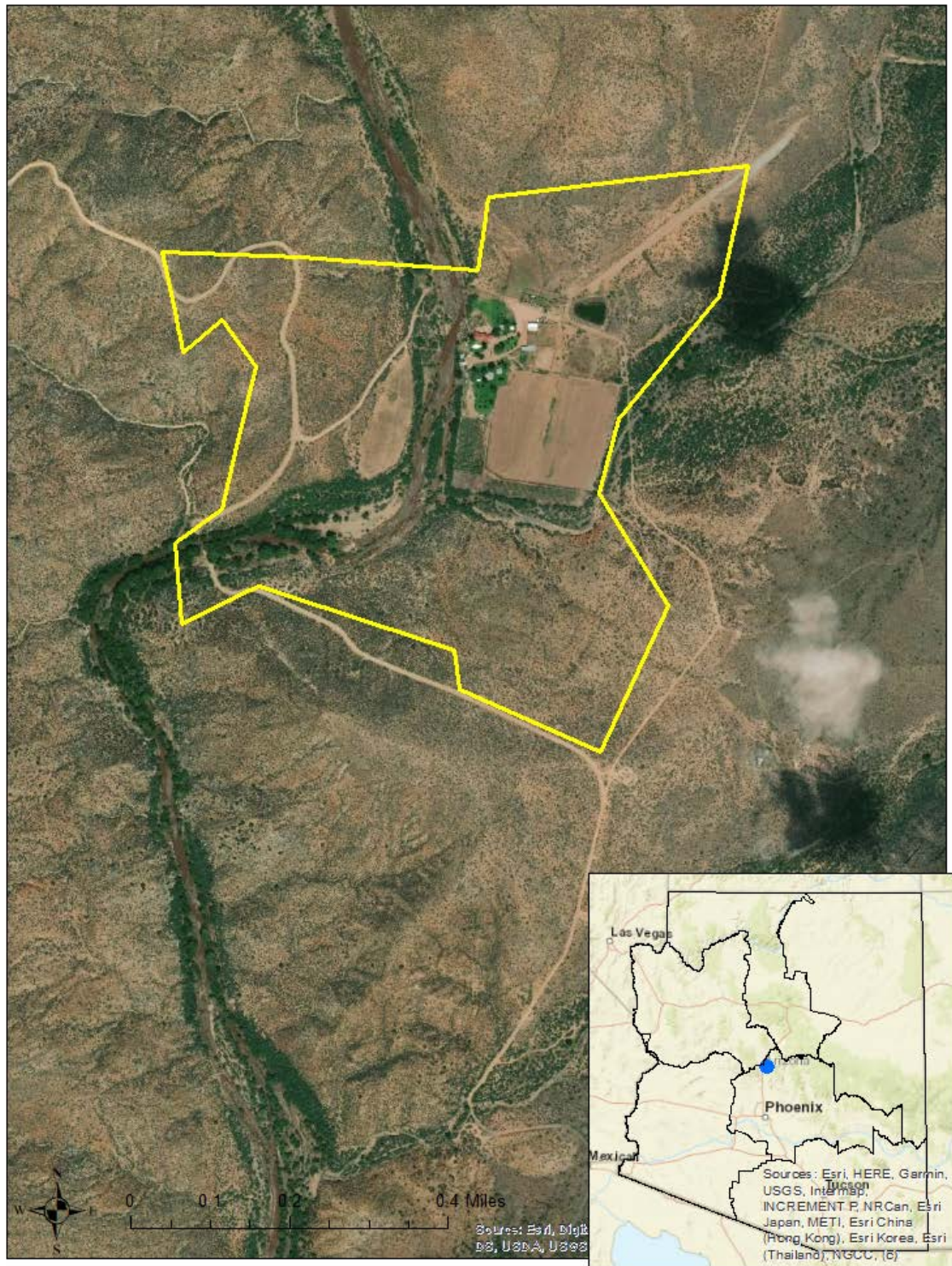


Figure 4. Horseshoe Ranch Property Boundary and Location

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Figure 5. Grazing Allotments

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Figure 6. Property Features

B. Photos/Illustrations

14. Tables

A. Species List (includes special status where applicable)

Special Status Species Documented within 2 Miles of Project Vicinity*						
Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
<i>Agosia chrysogaster chrysogaster</i>	Gila Longfin Dace	SC		S		1B
<i>Anaxyrus microscaphus</i>	Arizona Toad	SC		S		1B
<i>Aquila chrysaetos</i>	Golden Eagle	BGA		S		1B
<i>Catostomus clarkii</i>	Desert Sucker	SC	S	S		1B
<i>Cicindela oregona maricopa</i>	Maricopa Tiger Beetle	SC				
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo (Western DPS)	LT	S			1A
<i>Cyprinodon macularius</i>	Desert Pupfish	LE				1A
<i>Empidonax traillii eximius</i>	Southwestern Willow Flycatcher	LE				1A
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	SC	S	S		1A
<i>Gila intermedia</i>	Gila Chub	LE				1A
<i>Gila robusta</i>	Roundtail Chub	CCA	S	S		1A
<i>Heloderma suspectum</i>	Gila Monster					1A
<i>Kinosternon sonoriense sonoriense</i>	Desert Mud Turtle			S		1B
<i>Lithobates yavapaiensis</i>	Lowland Leopard Frog	SC	S	S		1A
<i>Poeciliopsis occidentalis occidentalis</i>	Gila Topminnow Refugia	LE				1A
<i>Thamnophis eques megalops</i>	Northern Mexican Gartersnake	LT	S			1A

*Source: Environmental Review Tool, 2019

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Species of Greatest Conservation Need Predicted within the Project Vicinity based on Predicted Range Models*						
Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
<i>Agosia chrysogaster</i>	Longfin Dace	SC		S		1B
<i>Aix sponsa</i>	Wood Duck					1B
<i>Ammodramus savannarum perpallidus</i>	Western Grasshopper Sparrow					1B
<i>Ammospermophilus harrisi</i>	Harris' Antelope Squirrel					1B
<i>Anaxyrus microscaphus</i>	Arizona Toad	SC		S		1B
<i>Antilocapra americana americana</i>	American Pronghorn					1B
<i>Aquila chrysaetos</i>	Golden Eagle	BGA		S		1B
<i>Baeolophus ridgwayi</i>	Juniper Titmouse					1C
<i>Botaurus lentiginosus</i>	American Bittern					1B
<i>Buteo regalis</i>	Ferruginous Hawk	SC		S		1B
<i>Buteo swainsoni</i>	Swainson's Hawk					1C
<i>Buteogallus anthracinus</i>	Common Black Hawk					1C
<i>Calypte costae</i>	Costa's Hummingbird					1C
<i>Catostomus clarkii</i>	Desert Sucker	SC	S	S		1B
<i>Cistothorus palustris</i>	Marsh Wren					1C
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo (Western DPS)	LT	S			1A
<i>Colaptes chrysoides</i>	Gilded Flicker			S		1B
<i>Corynorhinus townsendii pallescens</i>	Pale Townsend's Big-eared Bat	SC	S	S		1B
<i>Crotalus tigris</i>	Tiger Rattlesnake					1B
<i>Cyprinodon macularius</i>	Desert Pupfish	LE				1A
<i>Euderma maculatum</i>	Spotted Bat	SC	S	S		1B
<i>Eumops perotis californicus</i>	Greater Western Bonneted Bat	SC		S		1B
<i>Gila intermedia</i>	Gila Chub	LE				1A
<i>Gopherus morafkai</i>	Sonoran Desert Tortoise	CCA	S	S		1A
<i>Haliaeetus leucocephalus</i>	Bald Eagle	SC, BGA	S	S		1A
<i>Heloderma suspectum</i>	Gila Monster					1A
<i>Incilius alvarius</i>	Sonoran Desert Toad					1B
<i>Kinosternon sonoriense sonoriense</i>	Desert Mud Turtle			S		1B
<i>Lasiurus blossevillii</i>	Western Red Bat		S			1B
<i>Lasiurus xanthinus</i>	Western Yellow Bat		S			1B
<i>Leopardus pardalis</i>	Ocelot	LE				1A
<i>Lithobates yavapaiensis</i>	Lowland Leopard Frog	SC	S	S		1A
<i>Macrotus californicus</i>	California Leaf-nosed Bat	SC		S		1B
<i>Melanerpes uropygialis</i>	Gila Woodpecker					1B
<i>Melospiza lincolni</i>	Lincoln's Sparrow					1B
<i>Melospiza aberti</i>	Abert's Towhee		S			1B
<i>Micrathene whitneyi</i>	Elf Owl					1C
<i>Microtus mexicanus</i>	Mexican Vole					1B
<i>Micruroides euryxanthus</i>	Sonoran Coralsnake					1B
<i>Myiarchus tyrannulus</i>	Brown-crested Flycatcher					1C
<i>Myotis occultus</i>	Arizona Myotis	SC		S		1B
<i>Myotis velifer</i>	Cave Myotis	SC		S		1B
<i>Myotis yumanensis</i>	Yuma Myotis	SC				1B
<i>Nyctinomops femorosaccus</i>	Pocketed Free-tailed Bat					1B
<i>Oreoscoptes montanus</i>	Sage Thrasher					1C
<i>Oreothlypis luciae</i>	Lucy's Warbler					1C
<i>Panthera onca</i>	Jaguar	LE				1A
<i>Passerculus sandwichensis</i>	Savannah Sparrow					1B
<i>Perognathus longimembris</i>	Little Pocket Mouse	No Status				1B
<i>Phrynosoma solare</i>	Regal Horned Lizard					1B
<i>Poeciliopsis occidentalis occidentalis</i>	Gila Topminnow	LE				1A
<i>Setophaga petechia</i>	Yellow Warbler					1B
<i>Sphyrapicus nuchalis</i>	Red-naped Sapsucker					1C
<i>Sphyrapicus thyroideus</i>	Williamson's Sapsucker					1C

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<i>Spizella atrogularis</i>	Black-chinned Sparrow					1C
<i>Spizella breweri</i>	Brewer's Sparrow					1C
<i>Sturnella magna</i>	Eastern Meadowlark					1C
<i>Tadarida brasiliensis</i>	Brazilian Free-tailed Bat					1B
<i>Troglodytes pacificus</i>	Pacific Wren					1B
<i>Vireo bellii arizonae</i>	Arizona Bell's Vireo					1B
<i>Vireo vicinior</i>	Gray Vireo		S			1C
<i>Vulpes macrotis</i>	Kit Fox	No Status				1B

*Source: Environmental Review Tool, 2019

Species of Economic and Recreation Importance Predicted within the Project Vicinity*						
Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
<i>Callipepla gambelii</i>	Gambel's Quail					
<i>Odocoileus hemionus</i>	Mule Deer					
<i>Odocoileus virginianus</i>	White-tailed Deer					1B
<i>Patagioenas fasciata</i>	Band-tailed Pigeon					1C
<i>Pecari tajacu</i>	Javelina					
<i>Zenaida asiatica</i>	White-winged Dove					
<i>Zenaida macroura</i>	Mourning Dove					

*Source: Environmental Review Tool, 2019

B. Current and Future Management Actions

As stated in the Biological Opinion (USFWS, 2018), the following projects are proposed or ongoing on the Ranch:

- **Pond Management.** The Department intends to manage the existing pond for the chub, topminnow, pupfish, and gartersnakes. Northern Mexican gartersnakes were translocated into the pond in October 2017. The ability for long-term vegetation control will be crucial to the pond's success in providing for listed species' habitat.
- **Maintenance of Experimental Garden.** After the Ranch was acquired, the Department and researchers with Northern Arizona University (NAU) collaborated on a research and riparian restoration project funded by a National Science Foundation grant. In 2014, a 3-acre experimental garden of Fremont cottonwood trees (*Populus fremontii*) was planted on the Ranch to investigate the impacts of climate change and exotic species invasions on riparian ecosystems, as well as genetic responses to assisted migration. Approximately 4,096 cottonwood seedlings were planted on the upper terrace of the Agua Fria River channel, and irrigation infrastructure was installed. Irrigation water is provided via the existing Horseshoe Irrigation Well.
- **Future Tamarisk Removal.** If future funding permits, the Department may consider tamarisk (*Tamarix* spp.) removal within the Agua Fria and Indian Creek drainages, native plant (i.e., cottonwood and willow) re-vegetation through pole and/or pot plantings, and implementation of practices to stabilize stream banks along areas with threatened infrastructure. It is anticipated that the experimental garden may be the source of cottonwood, and possibly other native plant species, stock or cuttings for these future in-channel restoration activities.
- **Re-vegetation of Fallow Cropland.** The Department has begun to establish a native grass and forb community and annual upland game bird seed crops in approximately 15 acres of fallow cropland adjacent to the experimental garden. The cropland is also used occasionally to hold horses and cows for shipping and pasturing and has been impacted by past plowing, vehicles, livestock grazing, and trampling. In addition, water will be

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brought to the Ranch's west field via a pipeline in 2020 in order to irrigate native plants (milkweed) to be established there from seed.

15. Appendices

- A. Habitat Enhancement Plan
- B. Water Rights