

# 2005 Summary Report

## Southwestern Willow Flycatcher Survey and Nest Monitoring Along the Verde River from Sheep's Bridge to the Fort McDowell Indian Reservation Boundary, Maricopa and Yavapai Counties, Arizona

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## 1. Introduction

The southwestern willow flycatcher (*Empidonax traillii extimus* [WIFL]) is a small, migratory passerine associated with riparian habitat in Arizona, New Mexico, southern California, southern Utah, southern Nevada, and southwestern Colorado. WIFLs are listed as an endangered species under the federal Endangered Species Act (ESA). WIFLs arrive at their summer breeding grounds in April and stay until mid- to late August, when they begin their migration back to their wintering grounds in Central and South America.

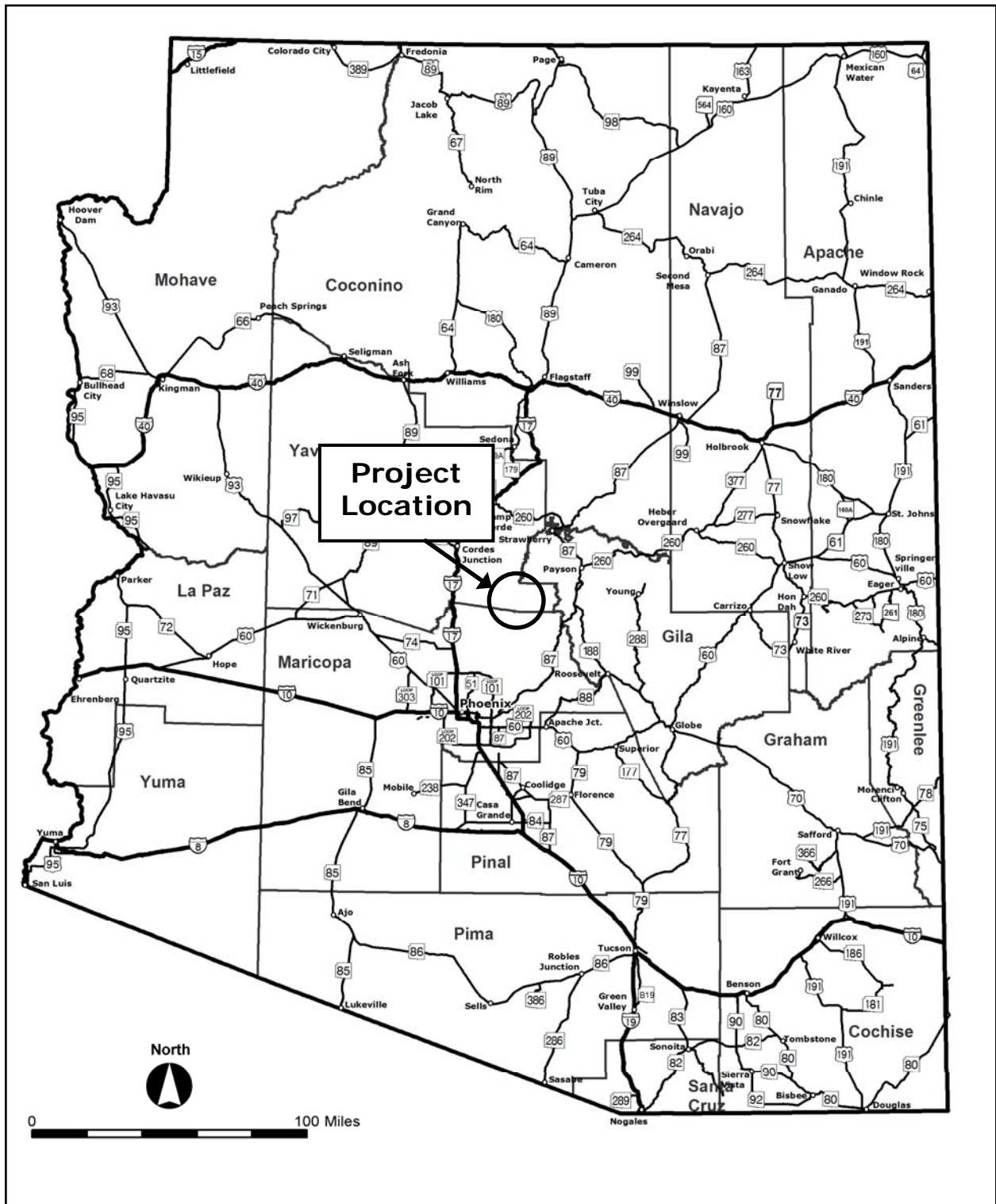
WIFLs are riparian obligates and breed in dense riparian habitat along rivers, streams, and the edges of reservoirs. As a result of prolonged drought in Arizona, and particularly in the Verde River watershed, Horseshoe Reservoir has remained empty or nearly empty for several years. This has resulted in the growth of suitable WIFL habitat dominated by Goodding's willows (*Salix gooddingii*) and tamarisk (*Tamarix* spp.) within the upper reaches of the reservoir, especially along the flowing river channel. In 2002, WIFLs were documented for the first time nesting at this site. In 2004, 17 territories (seven were paired) and four migrant WIFLs were detected within Horseshoe Reservoir (Spencer 2004).

In 2003, the Salt River Project (SRP) and the U.S. Fish and Wildlife Service (USFWS) initiated discussions of a Habitat Conservation Plan as part of an incidental take ESA Section 10(a)(1)(B) permit for continued operation of Horseshoe and Bartlett reservoirs. By January 2005, it was evident that winter and spring runoff would elevate Horseshoe Reservoir water levels and would inundate suitable and previously occupied WIFL habitat. In February 2005, SRP and USFWS discussed alternative operations of the dam, research opportunities, and the issuance of a recovery permit under Section 10(a)(1)(A) of the ESA. Such a recovery permit would allow research proposed by SRP on Horseshoe Reservoir and would aid in the development of the 10(a)(1)(B) permit mentioned above. Specifically, the 10(a)(1)(A) permit was designed with the following objectives in mind (among others): (1) determine the suitability of WIFL habitat at Horseshoe Reservoir before and after inundation and (2) to evaluate dispersal of WIFLs if habitat is unavailable at Horseshoe Reservoir and to evaluate their productivity if they return to Horseshoe later in the year. This document reports and evaluates data collected between May and September 2005 to assist in the achievement of these objectives.

## 2. Study Area

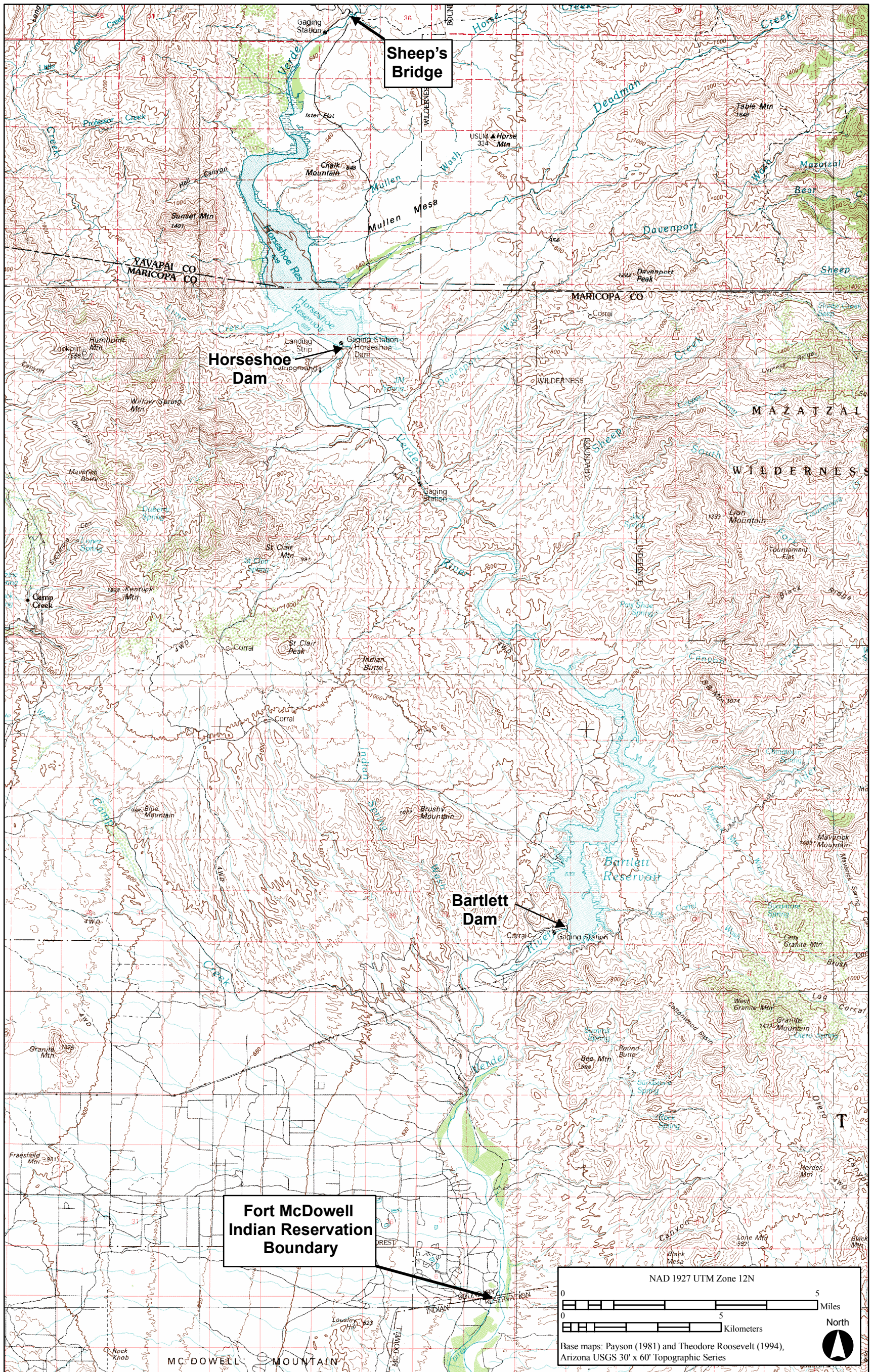
The study area comprises the Verde River from Sheep's Bridge downstream to the boundary of the Fort McDowell Indian Reservation, a distance of approximately 28 miles (Figure 1 and Figure 2). This reach of the Verde River flows south through the Mazatzal Mountains on the east and the New River Mountains on the west. The Verde River is perennial, with flows above Horseshoe fluctuating in response to rainfall and flows below Horseshoe and Bartlett reservoirs regulated by SRP to meet downstream users' demands under various water rights. Downstream of the project area, the Verde River flows south through the Fort McDowell Indian Reservation and joins with the Salt River upstream of the Phoenix metropolitan area.

The Verde River, through much of its course, is a well-vegetated riparian corridor, with a section upstream of the study site designated as a Wild and Scenic River in 1984 by the National Park Service. Within the study area, from Horseshoe Dam to the boundary of the Fort McDowell



**Figure 1. Southwestern Willow Flycatcher Survey and Nest Monitoring Along the Verde River from Sheep’s Bridge to the Fort McDowell Indian Reservation Boundary, Maricopa and Yavapai Counties, Arizona, 2005.**

**Figure 1. Project location.**



W:\04-715\BIO\Survey\Horseshoe\draft\Fig2

Figure 2. Project Area.

Indian Reservation, the river supports Goodding's willow, tamarisk, and cottonwood (*Populus fremontii*) along the banks and within the floodplain, in various-sized patches bordered by mesquite (*Prosopis* spp.) and surrounded by upland Sonoran desertscrub (Brown 1994). The portion of the study area from Sheep's Bridge to Horseshoe Dam contained no cottonwood trees, with the exception of a solitary individual in Deadman's Wash, a tributary draining into Horseshoe Reservoir.

The Verde River is subject to floods that result in a patchwork of scoured, cobbly, or silted areas, stringers of smaller willows and cottonwood near the main channel, and larger willow and cottonwood trees farther from the main channel, interspersed with tamarisk. Tamarisk ranged from large monotypic stands in the bed of Horseshoe Reservoir to small patches and individuals interspersed within stands of willows and cottonwoods above and below Horseshoe Reservoir. Operation of Horseshoe Dam often subjects the lower half of the reservoir bed to inundation for various lengths of time, limiting the establishment of large stands of mature riparian vegetation. Although the entire reservoir below the full-pool elevation is subject to inundation, the upper half is inundated less frequently and has developed larger stemmed stands of willow and tamarisk of varying size and structure.

### **3. Methods**

#### Surveys

Surveys were conducted in all areas containing suitable habitat for migrating and breeding WIFLs (Appendix A, Maps 1–3). Three distinct areas were surveyed: (1) from Sheep's Bridge downstream to Horseshoe Reservoir Dam, (2) from Horseshoe Reservoir Dam to Bartlett Reservoir Dam, and (3) from Bartlett Reservoir Dam to the boundary of the Fort McDowell Indian Reservation. The Mesquite Campground site, located just below Horseshoe Dam, was surveyed by Engineering and Environmental Consultants, Inc. (EEC).

Suitable habitat was identified using aerial photographs and information gathered from knowledgeable individuals and during pre-survey site reconnaissance trips. Three surveys were conducted according to the protocol of Sogge et al. (1997). The distance between patches of suitable habitat in the three survey areas required the surveys to be completed on separate days. Surveys were accomplished by kayaking to suitable habitat. Depending on whether the habitat was inundated, tape playback was performed either while kayaking into the habitat at appropriate intervals or by anchoring and walking along a transect through the habitat.

Surveys generally began at sunrise and ended at 10 a.m. except in cases where birds were continuing to respond to taped calls. Tape playback methods were used in areas with no previously detected resident WIFLs or where surveyors had not previously investigated. Tape playback methods for WIFLs entail playing a tape with the diagnostic "*fitz-bew*" vocalization for approximately 30 seconds every 30 meters, depending on density of the habitat. Calls were broadcast to elicit responses from WIFLs in the immediate area. Many WIFLs were located during nest monitoring efforts and, to minimize disturbance to potentially nesting birds, these areas were not surveyed. Habitat adjacent to occupied areas was surveyed during subsequent efforts to locate previously undetected birds. Habitat patches determined to be unsuitable during initial surveys or site reconnaissance efforts were not surveyed. Habitat was considered unsuitable if the canopy was open, the vegetation was sparse, or it was far from surface water or saturated soil.

From late April throughout the field season, as time permitted, general territory searches were conducted in addition to protocol surveys. These general searches consisted of slowly drifting or boating down the river near suitable habitat and listening for spontaneously singing males. General territory searches allowed detection of WIFLs prior to the first protocol surveys.

WIFLs detected were considered territorial (*E. t. extimus*) if they displayed nesting behavior, and/or were calling vigorously within a territory after June 14<sup>th</sup>. WIFLs that were detected only once or twice during surveying or monitoring efforts, or left the study area before June 15<sup>th</sup>, were considered migrants and were assumed to have moved on to other areas to breed.

### Nest Monitoring

Nest monitoring followed the protocol of Rourke et al. (1999). Surveys were used to initially locate singing males, and each location where a singing male was detected was documented as a territory. New territories were discovered throughout the breeding season by observers hearing spontaneously calling males or finding additional nests that had not been documented previously. As territories were found, they were given a number based on chronological order of discovery. The observer would remain in the area long enough to estimate and mark the center of activity with flagging. Flag trails were established to the observation point (OP) to minimize disturbance to nesting WIFLs. Early in the season, a motor boat was used to access the project area, and monitors would visit territories by kayaking to the flag trail and then into the territory. After the reservoir levels began dropping, all-terrain vehicles were used as transport to the project area, and observers would walk to the territory along the flag trails.

Monitoring began with the discovery of the first territory and continued until WIFL activity was no longer detected. Visits were conducted as efficiently and quietly as possible to reduce disturbance to the nesting WIFLs. As territories were located, nest searching began. Nests were located by first entering the territory of a singing male WIFL, then listening for the “whit” calls and other behaviors characteristic of pair activity and breeding WIFLs. Following these behavioral cues often led to the discovery of a nest. Personnel revisited territories every four days until a nest was located or until the territory was vacated. The first nest found within a territory was designated as the A nest. Subsequent nesting attempts were given the letters B, then C. For example, the first nest found in territory 1 was designated nest 1A. If this nest failed, and the female renested the new nest was designated 1B. Second nesting attempts within the same nest cup were designated as A2. For example, if the first nest in territory 21 is 21A and the second nesting attempt is in the same nest cup, the second nesting attempt is labeled as 21A2 and the first is redesignated as nest 21A1.

To facilitate nest monitoring, an OP was marked with flagging at a suitable distance as determined by the observer. Suitability of an OP was dictated by the observer’s ability to see the nest with the least amount of disturbance to the adult WIFL’s regular nesting behaviors while the observer was present. This distance was usually  $\geq 5$  m from the nest, but varied slightly based on nest visibility in specific vegetation and water level conditions.

When a nest was located, behavioral cues were used to determine the stage of the nest cycle. If a nest was found during the building stage, the observer estimated the number of building-days completed (based on six days for building). A return date to confirm incubation was scheduled



based on an assumed total of six days needed for nest building and four additional days for egg laying. Incubation was confirmed if the female was observed sitting on the nest for 10 minutes or more. Once incubation was confirmed, the nest was visually inspected to determine the contents after the female voluntarily left. Visual inspections involved a small mirror or a small video camera attached to a telescoping aluminum pole. Inspections were repeated every four days until two days before the estimated hatching date (based on a 12-day incubation period). Nest inspections continued until the nestlings reached an estimated six days old, decreasing the chance of premature fledging. After the nestlings reached six days old, visual observations were conducted from the OP to confirm the status of the nest and its contents. Number of nestlings was estimated from the number of heads visible above the nest rim and the feeding behavior of the adult female. Visits during the nestling stage were conducted every four days until two days before the estimated fledge date (based on a 12-day nestling period). Visits were conducted every two days until fledging was confirmed or the nest was determined to have failed.

Once a nest was determined to have succeeded or failed, return visits were conducted every four days to detect renests (i.e., nesting attempts by the same individual female after her first nest fledges young or fails). Several nests were presumed to be renests based solely on bird behavior, timing of nest activities (i.e., it could not be the same female if a second nest was started before the first nest failed), and proximity to previous nesting attempts. Return visits were continued until no activity was detected for three consecutive visits four days apart and one visit scheduled 10 days following the third visit. These territories were then considered vacated after 22 days and removed from the monitoring schedule.

Nests were considered successful if fledglings were detected (confirmed) in the territory. Fledging was assumed if nestlings were observed within two days of the estimated fledge date (12 days after hatching). This assumption is based on observations of WIFL fledging at 10 days of age (Arizona Game and Fish Department [AGFD], unpublished data). Assuming fledging without confirmation may result in overestimation of nest success. However, excluding such data may result in underestimation of nest success. Therefore, confirmation of fledging was in all cases preferred. Nest attempts were considered failed if the nest was (1) found empty or destroyed more than two days before the estimated fledge date (depredated), (2) deserted with eggs, (3) abandoned before egg laying occurred, (4) the clutch was incubated for more than 20 days without hatching (at which time they were considered to be infertile), or (5) the nest fledged no WIFL young due to brown-headed cowbird (*Molothrus ater* [BHCO]) parasitism.

We used the method described by Mayfield (1961, 1975) to calculate nest success (survival probability). This method is more accurate than using percentages solely derived from number of nests, successful nests, or number of young fledged due to the consideration made for the probability that a given nest will be lost on any given day. This corrects for potential biases associated with finding nests at various stages of the nesting cycle, or those nests belonging to more conspicuous adult WIFLs. We calculated the probability of nest success during the three primary stages: egg laying, incubation, and nestling. We did not calculate success during the hatching stage because of small sample sizes and the lack of reliability in the results of these calculations.

### Resighting and Banding

As WIFLs were detected, surveyors and monitors attempted to detect (resight) color leg bands. Color bands are used by researchers to create a unique identifier for individual birds. When bands were detected, the color combination was noted and then reported to the U.S. Geological Survey (USGS), Colorado Plateau Field Station in Flagstaff, Arizona. The USGS then determined whether additional work was needed, such as more resighting to increase the confidence level of the color combination or capturing of WIFLs to apply color bands.

### Habitat Observations

Visual habitat observations, including nest substrate, water levels, approximate canopy height, and patch composition; were noted throughout the field season.

## **4. Results**

### Surveys

Not all WIFLs were present, paired, or nesting during any individual survey event. Thus, in survey area 1, the only survey area of the three where WIFLs were detected, the numbers reported during each individual survey event do not equal the actual number of WIFLs within the survey area. The summary numbers for Sheep's Bridge to Horseshoe Reservoir were 35 adults, 15 pairs, 20 territories, and 23 nests (Table 1).

**Table 1. Survey Results for Verde River Study Area, From Sheep's Bridge to the Boundary of the Fort McDowell Indian Reservation, Arizona, 2005.**

Survey Date	Hours	Number of Adults <sup>1,2</sup>	Number of Pairs <sup>2</sup>	Number of Territories	Number of Active Nests <sup>2</sup>
<b>Survey Area 1: Sheep's Bridge to Horseshoe Reservoir Dam</b>					
5/17 and 5/19	10.00	12	0	12	0
6/2	4.00	25	9	16	6
7/6	4.00	30	14	16	14
<b>Total</b>	<b>18.00</b>	<b>35</b>	<b>15</b>	<b>20</b>	<b>23</b>
<b>Survey Area 2: Horseshoe Reservoir Dam to Bartlett Reservoir Dam</b>					
5/23	4.17	0	0	0	0
6/16	3.75	0	0	0	0
7/14	3.97	0	0	0	0
<b>Total</b>	<b>11.89</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Survey Area 3: Bartlett Reservoir Dam to the Fort McDowell Indian Reservation Boundary</b>					
5/23	4.50	0	0	0	0
6/16	5.08	0	0	0	0
7/14	3.70	0	0	0	0
<b>Total</b>	<b>13.28</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<sup>1</sup>Five migrant WIFLs were detected. One from 5/13 to 6/14, a second from 5/13 to 6/8, a third from 5/6 to 5/10, a fourth from 5/19 to 6/10, and a fifth from 6/14 to 6/16. All were in the Sheep's Bridge to Horseshoe Reservoir survey area.

<sup>2</sup>Number of adults, pairs, and active nests were determined from the monitoring results. No WIFLs were detected outside the monitoring area.

We submitted survey results via the "Willow Flycatcher Survey and Detection Form (revised April 2004)" to AGFD and USFWS. Additional details of the surveys are contained within the appendices (Appendix A provides survey area maps, Appendix B provides survey forms, Appendix C lists Global Positioning System (GPS) points related to the surveys, and Appendix D contains survey forms provided by EEC for the Mesquite Campground survey area).

### Nest Monitoring

Monitoring began at Horseshoe Reservoir on May 5, the date the first territories were found and flagged. The first pairs were detected on May 20, as was the first nest located. In total, 20 territories, 15 with pairs, and 23 nests were monitored. Additional details of nest monitoring are

contained within the appendices (Appendix E illustrates the locations of territories and nests, Appendix F lists all GPS points of the territories and nests, Appendix G list the outcomes of all territories, and Appendix H provides the nest record forms). Nests were found for all documented paired WIFLs (15 territories). Eight males established territories, remained unpaired, and did not attempt to nest.

Of the 23 nests found during the season, eight were renests (seven were second nesting attempts and one was a third nesting attempt). Twelve nests were successful, nine were depredated, one failed due to weather, and one failed due to human interference. There were neither parasitized nests nor suspected abandonment due to BHCO. Mean number of eggs per clutch for first nest attempts and renests with known nest contents (n=19) were 2.92 and 2.17 respectively. Fifty-two percent of the nests were successful (fledged WIFL young), with 2.58 fledglings per successful nest (n=12). Table 2 provides calculated results of monitored nesting attempts.

**Table 2. Calculations Based on Monitoring Results, Horseshoe Reservoir, 2005.**

<b>Calculations Based on All Nesting Attempts<sup>1</sup></b>	
Number of nests	23
<i>Incubation stage</i>	
Total number of eggs	54
$\bar{x}$ Eggs per nest	2.35
<i>Nestling stage</i>	
Total number of nestlings	39
$\bar{x}$ Nestlings per nest	1.70
<i>Fledgling stage</i>	
Total number of fledglings	31
$\bar{x}$ Fledglings per nest	1.34
<b>Calculations Based on Nesting Attempts With Known Contents<sup>2</sup></b>	
Number of nests	19
<i>Incubation stage</i>	
Total number of eggs	54
$\bar{x}$ Eggs per nest	2.84
<i>Nestling stage</i>	
Total number of nestlings	39
$\bar{x}$ Nestlings per nest	2.05
<i>Fledgling stage</i>	
Total number of fledglings	31
$\bar{x}$ Fledglings per nest	1.63
<b>Success Rates per Stage</b>	
Percentage of eggs laid that hatched	72%
Percentage of nestling that fledged	79%
Percentage of eggs laid that fledged	57%

<sup>1</sup>These calculations include three nests with unverified contents and a fourth nest abandoned during the building stage; Appendix G summarizes nesting attempts.

<sup>2</sup>These calculations do not include three nests with unverified contents and a fourth nest abandoned during the building stage.

The probability of a nest surviving from the initiation of laying through the successful fledging of at least one nestling was 61.8% (Table 3). Appendix G lists all territory and nest outcomes.

**Table 3. Mayfield (1961, 1975) Survival Probability of Nests Through the Three Primary Nesting Stages, Horseshoe Reservoir, 2005.**

Nesting Stage	Total Nests Lost	Total Exposure Days	Probability of Survival
Egg laying	0	60	1.000
Incubation	4	163	0.799
Nestling	4	189	0.774
All stages	8	484	0.618

#### Resighting and Banding

A total of four banded birds were resighted within the study area. Three were previously banded, and one was banded by USGS during the field season. On two occasions, USGS determined that additional work was warranted and provided field technicians to assist in resighting. Four color-banded WIFLs were positively identified. One visit was conducted by USGS to capture and add color bands to an individual that was detected with a USFWS band on one leg (Table 4).

**Table 4. Color-banded Birds and Their History, Horseshoe Reservoir, Arizona, 2005.**

Territory	Band Combination <sup>1</sup>	USFWS Band Number <sup>2</sup>	History <sup>2</sup>
19	KD:KK	1740-51893	This is a female originally banded as a nestling at Roosevelt Reservoir in 2001 and first detected at Horseshoe Reservoir in 2003
21	NN:ZG	2350-24429	This is a male banded as an adult at Horseshoe in 2005
21	YRY:VV	1490-89827	This is a female originally banded as a nestling at Roosevelt Reservoir in 2003, recaptured and given a 2 <sup>nd</sup> unique identifier color band at Horseshoe Reservoir in 2005, recaptured in a passive net at Roosevelt Reservoir after leaving Horseshoe in 2005
23	KK:RDR	1740-51900	This is a female originally banded as an adult at Roosevelt Reservoir in 2001

<sup>1</sup>D=blue, G=green, K=black, N=bronze, R=red, V=violet, Y=yellow, Z=gold

<sup>2</sup>This information was provided by Scott Durst, USGS.

#### Habitat Observations

Over the breeding season, the reservoir dropped, from full, with a majority of the habitat inundated, to nearly empty, with no habitat inundated. The occupied habitat north of Chalk Mountain was free of inundation by the middle of July, while the occupied habitat further downstream in the reservoir was not free from inundation until the end of July. Consequently, the average canopy height changed considerably over the course of the season. Approximate canopy height for all occupied patches with no inundation was 12 meters. When the reservoir was full and WIFLs started to arrive, the average canopy height above the water was approximately 4 meters. Throughout the season, the river ran directly through the patch or next to the patch, hence 0 meters for distance to water. Nests were placed in Goodding's willow trees (n=17) and tamarisk trees (n=6) (see Appendix H for individual nest substrate).

Habitat along the river below Horseshoe Dam to the boundary of Fort McDowell Indian Reservation was either stringers of small (canopy height was approximately 10 meters) Goodding's willow 1 to 10 trees thick along the river banks, or large cottonwood galleries (canopy height was approximately 20 meters) away from the river with no understory. Very little tamarisk was present, but it did occur.

## **5. Discussion**

### Surveys

The Verde River below Horseshoe Dam and Bartlett Dam is regulated to meet downstream users' demands under various water rights. Despite this, it is evident from surveys and observations of habitat that the riparian ecosystem is generally dynamic, not static in nature. Evidence of the dynamic nature of the river included stands of cottonwoods and willows now within the main channel, channel braids no longer connected to the main channel, and signs of flooding (such as large piles of flood debris and debris high in trees). This is typical for southwestern river systems (Periman and Kelly 2000), conditions to which WIFLs have adapted. The majority of patches along this reach of the Verde River were relatively small, disparate, and may be affected by the discharges from Horseshoe and Bartlett dams. Although some patches of habitat along this stretch of the Verde River appeared potentially suitable, no WIFLs were detected along the Verde River between Horseshoe Reservoir Dam downstream to the Fort McDowell Indian Reservation boundary in 2005. Due to the dynamic, albeit regulated, nature of this river system, suitability of the habitat in the future is unknown, but based on field observations (described above) historical dam operations have allowed germination and persistence of riparian forest (also see Appendix B-6).

Surveys along the Verde River in 2005, from Sheep's Bridge downstream to Horseshoe Reservoir Dam, found WIFLs in patches where they were not previously detected. In 2004, WIFLs were found as far north as the south edge of Ister Flat, located approximately 2 miles south of Sheep's Bridge (Spencer 2004). In 2005, WIFLs were detected within habitat patches on the banks of the Verde River west of Ister Flat, 0.75 mile upstream of detections in 2004. These detections may be attributable to WIFLs which may have dispersed because of inundation of previously occupied habitat, WIFLs which colonized these patches because of improved quality due to higher lake elevations, or WIFLs which were not detected during past surveys.

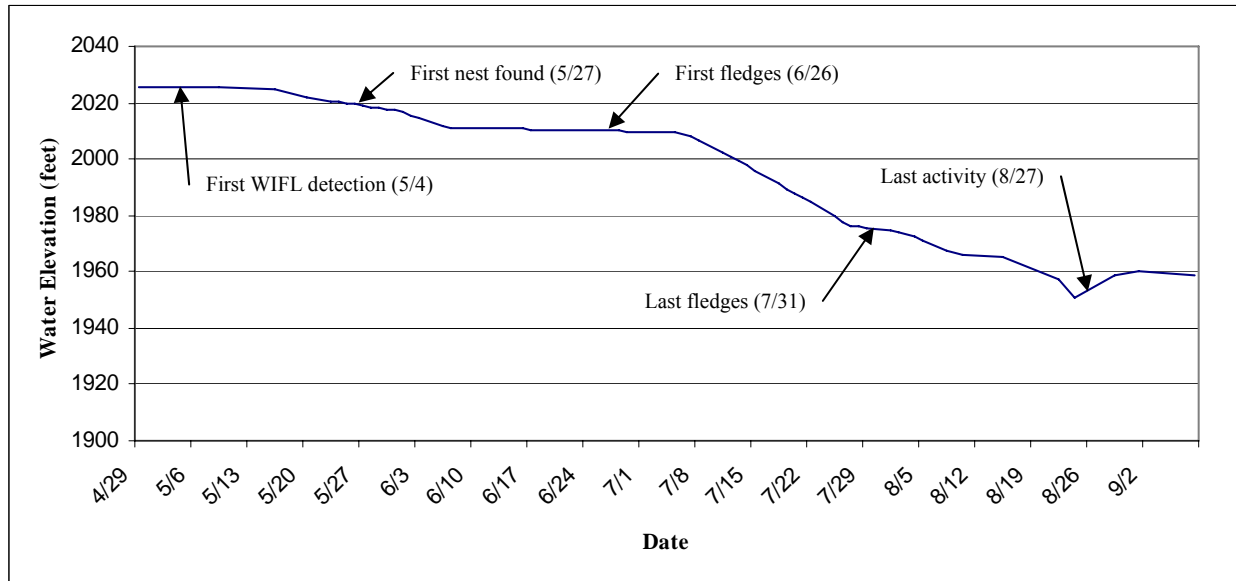
Five detections were considered migrants and 5 out of 20 territories were considered unpaired males (25%). These migrants and unpaired territorial individuals could have been males who had moved within the study area between survey events and were double counted. In one case, two unpaired males at the upstream extent of the occupied patches were not detected after the middle of June. During mid-June, two males were detected approximately 1 mile downstream and may have been the individuals previously detected upstream.

### Monitoring

Probability of success as outlined by Mayfield (1961, 1975) and productivity, as represented by number of fledges per nesting attempt, was calculated for Horseshoe Reservoir as 62% and 1.41 fledges per nest, respectively. These results are consistent with or higher than results reported for other monitoring studies. AGFD reports from 1997 through 2005 show Mayfield values ranging from 28% to 65% and fledges per nest ranging from 0.50 to 1.74 (Sferra et al. 1997; McCarthey

et al. 1998; Paradzick et al. 1999, 2000, 2001; Smith et al. 2002, 2003, 2004; Munzer et al. 2005) for various sites within Arizona where nest monitoring took place.

The water level in Horseshoe Reservoir was just below full pool elevation (98%) at the start of the breeding season in 2005 and receded slowly until water levels began to drop (ca. July 6 to July 29) up to 1 foot per day (Figure 3). Success rates for nests in inundated trees was 60%



**Figure 3. Water level at Horseshoe Reservoir, Arizona, 2005. Full pool elevation is 2,026 feet and empty pool elevation is 1,900 feet.**

(n=17), whereas nests located on dry substrates was 50% (n=6). While inundation appeared to have a slightly beneficial effect on nest success, sample size was small and reflects one year of data. Potential benefits from short-term inundation may be the exclusion of terrestrial predators from nesting habitat, or improved microclimate conditions (e.g., lower temperatures, higher humidity) surrounding the nest.

In the study site as a whole, 9 of 11 failed nests were attributed to predation. Paradzick et al. (2000, 2001), Smith et al. (2002, 2003, 2004), and Munzer et al. (2005) report depredation as accounting for the majority of all willow flycatcher nest failures. Although no predation events were observed, several potential predators were frequently present within the habitat, including Cooper's hawk (*Accipiter cooperii*) and various snakes, both of which prey on young WIFLs (AGFD, unpublished data) A rattlesnake (*Crotalus* spp.) was noted swimming through debris within inundated habitat (Appendix I, photo 22). Great-tailed grackles (*Quiscalus mexicanus*) were observed nesting within Area 2 and are known egg predators (Ehrlich et al. 1988). Three of five nests presumed to be predated in this area were predated during the incubation or laying stage.

Within the study site as a whole, one nest presumed to be predated showed damage (holes in nest), and several others appeared undisturbed. Traditionally, damage to nests was used to indicate the type of predator (i.e., mammals leave major disturbance; birds, no disturbance; small mammals, minor disturbance; and snakes, holes; Pietz and Granfors 2000). The reliability of determining predator type based on nest damage is questionable (Peterson et. al. 2004;

Thompson, et. al. 1999; Williams and Wood 2002); therefore, predator type was not predicted for failed nests.

BHCOs are known to parasitize WIFL nests (USFWS 1995), and though they were present within the occupied habitat, their numbers were relatively low. No parasitism was noted, and BHCOs did not otherwise have an observable effect on WIFL nest success.

#### Resighting and Banding

Four WIFLs detected at Horseshoe Reservoir were color-banded. Three of these were banded previously, and one was banded during the field season. The three previously banded WIFLs were originally banded at Roosevelt Reservoir—one as an adult and two as nestlings. One female WIFL was recaptured at Roosevelt Reservoir after leaving Horseshoe Reservoir in August 2005 (Appendix I, photo 23).

The pair at territory 21 was banded during the building or laying stage of the A nest (Appendix G). The nest appeared abandoned the following day and, therefore, human interference was presumed to be the cause of failure. No activity was detected in the territory for 11 days following banding, when a renest (second nesting attempt by the same pair) was found. Out of concern of potential impacts to WIFLs, USGS compared nest failure rates in 2001 and 2003 from Roosevelt Reservoir territories with banding activity and those without banding activity. They found that the failure rates showed no banding influence on nest success. At nests with no banding activity, nest failure was 33% and 35% in 2001 and 2003, respectively. At nests with banding activity, nest failure was 27% and 35% in 2001 and 2003, respectively (Scott Durst, USGS, personal communication).

Future banding efforts at Horseshoe may provide additional information to better understand intersite and metapopulation movements, bird/nest associations, fecundity, migration routes, and timing, and ultimately, the impacts of such efforts on nesting success.

#### Habitat Observations

Most breeding pairs of WIFLs were located in two spatially separated areas. Area 1 was located north of Chalk Mountain and Area 2 was downstream, west of Chalk Mountain and just upstream from where the floodplain becomes wider (Appendix E). Territories in Area 1 were nearly all clumped together while territories in Area 2 were linear. The two areas were separated by 0.60 straight-line miles, and 0.80 river miles. Eight of 11 (73%) nests in Area 1 were successful and 4 of 10 (40%) in Area 2 were successful.

Areas 1 and 2 both had a willow component along the river channel, bordered by a tamarisk stand on a higher terrace. Tamarisk was intermixed on the edge of the willow patch in Area 1 which graded into monotypic tamarisk on the terrace. The willow patch in Area 2 had no tamarisk intermixed; there was a distinct break in forest composition between the lower elevation willow patch near the channel and the higher elevation (terrace) tamarisk patch. Because of higher lake elevation, Area 1 dried out earlier when lake levels receded. Tamarisk in Area 1 leafed out, provided canopy cover, and was used for nesting by WIFLs (6 nests). The tamarisk on the higher terrace in Area 2 was submerged and inundated for a longer period, did not leaf out or provide a canopy cover, and appeared dead throughout the field season. No nests were found in the tamarisk patch within Area 2. All WIFL activity in Area 2 occurred within the willow

patch near the river channel. No WIFLs were detected in tamarisk patches in 2004 (Spencer 2004) and surveyors did not report habitat measurements or observations; thus, it is unknown if the tamarisk patch in Area 2 was suitable for nesting WIFLs.

## 6. Literature Cited

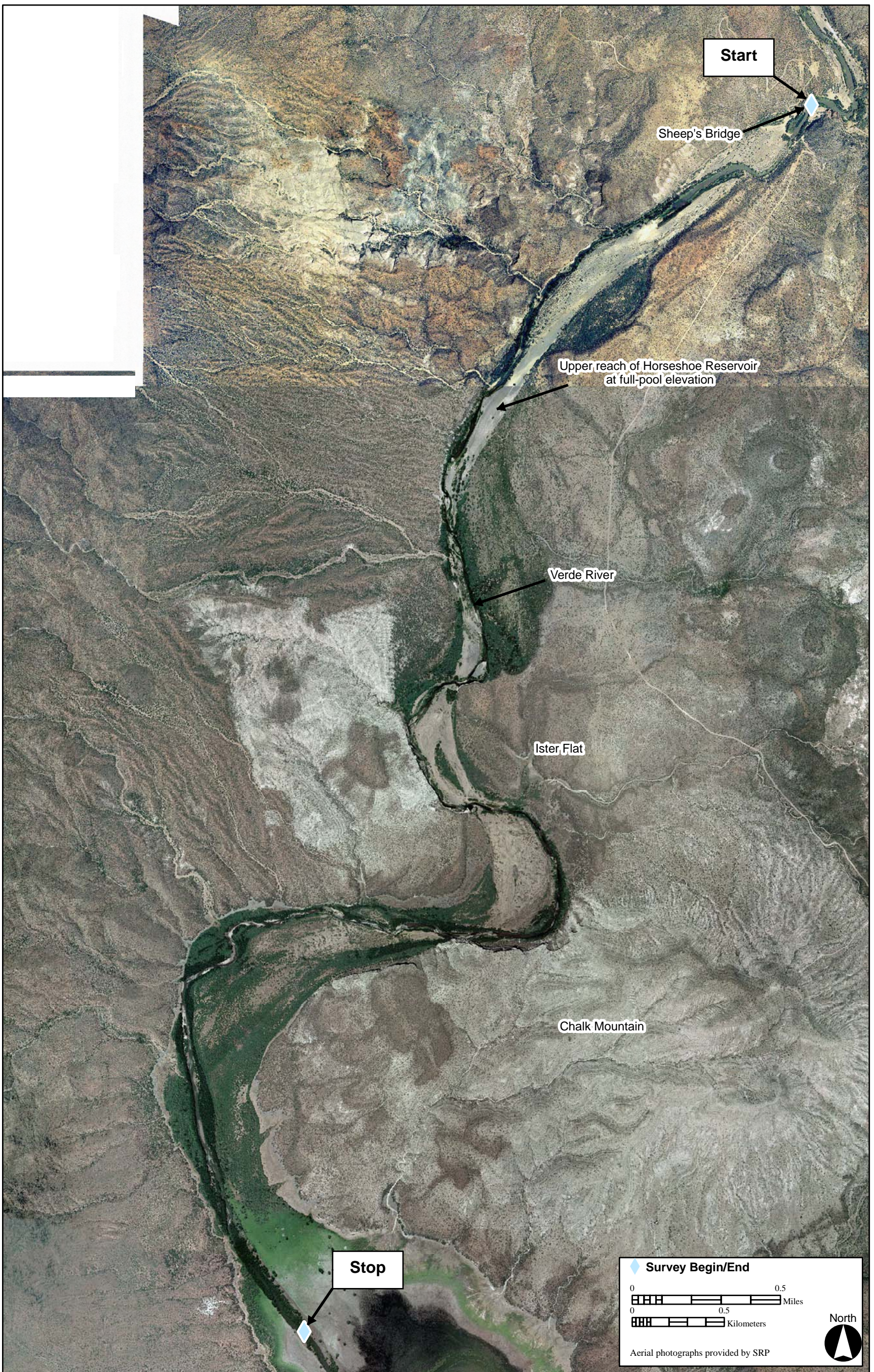
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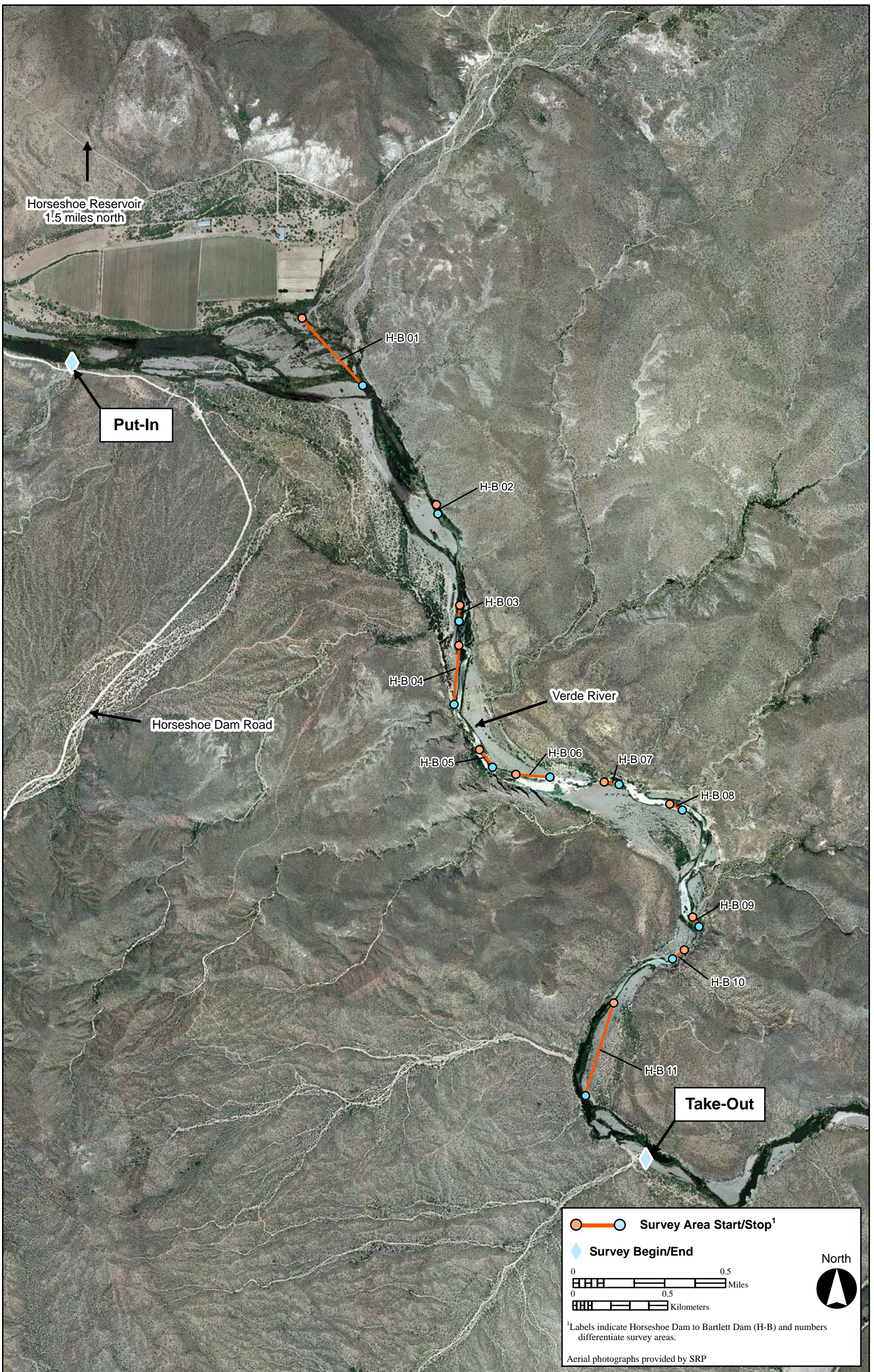
## **Appendix A**

WIFL Survey Areas, Verde River, Sheep's Bridge to  
Fort McDowell Indian Reservation Boundary, Arizona, 2005



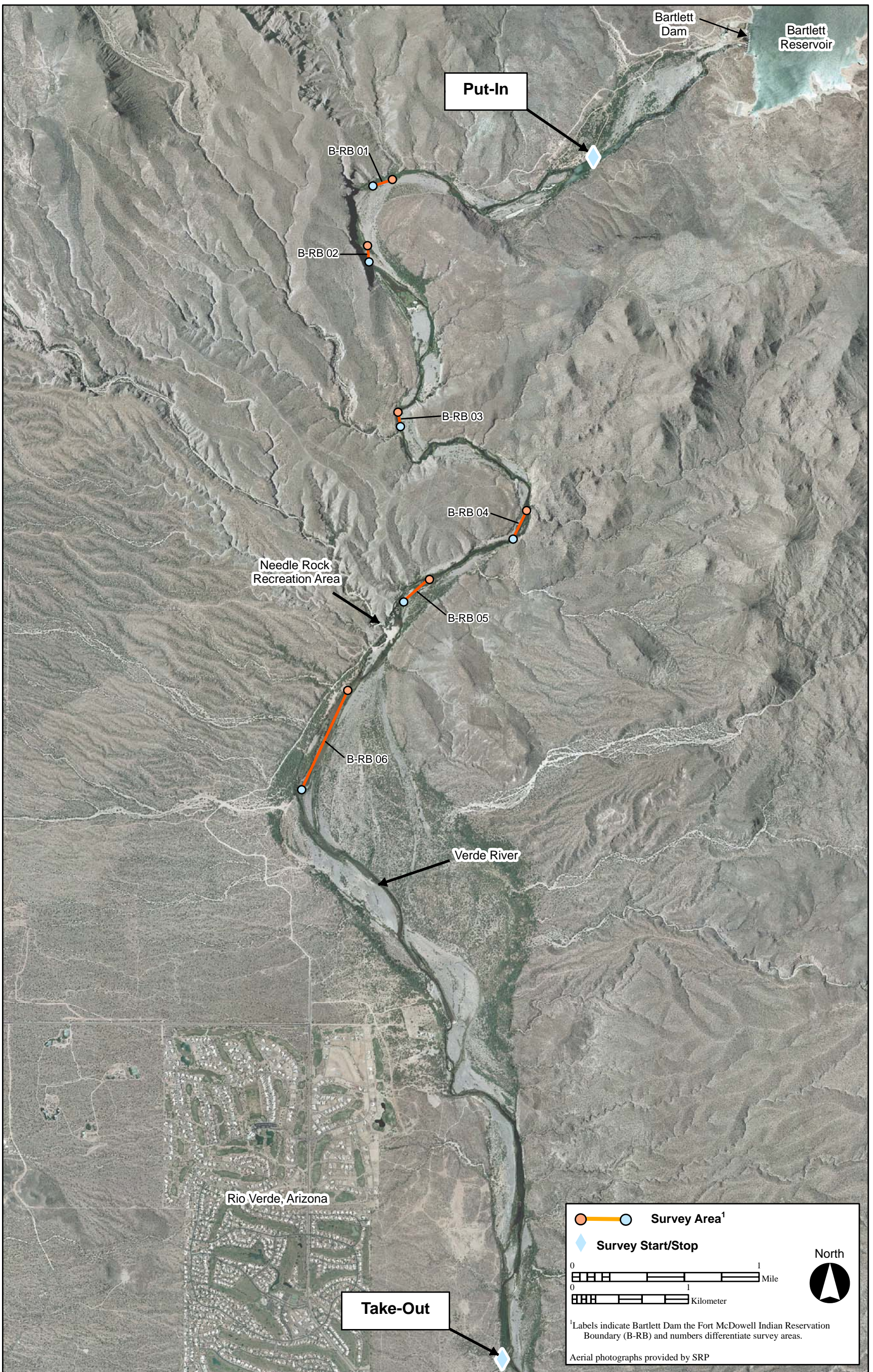
W:\04-715\BIO\Survey\Horseshoe\draft\App.A\Map1

Map 1. Survey Area 1: Sheep's Bridge to Horseshoe Reservoir Dam.



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Map 2. Survey Area 2: Horseshoe Reservoir Dam to Bartlett Reservoir Dam.



Map 3. Survey Area 3: Bartlett Reservoir Dam to the Fort McDowell Indian Reservation Boundary.

**Appendix B**  
WIFL Survey and Detection Forms,  
Verde River, Sheep's Bridge to the  
Fort McDowell Indian Reservation Boundary, 2005

**Survey Area 1: Sheep's Bridge to Horseshoe Reservoir Dam.**

Site Name: Sheep's Bridge to Horseshoe Reservoir Dam

USGS Quad Name: Chalk Mountain

Site Coordinates: Start: 3770759n, 434756e

Stop: 3763947n, 432850e

State: AZ County: Yavapai

Elevation: 590-640 meters

Datum: NAD27

Zone: 12s, UTM

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey Time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent Sign, Y or N	Comments About This Survey
1. 5/16: Janine Spencer Debra Brewer 5/19: Thomas C. Ashbeck Patrick E.T. Dockens	Date: 5/16/05 0500-0900 5/19/05 0700-0900 Total hrs: <u>10</u>	<b>12</b>	<b>0</b>	<b>12</b>	N	Y	N	
2. Janine Spencer Debra Brewer	Date: 6/15/05 0500-0900  Total hrs: <u>4</u>	<b>25</b>	<b>9</b>	<b>16</b>	Y (6 active nests)	Y	N	
3. Janine Spencer Debra Brewer	Date 7/11/05 0500-0900  Total hrs: <u>4</u>	<b>30</b>	<b>14</b>	<b>16</b>	Y (14 active nests)	Y	N	
4.	Date  Start  Stop  Total hrs _____							
5.	Date  Start  Stop  Total hrs _____							
Overall Site Summary <sup>1</sup> (Total <b>resident</b> WIFLs only)  Total survey hrs: <u>18</u>		Adults  <b>35</b>	Pairs  <b>15</b>	Territories  <b>20</b>	Nests  <b>23</b>	Were any WIFLs color-banded? <u>Yes</u> <sup>2</sup> No  Band combinations were reported to USGS when sighted; combinations are in full technical report.		

Reporting Individual: Thomas C. Ashbeck  
Affiliation: EcoPlan Associates, Inc.  
U.S. Fish and Wildlife Service Permit # TE 830213-1  
Site Name: Sheep's Bridge to Horseshoe Reservoir Dam

Phone #: (480) 733-6666, x128  
E-mail: tashbeck@ecoplanaz.com  
AZ Game and Fish Department Permit # SP 629562  
Date Report Completed: 11/21/2005

Did you verify that this site name is consistent with that used in previous years? Yes  No   
If name is different, what name(s) was used in the past? Ister Flat, Horseshoe Reservoir  
If site was surveyed last year, did you survey the same general area this year?  Yes  No  
Did you survey the same general area during each visit to this site this year? Yes  No

Management Authority for Survey Area (circle one):  Federal  Municipal/County  State  Tribal  Private  
Name of Management Entity or Owner: Tonto National Forest, Cave Creek Ranger District

Length of area surveyed: 6.1 miles

Vegetation Characteristics: Overall, are the species at this site comprised predominantly of:

- Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)  
 Mixed native and exotic plants (mostly native)  
 Mixed native and exotic plants (mostly exotic)  
 Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: SAGO, TASP  
Average height of canopy (Do not put a range): 12 meters<sup>5</sup>

Was surface water or saturated soil present at or adjacent to site?  Yes  No

Distance from the site to surface water or saturated soil: 0 meters<sup>5</sup>

Did hydrological conditions change significantly among visits (did the site flood or dry out)?  Yes  No

Comments:

<sup>1</sup>Five migrant WIFLs were detected. One from 5/13 to 6/14, a second from 5/13 to 6/8, a third from 5/6 to 5/10, a fourth from 5/19 to 6/10, and a fifth from 6/14 to 6/16.

<sup>2</sup>There were a total of four banded birds at the site—three previously banded and one banded this summer. All band combinations were reported to USGS and are included in the technical report.

<sup>3</sup>All suitable habitat from start to finish was surveyed.

<sup>4</sup>Any areas with resident WIFLs were monitored; only areas with no previous detections were surveyed.

<sup>5</sup>Over the breeding season, the reservoir dropped considerably, from full, with a majority of the habitat inundated, to nearly empty, with no habitat inundated. Consequently, the average canopy height and distance to water changed considerably over the course of the season. The canopy height listed above is for all occupied patches with no inundation. When the reservoir was full and WIFLs started to arrive, the average canopy height above the water was 3.81 meters. Throughout the season, the river ran directly through the patch, hence 0 meters for distance to water.



## Survey Area 2: Horseshoe Reservoir Dam to Bartlett Reservoir Dam.

Site Name: Horseshoe Reservoir Dam to Bartlett Reservoir Dam

State: AZ County: Maricopa

USGS Quad Name: Horseshoe Dam

Elevation: 545-575 meters

Site Coordinates: Start: 3757834n, 434952e

Datum: NAD27

Stop: 3753630n, 437964e

Zone: 12s, UTM

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey Time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent Sign, Y or N	Comments About this Survey
1. Thomas C. Ashbeck Patrick E.T. Dockens	Date: 5/19/05 0520-0930  Total hrs: <u>4.17</u>	<b>0</b>	<b>0</b>	<b>0</b>	N	Y	N	Habitat along the river is either stringers of young (~10m high) SAGO 1-10 trees thick, or its large cottonwood galleries away from the river with no understory. Very little TASP, but it does occur.
2. Steve F. Hale Colby Henly	Date: 6/15/05 0540-0925  Total hrs: <u>3.75</u>	<b>0</b>	<b>0</b>	<b>0</b>	N	Y	N	
3. Steve F. Hale Colby Henly	Date 7/13/05 0618-1009  Total hrs: <u>3.97</u>	<b>0</b>	<b>0</b>	<b>0</b>	N	Y	N	
4.	Date  Start  Stop  Total hrs							
5.	Date  Start  Stop  Total hrs							
Overall Site Summary (Total <b>resident</b> WIFLs only)  Total survey hrs: <u>11.89</u>		Adults  <b>0</b>	Pairs  <b>0</b>	Territories  <b>0</b>	Nests  <b>0</b>	Were any WIFLs color-banded? <input checked="" type="radio"/> Yes <input type="radio"/> No  If yes, report color combination(s) in the comments section on back of form		

Reporting Individual: Thomas C. Ashbeck

Phone #: (480) 733-6666, x128

Affiliation: EcoPlan Associates, Inc.

E-mail: tashbeck@ecoplanaz.com

U.S. Fish and Wildlife Service Permit # TE 830213-1

AZ Game and Fish Department Permit # SP 629562

Site Name: Horseshoe Reservoir Dam to Bartlett Reservoir Dam

Date Report Completed: 11/21/2005

Did you verify that this site name is consistent with that used in previous years? Yes  No  (circle one)

If name is different, what name(s) was used in the past? Unknown

If site was surveyed last year, did you survey the same general area this year?  Yes<sup>1</sup>/ No If no, summarize in comments below.

Did you survey the same general area during each visit to this site this year?  Yes/ No If no, summarize in comments below.

Management Authority for Survey Area (circle one)  Federal  Municipal/County  State  Tribal  Private  
Name of Management Entity or Owner: Tonto National Forest, Cave Creek Ranger District

Length of area surveyed: 4.6 miles

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

- Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)
- Mixed native and exotic plants (mostly native)
- Mixed native and exotic plants (mostly exotic)
- Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: SAGO, POFR, TASP

Average height of canopy (Do not put a range): 10 meters

Was surface water or saturated soil present at or adjacent to site?  Yes/ No (circle one)

Distance from the site to surface water or saturated soil: 0 meters<sup>2</sup> (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)?  Yes<sup>2</sup>/ No (circle one)

If yes, describe in comments section below.

Comments:

<sup>1</sup>The same areas were surveyed plus any other areas that appeared suitable.

<sup>2</sup>Fluctuations in river levels were due to rainfall and releases from Horseshoe Dam. The river flowed next to and through the various patches.

WIFL Detection Locations: No WIFL detected.

**Survey Area 3: Bartlett Reservoir Dam to Fort McDowell Indian Reservation Boundary.**

Site Name: Bartlett Reservoir Dam to Fort McDowell Indian Reservation Boundary

State: AZ County: Maricopa

USGS Quad Name: Bartlett Dam, Fort McDowell

Elevation: 450–487 meters

Site Coordinates: Start: 3740981n, 440240e

Datum: NAD27

Stop: 3730610n, 439479e

Zone: 12s, UTM

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey Time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent Sign, Y or N	Comments About this Survey
1. Thomas C. Ashbeck Patrick E.T. Dockens	Date: 5/23/05 0530-1000  Total hrs: <u>4.50</u>	<b>0</b>	<b>0</b>	<b>0</b>	N	Y	N	Habitat along the river is either stringers of young (~10m high) SAGO 1–10 trees thick, or its large cottonwood galleries away from the river with no understory. Very little TASP, but it does occur.
2. Steve F. Hale Colby Henly	Date: 6/16/05 0540-1045  Total hrs: <u>5.08</u>	<b>0</b>	<b>0</b>	<b>0</b>	N	Y	N	
3. Steve F. Hale Colby Henly	Date: 7/14/05 0548-0930  Total hrs: <u>3.70</u>	<b>0</b>	<b>0</b>	<b>0</b>	N	Y	N	
4.	Date  Start  Stop  Total hrs							
5.	Date  Start  Stop  Total hrs							
Overall Site Summary (Total <b>resident</b> WIFLs only)  Total survey hrs: <u>13.28</u>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	Were any WIFLs color-banded? <input checked="" type="radio"/> Yes <input type="radio"/> No  If yes, report color combination(s) in the comments section on back of form		

Reporting Individual: Thomas C. Ashbeck

Phone #: (480) 733-6666, x128

Affiliation: EcoPlan Associates, Inc.

E-mail: tashbeck@ecoplanaz.com

U.S. Fish and Wildlife Service Permit # TE 830213-1

AZ Game and Fish Department Permit # SP 629562

Site Name: Bartlett Reservoir to Fort McDowell Indian Reservation Boundary Date Report Completed: 11/21/2005

Did you verify that this site name is consistent with that used in previous years? Yes  No  (circle one)

If name is different, what name(s) was used in the past? Unknown

If site was surveyed last year, did you survey the same general area this year?  Yes<sup>1</sup> / No If no, summarize in comments below.

Did you survey the same general area during each visit to this site this year?  Yes No If no, summarize in comments below.

Management Authority for Survey Area (circle one)  Federal  Municipal/County  State  Tribal  Private  
Name of Management Entity or Owner: Tonto National Forest, Cave Creek Ranger District

Length of area surveyed: 9.9 miles

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

- Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)
- Mixed native and exotic plants (mostly native)
- Mixed native and exotic plants (mostly exotic)
- Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: SAGO, POFR, TASP

Average height of canopy (Do not put a range): 10 meters

Was surface water or saturated soil present at or adjacent to site?  Yes  No (circle one)

Distance from the site to surface water or saturated soil: 0 meters<sup>2</sup> (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)?  Yes<sup>2</sup> / No (circle one)

If yes, describe in comments section below.

Comments:

<sup>1</sup>The same areas were surveyed plus any other areas that appeared suitable.

<sup>2</sup>Fluctuations in river levels were due to rainfall and releases from Horseshoe Dam. The river flowed next to and through the various patches.

WIFL Detection Locations: No WIFL detected.

## **Appendix C**

GPS Points of Survey Areas  
Along the Verde River, from Sheep's Bridge to  
Fort McDowell Indian Reservation, Arizona, 2005

**Appendix C. GPS Points of Willow Flycatcher Survey Areas Along the Verde River, From Sheep's Bridge to Fort McDowell Indian Reservation, Arizona, 2005.**

Survey Area	Start		Stop	
	Easting	Northing	Easting	Northing
<b>Sheep's Bridge to Horseshoe Reservoir</b>	434762	3770790	432008	3764114
<b>Horseshoe Dam to Bartlett Dam</b>	434949	3757837	437979	3753634
Survey Areas:				
01	436160	3758071	436480	3757715
02	436869	3757085	436877	3757037
03	436992	3756553	436988	3756468
04	436988	3756341	436962	3756029
05	437096	3755790	437165	3755697
06	437288	3755659	437468	3755645
07	437754	3755619	437833	3755605
08	438100	3755502	438166	3755470
09	438221	3754904	438255	3754854
10	438177	3754731	438115	3754683
11	437805	3754451	437656	3753960
<b>Bartlett Dam to Fort McDowell Indian Reservation Boundary</b>	440267	3740995	439478	3730602
Survey Areas:				
01	438533	3740800	438365	3740744
02	438318	3740228	438331	3740088
03	438581	3738789	438602	3738665
04	439689	3737939	439574	3737692
05	438852	3737344	438630	3737149
06	438148	3736386	437751	3735527

<sup>1</sup>GPS points are projected in NAD27, Zone 12s, UTM's.

## **Appendix D**

WIFL Survey Form Provided by EEC, Inc.,  
of Mesquite Campground, Verde River, Arizona, 2005

**Willow Flycatcher Survey and Detection Form (revised April, 2004)**

Site Name Davenport (Mesquite Campground) Verde State AZ County \_\_\_\_\_  
 USGS Quad Name Horseshoe Dam Elevation 1,960'  meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)?  Yes  No

Site Coordinates: Start: N 3758625 E 433782 UTM Datum 27 (NAD27 preferred)  
 Stop: N 3757936 E 433403 UTM Zone 12

**\*\* Fill in additional site information on back of this page \*\***

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found ? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1. <u>Janine Spencer, Debbie Brewer</u>	Date <u>5-18-05</u> Start <u>05:15</u> Stop <u>06:30</u> Total hrs <u>1.25</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>N</u>	<u>N</u>	<u>N</u>	
2. <u>Janine Spencer, Debbie Brewer</u>	Date <u>6-14-05</u> Start <u>05:20</u> Stop <u>07:00</u> Total hrs <u>1.25</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>N</u>	<u>N</u>	<u>N</u>	
3. <u>Janine Spencer, Debbie Brewer</u>	Date <u>7-11-05</u> Start <u>No</u> Stop <u>see</u> Total hrs <u>0</u> <i>Comments</i>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>Area mostly burned, including much of the riparian vegetation.</u>
4. _____	Date _____ Start _____ Stop _____ Total hrs _____							
5. _____	Date _____ Start _____ Stop _____ Total hrs _____							
Overall Site Summary (Total resident WIFLs only)		Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes <input checked="" type="checkbox"/> If yes, report color combination(s) in the comments section on back of form		
Total survey hrs <u>2.5</u>		<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>			

Reporting Individual Janine Spencer EEC Date Report Completed 8-1-05  
 US Fish and Wildlife Service Permit # TE020844-IAZ Game and Fish Department (or other state) Permit # 221462

*Submit original form by August 1<sup>st</sup>. Retain a copy for your records.*



Fill in the following information completely. Submit original form by August 1<sup>st</sup>. Retain a copy for your records.

Reporting Individual Janine Spencer, P.E.C. Phone # 520-321-4625  
 Affiliation Engineering & Environmental Consultants E-mail jspencer@eec2uc.com  
 Site Name Mesquite Campground Date Report Completed 8-1-05

Did you verify that this site name is consistent with that used in previous years? Yes/ No (circle one)  
 If name is different, what name(s) was used in the past? \_\_\_\_\_  
 If site was surveyed last year, did you survey the same general area this year? Yes/ No If no, summarize in comments below.  
 Did you survey the same general area during each visit to this site this year? Yes/ No If no, summarize in comments below.

Management Authority for Survey Area (circle one): Federal Municipal/County State Tribal Private  
 Name of Management Entity or Owner (e.g., Tonto National Forest) Tonto National Forest

Length of area surveyed: 0.6 mi. (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

- Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)  
 Mixed native and exotic plants (mostly native)  
 Mixed native and exotic plants (mostly exotic)  
 Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Gooddings willow, tamarisk, sycamore

Average height of canopy (Do not put a range): ~ 50 ft. (specify units)

Was surface water or saturated soil present at or adjacent to site? Yes/ No (circle one)

Distance from the site to surface water or saturated soil: ~ 3 ft. (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes / No (circle one)  
 If yes, describe in comments section below.

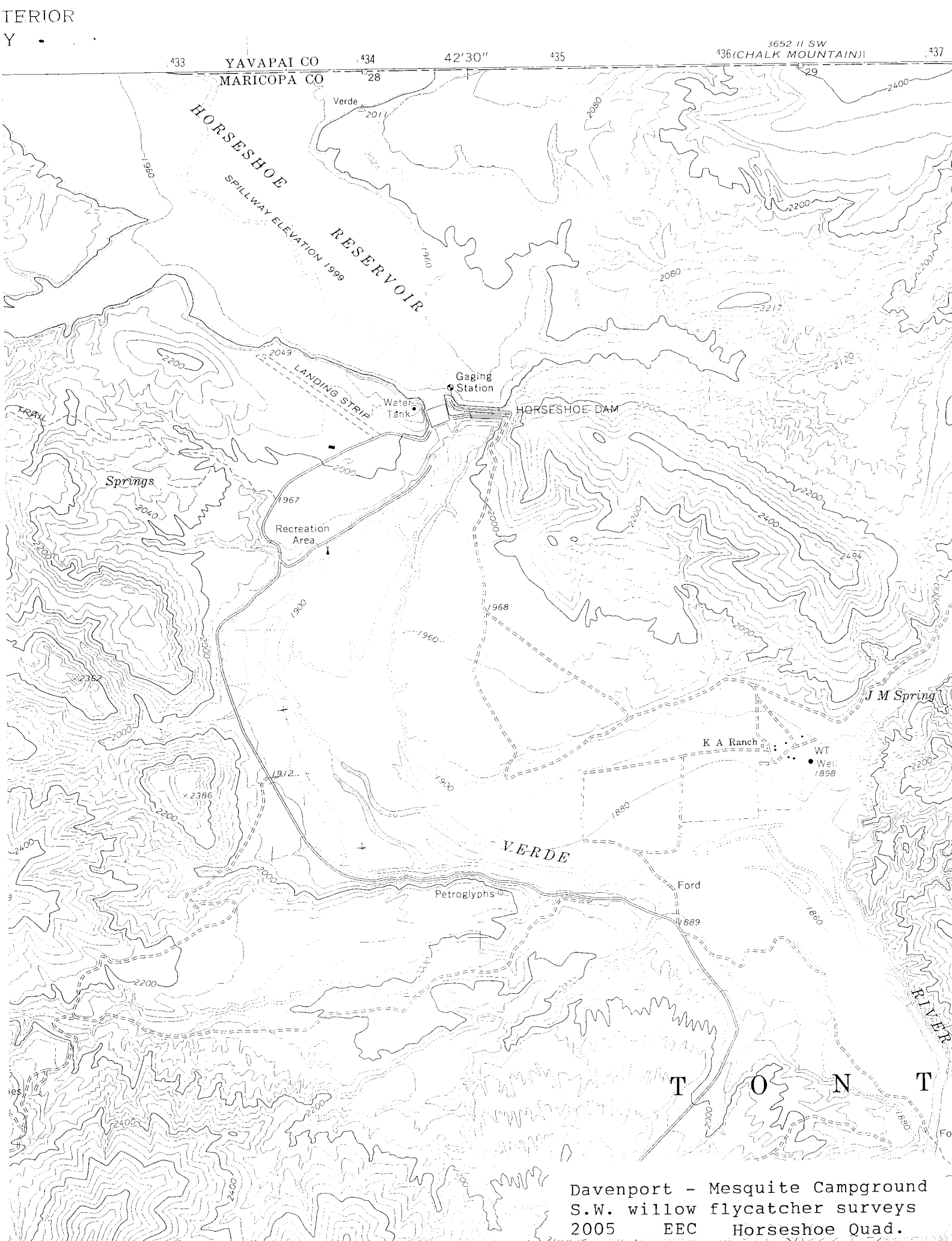
Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

A log jam blocked water flow at the area where wifls were found in previous years. The campground burned just prior to our visit on 7-11-05. The fire hopped across the ditch & burned the riparian vegetation, with greenery left in some spots.

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM



TERIOR  
Y

433 YAVAPAI CO 434 42'30" 435 3652 ft SW (CHALK MOUNTAIN) 437  
MARICOPA CO 28 29

HORSESHOE  
SPILLWAY ELEVATION 1999  
RESERVOIR

Verde 2011  
2080  
2080  
2200  
2217  
2120  
2049 LANDING STRIP  
Gaging Station  
Water Tank  
HORSESHOE DAM

TRAIL  
Springs  
2040  
1967  
Recreation Area  
2000

J M Spring  
K A Ranch  
WT Well 1998

VERDE

Petroglyphs

Ford  
1889

T O N T

Davenport - Mesquite Campground  
S.W. willow flycatcher surveys  
2005 EEC Horseshoe Quad.

## **Appendix E**

WIFL Migrant, Territory, and Nest Locations  
at Horseshoe Reservoir, Arizona, 2005

THE INFORMATION WITHIN THIS APPENDIX WAS  
REMOVED DUE TO SENSITIVITY OF DATA.  
PLEASE CONTACT SRP OR AGFD FOR MORE INFORMATION.

## **Appendix F**

GPS Points of WIFL Migrants, Territories, and Nests  
at Horseshoe Reservoir, Arizona, 2005

THE INFORMATION WITHIN THIS APPENDIX WAS  
REMOVED DUE TO SENSITIVITY OF DATA.  
PLEASE CONTACT SRP OR AGFD FOR MORE INFORMATION.

**Appendix G**  
Summary of Outcomes at  
Horseshoe Reservoir, Arizona, 2005

## Appendix G. Summary of Outcomes at Horseshoe Reservoir, Arizona, 2005.

Migrant, Territory, or Nesting Attempt <sup>1</sup>	Result <sup>2</sup>	Exposure Days <sup>3</sup>			
		Egg Laying	Incubation	Nestling	Total
1A	Predated during incubation, 3 eggs	3	3	0	6
1B	Failed due to weather during nestling stage, 3 nestlings	3	10	4	17
2A	Predated during nestling stage, 3 nestlings	3	12	4	19
2B	Fledged 3 young	3	12	12	27
3A	Predated during egg stage (went from 3 to 2 eggs) and nestling stage, 1 egg never hatched and was also predated during nestling stage	3	12	7	22
3B <sup>4</sup>	Predated, probably during egg laying, stage never confirmed, incubation never confirmed, female on nest for max eight minutes	—	—	—	3
4A	Fledged 3 young	3	12	15	30
4B	Fledged 2 young	2	12	12	26
5A	Predated during incubation, 4 eggs	4	12	0	16
7A	Fledged 2 young, 1 egg never hatched	4	11	19	34
8 <sup>5</sup>	Migrant, 5/13 to 6/14	0	0	0	0
9 <sup>5</sup>	Migrant, 5/13 to 6/8	0	0	0	0
11 <sup>5</sup>	Migrant, 5/6 o 5/10	0	0	0	0
12A	Fledged 3 young	3	12	14	29
13A <sup>4</sup>	Predated, probably during incubation, stage never confirmed, female on nest briefly several times, nest found empty and damaged	—	—	—	10
13B	Predated during incubation, nest too tall to check contents	3	4	0	7
13C	Fledged 3 young	3	12	16	31
14A	Fledged 3 young	3	12	14	29
15 <sup>6</sup>	Unpaired male, 5/16 to 6/27	0	0	0	0
16A <sup>7</sup>	Predated during incubation, 2 eggs	—	—	—	8
17 <sup>6</sup>	Unpaired male, 5/19 to 6/15	0	0	0	0
18 <sup>5</sup>	Migrant, 5/19 to 6/10	0	0	0	0
19A	Fledged 3 young	3	12	13	28
20 <sup>6</sup>	Unpaired male, 5/31 to 7/12	0	0	0	0
21A1 <sup>8</sup>	Failed due to human interference, both adults banded during building stage, nest abandoned	—	—	—	—
21A2	Fledged 3 young	3	12	10	25
22A	Fledged 3 young	3	12	11	26
23A	Fledged 2 young, 1 egg never hatched	3	12	15	30
23B	Predated during nestling stage, 1 nestling, 1 egg never hatched, also predated during nestling stage	2	12	8	22
24A	Fledged 1 young, 2 eggs predated during incubation	3	12	15	30
25 <sup>6</sup>	Unpaired male, 6/8 to 6/21	0	0	0	0
26 <sup>5</sup>	Migrant, 6/14 to 6/16	0	0	0	0
27 <sup>6</sup>	Unpaired male, 6/17 to 7/4	0	0	0	0
Totals:		57	208	189	475

<sup>1</sup>The number indicates an individual female's territory and the letter indicates a nesting attempt by that female, and a letter followed by a number indicates another nesting attempt within the same nest cup (i.e., A is the 1<sup>st</sup> nesting attempt, B is the 2<sup>nd</sup>, and C is the 3<sup>rd</sup>; A1 is the 1<sup>st</sup> nesting attempt and A2 is the 2<sup>nd</sup> nesting attempt in the same nest cup).

<sup>2</sup>All eggs, nestlings, and young fledged are considered WIFL.

<sup>3</sup>Exposure days are defined according to Mayfield (1961, 1975); one nest in existence for one day equals one nest-day or one exposure day.

<sup>4</sup>Nest stage could not be determined accurately for this nest; therefore exposure days only counted toward total.

<sup>5</sup>These detections were considered migrant WIFLs. Dates indicate time frame when WIFL was present.

<sup>6</sup>Dates indicate time frame when WIFL was present at the territory. These territories never paired or nested.

<sup>7</sup>Nest stage determined, but not how far into stage; therefore exposure days only count toward total.

<sup>8</sup>This nest was abandoned before egg laying; therefore, there were no exposure days and this nest is not counted in Mayfield calculations.

## **Appendix H**

WIFL Nest Record Forms,  
Horseshoe Reservoir, Arizona, 2005

THE INFORMATION WITHIN THIS APPENDIX WAS  
REMOVED DUE TO SENSITIVITY OF DATA.  
PLEASE CONTACT SRP OR AGFD FOR MORE INFORMATION.

## **Appendix I**

Photos, Horseshoe Reservoir, Arizona, 2005

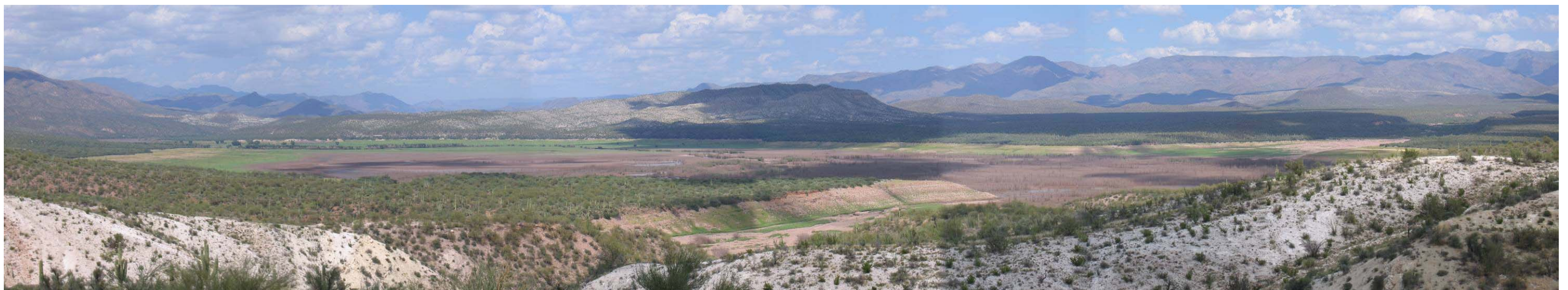




**Photo 1. Panoramic overview of Horseshoe Reservoir from south of Lime Creek, facing north and east, May 23, 2005.**



**Photo 2. Panoramic overview of Horseshoe Reservoir from south of Lime Creek, facing north and east, June 6, 2005.**



**Photo 3. Panoramic overview of Horseshoe Reservoir from south of Lime Creek, facing north and east, September 9, 2005.**



**Photo 4.**



**Photo 5.**



**Photo 6.**



**Photo 7.**

**Photos 4–7. Photos of Horseshoe Reservoir on August 8, 2005, taken facing north and west, from above Lime Creek.**



**Photo 8. June 2, 2005.**



**Photo 9. June 16, 2005.**



**Photo 10. July 13, 2005.**



**Photo 11. July 25, 2005.**

**Photos 8–11. Photo series within the main river channel facing upstream (north) in the vicinity of territories 3 and 20 (dates listed with each photo).**



**Photo 12. Habitat within territory 14, willow stand near river channel. Note WIFL in center of photo, May 15, 2005.**



**Photo 13. View facing upstream (north) of willow habitat around main channel near territories 1, 2, and 5, April 18, 2005.**



**Photo 14. View facing north, toward territories 4 (on right) and 13 (on left). Chalk Mountain is behind (south of) photographer, April 18, 2005.**



**Photo 15. View facing downstream of habitat near territory 25. Note leafless area below old high water level. Photo taken July 13, 2005.**



**Photo 16. View of interior of territory 13 after reservoir levels have dropped. Thirteen A, B, and C are in willows within photo. Photo taken August 8, 2005.**



**Photo 17. Nest 2A tree knocked over by monsoon storm, photo taken July 20, 2005. Inverted WIFL nest circled.**



**Photo 18. Monsoon storm damage and fallen willows, photo taken July 25, 2005. View facing upstream, near territories 3 and 20.**



**Photo 19. Monsoon storm damage, photo taken July 25, 2005. View facing west, near territories 1, 2, and 5.**



**Photo 20. Cutbank created by high steady flows through July and August after reservoir levels dropped. Photo taken facing entrance to territories 13, 14, and 23, July 21, 2005.**



**Photo 21. View looking upstream (north) near territory 20 of hazy conditions resulting from one of several wildfires near Horseshoe Reservoir in 2005. Photo taken June 27, 2005.**





**Photo 22. Rattlesnake swimming through inundated habitat.**



**Photo 23. Female WIFL being banded at territory 21. Photo taken June 13, 2005.**