

**Site Conservation Plan
for the
Hassayampa River Preserve**



Photo by Kent Corts

The Nature Conservancy in Arizona

September 2, 2016

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*Cover photo: Yellow-billed cuckoo at the Hassayampa River Preserve, August 2015.
Photo by Kent Cortis.*

Terms and Definitions

ADOT	Arizona Department of Transportation
AF/yr	acre feet per year
AGFD	Arizona Game and Fish Department
aquifer	A geologic formation that contains sufficient saturated materials to be capable of storing water and transmitting water in useable quantities to a well or stream.
avifauna	The birds of a particular region, habitat, or geological period.
base flow	The part of a stream discharge that is not attributable to direct runoff from precipitation or melting snow. It is sustained by groundwater discharge and may be considered as normal day-to-day flow during most of the year.
BLM	Bureau of Land Management
BP	before present
cfs	cubic feet per second
conservation target	species or biological communities chosen as the focus of conservation actions
entrenchment	The vertical containment of a river or stream and the degree in which it is incised in the valley floor.
gpm	gallons per minute
groundwater	Generally, water below the earth's surface but commonly applied to water in fully saturated soils and geologic formations.
MCPRD	Maricopa County Parks and Recreation Department
patch dynamics	A conceptual approach to ecosystem and habitat analysis that emphasizes the diverse and unevenly distributed mixture of organisms and resources within a system.
perennial stream	A stream or part of a stream with surface flow throughout the year, drying only during periods of drought.
riparian	Vegetation, habitats, or ecosystems that are associated with bodies of water (streams or lakes) or are dependent on the existence of perennial, intermittent, or ephemeral surface or subsurface water drainage.

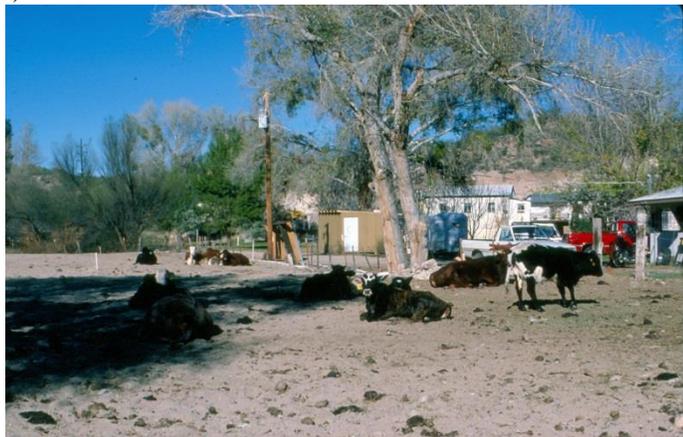
riverine Relating to or situated on a river or riverbank.
TNC The Nature Conservancy

A. INTRODUCTION

Archeological surveys show that the area encompassing the Hassayampa River Preserve was used by early cultures such as the Hohokam for many hundreds and perhaps thousands of years. Corn pollen from 600 BP recovered from sediment cores indicates that the site was used for agriculture by prehistoric cultures. The first Anglo settlers arrived about 1850 and used the land for livestock grazing and farming. A spring-fed cienega supplied water for fish ponds below what is now Palm Lake. From 1913 until 1986 the land was used as a guest ranch and livestock ranch and for recreation and finally as a mobile home park. Palm Lake was created in 1960 for recreational use.

The Hassayampa River Preserve (Preserve) began with the 1986 acquisition of a 345 acre parcel by The Nature Conservancy (Conservancy). It was intended to protect and restore the riparian plant community there, along with a suite of plant and animal species. The Preserve now consists of 789 acres in nine legal parcels with associated surface water rights (Appendix B) and a certificated instream flow right (Appendix C).

When the Conservancy started the Preserve, much of the floodplain area was severely trampled and barren around a set of mature cottonwoods and willows. Livestock grazing and off-road vehicle use had largely eliminated young trees and associated shrubs. Within three years after exclusion of those impacts, the riparian forest understory had been substantially recolonized by new plants.



1986 photo of Hassayampa River Preserve

The Nature Conservancy expects to transfer management of visitor services and ownership of about 77 acres of the Preserve (including most of the trails and infrastructure) to Maricopa County Parks and Recreation Department (MCPRD), who will then be responsible for that aspect of management. The Conservancy will retain ownership of the remaining property with MCPRD leasing most of that portion, but excluding the ILF Mitigation Lands. HRP consists of approximately 789 acres, a portion of which was acquired through an agreement with the U.S. Army Corps of Engineers and are subject to the In-Lieu-Fee Mitigation Program (ILF) requirements (97 acres of ILF Mitigation lands). Following the land transfer, the Conservancy will remain actively involved in oversight and monitoring of the conservation values of the property, as well as assisting MCPRD from a consulting standpoint with respect to the Preserve acreage and the greater Vulture Mountains Cooperative Recreation Management Area as needed (Figure 1).

Overall, floodplain processes through the Preserve are intact and the system supports one of the best remaining occurrences of Fremont cottonwood – Goodding willow riparian forest in the Sonoran desert. This forest supports the endangered southwestern willow flycatcher, western yellow-billed cuckoo, among a community of at least 291 resident and migratory bird species.

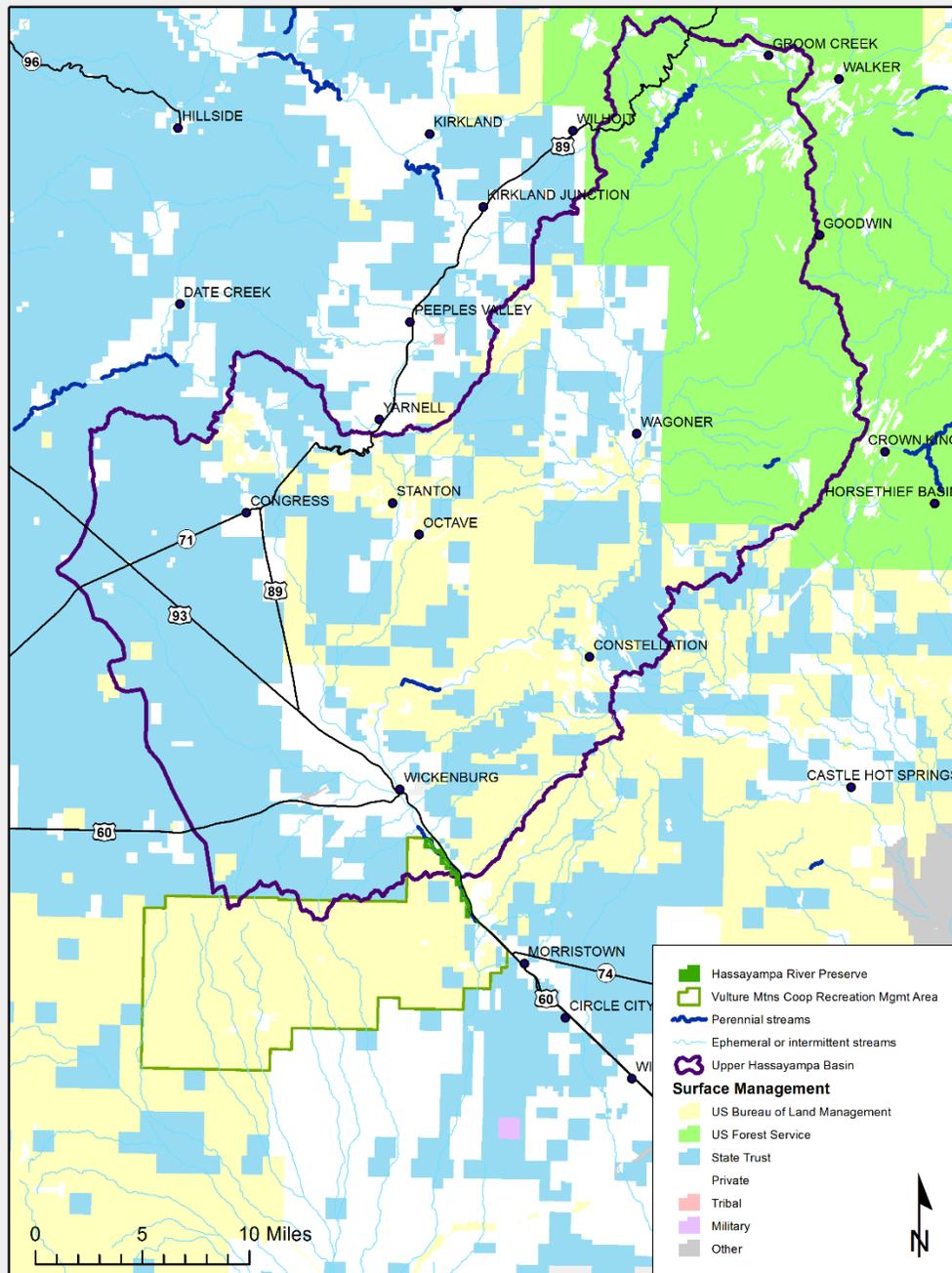


Figure 1. Land management status of the Greater Vulture Mountains Cooperative Recreation Management Area and Hassayampa River Watershed.

The riverine habitat currently supports longfin dace. Although the Hassayampa River through the Preserve has received an instream flow protection certificate, ensuring adequate flows over the long-term to maintain the site's riparian and aquatic conservation targets remains the most significant overall challenge. Area residents obtain all of their water from the floodplain alluvial aquifers associated with the Hassayampa River and its tributaries and from the underlying basin-fill alluvium. The population in the upper Hassayampa River basin doubled from 6,050 in 1980 to 12,348 in 2010 and is projected to exceed 18,000 by 2030 (ADWR 2010), with associated increases in groundwater use. Population increases, combined with the semi-arid conditions in the region, which provide little annual water inflows to recharge the aquifers, and the connection between groundwater pumping and surface water depletion, points to the need for careful water management with consideration of the water needs of riverine, riparian, and aquatic species.

In addition to the Hassayampa's riparian resources, which are well known, the currently unfragmented desert landscape that surrounds the Preserve represents an intact desert upland to river corridor, a rare feature in the ever urbanizing Sonoran desert. While this landscape is not populated with many rare and endangered species, it supports a full complement desert fauna and flora associated with the Arizona upland subdivision of the Sonoran desert. Combined with the river corridor, this landscape provides an open space buffer between the growing urban areas of Phoenix and Wickenburg. These values were recognized at the Conservancy's 1998 Sonoran Desert Experts Workshop where participants from the fish, birds, and natural communities groups nominated the Preserve and environs for inclusion in the ecoregional plan for the Sonoran Desert (Marshall et al. 2000). (http://azconservation.org/downloads/category/ecoregional_assessment).

A new issue considered in this plan that potentially threatens the above landscape values is development of a new interstate highway, I-11. The Arizona Department of Transportation (ADOT) is currently considering two potential routes to join the existing US Highway 93 with a new highway from the south. One route would pass through Wickenburg and adjacent to the Preserve, creating a major barrier to wildlife and potentially fostering more growth. The other route would join US Highway 93 northwest of Wickenburg and thus avoid the town and the Preserve. At this writing ADOT is initiating environmental studies.

Five conservation zones were identified for the Hassayampa River watershed and the Preserve, including two associated with riverine or alluvial areas, one for the unfragmented desert lands, one watershed zone, and one that bounds current developed areas (Figure 5).

B. SITE INFORMATION

Site Description

The Hassayampa River watershed drains approximately 1,470 square miles in southern Yavapai and western Maricopa counties. Elevations range from 1,000 feet near the Hassayampa River's confluence with the Gila River to over 7,000 feet in the Bradshaw Mountains.

Biogeographically, the watershed straddles both the Sonoran desert and Apache highlands ecoregions. The southern two-thirds of the watershed is comprised of Arizona upland and lower Colorado River subdivisions of Sonoran desertscrub, while the upper third contains semidesert

grassland, interior chaparral, montane conifer forest, and Mohave desertscrub communities. Bureau of Land Management (BLM) lands comprise 32% of the watershed, private lands 28%, State Trust Lands 27%, and Prescott National Forest lands 13% (Figure 1). The watershed at the Morristown gage, just downstream from the preserve, covers 774 square miles.

The Hassayampa River forms the watershed's primary drainage and contains three perennial reaches: a 12-mile reach that runs through the Prescott National Forest at the top of the watershed, a reach that surfaces north of Walnut Grove and flows through BLM's Hassayampa River Canyon Wilderness into Box Canyon (in Sept. 1998 surface flow emerged in the vicinity of Middlewater Creek and was present downstream to the Hassayampa River Wilderness, approximately 38 miles); and a four-mile reach that surfaces at the Town of Wickenburg and runs through the Hassayampa River Preserve.

The most outstanding ecological attributes found in the watershed include the two lower elevation riparian systems found on the Hassayampa River. The perennial stretch near the town of Wagoner contains Fremont cottonwood - Goodding willow gallery forest, longfin dace and desert sucker, and other riparian- and aquatic-dependent species within a mosaic of floodplain lands under irrigated agriculture. The Hassayampa River was identified as a high priority site for biodiversity in the Conservancy's Sonoran Desert ecoregional assessment (Marshall et al. 2000), and was later ranked in the top 15% of conservation sites within the five ecoregions that include Arizona.

The Hassayampa River has been the focus of many pioneering ecological studies on riparian vegetation, including vegetation responses to flooding, marsh development, seed bank dynamics, hydrologic requirements of mesquite, and the biodiversity value of intermittent streams (e.g., Boudell and Stromberg 2008, Drezner et al. 2001, Katz et al. 2012, Stromberg 1997, Stromberg et al. 1993a, Stromberg et al. 1993b, Stromberg et al. 1997, Stromberg et al. 2008, Stromberg et al. 2009, Wolden et al. 1995).

This plan focuses on the riverine, riparian, aquatic, and desert environs associated with the Hassayampa River Preserve. The site is centered on the perennial stretch of the Hassayampa River that emerges near the Town of Wickenburg and flows for approximately four miles through the Preserve. The importance of perennial surface flow in this ecoregion is highlighted by the fact that of the 30 watersheds found in Arizona's portion of the Sonoran desert (based on the USGS Hydrologic Unit Classification at the 8-digit scale), the Hassayampa is one of only four unregulated rivers with perennial flow (the three others are the Big Sandy, Santa Maria, and San Pedro).

The Preserve is generally shaped by Highway 93 to the east and by the BNSF Railway to the west, though some parcels extend west of the railroad tracks. Beyond these transportation corridors the Preserve is surrounded by low hills covered with saguaro – paloverde desertscrub and numerous washes. The hills eventually give way to the more prominent Vulture Mountains to the west and Wickenburg Mountains to the east. Although incompletely inventoried, these adjacent desert habitats are known to support a typical assemblage of desert fauna, including several bats, mountain lion, mule deer, javelina and Sonoran desert tortoise, among others. To date, this area remains largely unfragmented and is comprised mostly of BLM and State Trust

lands forming a desert corridor that separates Wickenburg from the greater Phoenix urban area to the southeast.

The river, floodplain habitats, and complex of washes and unfragmented desert scrub (BLM and State Trust lands) adjoining the river corridor contribute to an overall landscape that provides for animal and plant dispersal and watershed conditions that help sustain a proper functioning condition of the floodplain.

Ecological Information

Hydrological Conditions

Despite widespread modifications to Southwestern river systems, Brown (1994) noted that the Hassayampa River remains as one of the more “natural” functioning rivers in the Sonoran desert, remaining undammed, flowing perennially, and supporting outstanding riparian habitats and native fish.

The occurrence of year-round surface water in the Hassayampa River is controlled chiefly by geologic conditions – the presence of shallow bedrock forces groundwater to the surface creating a stretch of perennial flow whereas deep alluvium allows water to stay below the surface. Figure 2 shows hydrologic features, including depth to bedrock in the alluvial basin northwest from the Town of Wickenburg. Immediately above Wickenburg the Hassayampa River is a broad sandy wash with ephemeral surface flow. At Wickenburg the floodplain is constricted by bedrock outcrops flanking the Vulture and Wickenburg Mountains, which lie to the west and east, respectively. The bedrock constriction forces groundwater to the surface, giving rise to about four miles of perennial flow that supports the cottonwood-willow riparian gallery forest and aquatic habitats of the Hassayampa River Preserve. The confined floodplain ends near San Domingo Wash where the river empties onto the broad Hassayampa Plain, a largely undisturbed area of desert scrub managed by the BLM. Several washes draining adjacent mountains enter on both sides of the floodplain in this reach, including Sols Wash, Martinez Wash, Cemetery Wash, Mockingbird Wash, Blue Tank Wash, Calamity Wash, Turtleback Wash, and San Domingo Wash. Sols Wash joins the Hassayampa River at Wickenburg. It drains the Date Creek Mountains and Aguila Plain and is the largest tributary drainage in the upper watershed.

The area between the Date Creek Mountains and Aguila Plain is also the largest water-bearing geologic unit in the watershed, with consolidated and unconsolidated sedimentary basin-fill deposits of gravel, sand, silt, and clay ranging in thickness from less than 20 feet near the mountain fronts to greater than 2,370 feet near the Town of Congress (Figure 2; Richard et al 2007). The surface drainage for this area is Sols Wash and Martinez Wash. The Hassayampa River receives snow melt runoff from the Bradshaw Mountains and rainfall runoff from the Bradshaws and ephemeral washes throughout the basin. Temporary seasonal flow occurs due to snowmelt and rainfall runoff events. Perennial surface water occurs where the groundwater level intersects the land surface. This occurs chiefly due to the presence of low-permeability shallow bedrock, which causes a thinning of stream alluvium, forcing groundwater to the surface.

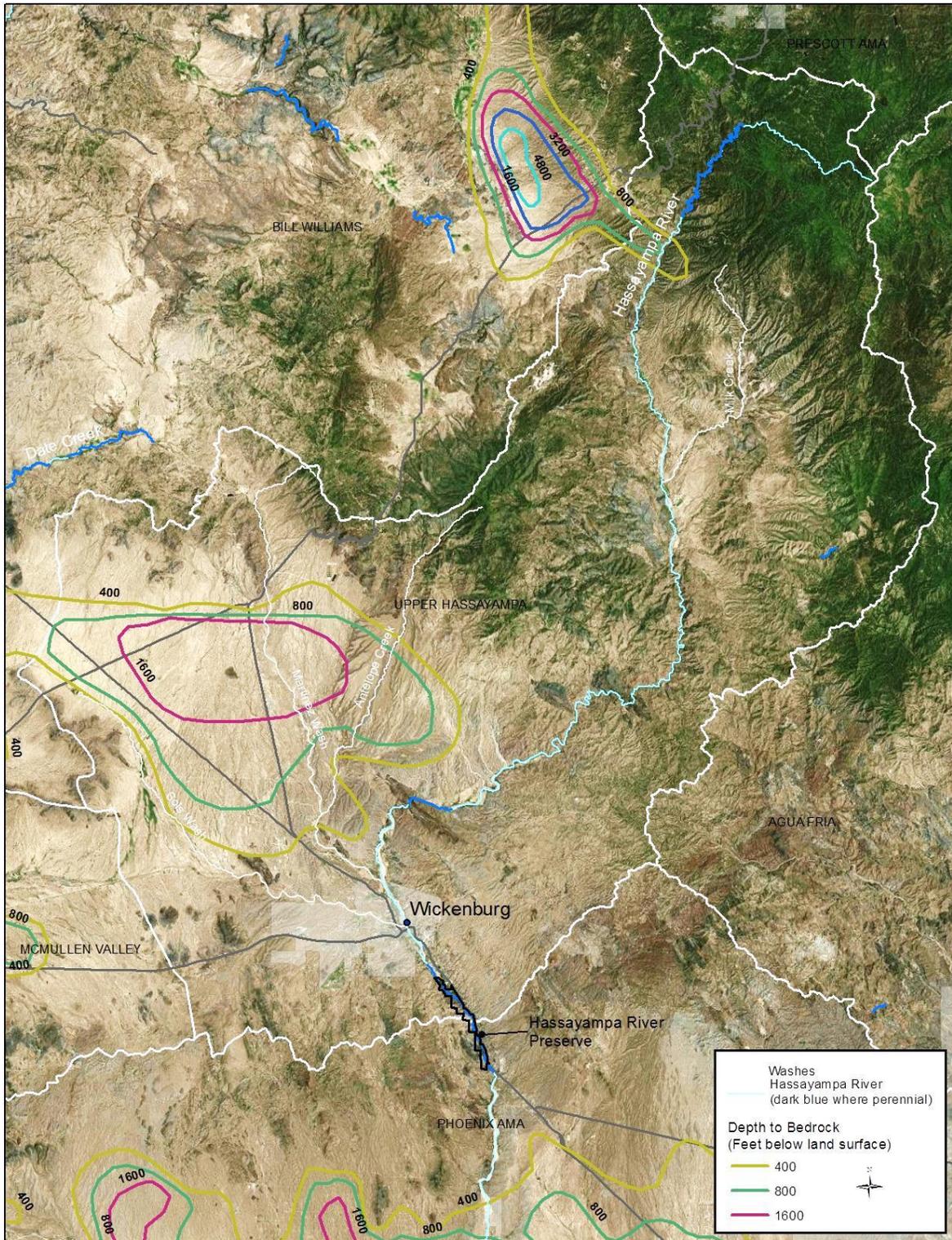


Figure 2. Hydrologic features of the Upper Hassayampa River Basin, central Arizona. The Hassayampa River drains a portion of the Bradshaw Mountains and flows from north to south through the eastern and south-central part of the basin. The western portion of the basin features a down-faulted basin filled with more than 1,600 feet of basin-fill alluvial material.

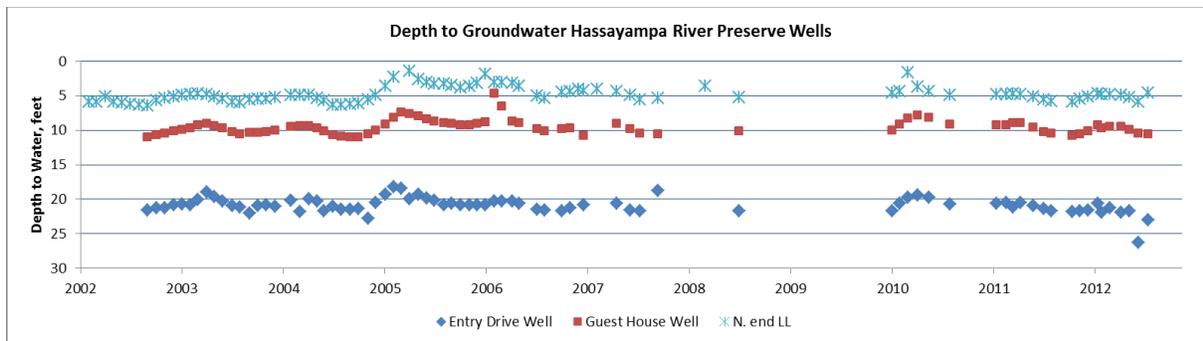


Figure 4. Depth to Groundwater in Wells at Hassayampa River Preserve.

accessed April 2016). Groundwater is pumped from the Hassayampa River aquifer by five Town-operated wells, ranging in depth from 110 to 500 feet, located near the Hassayampa River and Sols Wash. The wells' maximum pumping rates range from 450 gallons per minute (GPM) at Mariposa Well to 1,050 GPM from the Barnett Well. Five well sites pump water to six water storage tanks, with a total capacity of 4.3 million gallons of water (Blanton and Cooper 2013). This water is then distributed to customers through 55.4 miles of piping that is maintained by the Town of Wickenburg's Public Works Water Operations maintenance crews.

The Town of Wickenburg wastewater treatment plant is about one mile upstream from the Preserve. The plant has a capacity of 800,000 gallons per day and currently treats an average of 479,575 gallons of wastewater per day (537 AF/yr; 0.74 cfs) (Blanton and Cooper 2013). Treatment is secondary, using the activated sludge process. Discharge is to infiltration ponds and spray irrigation. The plant has an AZNPDES permit for discharge to the Hassayampa River (pers. comm. D. Daniels, ADEQ 2008) but the sampling requirements are laborious and plant operators rely on an Aquifer Protection Permit for discharge to infiltration basins. Large portions of central and western Wickenburg, including some older residential areas and large lot subdivisions, are without sewage collection service.

The Nature Conservancy was issued a certificate of water right for instream flow at the Hassayampa River Preserve, Certificate No. 33-92304 with a priority date of January 20, 1987 (Appendix B). The water right is expressed as specific monthly flow rates and total annual volumes as measured at two specified locations. The specific permitted flow amounts vary from two to seven cfs depending on the sample point and time of year. An instream flow certificate may provide some protection to surface flows in the case of junior surface water diverters; however, there is no protection from groundwater pumping given the bifurcated nature of Arizona water law and the lack of water rights adjudication.

The science is clear that consumptive use of groundwater removes water that would have otherwise, at some time in the future, discharged to the stream. Population growth and increase in consumptive water use is occurring and will continue into the future, as economic conditions allow. Similar to the Conservancy's work in the San Pedro and Verde River basins, the best protection for Arizona's rivers is to work in partnership with municipalities and others to develop integrated, conjunctive, science-based water management policies and plans that include consideration of nature's water needs and services.

Riparian, Riverine and Aquatic Habitats

Fremont cottonwood – Goodding willow (*Populus fremontii* – *Salix gooddingii*) forest is a subtropical riparian association found in the Sonoran desert below 4000 feet (Brown 1994). The cottonwood – willow association is restricted to the immediate floodplains of perennial streams and spring systems where they are maintained by winter flooding.

In a summary of floodplain processes that influence Sonoran Fremont cottonwood – Goodding willow riparian forest, Gori (1996) described the Hassayampa floodplain as currently supporting a diverse distribution of cottonwood – willow cohorts that extend laterally from the active channel through higher terraces. At present limited scouring of streamside herbaceous habitat occurs with 10-year return interval floods. Based on the cottonwood – willow patch model in Gori (1996), the probability of channel realignment, and thus substantial scouring of floodplain forest, increases with flood events that exceed the 10-year return interval. Gori (1996) noted that significant recruitment occurs every 10 years, on average, when large fall or winter floods are followed by one or more seasons of low flow.

Extensive mesquite bosques develop on the alluvium of old dissected floodplains (Brown 1994). Mesquite saplings (*Prosopis* sp.) and adults are abundant at the Preserve in the understory of mature cottonwood and willow stands, but little in the way of a bosque exists in the current floodplain. Most of the mesquite currently within the Hassayampa River floodplain sits on terraces at least 9 feet above the water table. Mesquite germination occurs during late summer flood events. Five-year or larger return interval floods are required to inundate the higher terraces where mesquite survivorship is thought to be highest. Portions of the current floodplain that are more likely to develop mesquite bosques, however, are also the areas where residential development exists. It is unclear whether mesquite could be more extensive absent some rehabilitation of developed floodplain areas.

Saltcedar (*Tamarisk chinensis*) occurs in relatively low abundance at the Preserve. Seed dispersal occurs later in the season than cottonwood and willow resulting in numerous seedlings along the wetted stream channel. Saltcedar is less tolerant of flood scour and burying by sediment than cottonwood and willow, but is more tolerant of drought. Thus, saltcedar persists on higher terraces when germination is stimulated by summer floods. Saltcedar tends to increase in density and cover along ephemeral reaches where its drought tolerance yields a competitive advantage over cottonwood and willow. At the Preserve saltcedar increases in abundance below Monarch Wash where surface flow begins to diminish and depth to groundwater increases.

The most likely situation in which saltcedar would increase in abundance is if large scouring floods occurred during the summer monsoon season when saltcedar begins its second period of flowering and seed dispersal. A large late-summer flood followed by several seasons of low flow would likely provide saltcedar a competitive advantage over cottonwood – willow until the next catastrophic winter flood event.

The Preserve has had an active saltcedar removal program carried out by volunteers for many years, which has successfully suppressed the saltcedar population to a low abundance and cover. Given the abundance of seed sources in the watershed, a steady effort will probably always be

necessary to maintain these conditions.

Palm Lake originally was a spring-fed cienega (Davis 1990). The “Lake” was excavated and a berm constructed ca. 1960. The Lake still contains some emergent vegetation (mainly cattail [*Typha* sp.]), but is predominantly surrounded by cottonwood, willow, palms (*Washingtonia filifera*) and some white mulberry (*Morus alba*). Based on Davis’ pollen analysis, the cottonwood, willow, and *Washingtonia* palms have been present at the Lake for less than 100 years. There are now over 100 mature palms at the Preserve. Conservancy staff and volunteers have been removing young palms and trimming mature palms near structures to reduce fire danger. Young palms are also removed to avoid a problem of encroachment into floodplain areas that, otherwise, would be occupied by cottonwood, willow, or mesquite.

The Lake was unsuccessfully used in the early 1990’s as a refugium or rearing facility for some of the Southwest’s most endangered fish, including Gila topminnow (*Poeciliopsis occidentalis*), desert pupfish (*Cyprinodon macularius*), razorback sucker (*Xyrauchen texanus*), Colorado pikeminnow (*Ptychocheilus lucius*), and bonytail chub (*Gila elegans*). A barrier erected at the spring’s source was later broken down and it is unlikely that the topminnow and pupfish still exist.

A planning effort to restore Palm Lake to a cienega was initiated in the early 1990s. The plan was abandoned due to high cost and uncertain ecological benefits. The current ponded habitat also represents a source of aquatic diversity, however (open water, emergent marsh). This source could be enhanced, particularly if palms were replaced by more typical vegetation for the site and bullfrog control was maintained (currently the bullfrogs are not present, which should be monitored to maintain conditions). The existing healthy palms do provide habitat for wildlife and are not seen as a priority to remove. However, unhealthy and new volunteer palms can be removed to prevent the spread of additional plants and reduce safety concerns. In the absence of an active restoration program, a transition to cienega habitat will likely occur due to natural accumulation of organic material. An active restoration program could be developed by MCPRD to keep Palm Lake in its current state at the time of this plan.

Birds

More than 290 avian species have been documented using the Hassayampa River Preserve, alone; 79 species have been recorded nesting on the Preserve (Appendix D). Avian data collected from southeastern Arizona (Skagen et al. 1998) suggest that forested riparian habitats such as that found at the Preserve provide critical stopover habitat for substantial numbers of neotropical migrants.

The Preserve currently provides breeding habitat for the federally protected southwestern willow flycatcher (*Empidonax traillii extimus*) and western yellow-billed cuckoo (*Coccyzus americanus occidentalis*). The flycatcher occurs on the Preserve from May through September; the cuckoo from June through September. Both species migrate to Central and South America during the non-breeding season. Conservancy staff determined that it was not necessary to re-route trails during the southwestern willow flycatcher breeding season because summer visitation is low and nests are higher in trees and located off-trail.

The flycatcher places its nest in very dense patches of willow or cottonwood/willow/saltcedar mixtures, but its territory is placed in a mosaic of dense patches and openings. While its territory is typically under 1 hectare in size, it situates its territory in larger contiguous patches. Conservancy staff have been conducting annual flycatcher surveys which show at least one nesting pair each year, along with a number of transient birds.

The western yellow-billed cuckoo inhabits large contiguous patches of mature cottonwood–willow with dense understories. Cuckoo territories are large (8 - 40 hectares) and characterized by high percent canopy closure and high foliage volumes in lower strata. Cuckoos nest within the canopy of large cottonwoods or willows. Surveys conducted in 2015 by AGFD detected 29 cuckoos with at least seven nesting territories.

Fish

In June of 1998 the AGFD sampled the upper and lower portions of the Preserve and found the following: upper end (within 200 m of the emergence of surface flow) 63 longfin dace (*Agosia chrysogaster*); lower end (just below rest area) 216 longfin dace, 5 mosquito fish (*Gambusia affinis*), 1 green sunfish (*Lepomis cyanellus*). There has been no recent sampling, but visual surveys detected only longfin dace, mosquito fish, and yellow bullheads (*Ameiurus natalis*). At present, the aquatic habitat diversity of the Hassayampa River through the Preserve is relatively low and is characterized, essentially, by one habitat type - shallow, braided channel with swift current. The lack of deeper pools precludes the long-term persistence of other species found upstream in the Hassayampa River Wilderness such as desert sucker (*Pantosteus clarki*). However, the AGFD considers the current habitat potential, combined with the relatively small number and types of exotic fish species, to provide the appropriate conditions for the reintroduction of the endangered woundfin (*Plagopterus argentissimus*). The woundfin is currently restricted to the mainstem of the Virgin River and is in decline. Although there are no historical records for woundfin in the Hassayampa, the Virgin River Fishes Recovery Team, Desert Fishes Recovery Team, and U.S. Fish and Wildlife Service all consider the Hassayampa to be within the historic range of this species. The AGFD is attempted to re-introduce woundfin into the Hassayampa River at the Preserve in 2007 but there are no recent records of them persisting. The U.S. Fish and Wildlife Service designated the Hassayampa River as an experimental, non-essential area for the woundfin in 1985, so woundfin at this site do not receive any official regulatory protections under the ESA.

Amphibians

The Hassayampa River maintains a healthy population of lowland leopard frog (*Lithobates yavapaiensis*), despite the presence of bullfrogs (*Lithobates catesbeiana*), which are non-native, invasive, and predatory. The Hassayampa leopard frogs appear to have an important genetic resistance to disease, with research showing they can tolerate high intensities of infection by chytridiomycosis with no apparent consequences (Savage et al. 2015). That fungal infection has caused massive die-offs among amphibians around the world, so understanding and maintaining this population may be globally important.

Palm Lake has been a source population for bullfrogs, which periodically show up along the mainstem Hassayampa. Bullfrog control efforts have been tried, with the goal of reducing the density in Palm Lake and emigration rates into the mainstem Hassayampa. There was no quantitative monitoring to determine the efficacy of early removal efforts. The bullfrog population appears to have greatly declined over the past five years, for reasons that are not clear.

Demographics and Stakeholders

Land Ownership

Detailed land ownership is depicted in Figure 1.

Population Characteristics

The Hassayampa River watershed has one relatively large population center, Wickenburg, and a number of smaller communities. The official population estimate for the Town of Wickenburg is 6,395 (U.S. Census Bureau, 2014 data), but local informants suggest that greater Wickenburg has approximately 9,000 year-round residents, increasing to near 13,000 in the winter months. Other population centers in the watershed typically have populations of less than 1,000. The Hassayampa River watershed lies within Maricopa and Yavapai Counties whose population growth rates are among the fastest in Arizona.

Economic Base

The upper watershed has a rich mining and ranching history, but the current economy is largely service-based, with a significant construction sector and some ranching and tourism. The lower watershed has a significantly higher proportion of private land and is in the path of development coming up Grand Avenue/Highway 60. Thus, residential construction and services for retirees are the anchors of the economy.

Stakeholders

Due to patterns of land ownership, public sector entities are significant stakeholders in the watershed. Because of the proximity of the private land to the historic surface water flows in the upper watershed, private entities may also have a large influence on the Conservancy's ability to protect riparian conservation targets.

Long-term Development Trends in the Hassayampa River Watershed

Continued population growth in Yavapai and Maricopa Counties will be the most significant driver of change within the watershed. The most visible impacts of this growth are fragmentation of the landscape, higher traffic levels on transportation routes through the watershed, and elevated levels of tourism. The watershed lies directly between the booming cities of Phoenix and Las Vegas, and is one stop on the scenic Phoenix-Sedona-South Rim

“Grand Canyon Route.”

Maricopa County has designated the 34 miles between Bell Road and the Town of Wickenburg as a Scenic Corridor, part of the Maricopa County Comprehensive Plan. It applies development standards to the land within two miles of this stretch of Grand Avenue/Highway 60, with an objective to maintain scenic beauty by “encouraging orderly and sensitive development within the scenic corridor.” Maricopa County has plans in anticipation of continued growth northwest up Highway 60 out of the Agua Fria watershed and into the Hassayampa watershed.

C. CONSERVATION PLAN

Conservation Targets

Conservation targets are species or biological communities chosen as the focus of conservation actions. The following conservation targets were selected for this planning effort.

1. Sonoran riparian deciduous habitat types along Hassayampa River and associated resident and migratory bird fauna.
2. Riverine and aquatic habitat types and associated native fish and herpetofauna.
3. Unfragmented desert landscape between river and uplands to provide habitat for medium and large mammals between Vulture Mountains and Wickenburg Mountains, and between upper and lower portions of watershed; and to provide for watershed conditions that promote proper functioning conditions within the Hassayampa River floodplain. The Conservancy will strive to address these conditions through its role as an active partner to MCPRD.

Conservation and Programmatic Goals for The Nature Conservancy

Conservation Goals

The portion of the Hassayampa River below Wickenburg that has perennial flow represents a relatively intact and functioning aquatic and riparian floodplain system. In addition, much of the uplands west of the river – and to a lesser extent east of the river - remain unfragmented desert habitat. While the desert lands adjacent to the Hassayampa comprise common desertscrub habitat, the larger intact connection of washes and pediments to a perennial river is a rare occurrence in the Sonoran desert ecoregion. The Nature Conservancy’s overall goal for this site, therefore, is to maintain system functioning (perennial flow, a variety of aquatic habitats, dynamic mosaic of riparian habitats) and the intact upland desert to river landscape.

Specific conservation goals needed to achieve the Conservancy’s overall goal include:

1. Maintain quantity and quality of existing base flows in Hassayampa River.
2. Maintain, or restore where needed, natural river floodplain morphology and patch dynamics

for all riparian, riverine, and wetland types identified in site ecological studies.

3. The Conservancy will strive to maintain unfragmented desert uplands and connection between river and wash/pediment complexes to the west and east.
4. Maintain and enhance, where necessary and feasible, existing populations of all rare (G1/T1-G3/T3) and Federal and State listed species, including those proposed for reintroduction.

Programmatic Goal

1. Maintain partnerships with Maricopa County Parks and Recreation Department, and other public agencies and private entities where appropriate, to identify common conservation objectives, to raise awareness about ecological significance of and threats to the site, and to develop initiatives to accomplish conservation goals. The Hassayampa River Preserve provides an important interface between the urban Phoenix metropolitan area and a natural landscape along the Hassayampa River. Therefore, it provides a platform for addressing challenges associated with protecting natural and ecological features in an urbanizing landscape.

Stress Assessment

The Conservancy identified and ranked the primary stresses affecting conservation targets, and determined the likely sources of stress. Whereas stresses are the biological, ecological, and physical phenomena that threaten the viability conservation targets, sources are the probable underlying causes for a stress. Understanding the sources provides the foundation for taking corrective action through the development of conservation strategies.

A stress assessment for the Hassayampa site is outlined in Table 1. That assessment identifies stresses, the likely sources of each stress, the conservation targets affected, and the likely impact of the stress on conservation targets. An assessment of the urgency and need to act is also provided. Here, the analysis is further refined, focusing on the highest priority stresses/sources identified.

Several critical stresses are identified in Table 1 as having the highest potential to adversely affect conservation targets and substantially reduce the Conservancy's ability to accomplish stated conservation goals. These include:

- (1) Reduced base flows and lowered groundwater table in Hassayampa River from groundwater pumping in the upper Hassayampa River basin, especially in the floodplain alluvium of the Hassayampa River and Sols Wash.

The dramatic improvement in riparian habitat diversity and extent within the Preserve since the Conservancy acquired the property in 1986 is testament to the high level of hydrological and ecological functioning still present within the system. Based on a preliminary water budget, the Preserve is actually the largest beneficiary of water at present with evapotranspiration by riparian vegetation accounting for 14% of water that exits the system

as compared to a total of 6% used for municipal, agriculture, and mining uses (Jenkins 1989). These numbers should be viewed cautiously, however, for adequate data is not yet available to develop the comprehensive water budget needed to understand all relevant inputs and outputs nor to model impacts from increased water use, regardless of the source.

Even in the absence of more comprehensive water data, population trends for Wickenburg and Yavapai and Maricopa Counties suggest that human water consumption will grow. With the Hassayampa River being the sole water source for the area, water that currently supports the riparian, riverine, and aquatic conservation targets will likely be affected by increasing human demands.

(2) Loss of riparian community diversity and extent from catastrophic fire.

The greatest short-term threat to riparian and aquatic conservation targets is from catastrophic fire. The sources of fire are varied, but the greatest risk comes from the railroad. Regardless of the source, catastrophic fire has the potential to eliminate cottonwood – willow habitat, mesquite, and other riparian habitat types, extirpate rare bird and fish species, substantially reduce the populations of more common riparian obligate species, and potentially result in entrenchment of the floodplain and reduce floodplain capacity and functioning. While the system would recover over time, time to recovery might be slow and complicated by the spread of saltcedar and other exotics. A fire plan exists but is somewhat dated. It is focused on defensible space around buildings, and on limiting fuels between the buildings and the highway. Conservancy staff have had discussions with the local fire department about access, but no formal agreements exist.

(3) Loss of unfragmented desert upland to river landscape from residential development immediately adjacent to the Preserve, sub-division of State Trust Lands, and the new Interstate 11.

Table 1. Stress/Source assessment for the Hassayampa River Preserve.

STRESS	SOURCE OF STRESS	CONSERVATION TARGETS AFFECTED	IMPACT OF STRESS	URGENCY OF NEED TO ACT (PRIORITY)
1. Reduced base flow and lowered groundwater table in Hassayampa River	Groundwater pumping by town of Wickenburg and by private water companies serving residents not connected to Town water (Offsite water use is not a part of the County's management requirements for this plan)	<ul style="list-style-type: none"> Sonoran deciduous riparian forest & associated resident and migratory fauna Riverine & aquatic community 	<ul style="list-style-type: none"> Loss and fragmentation of riparian vegetation; increase in distribution and abundance of saltcedar Decreases in abundance of riparian-dependent avifauna Extirpation of southwestern willow flycatcher and yellow-billed cuckoo Reduction or extirpation of longfin dace Reduced probability of successful introduction of woudfin Overall decrease in aquatic invertebrate diversity 	<p>Adverse impacts to flows have not been observed at current pumping levels, but are likely to occur with increasing population. Time to evaluate potential impacts is now.</p> <p style="text-align: center;">(High)</p>
	Loss of effluent discharge from Wickenburg sewage treatment plant	Same as above	Same as above	<p>Market value of effluent likely to increase as Wickenburg grows.</p> <p style="text-align: center;">(High)</p>
	Stream entrenchment	Same as above	Same as above	<p>River has been aggrading. Probability of entrenchment low.</p> <p style="text-align: center;">(Low)</p>
	Drought	Same as above	<ul style="list-style-type: none"> Reduced abundance of all conservation targets; extirpation possible for rarest. Increase potential for fire to impact cottonwood – willow 	<p>Will occur. Updated fire plan critical.</p> <p style="text-align: center;">(High)</p>
2. Fire	Railroad on west side of Preserve	<ul style="list-style-type: none"> Sonoran riparian deciduous forest and associated resident and migratory fauna Riverine and aquatic community Unfragmented desert landscape 	<ul style="list-style-type: none"> Impacts dependent on size of fire, ranging from minimal with a small fire to catastrophic with large fire. Fire likely to result in increase in saltcedar. 	<p>Updated fire plan critical.</p> <p style="text-align: center;">(High)</p>
	Trespass in Rest Area	Same as above	Same as above	Same as above
	Accidental event originating from dense residential areas bordering Preserve	Same as above	Same as above	Same as above
	Accidental event originating from Highway 93 (cigarette, burning vehicles)	Same as above	Same as above	Same as above

STRESS	SOURCE OF STRESS	CONSERVATION TARGETS AFFECTED	IMPACT OF STRESS	URGENCY OF NEED TO ACT (PRIORITY)
	Lightning	Same as above	Same as above	
3. Loss/degradation of riparian and aquatic habitats (sources other than hydrological modifications, fire, or drought)	Conversion of floodplain habitat to residences, agriculture, or other incompatible uses	<ul style="list-style-type: none"> • Sonoran riparian deciduous forest and associated resident and migratory fauna • Riverine & aquatic community • Unfragmented desert landscape 	<ul style="list-style-type: none"> • Habitat loss and fragmentation at northern end and middle portion of Preserve. • Reduction in abundance and distribution of terrestrial and aquatic conservation targets. 	Priority to identify key tracts where concerns are greatest and determine feasibility of and strategy for protection. (Medium)
	Channelization or bank-stabilization efforts	Same as above	<ul style="list-style-type: none"> • Loss of floodplain function • Loss of riparian habitat where structure is placed. • Potential loss of floodplain function and habitat upstream and downstream of structure. • Increased velocity of flows from tributaries subject to channelization may increase scouring and floodplain destabilization within Hassayampa River proper. 	Bank stabilization restricted to certain properties; channelization occurring within tributaries on east side: Calamity Wash. (Low)
	Trespass cattle grazing and trampling	<ul style="list-style-type: none"> • Sonoran riparian deciduous forest and associated resident and migratory fauna • Riverine & aquatic community 	<ul style="list-style-type: none"> • Loss and fragmentation of riparian vegetation; increase in distribution and abundance of saltcedar • Decreases in abundance of riparian-dependent birds 	Ongoing management need to maintain fences, evict cattle. (Medium)
4. Decreases in water quality	Increases in surface runoff from man-made surfaces	<ul style="list-style-type: none"> • Sonoran riparian deciduous forest and associated resident and migratory fauna • Riverine & aquatic community 	<ul style="list-style-type: none"> • Increases in levels of total dissolved solids could result in increases in distribution and abundance of saltcedar. • Declines or extirpation of fish and aquatic invertebrates. • Indirect effect to riparian-dependent birds through changes in vegetation composition. 	Unknown potential; lack of data, but potential increases with urbanization. (Low)
	Toxic spill on Highway 60/93	<ul style="list-style-type: none"> • Riverine & aquatic community 	<ul style="list-style-type: none"> • Declines in fish, aquatic inverts, and amphibian populations. 	Unknown potential; lack of data. (Low)
	Inadequate septic systems	<ul style="list-style-type: none"> • Riverine & aquatic community 	<ul style="list-style-type: none"> • Declines in fish, aquatic inverts, and amphibian populations. 	Unknown potential; lack of data. (Low)
	Lead contamination from Vulture Mill site 2 miles above Preserve	<ul style="list-style-type: none"> • Riverine & aquatic community 	<ul style="list-style-type: none"> • Declines in fish, aquatic inverts, and amphibian populations. 	Probable low potential based on ADEQ data and planned response. (Low)

STRESS	SOURCE OF STRESS	CONSERVATION TARGETS AFFECTED	IMPACT OF STRESS	URGENCY OF NEED TO ACT (PRIORITY)
5. Loss of unfragmented desert upland to river landscape	Sub-division of State Trust land	<ul style="list-style-type: none"> Desertscrub uplands, medium and large mammals that are area sensitive 	<ul style="list-style-type: none"> Increases in the distribution and number of roads and houses will result in habitat loss of upland desertscrub and limit movement corridors for area sensitive species such as mule deer, mountain lion, javelina. Increases in roads and houses may result in degradation of watershed quality accelerating erosion, reducing groundwater infiltration, and aquifer recharge. Loss of unfragmented, functioning upland to river landscape will reduce overall ecological value of Hassayampa Preserve. 	Conversion of key State Trust land sections to BLM lands, or other protected status, should be high priority. (High)
	Development of I-11 through Wickenburg	<ul style="list-style-type: none"> Desertscrub uplands, medium and large mammals that are area sensitive 	<ul style="list-style-type: none"> Magnitude and type of impact depends on route selected, how washes are spanned, and how exits and associated development (e.g. commercial strip, subdivisions) are zoned. 	High priority to send ADOT appropriate signals as to TNC's preferred option. (High)
6. Exotic species	Summer flood-induced increase in Saltcedar	<ul style="list-style-type: none"> Sonoran riparian deciduous forest and associated resident and migratory fauna Riverine & aquatic community 	<ul style="list-style-type: none"> Difficult to adequately assess without monitoring data. Potential high for short-term changes in the relative abundance and distribution of saltcedar vs native trees and shrubs. Greatest impact likely to result from synergistic interactions with catastrophic fire and/or drought. 	Few effective strategies to minimize potential other than minimizing catastrophic fire. (Low)
	Increase in abundance and diversity of non-native fish.	<ul style="list-style-type: none"> Riverine and aquatic community 	<ul style="list-style-type: none"> Predation on and competition with native fish. 	Control of non-native fish is difficult, expensive, and usually only temporary. Would only be a priority as part of a larger fish management plan. (Low)
	Spread of <i>Washingtonia</i> palms and white mulberry	<ul style="list-style-type: none"> Sonoran riparian deciduous forest and associated resident and migratory fauna 	<ul style="list-style-type: none"> Small number of aesthetically-pleasing palms around the Visitor Center is probably not of concern, but potential for palms to spread is a threat to distribution of cottonwood-willow and mesquite. <i>Washingtonia</i> provide nesting habitat for exotic bird species. 	Judicious thinning of larger palms and saplings probably of greater benefit than pulling saltcedar. (Moderate)

Conservation Zones

Five conservation zones providing the conservation context for the Hassayampa River Preserve and environs are depicted on Figure 5.

Zone 1 comprises the primary riverine and riparian ecological area surrounding the Preserve (approximately 5 miles of the Hassayampa River), including the perennial reach of the Hassayampa River laterally out to the 100-year floodplain, which captures all existing and potential riverine, aquatic, and riparian habitats.

Zone 2 forms an alluvial aquifer buffer zone as well as a movement corridor for wildlife between the upper and lower portions of the watershed. It includes approximately 8 miles of the intermittent portion of the Hassayampa River (laterally to the 100-year floodplain) upstream of the Preserve and approximately 5 miles downstream; it also includes the lower 5 miles of Sols Wash where additional groundwater pumping may impact flows in the Hassayampa mainstem.

Zone 3 includes all of the currently unfragmented desertscrub uplands to the east and west of the Preserve extending laterally to the watershed boundary. This is the primary ecological zone for protecting the unfragmented desertscrub that surrounds the greater Wickenburg area. It is comprised mostly of BLM and State Trust lands with some private lands adjacent to the Preserve.

Zone 4 includes all of the urban, residential, or otherwise developed lands in Wickenburg and adjacent to the Preserve. This zone more appropriately delineates an urban area where ecological values are highly compromised. However, Sols Wash represents an important alluvial aquifer and source of Town of Wickenburg water.

Zone 5 includes the upper portion of the watershed where activities may adversely affect conservation targets downstream in Zones 1, 2, and 3.

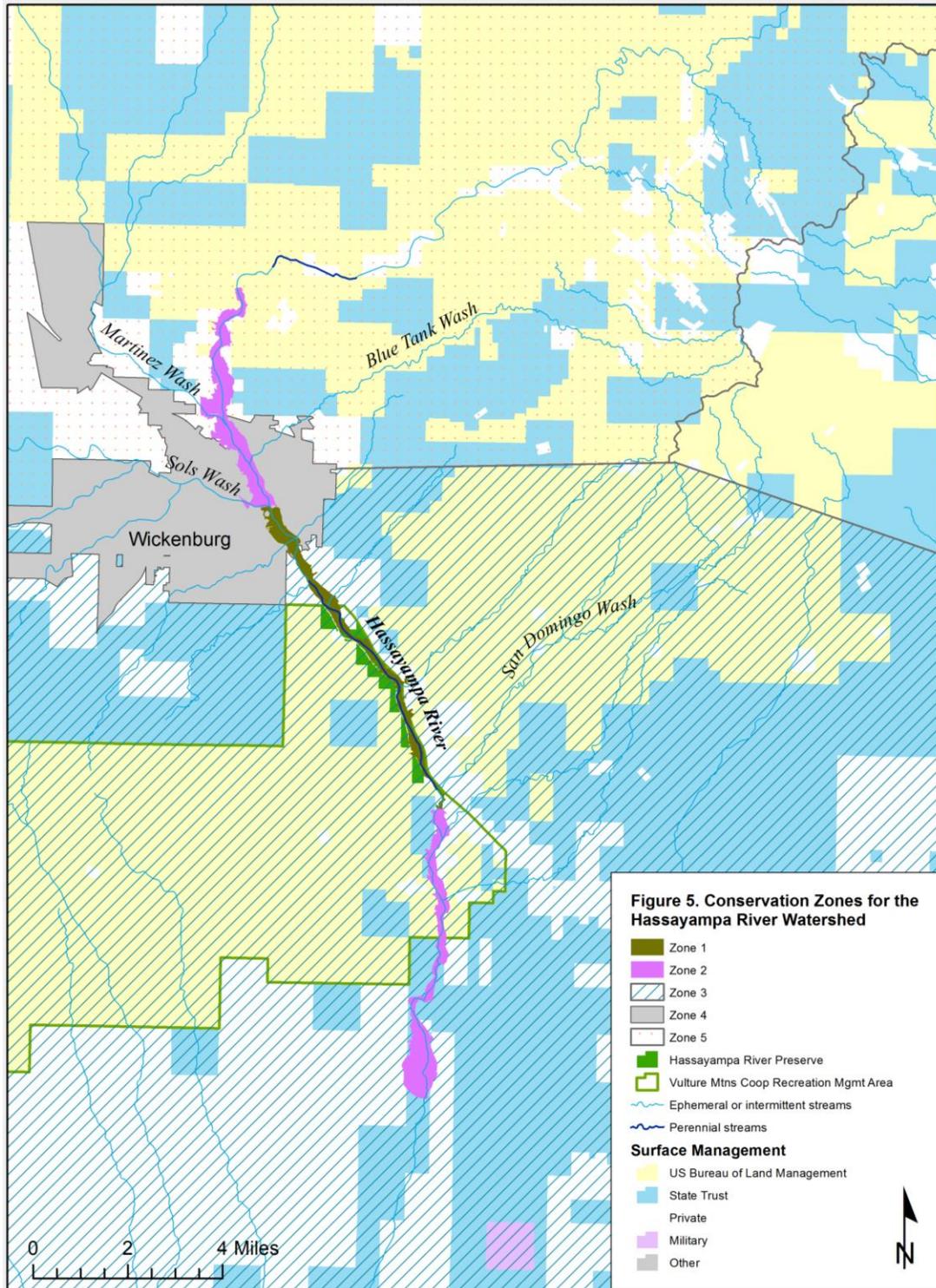


Figure 5. Conservation Zones for the Hassayampa River Watershed, providing the conservation context for the Hassayampa River Preserve and environs.

Conservation Strategies

1. If resources permit, the Conservancy may work with Wickenburg, Maricopa County, BLM, and other partners to protect flows in the Hassayampa River. This could include water conservation, use of treated effluent, and location of groundwater pumping to minimize declines and maintain riparian conditions and base flow in the river.
2. The Conservancy and MCPRD will jointly establish clear, legally-enforceable conservation easement terms to protect, in perpetuity, the conservation values of the property transferred to Maricopa County. This should include limits on water extraction, constraints on where vegetation can be removed for buildings and other infrastructure, and limits on permitted activities that would degrade the riparian plant and animal community. Similar terms should be included in any lease agreement for the county's management of the remaining property.
3. The Conservancy will work with MCPRD to develop metrics for a Limits of Acceptable Change framework for monitoring, with an emphasis on groundwater elevations, surface water flows, and riparian vegetation conditions.

Monitoring Needs

1. Hydrologic monitoring of streamflow, outflow from springs, and groundwater depth on the Preserve. Stream and groundwater monitoring has been conducted by the Conservancy, while spring monitoring would be new. These will be critical to understanding the key driver for riparian habitat conditions, are necessary for defending the existing instream flow right, and provide essential information for discussions with other water users in the area. MCPRD will do future data collection, and as resources permit the Conservancy will assist with training, data archiving, and analysis.
2. Annual surveys of the Preserve to document presence and breeding status of the southwestern willow flycatcher and western yellow-billed cuckoo. These have been conducted by the Conservancy (flycatcher) and AGFD (cuckoo). AGFD should conduct these surveys in the future.
3. Periodic vegetation monitoring to track major changes in riparian habitat. Staff from the Conservancy conducted vegetation transects and plot measurements in 2000, but these have not been repeated. Similar monitoring using the same protocols is conducted every five years at the Conservancy's San Pedro River Preserve. MCPRD will do future data collection, and as resources permit the Conservancy will do training, data archiving, and analysis.
4. Annual conservation easement compliance monitoring. This will be done by the Conservancy to meet its legal obligations for holding a conservation easement, and will focus on the specific terms and conditions established in the easement. The Conservancy will also conduct annual monitoring for conditions on the remainder of the Hassayampa River Preserve that will be leased by MCPRD but remain in Conservancy ownership.

Research Needs

1. Develop a comprehensive water budget for the Upper Hassayampa River basin.
2. Research on leopard frog and bullfrog ecology. Why did bullfrogs disappear from the Preserve? How has this population of leopard frogs persisted, despite predatory bullfrogs and fish?

Management Needs

1. Develop new or updated fire management plan.
2. Work with AGFD to develop appropriate wildlife management plans.
3. Removal of saltcedar to prevent competition with cottonwood, willow, and mesquite.
4. Removal of young palm trees to prevent competition with cottonwood, willow, and mesquite.
5. Trimming mature palms near structures to reduce fire danger.
6. Repair of broken fences to prevent trespass cattle and vehicles.
7. Trapping and removal of trespass cattle.

D. PLAN PREPARATION

This site conservation plan represents a revision of the Preserve Design Plan prepared by The Nature Conservancy for the Hassayampa River Preserve in 1990 and amended in 1994 and 1998.

This plan is meant to be reviewed annually by Preserve staff and to be used as a tool to create annual work plans, determine research and monitoring projects, and other administrative uses.

This plan should be updated, in partnership with the Conservancy, at least every five years or as conditions warrant.

2016 Plan Update by

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2016 Maps Prepared by

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1998 Plan Prepared by

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Appendix A. Annual water budget for Hassayampa River. This covers the reach from Box Damsite to Morrystown gages (Jenkins 1989).

Accountable Inputs		(cfs)	(ac-ft/yr)	(%)
	Surface Discharge at Box Damsite	24.0	17,345	93%
	Alluvial Subflow at Box Damsite	1.6	1,156	6%
	Effluent Returns	0.3	217	1%
	Total Accountable Inputs	25.9	18,718	100%
Accountable Outputs	Surface Discharge at Morrystown	17.0	12,286	66%
	Alluvial subflow at Morrystown	0.5	361	2%
	Municipal Well Withdrawals	0.9	650	3%
	Evapotranspiration Losses	3.7	2,655	14%
	Irrigation, Stock, and Mining	0.8	578	3%
Unaccountable Outputs		3.0	2,188	12%
	Total Outputs	25.9	18,718	100%
Balance (Input - Output)		0.0	0.0	

Appendix B. Hassayampa River Preserve Water Rights

Wells:

Registration #	File #	Drill Date	Depth to Water	Use	Location
55-535404	B(7-4)20caa	6/4/1992	100	Domestic	NE4 SW4 Sec 20 T7N R4W

Surface Claims:

36-67941

Claims 200 afa from Hassayampa for stockwater, recreation, domestic and commercial use. Point of Diversion is within the NW SE Section 20, T7N R4W.. Place of Use is within the NW SE Section 20, T7N R4W. Priority date is approximately 1850. It was assigned to The Nature Conservancy in 1987.

Adjudication Claims:

39-38039

Associated filing 36-67941. A claim for 200 acre feet per annum used for stockwater and recreation.. The source of water is groundwater which is conveyed by ditch. Some water is also pumped using well 55-650140. The priority date is approximately 1850 and the Statement of Claim was filed by The Nature Conservancy in 1987.

39-36904

Associated with filing 33-92304 for Instream Flow in the Hassayampa River. It is a claimed right for 5-10 cfs to maintain base flows. The priority date is 1986, upon The Nature Conservancy's acquisition of the property.

Instream Flow Certificate:

33-92304

Certificated instream flow water right for the Hassayampa River stretch, applies to two locations, an Upper and Lower reach of the Hassayampa River.

Certificate of Water Right



Arizona Department of Water Resources
500 North Third Street
Phoenix, Arizona 85004

This is to Certify, that The Nature Conservancy, of Tucson, Arizona, has made proof to the satisfaction of the Department of Water Resources of a right to the use of the waters flowing in the Hassayampa River, for wildlife, including fish, under Application and Permit No. 33-92304. The right to the use of the waters was perfected in accordance with the laws of Arizona; the priority of the water right dates from January 20, 1987; the amount of water to which such right is entitled for the stated purpose is limited to an amount actually beneficially used for such purpose, but shall not exceed an amount, as listed below, expressed as specific monthly flow rates and total annual volumes as measured at the specified measuring points only. The upper Hassayampa River measuring point is located in the Northwest quarter of the Northeast quarter of the Southwest quarter (NW $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$), Section 20 and the lower Hassayampa River measuring point is located in the Northeast quarter of the Southeast quarter of the Southwest quarter (NE $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$), Section 28, both in Township 7 North, Range 4 West, Gila and Salt River Base and Meridian.

MONTH	UPPER HASSAYAMPA		LOWER HASSAYAMPA	
	FLOW RATE (CUBIC FEET/SEC)	MONTHLY VOLUME (ACRE FEET/MONTH)	FLOW RATE (CUBIC FEET/SEC)	MONTHLY VOLUME (ACRE FEET/MONTH)
January	2.63	161.7	6.51	400.2
February	2.85	158.2	5.85	324.8
March	3.66	225.0	4.31	264.9
April	3.91	232.6	5.42	322.4
May	2.59	159.2	6.89	423.5
June	2.04	121.4	2.22	132.1
July	2.15	132.2	3.15	193.6
August	1.96	120.5	3.10	190.6
September	1.96	116.6	3.71	220.7
October	1.79	110.0	4.12	253.3
November	2.00	119.0	4.43	263.5
December	2.24	137.7	4.14	254.5
Total Annual Volume (acre feet/year)		1794.1	3244.1	

Location of the place of use: Water will not be diverted from the natural channel of the Hassayampa River. The beneficial use for wildlife, including fish, will occur instream along the meandering course of the natural channel of the Hassayampa River, beginning within the upper Hassayampa River in the Northeast quarter of the Northeast quarter (NE $\frac{1}{4}$ NE $\frac{1}{4}$), Section 19, the Northwest quarter of the Northwest quarter (NW $\frac{1}{4}$ NW $\frac{1}{4}$), the Southwest quarter of the Northwest quarter (SW $\frac{1}{4}$ NW $\frac{1}{4}$), the Northwest quarter of the Southwest quarter (NW $\frac{1}{4}$ SW $\frac{1}{4}$), the Northeast quarter of the Southwest quarter (NE $\frac{1}{4}$ SW $\frac{1}{4}$), the Northwest quarter of the Southeast quarter (NW $\frac{1}{4}$ SE $\frac{1}{4}$), the Southwest quarter of the Southeast quarter (SW $\frac{1}{4}$ SE $\frac{1}{4}$), the Southeast quarter of the Southeast quarter (SE $\frac{1}{4}$ SE $\frac{1}{4}$), Section 20, the Northeast quarter of the Northeast quarter (NE $\frac{1}{4}$ NE $\frac{1}{4}$), Section 29, the Southwest quarter of the Northwest quarter (SW $\frac{1}{4}$ NW $\frac{1}{4}$) and ending in the Northeast quarter of the Southwest quarter (NE $\frac{1}{4}$ SW $\frac{1}{4}$), Section 28, and beginning within

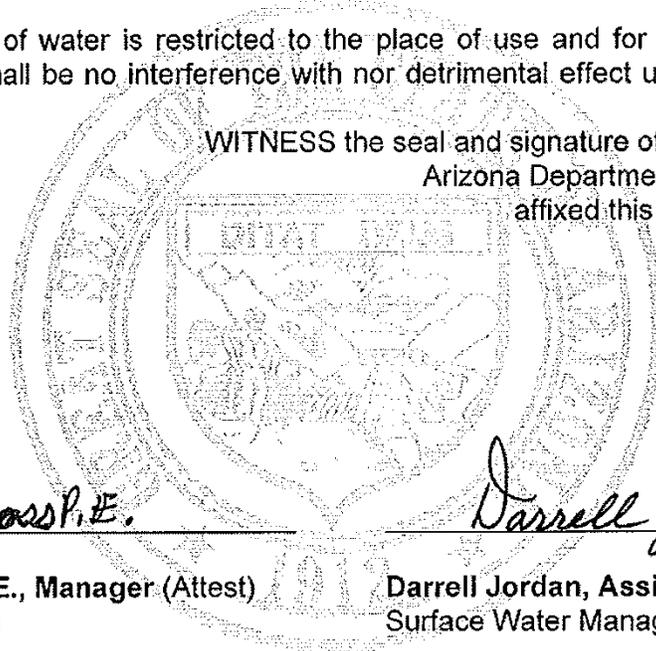
the lower Hassayampa River in the Southeast quarter of the Southwest quarter (SE¼SW¼), Section 28, the Northeast quarter of the Northwest quarter (NE¼NW¼), the Northwest quarter of the Northeast quarter (NW¼NE¼), the Southwest quarter of the Northeast quarter (SW¼NE¼), the Northwest quarter of the Southeast quarter (NW¼SE¼), the Southeast quarter of the Southeast quarter (SE¼SE¼), Section 33, Township 7 North, Range 4 West; and the Northwest quarter of the Northwest quarter (NW¼NW¼) and ending in the Southwest quarter of the Northwest quarter (SW¼NW¼), Section 3, Township 6 North, Range 4 West, Gila and Salt River Base and Meridian, Yavapai County, Arizona.

There shall be no impoundments of public waters nor interference with the natural surface water flow occurring along the described reach of the stream channel.

There shall be no consumptive use of public waters or degradation of water quality, other than is caused by natural habitat (flora and fauna).

The right to the use of water is restricted to the place of use and for the purpose described previously. There shall be no interference with nor detrimental effect upon prior vested water rights.

WITNESS the seal and signature of the Assistant Director,
Arizona Department of Water Resources,
affixed this 12th day of July, 2000.



Donald J. Gross, P.E.

Donald J. Gross, P.E., Manager (Attest)
Surface Water Rights

Darrell Jordan

Darrell Jordan, Assistant Director
Surface Water Management Division

The Department of Water Resources shall be notified of any change of address for the above named person(s), or if ownership of the water right or of the land at the location of the water right is conveyed to another person(s), pursuant to Arizona Revised Statute § 45-164(B).

Appendix D: Checklist of birds found at the Hassayampa River Preserve.



Hassayampa River Preserve Wickenburg, AZ

New Checklist of Birds

Originally published 1987, Rev. 1989, Rev. 2006-16

The 770-acre Hassayampa River Preserve is owned by The Nature Conservancy (TNC) in Arizona. **The mission of TNC is to conserve the lands and waters on which all life depends.**

This 291-species checklist is based on the **American Ornithologists' Union (AOU) 2015 list**. It includes 216 species with monthly observations according to the legend at the beginning of the checklist. Rare species in the checklist include banded birds and those observed at least four times. The 75 Rare/Accidental species at the end of the checklist represent those seen fewer than five times during the last ten years and not banded.

The original checklist was created in 1987 by Jeffrey Cooper, then HRP Naturalist, from many contributions. Over the years, a log was kept of observations including the Christmas Bird Counts, the May Migratory Bird Day counts, our year-round bird-banding program and confirmed sightings by visitors. This newest list is based on the original, modified by these observations over the last ten years and revised bird order per the new AOU list with DNA order modifications.

Date: _____ Time: _____

Weather: _____

Observer(s): _____

Notes: _____

Bird ID	J	F	M	A	M	J	J	A	S	O	N	D
Rose-breasted Grosbeak												
Black-headed Grosbeak												
Blue Grosbeak												
Lazuli Bunting												
Indigo Bunting												
BLACKBIRDS & ORIOLES												
Red-winged Blackbird												
Western Meadowlark												
Yellow-headed Blackbird												
Brewer's Blackbird												
Great-tailed Grackle												
Bronzed Cowbird												
Brown-headed Cowbird												
Hooded Oriole												
Bullock's Oriole												
Scott's Oriole												
FINCHES												
Cassin's Finch												
House Finch												
Pine Siskin												
Lesser Goldfinch												
Lawrence's Goldfinch												
American Goldfinch												
House Sparrow												

Bird ID	J	F	M	A	M	J	J	A	S	O	N	D
American Bittern												
American Dipper												
Bank Swallow												
Black-chinned Sparrow												
Black-shouldered Kite												
California Gull												
Canada Warbler												
Cliff Swallow												
Crested Caracara												
Eastern Bluebird												
Eastern Meadowlark												
Evening Grosbeak												
Gray-headed Junco												
Great Crested Flycatcher												
Hooded Warbler												
Kentucky Warbler												
Least Bittern												
Le Conte's Thrasher												
Long-billed Curlew												
Mississippi Kite												
Neotropical Cormorant												
Ovenbird												
Painted Bunting												
Phoebe Jay												
Pygmy Nuthatch												
Red-breasted Sapsucker												
Red-faced Warbler												
Ring-billed Gull												
Sage Sparrow												
Semi-palmated Plover												
Snow Goose												
Sprague's Pipit												
Thick-billed Kingbird												
Vesper Sparrow												
Western Sandpiper												
Whip-poor-will												
White-tailed Kite												

01/07/16 JA DB

Bird ID	J	F	M	A	M	J	J	A	S	O	N	D
MOCKINGBIRDS & THRASHERS												
Curve-billed Thrasher												
Brown Thrasher												
Bendire's Thrasher												
Grassl Thrasher												
Sage Thrasher												
Northern Mockingbird												
STARLINGS												
European Starling												
WAGTAILS & PIPITS												
American Pipit												
WAXWINGS												
Cedar Waxwing												
SILKY FLYCATCHERS												
Phainopepla												
WOOD-WARBLERS												
Worm-eating Warbler												
Northern Waterthrush												
Black & White Warbler												
Tennessee Warbler												
Orange-crowned Warbler												
Lucy's Warbler												
Nashville Warbler												
Virginia's Warbler												
MacGillivray's Warbler												
Kentucky Warbler												
Common Yellowthroat												
American Redstart												
Northern Parula												
Yellow Warbler												
Chestnut-sided Warbler												
Yellow-rumped Warbler												
Black-throated Gray W.												
Townsend's Warbler												
Hermit Warbler												
Wilson's Warbler												
Painted Redstart												
Yellow-breasted Chat												

Bird ID	J	F	M	A	M	J	J	A	S	O	N	D
NEW-WORLD SPARROWS & ALLIES												
Green-tailed Towhee												
Spotted Towhee												
Canyon Towhee												
Albert's Towhee												
Rufous-crowned Sparrow												
Chipping Sparrow												
Brewer's Sparrow												
Lark Sparrow												
Black-throated Sparrow												
Savannah Sparrow												
Fox Sparrow												
Song Sparrow												
Lincoln's Sparrow												
Swamp Sparrow												
White-throated Sparrow												
White-crowned Sparrow												
Dark-eyed Junco (Region)												
TANAGERS												
Hepatic Tanager												
Summer Tanager												
Western Tanager												
CARDINALS, GROSBEAKS, & ALLIES												
Northern Cardinal												
Pyrrhuloxia												

