

Horseshoe and Bartlett Reservoirs Habitat Conservation Plan Annual Report 2016



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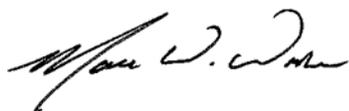
Appendix A. Southwestern willow flycatcher and yellow-billed cuckoo surveys at Fort Thomas, Arizona, 2016.¹

Appendix B. Fort Thomas Preserve Photo Point Monitoring 2016

¹Locations of endangered species are sensitive data considered confidential by U.S. Fish and Wildlife Service.

CERTIFICATION

Under penalty of law, I certify that, to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of this report, the information submitted is true, accurate, and complete.



January 20, 2017

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Date

1. Introduction

On May 30, 2008, the U.S. Fish and Wildlife Service (FWS) issued an Incidental Take Permit (ITP) pursuant to Section 10(a)(1)(B) of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended, to Salt River Project (SRP) for southwestern willow flycatcher (*Empidonax traillii extimus*) (“flycatcher”), yellow-billed cuckoo (*Coccyzus americanus*) (“cuckoo”), bald eagle (*Haliaeetus leucocephalus*), razorback sucker (*Xyrauchen texanus*), Colorado pikeminnow (*Ptychocheilus lucius*), Gila topminnow (*Peociliopsis occidentalis occidentalis*), spikedace (*Meda fulgida*), loach minnow (*Tiaroga cobitis*), roundtail chub (*Gila robusta*), longfin dace (*Agosia chrysogaster*), Sonora sucker (*Catostomus insignis*), desert sucker (*Catostomus clarki*), speckled dace (*Rhinichthys osculus*), lowland leopard frog (*Lithobates yavapaiensis*), northern Mexican gartersnake (*Thamnophis eques megalops*), and narrow-headed gartersnake (*Thamnophis rufipunctatus*). The activity covered by the ITP is the continued operation by SRP of Horseshoe and Bartlett dams and reservoirs. The ITP is conditioned upon SRP’s implementation of the Horseshoe and Bartlett Reservoirs Habitat Conservation Plan (“H-B HCP”) (Salt River Project 2008).

The H-B HCP provides measures to minimize and mitigate incidental take of the 16 species listed above “to the maximum extent practicable and ensures that incidental take will not appreciably reduce the likelihood of the survival and recovery of these species in the wild” (FWS 2008). Flycatcher and cuckoo (covered bird) mitigation efforts include operation of Horseshoe Reservoir to support tall dense vegetation at the upper end of the reservoir and off-site acquisition and management of suitable nesting habitat. Minimization and mitigation efforts for covered native fish, frog, and gartersnake (aquatic species) includes operation of Horseshoe Reservoir to minimize non-native fish production, stocking of covered native fish, and supporting stream and water supply protection projects in the Verde River watershed.

2. Annual Reporting Requirements

Obligation: SRP is required to submit an annual report to the FWS, City of Phoenix, Arizona Game and Fish Department (AGFD), and U.S. Forest Service (USFS) describing all H-B HCP activities occurring during the past year. A draft report must be sent to FWS prior to the annual meeting in October/November of each year. The report is to be finalized by February 1 of the following year.

Actions: SRP submits this report to the FWS, City of Phoenix, AGFD, and USFS to fulfill the annual reporting requirement. The report covers all activities relating to the H-B HCP from November 1, 2015 through October 31, 2016, including a summary of reservoir operations, management activities, monitoring results, status reports, and planned future activities.

3. Horseshoe Lake Operation ITP Compliance

a. Horseshoe and Bartlett Operation Summary

Obligation: SRP is required in this annual report to provide a summary of reservoir operations.

Action: Below is a summary of reservoir operations from SRP hydrologists for the 2016 water year (October 2015–September 2016).

Summary: The continuing drought and maintenance projects on the Verde system reservoirs had the greatest influence on the reservoirs in water year 2016. In general, El Niño and La Niña conditions can have a significant influence on the yearly winter weather in Arizona. El Niño conditions (warmer than normal sea surface temperatures in the equatorial eastern Pacific

Ocean) tend towards wetter weather conditions and La Niña conditions (cooler than normal sea surface temperatures in the equatorial eastern Pacific Ocean) tend towards dryer weather conditions. Sea surface temperatures in the equatorial Pacific were in a strong El Niño Southern Oscillation (ENSO) state as we entered water year 2016. Unfortunately, the anticipated boost in precipitation and subsequent runoff from the strong El Niño conditions in the winter of 2016 did not materialize making this past season the sixth consecutive winter producing below median runoff. Runoff this winter was just 63% of median and totaled about 10,000 acre-feet more than the previous water year. Cooling sea surface temperatures across the equatorial Eastern Pacific Ocean indicating a weakening trend in El Niño conditions were observed during the spring and summer, but the on-going moderate-to-weak El Niño had little effect on precipitation in Arizona so rainfall accumulations on the Salt and Verde watersheds during the 2016 monsoon were 100% of normal. By the end of Water Year 2016, enough cooling had occurred in sea surface temperatures across the equatorial Eastern Pacific that conditions were nearing the onset of a weak La Niña heading into water year 2017. Overall, the watershed recorded an average precipitation accumulation of 16.97 inches (93% of normal) and the SRP reservoir system received approximately 579,000 acre-feet of streamflow (63% of median) during Water Year 2016.

Precipitation: An average accumulation of 16.97” of precipitation was recorded across the Salt-Verde Watershed during Water Year 2016 which is 93% of normal. Several productive fall and early winter storms kept the water year total above normal into the early part of January, but the rest of the winter season was relatively inactive across all of Arizona and allowed the water year total to fall below normal by early spring. Although a few storm systems affected the state during the late spring and the monsoon of 2016 produced a normal average rainfall accumulation on the watershed, enough of a deficit had accumulated through the late winter that the water year total remained just below normal.

The chart below depicts the cumulated daily average precipitation observed on the Salt-Verde Watershed for Water Year 2016 (solid blue) in comparison to that from Water Year 2015 (dashed green) and the long-term normal accumulation (solid red). Watershed average totals for each season through Water Year 2016 are included on the chart as are deficits (surpluses) with respect to the normal average accumulation for those months in red (blue). See Figure 1.

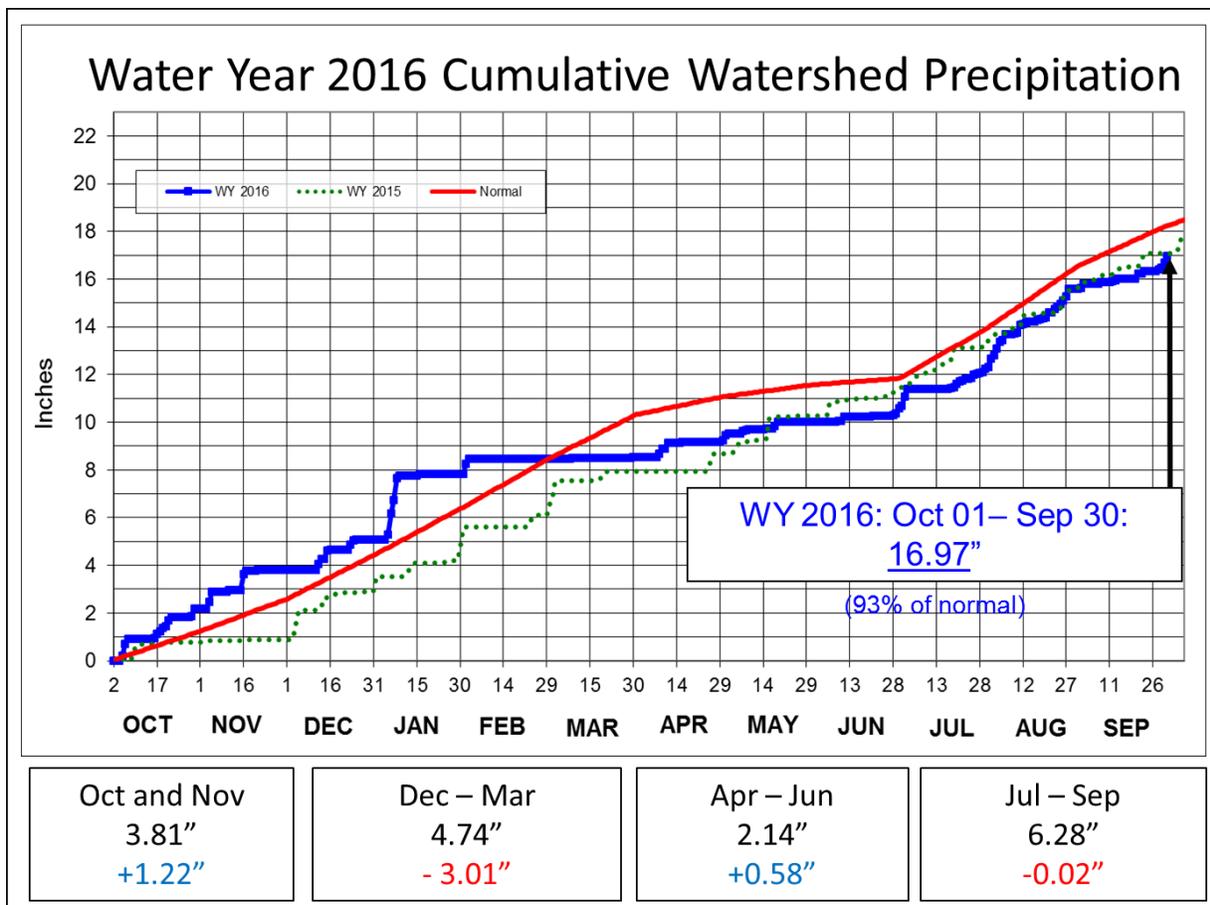


Figure 1: Water Year 2016 Precipitation Graph for the Salt-Verde Watershed.

Water Year 2016: These same seasonal totals for average accumulated precipitation across the Salt-Verde Watershed from Water Year 2016 are compared to normal values in the table below. The precipitation deficit accrued during the relatively “dry” winter months was almost offset by the surpluses that occurred during the anomalously “wet” fall and spring months which were then complimented by a near normal summer total.

Table 1: Average Salt-Verde Seasonal Watershed Precipitation. (In inches and in percent of the 1981-2010 normal)

	OCT-NOV 2015	DEC-MAR 2015-16	APR-JUN 2016	JUL-SEP 2016
Salt + Verde	3.81	4.74	2.14	6.28
<i>% of normal</i>	146%	62%	141%	99%
Normal (1981-2010)	2.61	7.64	1.52	6.36

b. Flycatcher and Cuckoo Operation Objective

Obligation: SRP will manage water levels at Horseshoe, conditional on other operation goals, to make riparian habitat available earlier in the nesting season and to maintain riparian vegetation at upper end of the reservoir. After two successive years of low water levels due to drought,

Horseshoe will be filled ahead of Bartlett, if feasible, to provide water to tall dense vegetation at upper end of Horseshoe.

Compared to recent water years, the average accumulated precipitation across the Salt-Verde Watershed during Water Year 2016 was 0.11" less than Water Year 2015 when 17.08" were recorded, 0.56" more than Water Year 2014 when 16.41" was recorded, and 0.40" less than the 17.37" observed during Water Year 2013.

Reservoir Status: Arizona depends on wet winters to reverse drought conditions but this winter continued the dry streak. The 2016 winter precipitation (December-March) ranked as the 32nd driest with an average accumulation of 4.74 inches across the Salt and Verde watershed. The 2016 winter produced 338,000 acre-feet from January through May which is 63% of median. This winter represents the sixth consecutive winter with below median runoff. The 2011, 2012, 2013, 2014, 2015 and 2016 winter seasons were the 24th, 17th, 42nd, 8th, 35th, and 37th lowest winter runoff seasons respectively and rank as the lowest consecutive six water year period on record. Runoff from the monsoon (July-September) produced about 75,000 acre-feet which is 68% of median. While the precipitation during the monsoon was near normal, the subsequent monsoon runoff was not. However, runoff generated during the monsoon typically has little impact on SRP's total storage.

The groundwater pumping target for calendar year 2017 is 250,000 acre-feet which is the same as calendar year 2016. Maintaining the same level pumping was possible due to conservative planning and decreasing demand. The reservoir system total storage capacity started at 49% of capacity and finished at 47% during water year 2016 in spite of experiencing the sixth consecutive below median runoff year. Total runoff for water year 2016 was approximately 579,000 acre-feet (See Hydrograph Below, Figure 2) which is 39,000 acre-feet more than the 540,000 acre-feet received during water year 2015.

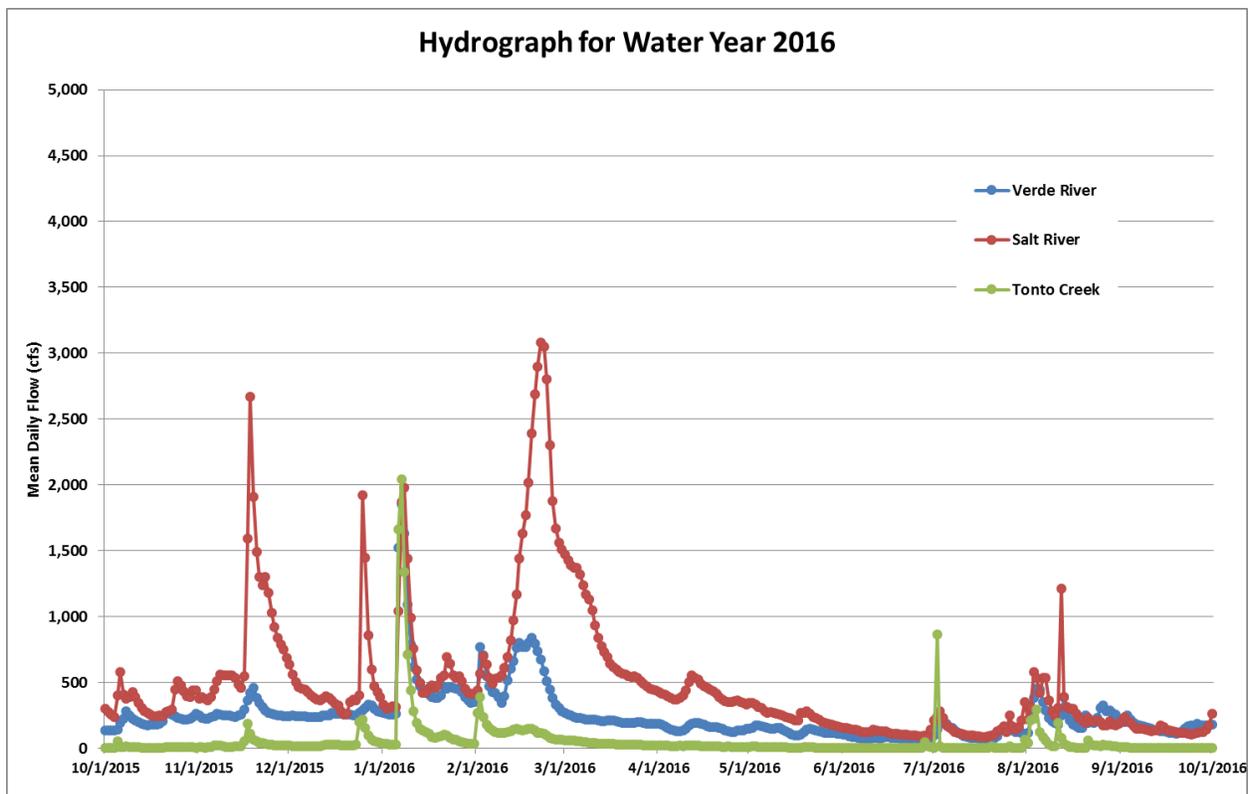


Figure 2: Verde River, Salt River, and Tonto Creek 2016 Water Year Hydrograph

Reservoir Operations: Continued dry weather and maintenance projects had the greatest influence on reservoir operations this water year.

Verde Operations: Typical operations call for the water order to be switched from the Verde system to the Salt system in May leaving Bartlett release at minimum. Water stored behind Horseshoe Dam is also typically moved as soon as possible downstream to Bartlett Reservoir to reduce the amount of loss from seepage and evaporation, and meet H-B HCP objectives. The water order may be switched sooner depending on the winter runoff.

The transition to the Verde system was completed on October 21, 2015 when Stewart Mountain Dam release was returned to minimum flow (8 cfs). The winter runoff produced approximately 97,000 acre feet which is 55% of median. Verde River inflow was stored in Horseshoe Reservoir at the beginning of water year 2016 due to valve replacement project at Horseshoe Dam. Releases began through the low flow valve at Horseshoe Dam on November 9, 2015. However, valve releases were limited to 350 cfs until the large flow valve was operational in early June, 2016.

Water levels at Horseshoe Reservoir reached elevation 2013.31 feet on February 28, 2016 in response to the early snowmelt initiated by a warm February, 2016. A portion of the water stored above the spillway was passed down to Bartlett Reservoir before completion of the large flow valve to provide a dry spillway for access to the work site and ultimately expedite the final drawdown. The work was completed in early June, 2016 and the remainder of the water stored at Horseshoe Dam was passed downstream to Bartlett Reservoir. Horseshoe Reservoir was empty on June 28, 2016. Bartlett Dam releases were reduced to minimum flow on March 31, 2016. The water order switched back to the Verde system on October 17, 2016. The lake levels for Horseshoe and Bartlett reservoirs are shown below (See Figure 3 and 4).

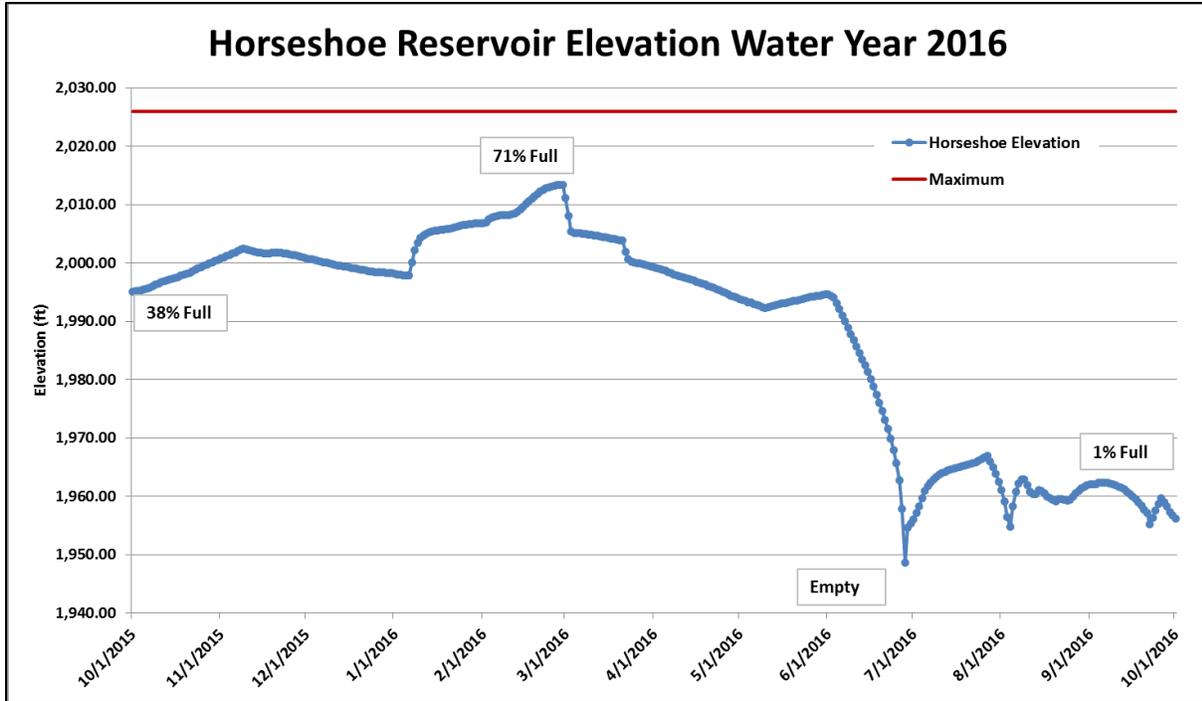


Figure 3: Horseshoe Reservoir Elevation for Water Year 2016

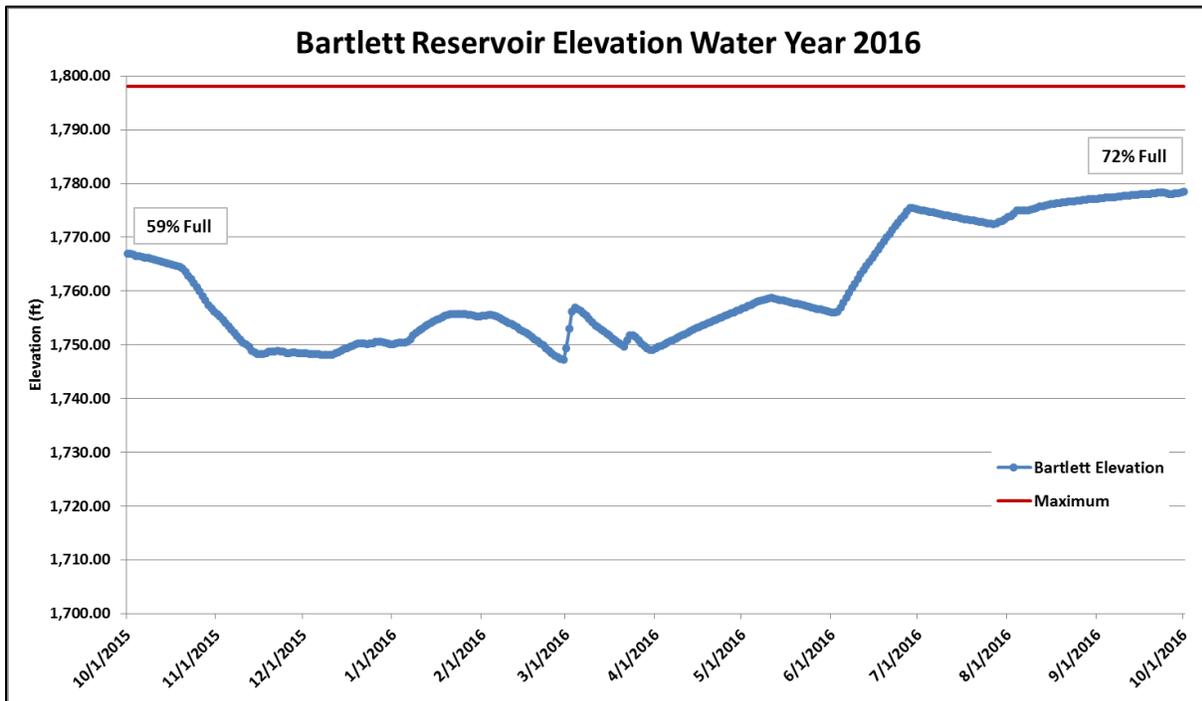


Figure 4: Bartlett Reservoir Elevation for Water Year 2016

Roosevelt Operations: Roosevelt Reservoir entered the season with almost 637,000 acre-feet of storage which is 39% of capacity. The winter of 2016 produced only 241,000 acre feet (67%

of median) of runoff into Roosevelt Reservoir. The elevation at Roosevelt Dam varied little through the winter with below normal inflows through the winter season. On March 31, 2016 the water order transitioned back to the Salt system. Reservoir levels began to decline as water order increased in the late spring and into the summer. Roosevelt storage on October 1, 2016 was 594,000 acre-feet which is 36% of capacity and 3% less than the previous year. The water order transitioned back to the Verde system on October 17, 2016, and releases from Stewart Mountain Dam reached minimum flow on October 22, 2016.

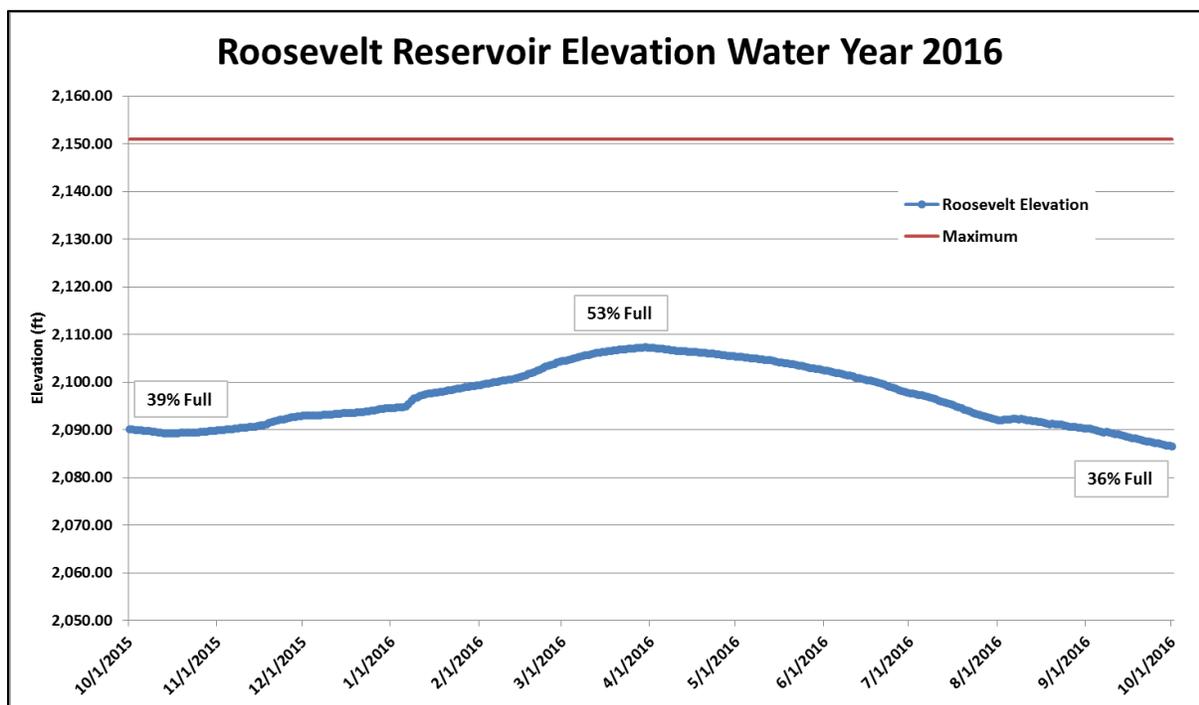


Figure 5: Roosevelt Reservoir Elevation for Water Year 2016

Action: Horseshoe storage reached a maximum of 71% full (elevation 2133') on February 28, 2016 and was empty by June 28, 2016. Verde River inflow was stored in Horseshoe Reservoir at the beginning of water year 2016 due to valve replacement project at Horseshoe Dam. Releases began through the low flow valve at Horseshoe Dam on November 9, 2015. However, valve releases were limited to 350 cfs until the large flow valve was operational in early June, 2016.

2017 Action: Now that the Horseshoe Dam valve construction is complete, the reservoir's spring drawdown will occur as usual in 2017 with a target empty date of May 1.

c. Covered Aquatic Species Operation Objective

Obligation: SRP will manage water levels at Horseshoe, conditional on other operation goals, to minimize the reproduction, recruitment, and survival of nonnative fish by rapidly drawing down the reservoir and minimizing carry-over storage. In years when the reservoir is held high for flycatchers, this will provide opportunities for razorback sucker reproduction and recruitment.

Action: Horseshoe Reservoir was held at or below elevation 2013' (Figure 3) until June 2016. Horseshoe was drawn down and empty July 1.

2017 Action: Horseshoe Reservoir will be operated normally and is scheduled to be empty by May 1.

d. Covered Bird Monitoring

i. Vegetation Monitoring

Obligation: SRP will use vegetation monitoring at Horseshoe to identify trends in the amount and height of tall dense vegetation to assist in the evaluation of whether adaptive management thresholds or ITP limits may be exceeded. Vegetation will be monitored once every three years.

Action: Because the methods to map and forecast breeding habitat has not been finalized, we continued to estimate the amount of potential breeding habitat in 2016 that may be unavailable in 2017. For the second time, LiDAR (Light Detection and Ranging) data has been integrated with the GIS breeding habitat model (Hatten and Paradzick 2003) results. The LiDAR flight in May 2015 introduces an alternative method to delineate and forecast suitable breeding habitat within Horseshoe Reservoir. The data provided via LiDAR was used to generate a Canopy Height Model, where the location average of tree canopy height values within a modeled "cell" were analyzed. Those cells with values below the threshold of 6 meters were removed post GIS breeding habitat modeling through a raster reclassification process in the ArcGIS software. Model results (Figure 6) from this year estimate that of the 130 acres of potentially suitable flycatcher breeding habitat (GIS model classes 3-5) that occurred in the reservoir in 2016, 0 acres would have been unavailable on May 1, 2016 (Table 2). The average amount of potentially suitable habitat that was unavailable at the beginning of the 2009–2016 breeding seasons equates to 34 acres, which is below the 200 acre average long-term permit threshold.

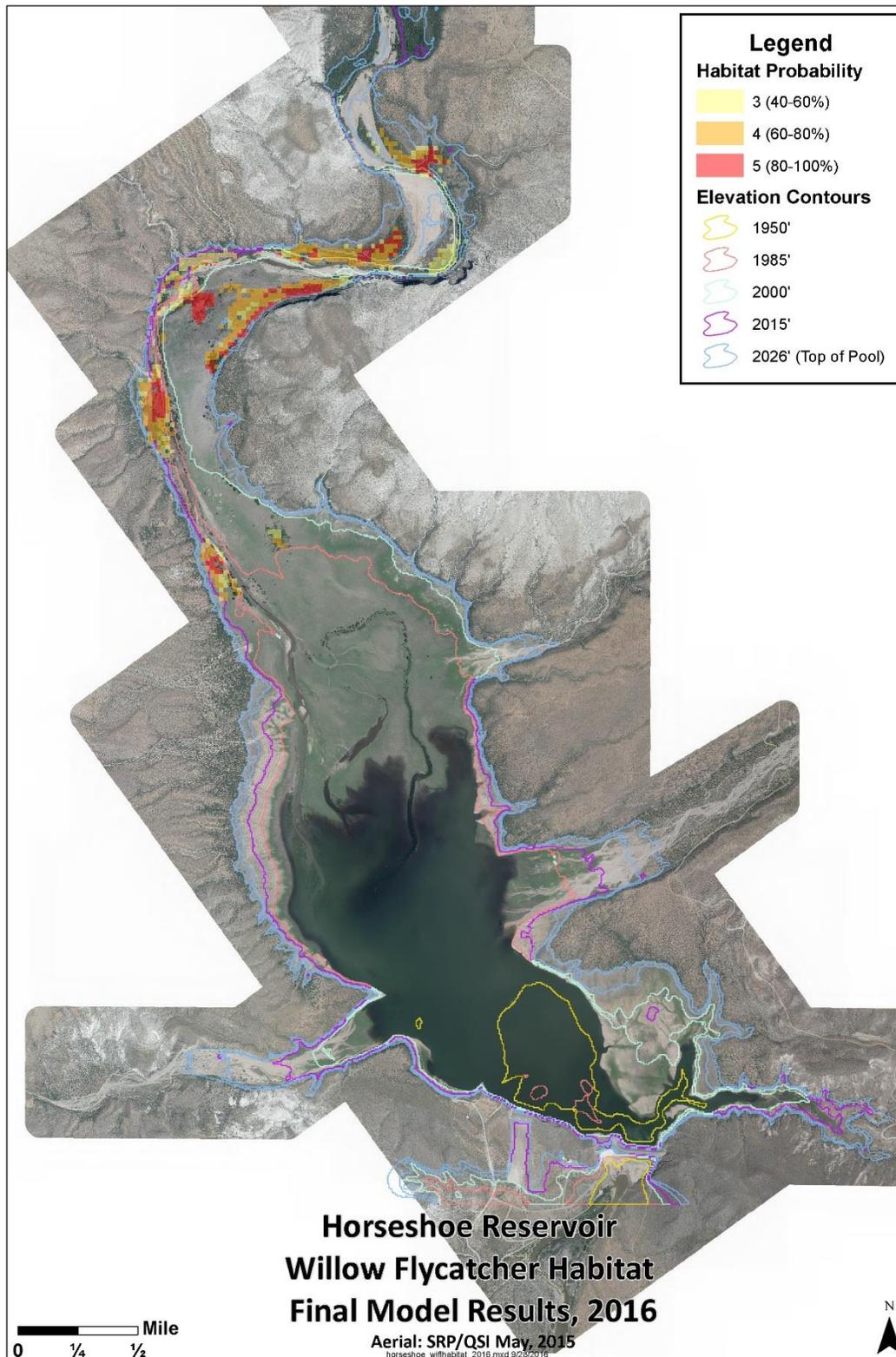


Figure 6. Willow flycatcher potential breeding habitat in Horseshoe Reservoir based on GIS satellite model results using May, 2015 imagery. [Note: model grid code scale: 3–5 breeding probability based on Hatten and Paradzick (2003); sediment contour interval 1950'≈0% storage; 1985'≈25% storage; 2000'≈50% storage; 2015'≈75% storage; 2025'≈98% storage.]

Table 2. Acres of occupied and predicted flycatcher habitat based on GIS breeding habitat model in Horseshoe Reservoir, 2008–2016

Year	May 1 Reservoir Elevation (feet)	Occupied Habitat (acres)		Predicted Habitat Probability class 3-5 (acres)	
		Occupied Habitat ¹	Occupied Habitat Unavailable May 1	Total within Reservoir	Estimated Habitat Unavailable May 1 ³
2008	-	52	-	95	-
2009	2000	-	0	141	42
2010	2026	-	52	28	87
2011	1981	82	0	82	0
2012	1950	-	0	76	0
2013	1987	-	0	147	0
2014	2005	-	6	133	107
2015	1966	32	0	203	0
2016	1994	-	0 ²	130	34
Annual Avg.				115	34
2017 predicted ⁴					124

¹Flycatcher surveys performed every three years within the reservoir (see Section 3.d.ii).

²The lowest elevation of occupied habitat in 2015 was 2000 ft. Water level on May 1, 2016 was 1994 ft.

³Estimated amount of habitat unavailable on May 1 is based on the elevation of classes 3-5 of the previous year's model results, the reservoir elevation on May 1, and the assumption that the vegetation is 25 ft. tall. If less than 15 ft. of vegetation was not above water on May 1 the habitat was considered unavailable (see assumptions outlined in the H-B HCP page 109).

⁴Assumes reservoir at full pool on May 1; habitat assumed unavailable if located at elevations \leq 2015' (see assumptions in note #3 above and the H-B HCP page 109).

2017 Action: For 2017, SRP will be utilizing results of the 2017 flycatcher surveys at Horseshoe Reservoir to update the occupied habitat data used in the flycatcher habitat prediction model.

ii. Flycatcher Monitoring

Obligation: SRP will monitor the flycatcher population to assist in the evaluation of ITP compliance relative to thresholds for adaptive management and the cap on harm of occupied habitat. The method used to determine occupied habitat is explained in Section IV.B.1.B of the H-B HCP. The adaptive management threshold is an annual average of 200 acres of potentially impacted occupied habitat and the cap is 400 acres. Flycatcher surveys will be conducted every three years.

Action: Flycatcher surveys were not conducted in 2016

2017 Action: Flycatcher surveys will be conducted in 2017.

iii. Yellow-billed Cuckoo Monitoring

Obligation: SRP will monitor cuckoos at Horseshoe to identify the long-term trend in the population. The reservoir will be surveyed every three years.

Action: No Cuckoo surveys were conducted at Horseshoe in 2016

2017 Action: Cuckoo surveys will be conducted at Horseshoe in 2017.

iv. Bald Eagle Monitoring and Emergency Rescue Protocol

Obligation: SRP will develop a coordinated plan with FWS and AGFD to identify when rescue actions would be required and the process to rescue bald eagle, bald eagle eggs, or nestlings; at Horseshoe or Bartlett. The plan will include triggers for winter monitoring at appropriate effort and frequency to determine if a nest has been built in the conservation space of the reservoir and the likelihood that the nest could be impacted by spring runoff. The plan will be completed within one year of permit issuance, and the implementation will begin within two years of ITP issuance.

Action: During the winter of 2015/16, AGFD identified a new bald eagle nest within Horseshoe Reservoir during annual nest search flights that SRP provides to the AGFD. The AGFD notified SRP of the nest and its location within the reservoir bottom. SRP initiated the HCP emergency response plan and began discussions with both the USFWS and the AGFD as to a course of action. At the time the nest was discovered, Horseshoe Reservoir was in the process of filling. AGFD visited the nest sight by boat to determine its approximate elevation in relation to the reservoir. The nest sat at approximately elevation 2007' which is roughly 19 feet below the full pool elevation (2026'). AGFD installed 'do not disturb' buoys in the vicinity of the nest. When the nest was approximately six feet from the water surface, SRP made the decision to discharge water from the reservoir to ensure the nest would not be inundated. SRP released water through the spillway gates as the valve house was under construction and out of service. SRP continued to closely monitor reservoir operations to ensure nest success. The nest successfully fledged two juvenile bald eagles.

In August of 2016, SRP discussed with the AGFD and the USFWS the best course of action to take before the 2016/17 eagle breeding season. It was determined that the construction of two alternative nest sites near the existing nest would be the best choice. If the eagles were to occupy their established nest, and the nest was in danger of inundation, there would be alternative nests in the vicinity for the AGFD to relocate the eggs or nestlings to.

SRP and AGFD visited the site to identify trees of adequate height and structure to accommodate nesting platforms. GPS coordinates were collected at areas that seemed appropriate. The locations were analyzed using LiDAR data that was collected in the reservoir in 2015 to ensure tree heights were above full pool elevation.

SRP contracted with Liberty Wildlife for the construction of the two nest platforms. AGFD and SRP installed the platforms on November 1, 2016.

2016 Action: SRP will coordinate nest monitoring with the AGFD. If the eagles return to nest at the same location as 2015-16, and it is anticipated that Horseshoe Reservoir elevations may impact the active nest, egg or nestling relocation may be implemented by the AGFD.

e. Covered Aquatic Species Monitoring

Obligation: SRP will monitor covered aquatic species populations and the effectiveness of minimization and mitigation measures. Periodic surveys in Horseshoe and several other locations in the Verde River will be conducted. Native fish composition and age class information will be recorded, and fish will be tagged in Horseshoe to assess movements from the reservoirs. In the first five years of implementation surveys will be focused near Horseshoe Reservoir.

Action: In 2016, SRP and the AGFD attempted to utilize a new method for determining fish disposition follow the annual rapid drawdown of Horseshoe Reservoir. The study included the use of passive integrated transponder (PIT) tag technology. These tags are surgically implanted (injected) in fish and the tags are detected at predetermined locations. The study was designed to determine what proportion of the tagged fish, during drawdown, moved upstream, were flushed through the dam, or were stranded in the reservoir bottom.

SRP purchased PIT equipment and contracted with Biomark to assist with its installation of the antennas and receivers. A solar/battery powered antenna array and receiver was installed upstream of Horseshoe Reservoir which included a full spanning antenna anchored to the river bottom (Figure 7). In the plunge pool below Horseshoe Dam, four battery powered PIT tag antennas/receivers were anchored and suspended mid water column (Figure 8). In anticipation of the drawdown, the AGFD implanted 1,994 PIT tags in fish captured in the reservoir (Table 3).



Figure 7. Cross channel PIT antenna on the bottom of the Verde River upstream of Horseshoe Reservoir.

Table 3. Fish implanted with PIT tags in Horseshoe Reservoir.

Largemouth Bass	1,156
Carp	576
Goldfish	246
Bluegill	8
Yellow bullhead	6
Green sunfish	1
Smallmouth bass	1
Total	1,994



Figure 8. Submersible PIT antenna.

However, reservoir operations were modified over the past two years to accommodate the construction of the Horseshoe Dam River Outlet Works (ROW). It was anticipated that the ROW would be completed and commissioned in time to accommodate the annual drawdown by May 1, 2016. Due to manufacturing challenges with the vendors fabrication of the primary valve, reservoir draw down was postponed until late June 2016 and the reservoir was empty on June 28. To further complicate matters, water was held in the reservoir between 2015 and 2016 because draining the reservoir was not possible. This provided an opportunity for non-native fish to spawn within the reservoir creating a non-typical fish assemblage.

To further confound the efficacy of the study methods, battery issues with the upstream receiver prevented data collection for much of the season.

2017 Action: SRP and the AGFD will be working with Biomark to improve the system performance and repeat the PIT tag study under typical reservoir operating conditions anticipated in 2017.

Status of Mitigation Property Acquisitions

Obligation: SRP must acquire and manage in perpetuity 200 acres of riparian habitat by fee title or conservation easements. Within one year of the permit issuance date, at least 150 acres of mitigation will be in place, and within ten years an additional 50 acres will be protected.

Action: On August 11, 2009, SRP and Freeport McMoRan executed a conservation agreement to secure the protection of the 150 acre preserve near Fort Thomas (SRPCE4). No additional action is needed until 2023 when the property will be purchased in fee.

SRP completed the purchase of the 55 acre Indian Springs parcel in December of 2011. The Fort Thomas baseline inventory report and management plans were updated to include both the 150 SRPCE4 parcel and the 55 acre Indian Springs parcel.

2016 Action: SRP has developed a fire management plan for the entire Fort Thomas Preserve and it is anticipated to be finalized after receiving comments from the Bureau of Reclamation (USBR).

4. Mitigation Property Monitoring and Management

a. Fort Thomas H-B Preserve (SRPCE4 and SRP2)

i. Flycatcher and Cuckoo Monitoring

Obligation: SRP will conduct flycatcher and cuckoo surveys the first spring and summer following land acquisition. If flycatchers are found, SRP will conduct a second year of surveys to establish a baseline. Once baseline surveys are complete, SRP will survey for flycatchers and cuckoos every other year on average but not less than every third year.

Action: Flycatcher and cuckoo surveys were conducted on the Fort Thomas H-B Preserve in 2016. A summary of the 2008-2016 results can be found in Table 4. The entire Fort Thomas survey report can be found in Appendix A. This was the highest willow flycatcher count at Fort Thomas since surveys began in 2008.

Table 4. Southwestern willow flycatcher and yellow-billed cuckoo survey results for the Fort Thomas H-B Preserve, 2008–2016.

Year	Willow flycatcher				Yellow-billed cuckoo	
	Resident Adults	Territories	Pairs	Nests	Detections	Incidental
2008	10	6	4	0	2	0
2009	14	8	6	5	0	0
2010	No Surveys					
2011	No Surveys					
2012	12	10	9	4	2	1
2013	No Surveys					
2014	30	16	14	1	3	0
2015	No Surveys					
2016	33	17	16	7	0	0

2017 Action: No Flycatcher or cuckoo surveys will be conducted at Fort Thomas Preserve in 2017.

ii. Vegetation and Habitat Monitoring

Obligation: SRP will conduct field observations assessment of habitat type, structure, and density of riparian and other vegetation. On-the-ground photo documentation from fixed points will be collected during the bird surveys.

Action: Photo points were repeated at the Fort Thomas Preserve in 2016. Photo points can be found in Appendix B

2017 Action: Photo points will be repeated in 2018.

iii. Management Obligations

Obligation: SRP's primary goal for management of these properties is to provide ecological and conservation benefits to the flycatcher and cuckoo. Management activities are focused primarily on minimizing or eliminating identified threats to riparian habitat, such as wildfire, groundwater pumping, surface water depletion, trespass livestock grazing, cowbird parasitism and vandalism. Actions to enhance the quality of habitat on a property or reverse past damage may also be conducted.

General management activities required for each property are listed below:

1. SRP will identify a manager for all acquired properties.
2. A management plan will be developed for each property within two years of acquisition in coordination with FWS and will be updated annually.
3. Management activities identified in the management plan will be implemented.
4. Cowbird management will occur on properties that are agreed to by SRP and FWS during the annual H-B HCP meeting.
5. Conservation easements shall be placed on all appropriate mitigation lands and will be held by an agency or organization acceptable to FWS.

Actions: SRP completed the following management actions on the Fort Thomas H-B Preserve in 2016:

- Management activities at Ft. Thomas consisted primarily of property patrol and fence maintenance.
- Late in the quarter, a campsite was discovered a willow flycatcher surveyor, deep in tamarisk in the southern part of the Hancock parcel of the USBR Annex. The site was later cleaned up.
- Stacy Walker, the Aravaipa Canyon Preserve Land Steward, who had been patrolling the Ft. Thomas property on a bi-weekly basis, has moved on to another position with TNC. When his replacement is hired, that individual will resume patrols of Ft. Thomas.
- Land management changes in the surrounding agricultural lands has brought the potential for increased security for the conservation properties, but carries with it the possibility of access limitations for flycatcher and cuckoo surveyors. So far, the neighbor farmers have been agreeable, allowing SRP to put its combination locks on gates important for access.

2017 Actions: SRP plans to conduct the following management actions in 2017 on the Fort Thomas Preserve:

- Continue to monitor both the tamarisk and native plant colonization in the burned areas.
- Continue to coordinate with Bureau of Land Management regarding fencing of the riparian area.
- Continue on-the-ground management activities in coordination with the Roosevelt HCP project manager.

- Continue to actively participate in the Gila Watershed Partnership and coordinate with the Stillwater Sciences and Walton Family Foundation staff on potential restoration projects.

b. Special Water Supply Protection Projects

Obligation: SRP will use its best efforts to protect future water supplies for mitigation lands.

Action: SRP provided funding to the U.S. Geological Survey (USGS) to conduct field work related to a 2-year Ecoflows project, which is a partnership among the USGS (Arizona and Utah offices), AZ Department of Water Resources, and TNC, to investigate the connection between stream flow in the Verde River and habitat along the riparian corridor. The USGS is working toward completing the report of the two-year Phase 1 project.

The original agreement between the USGS and TNC did not include funds to support additional field work in Phase 1. The additional support from SRP provided crucial support for field efforts, macroinvertebrate identification, data analysis, and geospatial interpretation of habitat characteristics. The results obtained with the SRP funding are included in the Phase 1 report which is in draft form and being peer reviewed.

In addition to completing the first phase, USGS installed a Continuous Slope Area (CSA) gage below the low flow SRP gage at Campbell Ranch (AGFD issued a permit for the installation). The gage installation was supported by the USGS WaterSMART program. During the first phase of the Ecoflows project, a biotic sampling site was established at Campbell Ranch. The CSA gage, which consists of three recording stage sensors from which discharge can be computed, is intended to complement the SRP gage by allowing for the estimation of discharges higher than the rating curve at the low-flow gage. The combined low-flow and CSA discharges should provide complete discharge records at Campbell Ranch.

2017 Action: After completion of the final Ecoflows Phase 1 report, the USGS will begin planning Phase 2.

5. Aquatic Species Mitigation

The overall goal of the minimization and mitigation measures for covered aquatic species is to offset the direct impacts caused from stranding and passage through the outlet works, and the indirect impacts (predation and competition) caused by the increase of nonnative fish produced in the reservoirs. Minimization and mitigation obligations under the H-B HCP include: rapid draw down of Horseshoe Reservoir; stocking adult and sub-adult razorback sucker in Horseshoe or elsewhere; installation of a fish barrier on Lime Creek; funding and supporting improvements to Bubbling Ponds Hatchery (BPH); stocking covered native fish in the Verde watershed; and watershed management activities that conserve in-stream flow, species, and habitats. The following implementation actions were taken:

a. Rapid Draw Down of Horseshoe Reservoir

Obligation: See Section 3.c.

Action: See Section 3.c.

2014 Action: See Section 3.c.

b. Stocking of Razorback Sucker at Horseshoe and Other Covered Species in Verde River.

Obligation: SRP will provide support for AGFD to stock razorback sucker during Horseshoe fills when conditions may be favorable. Other river segments may be stocked with razorback sucker upon mutual agreement among AGFD, FWS, and SRP. SRP will provide support to increase stocking of other covered native fish species in the Verde watershed.

Action: SRP continued funding AGFD Operation and Maintenance (O&M) and stocking actions at BPH under the collection agreement. As of January 2016, a total of 5,478 native fish were stocked into the Verde River watershed. (Table 5).

Table 5. Native fish stocked by AGFD in support of H-B HCP April 2015 through January 2016.

Stocking Date	Species	Number stocked	Pounds stocked	Location
04/21/15	Colorado Pikeminnow	2,384	1,490	Verde R. at Beasley Flat
10/29/15	Roundtail chub	211	11	SW Academy Pond
12/8/15	Roundtail chub	333	27	Verde R. at Burnt Ranch
1/13/16	Colorado Pikeminnow	2,261	1,615	Verde R. at Childs
1/14/16	Colorado Pikeminnow	266	190	Verde R. at Beasley Flat
1/14/16	Razorback Sucker	23	45	Verde R. at Beasley Flat
Total		5,478	3,378	

2017 Action: SRP will again coordinate a meeting among the cooperators in the spring of 2017 to discuss the status of implementation, changes to the species priorities or locations, and plans for future culture and stocking effort. SRP will continue to fund BPH O&M and stocking activities and will coordinate to develop a culture and stocking plan to be implemented over the following year.

The collection agreement between SRP and the AGFD will expire in March of 2017. Prior to that date, the agreement will be updated and renewed for an additional 10 years.

c. Bubbling Ponds Hatchery Improvements

Obligation: SRP will provide \$500,000 in funding or in-kind support for planning, design, engineering, and fund raising to improve and expand AGFD's BPH.

Action: SRP, USBR and AGFD met on May 24 to discuss future hatchery operations and the potential of utilizing the remaining BPH renovation funds to expand fish production at BPH. AGFD shared that they are planning upgrades to the facility but at this time a hatchery expansion onto the newly purchased adjacent parcel will be cost prohibitive. Options are being developed for potential improvements to the existing facility to improve failing infrastructure.

2017 Actions: AGFD will be providing SRP with details of what is proposed at future meetings.

d. Installation of a Fish Barrier in Lime Creek

Obligation: SRP will construct and maintain a fish barrier in Lime Creek to benefit resident, covered aquatic species such as Gila topminnow, longfin dace, and lowland leopard frogs.

Action: The barrier was completed on November 4, 2010. The construction of the barrier was described in detail in the 2010 H-B HCP annual report. SRP visited and inspected the barrier during a May 2012 site visit. The barrier was structurally sound and functional, and, as

anticipated, sediment had filled in most of the pool above the barrier. The barrier was inspected via helicopter in May of 2015 (Figure 9). The barrier appeared sound and functioning.

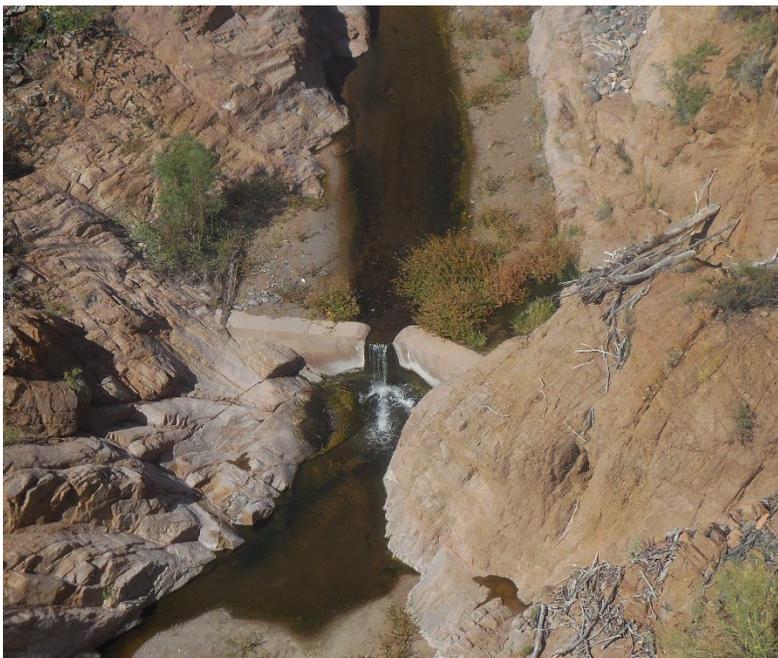


Figure 9. Lime Creek barrier aerial view, May 2015

2017 Actions: SRP will visually inspect barrier condition and conduct maintenance if necessary. SRP, in coordination with AGFD and USFS, may also monitor the fish populations in Lime Creek.

e. Watershed Management Efforts

Obligation: SRP will continue, and expand where feasible; its substantial watershed management efforts to maintain and/or improve stream flows, which benefit all main-stem species.

Actions: SRP took the following actions in 2016 to protect watershed in-stream flow:

- Public outreach and education
- Funding research and monitoring
- Administrative and legal efforts to protect in-stream flows

A detailed list of Watershed Management and Protection projects that occurred in 2016 is provided in Table 6.

2017 Action: SRP will continue supporting watershed protection efforts in 2017.

Table 6. SRP watershed protection efforts accomplished in 2016.

Project Name	Date Initiated	Date Completed	SRP Contribution	Description and Comments	In-kind	Cash
Public Presentations	Ongoing	Ongoing	NA	Several public presentations were given to community groups and various agencies (e.g., Cottonwood Chamber of Commerce, Verde Valley Mortgage and Real Estate Brokers, Citizens Water Advocacy Group, Verde River Basin Partnership, Verde Valley Water Users, League of Cities and Towns, Project WET Teachers, Camp Colley, and others).	X	
Agreement in Principle re: Big Chino Groundwater withdrawals	Ongoing	Ongoing	\$461,667	Year 3 of Comprehensive Agreement #1 between SRP, the City of Prescott, and the Town of Prescott Valley to implement monitoring and modeling of groundwater conditions in the Big Chino sub-basin to ensure appropriate protections against impacts to the Upper Verde River. Includes long-term funding commitment.		X
Legal efforts to curtail illegal groundwater pumping and surface water diversions–Verde Valley	Ongoing	Ongoing	NA	SRP continued its litigation against several groundwater pumpers in the Verde Valley who appear to be illegally diverting surface water.	X	
USGS/SRP cost share of stream gage maintenance	Jan 2013	Ongoing	~\$130,000	SRP's contribution to the USGS Joint Funding Agreement for the operation and maintenance of stream and reservoir gages in the Verde watershed (amount does not include reservoir gage operations).		X
WatershedMonitor.com	Sep 2007	Ongoing	NA	Maintain the website (www.watershedmonitor.com) which displays real time data for river flows and precipitation across the Salt and Verde Watersheds.	X	
Verde River Runoff		Mar 2016	\$3,000	Corporate sponsor of the Verde River Runoff.		X

Table 6. SRP watershed protection efforts accomplished in 2016.

Project Name	Date Initiated	Date Completed	SRP Contribution	Description and Comments	In-kind	Cash
Low Flow gages (Black Bridge, Verde Falls, , Bubbling Ponds Hatchery, Sterling Springs)	2005+	Ongoing	\$57,477	2015 O&M and telemetry support for gages.	X	
Low Flow gage East Verde @ Crackerjack	March 2012	ongoing	\$35,000?	O&M for installation of gage.		X
Verde River Days		Sep 2016	\$1,000	SRP sponsorship for event. SRP was also an Exhibitor.		X
Yavapai College Foundation		Oct 2016	\$5,000	SRP Donation/Table sponsorship for event. Theme re: Working Together for Sustainable Communities and Healthy Forests.		X
The Verde Valley Regional Economic Organization (VVREO)	Mar 2015	Mar 2016	\$2,000	Membership to VVREO and corporate sponsorship for 'speaker's series' featuring prominent educators and Industry representatives from the Verde Valley discussing Education and Workforce Planning.	X	X
Arizona State Parks Natural Areas Program Advisory Committee	Mar 2014	Ongoing	In kind leadership	As a member of NAPAC, SRP offers planning input on ASP Natural Areas, including the Verde River Greenway, which is looking at updating its management plans.	X	
Arizona Water Story	Jan 2010	Ongoing-Offered 2-4 times per year	In-Kind	SRP offers this 4 hour workshop to teachers throughout the Valley. Teachers receive a water education video as part of the Arizona Water Story to assist 4 th grade teachers throughout the state in teaching water science and Arizona history to their students.	X	

Table 6. SRP watershed protection efforts accomplished in 2016.

Project Name	Date Initiated	Date Completed	SRP Contribution	Description and Comments	In-kind	Cash
Water Education Grants	Oct 2007	Ongoing	\$4,750	SRP collaborated with the towns of Prescott and Prescott Valley as well as the Yavapai County Water Advisory Committee and Arizona Department of Water Resources to provide Water Education Grants to outstanding water education programs taking place in Yavapai County.		X
Water Chemistry/Quality Kits	Ongoing	Ongoing-Offered 2-4 times per year	In-Kind	Water Chemistry/Quality kit building and instruction to teachers through Sci4Kids EIG.	X	
Yavapai County Cooperative Extension Office /Project WET	Aug 2008	Ongoing	\$15,000	We offered a 5-day workshop this past summer in partnership with AZ Project WET. The workshop was called, "Water Solutions: Past, Present, and Future". We had 21 teachers from grades 3-6 that participated. The workshop covered the watershed, forest health, ground water, water chemistry and quality, water management and delivery. A variety of hands-on activities were used to show teachers how to improve their water education in their classrooms.	X	X

Table 6. SRP watershed protection efforts accomplished in 2016.

Project Name	Date Initiated	Date Completed	SRP Contribution	Description and Comments	In-kind	Cash
Verde Valley Youth Outreach Committee	Aug 2011	Ongoing	In-Kind leadership support	SRP serves on this committee to share and leverage partnerships in the Verde Valley related to youth education. Other partners on the committee include the parks, forest service, AZ Project WET, and V-Bar-V.	X	
Four Forest Restoration Initiative and Research Study Development	Jan 2012	Ongoing	In-Kind participation in 4FRI, and study design. \$600,000 to NAU thus far	SRP is supporting landscape level efforts to restore ponderosa pine forests, which includes the Salt and Verde watersheds to allow for increased ecologic function and decrease risk of catastrophic wildfire. We are also developing a study design to evaluate hydrologic effects of various forest treatment types, of which is being leveraged among the three Arizona universities. This study will evaluate impacts of forest restoration on variables such as run-off, groundwater infiltration, sedimentation, soil moisture, etc.	X	X
SRPs Forest Health Virtual Tour and Stakeholder Perspectives Video	January 2014	Ongoing	\$80,000	Outreach materials for engaging customers, stakeholders, investors.	X	X
Northern Arizona Forest Fund	January 2014	Ongoing	In kind program leadership and \$100,000	On the ground forest treatment sites that will be funded by SRP and corporate and private partners.	X	X
Cragin Watershed MOU	March 2014	Ongoing	In kind program leadership	Partnership between SRP, FS, NFF, Town of Payson and USBR to accelerate restoration objectives in Cragin Watershed.	X	
Oak Creek Watershed Council	September 2003	Ongoing	In-kind and \$30,000 to date	The Oak Creek Watershed Council is dedicated to maintaining a standard of excellence for watershed stewardship, as well as preserving the integrity of Oak Creek, and its tributaries.	X	X

6. Funding Methods and Assurances for HCP Implementation

Obligation: No later than five years after the Permit is issued, SRP shall insure that permanent funding is available to meet continuing obligations under the H-B HCP.

Action: Completed.

On March 24, 2009, SRP provided a letter to FWS indicating that we were proposing to establish an irrevocable trust to fund the H-B HCP. On November 2, 2009, the SRP Board approved an amendment to the Roosevelt Lake HCP trust, which allows for the creation and funding of a subaccount to meet the obligation of the H-B HCP. The subaccounts allow for each HCP trust fund to be managed (and reported) independently under a larger umbrella trust agreement. The H-B HCP subaccount was funded in January 2011 with approximately \$6.0M to support the estimated \$300,000 on average annual expenditures over the life of the permit and *in perpetuity* costs for some of the mitigation obligations.

7. HCP Implementation, Survey, and Monitoring 10-year Schedule

Table 7. HCP Implementation, Survey, and Monitoring 10-year Schedule.

Obligation	Completed /Ongoing	Year									
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017+
Horseshoe Reservoir											
Flycatcher and Cuckoo Reservoir Ops	Ongoing	RD ¹	RD	RD	RD	RD	Hold ²	RD	Hold	RD	RD
Aquatic Species Reservoir Ops	Ongoing	RD	RD	RD	RD	RD	Hold	RD	Hold	RD	RD
Vegetation Monitoring	Ongoing	X	X	X			X		X		X
Flycatcher and Cuckoo Surveys	Ongoing	X			X				X		X
Bald Eagle Monitoring and Rescue Plan	Completed	X	X								
Bald Eagle Monitoring	Ongoing			X	X	X	X	X	X	X	X
Fish Surveys:	Ongoing		X	X	X	X	X		X	X	X
Horseshoe			X	X	X ⁴	SRP ⁵	X		X	X	X
Verde (upstream Horseshoe)				X	X	X	-		X	X	?
Verde (downstream Bartlett)							-			?	?
Lime Creek		X	X	X	X	X					?
Frog and Garter Snake Survey	Ongoing					X	X				?
Horseshoe/Verde River Aquatic Species Mitigation											
Bubbling Ponds Hatchery (BPH) Improvements		X	X	X	X	X	X	X		?	?
BPH O&M	Ongoing	-	X	X	X	X	X	X	X	X	X
Stocking razorback sucker & other covered native fish	Ongoing	-	-	X	X	X	X	X	X	X	X
Lime Creek Barrier Construction	Completed	X	X	X							
Watershed Protection Projects	Ongoing	X	X	X	X	X	X	X	X	X	X

Table 7. HCP Implementation, Survey, and Monitoring 10-year Schedule.

Obligation	Completed /Ongoing	Year									
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017+
Fort Thomas Mitigation Property (150 acres)											
Execute Conservation Easement	Completed	X	X								
Management	Ongoing		X	X	X	X	X	X	X	X	X
Purchase											
Flycatcher and Cuckoo Monitoring ³	Ongoing	X	X			X		X		X	
Habitat Monitoring	Ongoing	X	X			X		X		X	
Indian Springs Ranch–Fort Thomas Preserve (55 acres)											
Identify suitable property	Completed	X	X	X	X						
Secure protection and manage	Ongoing					X	X	X	X	X	X
Special water supply protection projects	Ongoing	X	X	X	X	X	X	X	X	X	X

¹Rapid drawdown and minimize pool

²Hold reservoir high if two successive years of low storage.

³Monitoring frequency dependent upon management needs and cowbird parasitism rate.

⁴Sampling for tagged fish also conducted downstream of Horseshoe dam

⁵SRP will, as feasible, investigate fish stranding in Horseshoe during and after rapid drawdown.

8. Literature Cited

Fish and Wildlife Service. 2008. Final environmental impact statement for the incidental take permit for operations of Horseshoe and Bartlett Reservoirs. March 2008. Arizona Ecological Services Office, Phoenix, Arizona.

Hatten, J. R. and C. E. Paradzick. 2003. A multi-scaled model of southwestern willow flycatcher breeding habitat. *Journal of Wildlife Management* 67(4): 774-778.

Salt River Project. 2008. Habitat Conservation Plan Horseshoe and Bartlett Reservoirs. Submitted to the U.S. Fish and Wildlife Service Pursuant to Section 10(A)(1)(B) of the Endangered Species Act. Salt River Project, Tempe Arizona.

APPENDIX A

SOUTHWESTERN WILLOW FLYCATCHER AND YELLOW-BILLED CUCKOO SURVEYS ON THE FORT THOMAS PRESERVE 2016

EcoPlan Associates, Inc.

This report contains sensitive data, which is considered confidential by the U.S. Fish and Wildlife Service. Therefore, it has been removed from this version of the report. The full version was sent to the USFWS Ecological Field Services Office in Phoenix, AZ.

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APPENDIX B

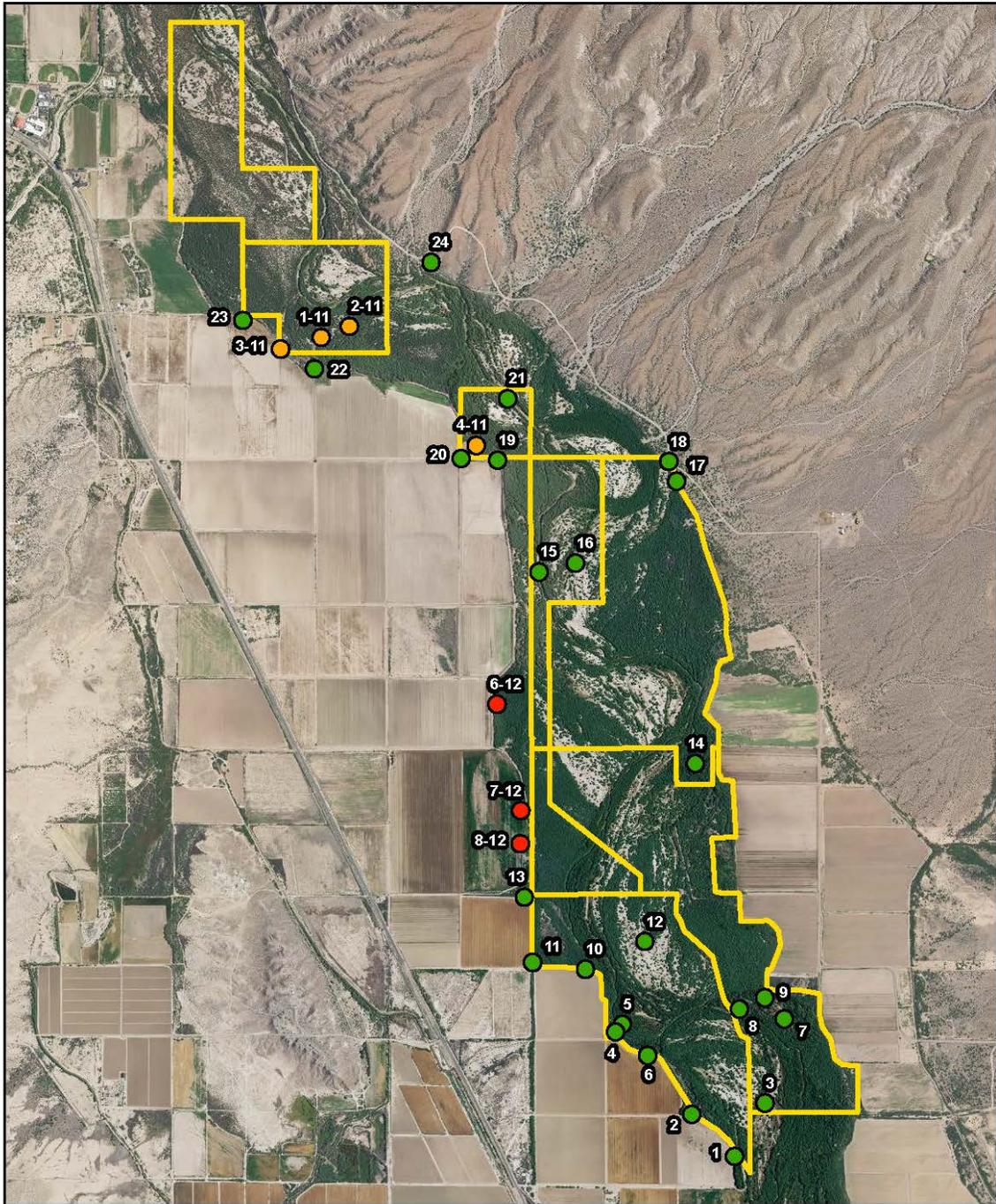
FORT THOMAS PRESERVE PHOTO POINT MONITORING
2016

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PHOTO POINT MONITORING RESULTS
FORT THOMAS PRESERVE

Photo Point Locations Fort Thomas Preserve

Fort Thomas Preserve Properties - Gila Valley , Arizona		Photo Point / Year
 <small>ftp_baseline_photop2016.mxd 8/2/2016</small>	T5S R23E, T5S R24E (Aerial: NAIP 2015)	<ul style="list-style-type: none"> ● 2008 ● 2011 ● 2012
		



2008 Photo Point Locations

Fort Thomas Preserve Photo Point Record
Photo Point 1



May 21, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2



May 21, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 3



May 20, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 4



May 21, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 5a



May 21, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 5b



May 21, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 6



August 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 7



May 20, 2008



August 25, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 8



May 20, 2008



August 25, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 9



May 20, 2008



August 25, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 10



May 20, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 11



May 22, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 12



May 21, 2008



August 25, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 13



May 22, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 14a



July 16, 2008



August 25, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 14b



July 16, 2016



August 25, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 15a



July 16, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 15b



July 16, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 16a



July 16, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 16b



July 16, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 17



July 16, 2008



August 25, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 18



July 17, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 19



July 17, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record

Photo Point 20



July 14, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 21a



July 16, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 21b



July 16, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 22



July 15, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 23



July 15, 2008



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 24a



July 15, 2008



August 25, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 24b



July 15, 2008



August 25, 2016

2011-2012 Photo Point Locations

Fort Thomas Preserve Photo Point Record
Photo Point 2011-1 View 1



November 9, 2011



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-1 View 2



November 9, 2011



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-1 View 3



November 9, 2011



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-2 View 1



November 9, 2011



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-2 View 2



November 9, 2011



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-2 View 3



November 9, 2011



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-3 View 1



November 9, 2011



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-3 View 2



November 9, 2011



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-3 View 3



November 9, 2011



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-4 View 1



November 9, 2011



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-4 View 2



November 9, 2011



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-4 View 3



November 9, 2011



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-5 View 1



November 9, 2011



August 25, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-5 View 2



November 9, 2011



August 25, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-5 View 3



November 9, 2011



August 25, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-5 View 4



November 9, 2011



August 25, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2011-5 View 5



November 9, 2011



August 25, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2012-6 View 1



August 16, 2012



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2012-6 View 2



August 16, 2012



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2012-7 View 1



August 16, 2012



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2012-7 View 2



August 16, 2012



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2012-8 View 1



August 16, 2012



August 24, 2016

Fort Thomas Preserve Photo Point Record
Photo Point 2012-8 View 2



August 16, 2012



August 24, 2016