ARIZONA BALD EAGLE MANAGEMENT PROGRAM
2016 SUMMARY REPORT

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Photo by Kurt Licence

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This report, in part, summarizes the results of monitoring by the Arizona Bald Eagle Nestwatch Program using the breeding area reports submitted in 2016. Those include: Danielle Glass and Meghan Hogan, Box Bar Breeding Area (BA); Dwight Jones and Katy Hudler, Cliff and Ladders BAs; Joe Peddie and Marta Peddie, Luna BA; Leah Vader and Jen Ottinger, Doka, Rodeo, Sycamore, and Ft. McDowell BAs; Matthew Pierle and Brent Saeli, Goldfield & Kerr BAs; Britney Zell and K. Cameron Beer, Granite Reef and Orme BAs; Russell Seeley and Eduardo Martinez Leyva, Pleasant and Crescent BAs; Rumaan Malhotra and Ben Sweet, Tonto BA; Paula Hartzell and Nicholas Metheny, Whiskey Spring BA; Ben Sweet, Meghan Hogan, Dwight Jones, and Danielle Glass, Woods Canyon BA.

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ARIZONA BALD EAGLE MANAGEMENT PROGRAM 2016 SUMMARY REPORT

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INTRODUCTION

In 1978, the U.S. Fish and Wildlife Service (USFWS) listed the bald eagle (*Haliaeetus leucocephalus*) as endangered under the Endangered Species Act (ESA), as amended (1973), in 43 states including Arizona and threatened in five others (USFWS 1982). The species was not listed in Alaska and it does not occur in Hawaii. The USFWS downlisted the bald eagle to threatened in 1995 and delisted the species in 2007 (USFWS 1995, 2007a).

Bald eagles in central Arizona were temporarily designated as a Distinct Population Segment (DPS) and listed as threatened in 2008 due to a court order requiring a 12-month status review of the Sonoran Desert Area population (USFWS 2008). As a result of the status review, the USFWS determined the population did not satisfy the definition of a DPS and was therefore not eligible for listing (USFWS 2010). Bald eagles in the Sonoran Desert Area were removed from the list of endangered and threatened species in 2011 (USFWS 2011). Further legal challenges resulted in a subsequent 12-month finding which supported the previous conclusions (USFWS 2012a).

The bald eagle remains protected in the state under Arizona Revised Statute Title 17 and nationally under the Bald and Golden Eagle Protection Act (Eagle Act), Migratory Bird Treaty Act, Lacey Act, Airborne Hunting Act, and the Convention on International Trade in Endangered Species of Wild Flora and Fauna. Along with delisting from the ESA, the USFWS revised the Eagle Act to codify the definition of "disturb" (USFWS 2007b) and finalize regulations to provide a mechanism to authorize take of eagles and eagle nests under limited circumstances (USFWS 2009). For implementation of take permits to be compatible with the Eagle Act, take must be "consistent with the goal of stable or increasing breeding populations." In the Southwest, take thresholds are extremely limited. In April 2012, the USFWS proposed revisions to eagle take permits which would have extended programmatic permits to a maximum of 30 years (USFWS 2012b), a rule which was challenged in court and overturned. As a result, the USFWS developed a new proposal in May 2016 to reinstate the 30-year permit and to re-evaluate take permit implementation (USFWS 2016).

The Southwestern Bald Eagle Management Committee (SWBEMC) was formed in 1984 by land and wildlife management agencies to enhance coordination, increase communication, and provide oversight for Arizona bald eagle management. In 2007 and again in 2014, some members of the SWBEMC signed the Conservation Assessment and Strategy for Bald Eagles in Arizona (CAS), which described strategies for continuing management post-delisting (Driscoll et al. 2006). The CAS also specified threats facing bald eagles in Arizona and identified actions necessary to maintain their distribution and abundance in the state. Today, the SWBEMC consists of 26 members, with the Arizona Game and Fish Department (Department) as the lead implementation agency for bald eagle management projects. This report covers the 2016 results

for the following projects: Bald Eagle Winter Count, Occupancy and Reproductive Assessment, Nest Survey, and Arizona Bald Eagle Nestwatch Program.

STUDY AREA

Statewide monitoring and surveys were conducted primarily within six biotic communities (Brown 1994): Rocky Mountain (Petran) and Madrean Montane Conifer Forest, Great Basin Conifer Woodland, Plains and Great Basin Grasslands, Sonoran Desertscrub-Arizona Upland Subdivision, Interior Chaparral, and Sonoran Riparian Deciduous Forest and Woodlands. Other biotic communities visited included Chihuahuan Desertscrub, Mohave Desertscrub, Great Basin Desertscrub, Semidesert Grassland, Subalpine Grassland, Madrean Evergreen Woodland, and Sonoran Desertscrub-Lower Colorado River Valley Subdivision.

Most bald eagle breeding areas (BAs) occur in central Arizona between elevations of 262 m (859 ft.) and 1,341 m (4,400 ft.), where they are found within the riparian areas of the Sonoran Riparian Scrubland and Sonoran Interior Strands as described in Brown (1994) (Figure 1). Representative riparian vegetation includes Fremont cottonwood (*Populus fremonti*), Goodding willow (*Salix gooddingii*), Arizona sycamore (*Platanus wrightii*), and nonnative salt cedar (*Tamarix* spp.). Surrounding uplands include the Sonoran Desertscrub biome-Arizona Upland subdivision, Interior Chaparral biome, and Great Basin Conifer Woodland biome. These areas are commonly vegetated with blue palo verde (*Parkinsonia florida*), mesquite (*Prosopis* spp.), ironwood (*Olneya tesota*), saguaro (*Carnegiea gigantea*), teddy bear cholla (*Opuntia bigelovii*), juniper (*Juniperus* spp.), and pinyon pine (*Pinus edulis*).

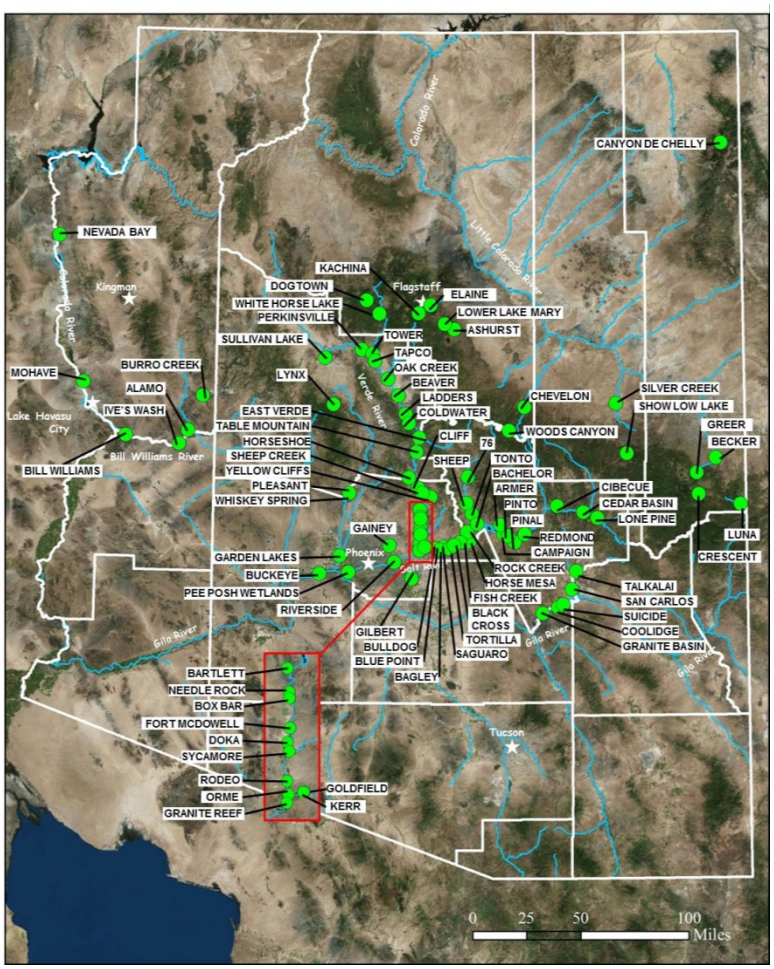

Figure 1. Location of known bald eagle breeding areas in Arizona, 2016.

In northwestern Arizona, two bald eagle BAs (Black Canyon and Nevada Bay) are located within Mohave desertscrub adjacent to the Colorado River. However at the Black Canyon BA,

the eagle pair has only built a nest on the Nevada side of the river and is not included in regular monitoring by the Department.

At middle and higher elevations, many other BAs are located outside of or do not include Sonoran Riparian Scrubland areas (Brown 1994). The Becker, Silver Creek, and Sullivan Lake BAs are in the Plains and Great Basin Grassland biome and contain isolated stands of Fremont cottonwoods. Ashurst, Chevelon, Crescent, Dogtown, Elaine, Greer Lakes, Lower Lake Mary, Luna, Lynx, Show Low Lake, White Horse, and Woods Canyon BAs are in Rocky Mountain and Madrean Montane Conifer Forest, where riparian vegetation includes narrow-leaf cottonwood (*Populus angustifolia*), thin-leaf alder (*Alnus tenuifolia*), Bebb's willow (*Salix bebbiana*), and coyote willow (*S. exigua*) (Brown 1994). Rock Creek BA includes Interior Chaparral consisting of pinyon-juniper woodland, shrub live oak (*Quercus turbinella*), and pointed (*Arctostaphylos pungens*) and pringle manzanita (*A. pringlei*). Canyon De Chelly BA includes components of Rocky Mountain Conifer forest and Great Basin Conifer Woodland and Desertscrub, consisting of big sagebrush (*Artemisia tridentata*), blackbrush (*Coleogyne ramosissima*), and shadscale (*Atriplex confertifolia*).

With a few exceptions, the majority of bald eagles in Arizona nested within a mile of water sources providing sufficient foraging opportunities for fish or waterfowl. However, distance to water within some BAs may vary between years depending on fluctuating creek and lake levels (e.g., Alamo Lake and Roosevelt Lake), and the distance of alternate nests. Terrestrial prey comprises a substantial dietary proportion at some BAs, most notably Gunnison's prairie dogs (*Cynomus gunnisoni*) at Canyon de Chelly and Silver Creek, and may also influence habitat selection. Several BAs are located in the Phoenix metropolitan area but include no natural riparian communities, primarily containing artificial water formations such as recharge basins, urban ponds and lakes, and canals.

In 2016, BAs were located along: Burro, Cibecue, Oak, Pinal, Silver, Tonto, and Walnut creeks; Alamo, Apache, Ashurst, Bartlett, Canyon, Chevelon Canyon, Crescent, Dogtown, Greer, Horseshoe, Lower Lake Mary, Luna, Lynx, Pleasant, Roosevelt, Saguaro, San Carlos, Show Low, Talkalai, White Horse, and Woods Canyon lakes or reservoirs; and the Agua Fria, Bill Williams, Colorado, Little Colorado, Gila, Salt, San Carlos, San Francisco, and Verde rivers. Nests within these drainages are usually on cliff ledges, rock pinnacles, and in cottonwood trees. However they also have been found in ponderosa pine (*Pinus ponderosa*), sycamore, snags, juniper, pinyon pine, willow, eucalyptus (*Eucalyptus sp.*), and artificial structures (Horseshoe BA, Kachina BA, Orme BA, Sheep BA, and White Horse BA) (Grubb 1980, McCarty and Jacobson 2012).

ARIZONA BALD EAGLE WINTER COUNT

INTRODUCTION

National winter surveys are an effective tool to monitor bald eagles throughout their range (Millsap 1986, Stalmaster 1987, Eakle et al. 2015). The knowledge of wintering bald eagle

habitat use allows for the consideration and implementation of management actions to protect important wintering areas. Even though the USFWS delisted the species nationwide in 2007, the importance of the national winter count persists. Through each state's consistent efforts, the winter count will continue to provide post-delisting data on national population trends and help to ensure implementation of Eagle Act permits remain compatible with stable or increasing populations (Steenhof et al. 2002, 2008; Eakle et al. 2015).

The National Wildlife Federation (NWF) initiated and organized the national midwinter bald eagle count from 1979-1992. From 1992-2007, coordination shifted among the Bureau of Land Management (BLM), the National Biological Survey, and then the U.S. Geological Survey (USGS). Since 2008, the U.S. Army Corps of Engineers (ACE) has coordinated the national winter count effort. Arizona participated in the program from the 1970s to the early 1980s (Todd 1981). However, in 1986 the national coordinators changed the survey protocol to only count areas of high bald eagle concentrations (routes with more than 15 bald eagles observed in two or more years). Due to Arizona's lack of "concentrations", minimal information was contributed in 1986 and 1987, and surveys only occurred in specific management areas in 1989-1991 such as Roosevelt Lake and Nankoweap Creek (Brown and Stevens 1992).

Arizona's statewide winter counts resumed in 1992 using a combination of terrestrial (foot, snowmobile, vehicle), boat, and aircraft surveys. In 1995, the Department and NWF established 115 standardized routes for Arizona's bald eagle winter count. In 2005, after 10 years of surveying the 115 established routes, we analyzed the data to eliminate those routes that did not meet USGS standards and to include new routes for future surveys. If a route produced three or fewer birds during the previous 10 years of surveys, the route was dropped per USGS guidance. As a result, in 2006 we removed 23 and added 12 new routes to the survey for a net result of 104 standardized routes. Additionally, in order to simplify reporting of data to ACE we dropped two more routes in 2008, Lake Mead and Lake Mohave, for a total of 102 standardized routes. These routes covered areas along the Colorado River both in Arizona and Nevada, and are reported by the state coordinators of the Nevada Winter Raptor Survey (Figure 2).

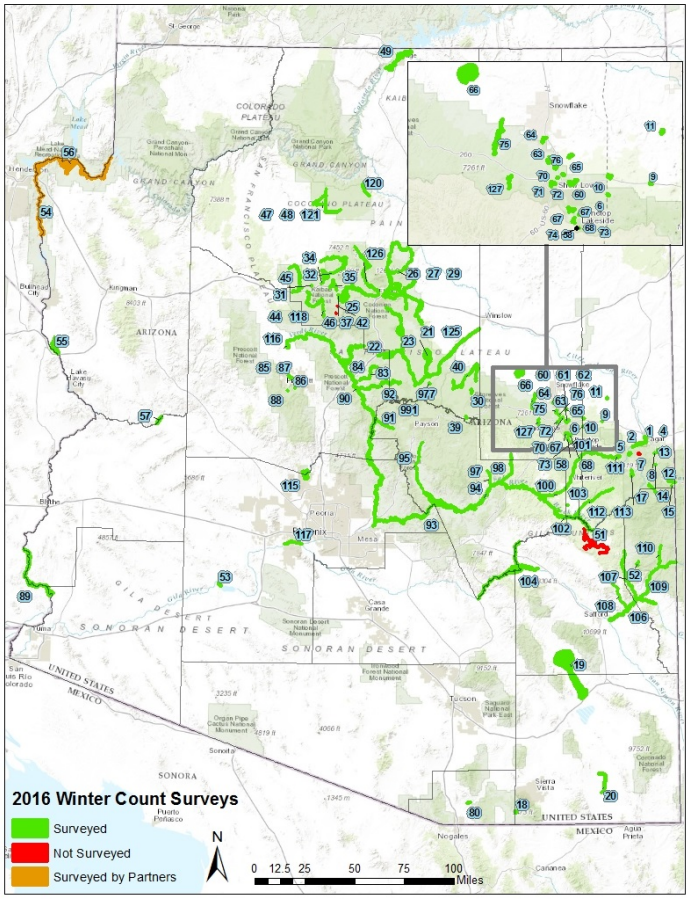

Figure 2. Map of the 2016 Arizona Bald Eagle Winter Count survey routes. See Appendix A for the associated route names.

METHODS

We continued to use, and strived to complete, the established 102 standardized survey routes for the 2016 Arizona bald eagle winter count. Additionally, four non-standard routes were completed and integrated into this document for management purposes, but were not included in the results submitted to the ACE. We scheduled the winter count for January 4 to 10, 2016, which included weekdays for agency personnel and a weekend for volunteers. The short survey period minimized the chance for any large-scale bald eagle movements between survey routes and related duplicate counts.

We used a variety of survey methods due to the diverse habitats in Arizona and our desire to maximize (but not duplicate) statewide coverage in a narrow period with minimal effort. The most effective method to survey Arizona's remote terrain and the deep canyons of linear drainages was by helicopter. The U.S. Bureau of Reclamation (USBR) and Salt River Project (SRP) contributed a total of five days of helicopter time for 2-3 biologists and a pilot to fly 25 of the winter count routes. The helicopter's altitude and speed were dependent upon terrain, height, density of power lines, and wind speed. In general, a height of 31-61 m (100-200 ft.) above ground level and 55-65 knots (63-75 mph) was typical for surveys. Highways, large lakes, and point counts were surveyed by boats, vehicles, and on foot. We solicited surveyors from cooperating agencies and volunteers from private groups, supplied survey forms from ACE, and instructed participants on the National Survey Protocol.

We classified bald eagle sightings into adult and immature age classes. In addition, we included sightings of unknown-age bald eagles and unidentified eagles in our totals to maintain consistency with the national count. We advised the volunteers to be aware of the various near-adult plumages as they may be easily mistaken for full adult bald eagles. Sightings of golden eagles (*Aquila chrysaetos*) and other raptors were also recorded during the survey, but are not reported in this document. We divided the data presented below into two sections for comparison: 1) the terrestrial and boat survey by county and 2) the helicopter survey by drainage or lake (Appendix A).

Due to our refinement of the statewide winter count routes in 2005, four counties are no longer surveyed by ground methods for wintering bald eagles, including Greenlee, Maricopa, Pima, and Pinal counties. However, portions of Greenlee, Maricopa, and Pinal counties were covered by the helicopter flights. Additionally, due to lack of surveyors the one route representing Graham County has not been surveyed in multiple years.

RESULTS AND DISCUSSION

The 2016 Arizona bald eagle winter count tallied 249 bald eagles, including 161 adults (65%), 71 subadults (29%), and 17 unknown eagles (7%) (Tables 1 and 2). Participants covered 98 of 102 standardized routes (96%) with a total survey effort of 8,814 minutes (147 hours) (Tables 1 and 2).

The highest total number of bald eagles observed during ground surveys occurred in Coconino County (n=57) (Table 1), and the largest concentration on a single ground survey occurred in Bellemont west of Flagstaff (n=13) (Appendix A). Also, a large number of bald eagles were observed by helicopter along the Verde River (n=38). An additional two bald eagles were counted on four non-standard routes (Appendix A).

Table 1. Summary of the Arizona bald eagle winter count 2016.

Survey areas	Routes	Minutes	Adults	Subadults	Unknown[1]	Total	Total/ Hr.
Apache County	14	935	11	6	0	17	1.1
Cochise County	2	90	1	0	0	1	0.7
Coconino County	32	4,264	35	17	5	57	0.8
Graham County	Not surveyed.						
Mohave County	1	114	3	0	0	3	1.6
Navajo County	16	546	4	7	12	23	2.5
Santa Cruz County	1	60	0	0	0	0	0.0
Yavapai County	6	1,790	7	1	0	8	0.3
Yuma and La Paz County	1	240	4	5	0	9	2.3
Verde River drainage	3	193	28	10	0	38	11.8
Salt River drainage	9	328	49	13	0	62	11.3
Gila River drainage	8	217	16	11	0	27	7.5
Various helicopter	5	37	3	1	0	4	6.5
Totals	98	8,814	161	71	17	249	1.7

[1] Unknown age bald eagles and unidentified eagles.

Table 2. Summary of Arizona bald eagle winter counts 2005-2016.

Year	Survey time (min)	Surveys completed		Birds/hour	Adults		Subadults		Unknown[1]		Total Birds
2005	8,910	97	(84%)	1.5	153	(68%)	56	(25%)	15	(7%)	224
2006[2]	10,074	104	(100%)	1.9	239	(74%)	77	(24%)	7	(2%)	323
2007	11,632*	100	(96%)	1.4	192	(68%)	81	(29%)	8	(3%)	281
2008[3]	9,362	96	(94%)	1.2	152	(82%)	29	(16%)	4	(2%)	185
2009	9,357	94	(92%)	1.3	139	(68%)	62	(30%)	3	(2%)	204
2010	9,138*	96	(94%)	1.7	159	(63%)	81	(32%)	12	(5%)	252
2011	8,713*	93	(91%)	1.5	157	(71%)	57	(26%)	8	(4%)	222
2012	10,320	100	(98%)	1.7	189	(63%)	94	(32%)	15	(5%)	298
2013	9,902*	98	(96%)	1.5	169	(66%)	76	(30%)	10	(4%)	255
2014	9,325	98	(96%)	1.7	188	(71%)	77	(29%)	1	(0.4%)	266
2015	8,989	93	(91%)	1.4	141	(69%)	53	(26%)	10	(5%)	204
2016	8,814	98	(96%)	1.7	161	(65%)	71	(29%)	17	(7%)	249
Average	9,394	97	(95%)	1.6	170	(69%)	68	(28%)	9	(4%)	247

[1]Unknown age bald eagles and unidentified eagles.
[2]Beginning of 104 standardized routes derived from the analysis of 1995-2005 surveys.
[3]Beginning of 102 standardized routes with Lake Meade and Lake Mohave routes dropped.
*Some survey times not recorded. Times averaged from reported times of previous counts.

The total of 249 bald eagles in 2016 approximated the average of 247 birds observed annually during standardized counts, 2005-2015. Although the 2016 winter count was consistent with the 10-year average, long-term winter count trends in the Southwest have decreased by -2.2% per year over 25 years (Eakle et al. 2015). While the number of bald eagles counted this year was

22% greater than bald eagles counted last year, some of the difference this year can be attributed to a relatively high number of eagles on the Verde River, lower Salt River, and the San Carlos Reservoir of the Gila River drainage. Another likely contributor was increased route coverage this year compared to last year (Table 2). The age composition of this year's count (65% adult, 29% subadult) approximated the average ratio of adults to subadults in Arizona's winter counts since 2005 (Table 2).

In addition to documenting bald eagle sightings, winter count surveyors are asked each year to rate the general weather conditions compared to previous years as being either very mild, mild, normal, harsh, or very harsh. Of those that rated the weather conditions (n=93), most responded that this year's weather was normal (86.0%), followed by mild (6.5%), harsh (6.5%), and very mild (1.1%). There were no responses for very harsh weather. Similarly, of those that rated ice cover (n=92), most responded that it was normal (66.3%), more than normal (29.3%), much more than normal (3.3%), and less than normal (1.1%). There were no responses for much less than normal ice cover. Nationally, winter count trends for bald eagles increased significantly from 1986 to 2010, particularly in twelve northern and eastern states (Eakle et al. 2015). However, despite growth of its bald eagle breeding population, Arizona was one of only four states with significantly decreasing winter count trends. Potentially, the distribution of wintering eagles has been impacted by climate change such that milder conditions allow eagles to stay farther north than in previous years.

MANAGEMENT RECOMMENDATIONS

1. Maintain the current 102 standardized routes.
2. Continue to assess non-standardized routes and add new routes for areas with consistent sightings of more than three bald eagles. The national coordinators require at least four years of data before a route is included in trend analyses.
3. Maintain winter count consistency by following established routes and methods to enable long-term analysis.
4. Continue updating the Terrestrial Wildlife Branch bald eagle winter count database with information from the standardized survey forms.
5. Compile spatial data from winter count survey maps to document the location and abundance of wintering bald eagles, spatially identify important habitat use areas, and develop statewide maps for distribution to cooperating agencies.
6. Update winter count datasheet to include a section for tallying all raptor observations and collect data on wintering raptors along survey routes in addition to eagles.
7. Work with partners and volunteers to improve route coverage, especially in underrepresented areas of the state.

ARIZONA BALD EAGLE OCCUPANCY AND REPRODUCTIVE ASSESSMENT AND NEST SURVEY

INTRODUCTION

The bald eagle Occupancy and Reproductive Assessment (ORA) and nest surveys enhance our understanding of breeding bald eagle ecology in Arizona. Discovery of new BAs and alternate nests within BAs, coupled with the knowledge of current and historical BAs, allows for an accurate description of the distribution, status, and annual productivity of the breeding population in Arizona. Timely discovery of BAs and alternate nests also helps the SWBEMC to identify sensitive areas requiring proactive management to prevent potentially adverse impacts.

In 1972, concern about bald eagle population declines nationwide prompted surveys for the species throughout Arizona (Rubink and Podborny 1976). These annual surveys have continued to the present, excluding 1976 and 1977 (e.g. McCarty et al. 2015). The Department administered and performed the 2016 surveys in cooperation with the SWBEMC.

METHODS

We monitored breeding activity at current and historic BAs, nest sites discovered between 1992 and 2015, and also investigated reports of bald eagles and nests by other agencies, biologists, and the public. Outside of known BAs, habitat quality, the presence of nests, previous sightings of bald eagles, and spacing between BAs prioritized survey effort. A two to three-person team conducted surveys between January and May 2016. Winter count flights (January), monthly ORA flights (February to May), and nest search flights (March and May) were used to locate nests and search for new BAs. Timing of the ORA flights corresponded with the timing of different breeding stages (incubation, hatching, nestling, and fledging). We also opportunistically visited some BAs during aerial searches for golden eagle nests (February-June).

Helicopters, provided by Arizona Public Service (APS), SRP, and USBR, flew at approximately 60 meters (200 ft.) above ground level and at 50-60 knots (58-70 mph). Drainage topography, ground-based obstacles (high-tension wires, meteorological towers), and wind influenced altitude and speed. If nest occupancy could not be determined from the air, a ground survey ensued. Boats, Off Highway Vehicles (OHVs), and vehicles were used to access survey areas. We used Questar® spotting scopes (40-160x), binoculars (10x), nest map atlases from Hunt et al. (1992) and SRP (2015), and handheld GPS units to relocate historic BAs and find alternate nests in existing BAs. New nests were numbered consecutively according to the last number assigned within that BA as reported in previous Arizona bald eagle nest survey reports (e.g. McCarty et al. 2015).

Determination of breeding status followed operational definitions derived from Postupalsky (1974, 1983), Steenhof and Kochert (1982), and Driscoll (2010) (Appendix B). Additionally, we used the terms “tall” and “short” in this section to describe heights of cliffs, and “large” and “small” to describe the size of trees and nests. “Tall” and “large” refer to substrates and nests we deemed suitable for breeding bald eagles as compared to current bald eagle nests and locations in Arizona (e.g., Grubb and Eakle 1987). The terms “small” and “short” refer to structures and

nests of inadequate height and size. A "nest site" refers to a nest of large size (unless otherwise noted) in appropriate bald eagle habitat that has not been documented as having been built or used by bald eagles, but which is routinely monitored for its potential to be utilized by eagles.

Due to the increase in the number and proximity of BAs in the last decade, territories that once covered large areas have been segmented into multiple smaller territories. As additional pairs occupy an area, unique breeding area names are assigned. In the event that breeding densities retract leaving one pair in an area previously occupied by 2 or more pairs, occupancy status will be assigned to the longest existing breeding area.

The management reports from 2011 to 2015 do not reflect this naming convention. As a result, the productivity status at the Bagley and Blue Point BAs should be reported as described in Table 3.

Table 3. Revised productivity data for the Bagley and Blue Point breeding areas, 2011-2015.

	2011	2012	2013	2014	2015
Bagley	U[1]	U	U	U	U
Blue Point	O	S3	S2	S2	F

[1]Breeding area status codes (Postupalsky 1974): U=unoccupied, O=occupied, S=successful & number of young fledged, F=failed.

RESULTS

All known BAs (n=81) were examined for breeding activity (Figure 1). Of 65 occupied BAs, 60 were active, and 41 pairs successfully produced 65 fledglings (Table 4; Appendix C). Noteworthy findings of the 2016 nest survey include five new bald eagle BAs, 18 new alternate bald eagle nests within BAs (Bill Williams #3, Burro Creek #2, Copper Basin #4, Copper Basin #5, Horseshoe #16, Lone Pine #8, Lynx #4, Nevada Bay #4, Orme #10, Pinal #9, Pinal #10, Rodeo #5, Show Low #3, Sycamore #7, Table Mountain #6, Talkalai #9, Tapco #5, White Horse #7), 15 fallen nests within BAs (Ashurst #1, Bill Williams #1, Gainey #1, Granite Reef #5, Lynx #3, Lynx #4, Orme #9, Pinal #5, Pinto #8, Pinto #9, Rodeo #4, Talkalai #8, Tapco #4, White Horse #2, White Horse #4), and eight new potential nests at five sites (Blue Ridge #7, Castle Cove #1, Fool Hollow #1-2, Gene Wash #4-6, Porphyry Gulch #2).

Table 4. Summary of Arizona bald eagle productivity 2016.

Number of BAs	81	Number of Active BAs	60
Number of Occupied BAs	65	Number of Failed Breeding Attempts	19
Number of Eggs	97+	Number of Successful Breeding Attempts	41
Nest Success = 41/65	0.63	Number of Young Hatched	79
Mean Brood Size = 65/41	1.59	Number of Young Fledged	65
		Productivity = 65/65	1.0

Results of the individual flights are located in Appendix D. Areas worthy of further discussion (bald eagle observations, fallen nests, new breeding areas, new nests, potential nest sites) are described here. Nest locations are sensitive data, considered confidential by the Department, and

omitted from this report. Management agencies requiring specific locations should contact the Department's Heritage Data Management System at (623) 236-7618.

New Locations Surveyed (Table 5)

Ashurst Lake (new BA). – On May 6, an adult bald eagle was observed with a 4-week old nestling in a new nest (#1) in a live pine tree. During a ground visit on May 10, the nest was found partially fallen after heavy winds the preceding weekend, and remains of the nestling were discovered below the nest.

Castle Cove (new nest site). – On March 30, a new large nest (#1) was found in poor condition on cliffs near Castle Cove on Lake Mead, and a red-tailed hawk was incubating in a medium nest near Painters Cove. No eagles were seen.

Colorado River. – On March 30, we saw a pair of adult bald eagles perched together near Steamboat Rock, approximately 6 miles downstream of Lake Havasu City. The area was characterized by low elevation rock formations, small cliff substrate, and minor washes with scattered desertscrub vegetation. No large nests were found.

Fool Hollow Lake (new nest site). – On April 22, we observed an adult bald eagle flying over the upper end of Fool Hollow Lake along Show Low Creek. Two new nests were found (#1 and #2); an osprey (*Pandion haliaetus*) was incubating in nest #1 and another osprey was standing in nest #2. On May 14, a blue-banded (28/S) immature eagle was photographed by the public. The lake is a known wintering area for eagles and appears to have the potential to support a breeding pair.

Gainey (new BA). – In January, Liberty Wildlife Rehabilitation Foundation reported a pair of bald eagles nest-building in a eucalyptus tree at a Scottsdale golf course. Eagles have occasionally been seen wintering there but no nest activity was previously documented. During an aerial survey on February 2, an adult was observed in the nest and appeared to be incubating. On February 9 we confirmed incubation at the new nest (#1), although Liberty had noted the activity sometime after January 20. One of the breeding pair was an unbanded adult, and the other was an unbanded subadult with a heavy eye stripe and dark markings on the head, tail, and beak (Figure 3). In October, we received reports of the pair building a new nest (#2).

Figure 3. Gainey subadult with nestlings. Photo by Robert Rinsem.

Garden Lakes (new BA). – Late in 2014 and early in January 2015, we received reports from the

public of a pair of adult or near-adult bald eagles nest-building in a eucalyptus tree previously occupied by great-blue herons. However egg-laying was not observed in spring 2015. In October 2015, we again received reports of a pair of bald eagles at the nest, this time one adult and one sub-adult. In November 2015, nest-building activity was reported and we confirmed incubation behavior in the nest (#1) on December 30. Incubation was seen again on January 22, January 29, and February 10, 2016. No activity was seen on February 26 and the breeding attempt was confirmed failed. On September 1, 2016, SRP reported that nest #1 had fallen. On November 21, 2016 we received reports from the public of a new nest (#2) being constructed by the eagle pair.

Kachina (new BA). – On March 30, we received a report from the public of bald eagles nesting on a golf course near Flagstaff. During a field visit on April 10, we confirmed the pair was incubating in a platform nest (#1) that had originally been built for use by ospreys. The adult male eagle had no bands, while the adult female had a silver band on the right leg and blue band on the left leg (27/E; fledged from Lower Lake Mary BA in 2011).

Trout Creek. – We surveyed the creek on March 30, examining nests at two golden eagle breeding areas and five potential golden eagle breeding areas. No bald eagles were seen.

West Clear Creek. – On January 4, a new large nest was found on a cliff on the south side of the creek downstream of Meadow Canyon. The nest appeared to be a probable golden eagle construction, and was designated as nest #3 within the West Clear Creek golden eagle breeding area.

Table 5. 2016 Arizona bald eagle nest survey summary, new locations.

Location	Date(s)	Survey Method	Results
Ashurst Lake	5/6, 5/10	Helicopter, Ground	Adult with one nestling, 4 weeks old, in new nest #1.
Colorado River	3/30	Helicopter	3/30: Pair of adults near Steamboat Rock.
Fool Hollow Lake	4/22	Helicopter	One adult at lake. Osprey incubating in new nest #1. Osprey standing in new nest #2.
Gainey	1/20, 2/2, 2/9, 2/17, 5/19, 5/28	Helicopter, Ground	2/2: Adult in new nest #1, probable incubation. 2/9: Incubation confirmed.
Garden Lakes	12/30, 1/22, 1/29, 2/10, 2/26, 3/18	Helicopter, Ground	12/30 & 1/22: Incubation behavior observed in new nest #1. 1/29: Adult standing in nest. 9/1: Nest #1 reported as fallen.
Kachina	4/10	Ground	4/10: Adult incubating in new nest (#1).
Kinnikinick Lake	5/6	Helicopter	No nests or eagles.
Castle Cove (Lake Mead)	3/30	Helicopter	New large cliff nest found (#1) near Castle Cove. Red-tailed hawk incubating in medium nest near Painters Cove.
Scholtz Lake	5/6	Helicopter	No nests or eagles.
Topock Marsh	3/30	Helicopter	No nests or eagles.
Trout Creek	3/30	Helicopter	All known nests empty. No bald eagles.
West Clear Creek	1/4	Helicopter	New large nest found on cliff.

Survey Sites with Existing Large Nests (Table 6)

Bear Canyon Lake. – On May 6, nests #1 and #2 were not found. Ospreys were incubating in nests #3 and #4. No bald eagles were seen.

Blue Ridge Reservoir. – On May 6, an osprey was incubating in nest #2. Nest #6 was not seen. A new large nest (#7) was found with greenery inside and an osprey perched nearby. An adult bald eagle was seen perched.

Dogtown Lake (new BA). – On May 6, a pair of adult bald eagles was seen in nest #2 with two small nestlings, approximately two weeks old.

Gene Wash (CA). – On March 30, three large nests were observed in pockets on the same cliff face at location #1. Prior to 2015, none of our survey reports noted more than one nest. Without knowing for sure which of the nests, if any, was the one originally found in 1996, we are designating these nests as #1, #2, and #3 (from top to bottom on the cliff). Also, three new large nests (#4, #5, and #6) were found on cliffs in the area this year.

George's Basin. – On January 14, one adult was perched. On March 16, a pair of adults were perched above nest #1 which was in good condition but no greenery was noted.

Granite. – On March 18, a golden eagle was incubating in nest #5.

JD Dam Lake. – On May 6, an osprey was incubating in nest #1 and nest #2 was not found. A new snag nest (#3) was found. No bald eagles were seen.

Kaibab Lake. – On May 6, ospreys were incubating in nests #2, #3, and #5, and standing in nest #6. All other known nests were empty and no bald eagles were observed.

Knoll Lake. – On May 6, an osprey was incubating in nest #5. No bald eagles were seen.

Lost Mule. – On January 14, March 16, and April 22 a pair of large nests spaced 20 feet apart were observed on a cliff above the Black River (Figure 4). The nests were located in the same general area as documented in previous nest survey reports, which refer to up to five nests (Glinski 1985, Hildebrandt and Glinski 1987, Driscoll et al. 1997, Driscoll et al. 1998, Driscoll et al. 1999, Canaca et al. 2004). The nests seen this year appear to align best with the original nest site location and will be referred to as nests #1 and #2 (left to right) in the future. The nests seemed to be of golden eagle construction.

Figure 4. Lost Mule nest site.

Mount Davis. – On March 30, a golden eagle was incubating in a new cliff nest (#3). Although this site is tracked as a golden eagle territory (3NE119), it is close enough to the Colorado River that it could someday be used by bald eagles.

Mormon Pocket. – On January 29, an adult golden eagle was standing in nest #1. Three bald eagles were perched on cliffs downstream; two of these adults flew and were involved in a chasing interaction. On March 18, a golden eagle was incubating in nest #1.

Porphyry Gulch. – On March 16, a red-tailed hawk was incubating in a new cliff nest (#2) that appeared to be large enough for eagles. We will continue to monitor the area.

Tremaine. – On May 6, an adult was perched by nest #2. The nest was in fair condition but no greenery was seen.

Two Bar. – On January 13, an adult was seen carrying a stick to nest #2, and a second adult was perched. The pair was seen standing in the nest on March 16 with some greenery inside.

Upper Lake Mary. – On May 6, ospreys were seen incubating in nest #3, #7, and #8. The remainder of nests at the lake were not checked and their status was unknown.

Table 6. 2016 Arizona bald eagle nest survey summary, potential nest sites.

Location	Date(s)	Survey Method	Results
Black Mountains (3NE095*)	3/30	Helicopter	All known nests empty. No eagles.
Bear Canyon Lake	5/6	Helicopter	Ospreys incubating in nests #3 and #4. Nests #1 and #2 not found. No eagles.
Blue Ridge Reservoir	5/6	Helicopter	One adult perched by lake. Osprey incubating in nest #2. Nest #6 not found. New large nest #7.
Dogtown Lake	5/6, 5/10	Helicopter, Ground	Adults in nest #2 with two nestlings, 2 weeks old.
Gene Wash, CA	3/30	Helicopter	Three large nests (#1-3) empty. Three new large nests found (#4-6). No eagles.
George's Basin	1/14, 3/16, 4/22	Helicopter	1/14: One adult perched. 3/16: Two adults.
Granite (2GE049*)	1/9, 1/29, 3/18, 4/21	Helicopter	3/18: Golden eagle incubating in nest #5. 4/21: Two golden eagle nestlings, 3 weeks old.
Hidden Valley	4/21	Helicopter	All known nests empty. No eagles.
JD Dam Lake	5/6	Helicopter	Osprey incubating in nest #1. Nest #2 not seen. New nest #3 found. No eagles.
Kaibab Lake	5/6	Helicopter	Ospreys incubating in nests #2, #3, and #5, and standing in nest #6. No eagles.
Knoll Lake	5/6	Helicopter	Osprey incubating in nest #5. No eagles.
Mount Davis (3NE119*)	3/30	Helicopter	Golden eagle incubating in new cliff nest #3.
Mormon Pocket (2GE031*)	1/9, 1/29, 3/18, 4/21	Helicopter	1/29: Golden eagle standing in nest #1. Three adult bald eagles downstream. 3/18: Golden eagle incubating in nest #1.
Needles Eye	2/2, 3/16	Helicopter	All known nests empty. No eagles.

Table 6 continued.

Location	Date(s)	Survey Method	Results
Pineasco Creek	1/14, 3/16, 4/22	Helicopter	All known nests empty. No eagles.
Porphyry Gulch	1/13, 2/2, 3/16	Helicopter	3/16: New large nest #2 found.
Ringbolt Rapids (3NE115*)	3/30	Helicopter	All known nests empty. No eagles.
Tremaine/Soldier Annex/ Long Lakes	5/6	Helicopter	Adult perched by nest #2.
Two Bar	1/13, 2/2, 3/16, 4/22	Helicopter	1/13: Two adults. One flew to nest #2 with a stick. 3/16: Two adults standing in nest #2.
Upper Lake Mary	5/6	Helicopter	Ospreys incubating in nests #3, #7, and #8.
Watson Lake	1/29	Helicopter	All known nests empty. No eagles.

*Golden eagle site identification number.

Historic Breeding Areas (Table 7)

Canyon historic BA. – On January 13, a new large nest was found on a cliff. Because the area was most recently occupied by golden eagles (2010), the new nest was assigned as nest #2 in the Canyon Creek golden eagle breeding area.

Table 7. 2016 Arizona bald eagle nest survey summary, historic breeding areas.

Location	Date(s)	Survey Method	Results
Canyon	1/13	Helicopter	All known nests empty. No eagles. New large nest found on cliff.
Devil's Post	3/18	Helicopter	Nests #2, #5, #6, #7 empty. No other nests observed. No eagles.
Hell Point	1/9, 1/29, 3/18	Helicopter	All known nests empty. 1/29: One immature perched.
Mule Hoof	1/14, 3/16	Helicopter	All known nests empty. No eagles.
Winkelman	1/13	Helicopter	No nests or eagles.

Breeding Areas (Table 8)

Bagley and Blue Point BAs. – This year, we re-evaluated productivity data at the Blue Point and Bagley BAs since 2010 and made changes to the status at these sites in the intervening years. Productivity data was swapped, and Bagley is now considered to have been unoccupied since 2011 while Blue Point was occupied (see Methods).

Bill Williams BA. – The USFWS reported there were no sightings of bald eagles or nesting activity this year. On March 30, we thoroughly searched the entire cottonwood grove along the river. Nest #1 was fallen and we found a new large cliff nest (#3). No bald eagles were seen.

Box Bar BA. – On January 4, a pair of adults was seen at nest #5. Nestwatchers reported adults copulating and nest-building nest into March, but no eggs were laid..

Burro Creek BA. – On March 18, an adult was incubating in a new nest (#2) in a sycamore tree. On April 21, the nest was empty and the breeding attempt had failed.

Copper Basin BA (*CA*). – On March 30, nest #1 was fallen and we found two new large nests (#4 and #5) on cliffs. Nest #5 was in fair condition and definitely eagle-sized.

Doka BA. – In our 2015 report, nest #7 was mistakenly reported as fallen and should have been reported that nest #6 had fallen. This year, breeding activity was not observed but a pair of adults was seen on January 29. One adult was perched by nest #7 on March 18, and some greenery was observed in the nest.

Granite Basin BA. – On February 2, an adult bald eagle was standing in nest #2.

Granite Reef BA. – On February 2, nest #5 was fallen.

Horseshoe BA. – On February 13, a member of the public observed bald eagles at a nest on Horseshoe Lake and sent photos of an adult on the nest, apparently incubating. On February 18, incubation behavior was confirmed at the new nest location (#16). SRP was notified of the new nest location and managed lake levels to minimize inundation potential. On November 1, the Department worked with SRP to place two nest "platforms" (constructed by Liberty Wildlife) upstream of nest #16 in large willow trees that were high enough to remain above the maximum reservoir capacity. These starter nests were built using natural materials and will be monitored as nest #17 and #18 (Figure 5).

Figure 5. Starter nest #17 placed at Horseshoe BA on November 1, 2016, before (left) and after (right) addition of nest materials Photos by Kyle McCarty.

Kerr BA. – On January 13, an adult and immature (age class not identified) bald eagle were observed in the breeding area. An adult and a sub-adult were perched by nest #1 on February 2. This pair was regularly observed by nestwatchers throughout the season.

Lone Pine BA. – On April 22, a pair of red-tailed hawks was standing in nest #7. We also found a new nest (#8) in a snag up Cave Creek. A large nest in a ponderosa pine was described at roughly the same location in 1987 (Hildebrandt and Glinski 1987), however it seems unlikely that a tree nest would have persisted to the present year.

Lynx BA. – On January 9, nest #3 was fallen. The United States Forest Service (USFS) reported a pair of adults and observed nest-building January 15. On January 29, an adult was incubating in

the new nest (#4). On April 21, nest #4 was fallen and the breeding attempt failed. On October 20, we worked with the USFS to place a nest platform (constructed by Liberty Wildlife) in a tree away from existing and planned trail systems. The starter nest will be monitored as nest #5.

Orme BA. – On January 4, nest #9 was fallen. On March 18, an adult was seen incubating in a platform nest that had been originally constructed by AGFD. Although the platform was installed in 2012, it was not used by eagles until this year and was given the next available nest number (#10).

Pee Posh Wetlands BA. – GRIC reported that nest tree #4 was blown down by high winds on May 17, a few weeks after the young had fledged. On August 8, GRIC reported that another storm toppled nest tree #6. In late October, GRIC reported nest-building activity at a new nest (#7) in a snag within the breeding area.

Pinal BA. – A lone adult was observed at the confluence of the Salt River and Pinal Creek on January 13, and was perched by a new, poorly-constructed cliff nest (#9) on February 2, March 16, and April 22. Another new large nest (#10) was found on a cliff February 2. A common black hawk (*Buteogallus anthracinus*) was incubating on a cliff nest along Pinal Creek for the third straight year (Licence and McCarty 2015).

Pinto BA. – On January 13, nest #8 was fallen. On April 22, nest #9 was fallen.

Rodeo BA. – On January 29, nest #4 was fallen and an adult was found incubating in a new tree nest (#5).

San Carlos BA. – On January 13, an adult and immature were perched together by nest #7. On March 16, one adult was seen 0.5 mile downstream of the nest.

Show Low Lake BA. – On April 22, an osprey was seen incubating in a new snag nest (#3).

Sycamore BA. – On January 29, an adult was incubating in a new nest (#7) in a live cottonwood tree.

Table Mountain BA. – On March 18, a new large nest (#6) was found in poor condition on a cliff.

Talkalai BA. – An adult was incubating in nest #8 on January 13, but the nesting attempt failed by February 2 when the nest was confirmed fallen. On February 16, San Carlos Apache Tribe (SCAT) reported a new nest (#9) under construction in a snag nearby but no second clutch was attempted.

Tapco BA. – On January 9, nest #4 was fallen. On January 29, an adult was incubating in a new nest (#5) in a live tree.

White Horse Lake BA. – Last year, the platform holding nest #4 had begun to fall apart. This year, on March 23, the USFS reported the platform had completely fallen. They also found a new nest (#7) in a live tree and observed a pair of adults.

Woods Canyon BA. – On March 18, the USFS observed an adult incubating in a new nest (#8) in a live pine tree.

Table 8. 2016 Arizona bald eagle nest survey summary, breeding areas (continued next page).

Location	Date(s)	Survey Method	Results
Bill Williams	3/30	Helicopter	Nest #1 fallen. New nest #3 found on cliff.
Black Canyon, NV	3/30	Helicopter	Adult in nest #1 with two nestlings, 4 weeks old.
Blue Point	1/13, 2/2, 4/21, 4/25	Helicopter, Ground	1/13: Adult incubating in nest #10.
Box Bar	1/4, 1/29, 3/18	Helicopter	1/4: One adult in nest #5, second adult in nest tree. 1/29: One adult perched. 3/18: One adult perched in nest tree.
Burro Creek	3/18, 4/21	Helicopter	3/18: Adult incubating in new tree nest #2.
Copper Basin, CA	3/30	Helicopter	3/30: Nest #1 fallen. All other known nests empty. New large nests #4 and #5 found.
Doka	1/4, 1/29, 3/18, 4/21	Helicopter, Ground	1/4: One adult. 1/29: Two adults. 3/18: One adult perched by nest #7.
Granite Basin	1/13, 2/2, 3/16	Helicopter	2/2: Adult standing in nest #2.
Granite Reef	1/13, 2/2, 3/16, 4/21	Helicopter	2/2: Nest #5 fallen.
Horseshoe	1/4, 1/29, 3/18, 4/5, 4/21, 5/6	Helicopter, Boat	3/18: Adult with two nestlings in new nest #16. 11/1: Two new nest platforms installed (nests #17 and #18).
Kerr	1/13, 2/2, 3/16	Helicopter	1/13: Adult and immature in area. 2/2: Adult and near-adult perched.
Lone Pine	1/14, 3/16, 4/22	Helicopter	4/22: New snag nest #8 found.
Lynx	1/9, 1/29, 2/10, 3/18, 4/21	Helicopter, Ground	1/9: Nest #3 fallen. 1/29: Adult incubating in new nest #4. 4/21: Nest #4 fallen. 10/20: New nest platform installed (nest #5).
Nevada Bay	2/18, 3/9, 3/30	Helicopter	3/9: Red-tailed hawk with two eggs in nest #1. 3/30: Red-tailed hawk incubating in nest #1. New cliff nest #4 found.
Orme	1/4, 1/13, 1/29, 2/2, 2/5, 3/18, 4/21	Helicopter, Ground	1/4: Nest #9 fallen. 2/2: Incubating in platform nest #10.
Pee Posh Wetlands	1/5, 1/26	Helicopter	5/17: Nest #4 reported fallen. 8/8: Nest #6 reported fallen.
Pinal	1/13, 2/2, 3/16, 4/22	Helicopter	1/13: One adult. 2/2: One adult perched by new nest #9. New nest #10 found. 3/16 & 4/22: One adult perched by nest #9.
Pinto	1/13, 2/2, 3/16, 4/22	Helicopter	1/13: Nest #8 fallen. 4/22: Nest #9 fallen.
Rodeo	1/4, 1/29, 3/18, 3/24, 4/21	Helicopter, Ground	1/29: Adult incubating in new nest #5. Nest #4 fallen.
San Carlos	1/13, 2/2, 3/16	Helicopter	1/13: Adult and immature perched by nest #7. 3/16: One adult downstream.

Table 8 continued.

Location	Date(s)	Survey Method	Results
Show Low Lake	2/24, 3/16, 4/22, 5/11, 6/8, 6/10	Helicopter, Ground	4/22: Osprey incubating in new snag nest #3.
Sycamore	1/4, 1/29, 3/18, 4/12, 4/21	Helicopter, Ground	1/29: Adult incubating in new tree nest #7.
Table Mountain	1/4, 1/29, 3/18, 4/21	Helicopter	3/18: New large nest #6 found.
Talkalai	1/13, 2/2, 3/16	helicopter	2/2: Nest #8 fallen. 3/16: New nest #9 observed.
Tapco	1/9, 1/28, 1/29, 3/18, 4/18	Helicopter, Ground	1/9: Nest #4 fallen. 1/29: Adult incubating in new nest #5.
White Horse Lake	4/21, 5/6	Helicopter	4/21: Nests #2 and @4 fallen. New tree nest (#7) observed.
Woods Canyon	5/6, 5/24, 7/9, 7/12	Helicopter, Ground	5/6: Adult brooding young in new nest #9.

Overview

Noteworthy findings of the 2016 nest survey include five new bald eagle BAs, 18 new alternate bald eagle nests within BAs, 15 fallen or partially fallen nests within BAs, and eight new potential nests at five sites. The five new BAs this year included two sites on golf courses, Gainey and Kachina. Golf courses represent a new kind of habitat selection for bald eagles in Arizona. The extraordinary tolerance of the Gainey eagles toward people, fledging young in a densely populated neighborhood, is an indicator that we may observe more of this phenomenon in the future. On the other hand at Garden Lakes, another new BA found in an urban environment, there is evidence that the breeding attempt may have failed due to human activity (photographers). The contrast between the outcomes at these two BAs illustrates the need for adaptive management of eagles that choose to move into areas where human activity and infrastructure is already established. The new BAs found at Ashurst and Dogtown Lakes occur in more typical bald eagle habitat, and share similarities with other high elevation nest sites in the state. Both of these BAs occur at lakes that have been regularly surveyed in the preceding years.

Productivity in 2016 was 1.0 young per occupied BA (Table 9), and averaged 0.97 in the past ten years. Since 1980, productivity has a flat trend overall. The trend was negative from 1980-1989, and positive from 1990 to 2016. In the earlier years of monitoring, with fewer occupied BAs there was greater variability in productivity from year to year. As the number of occupied BAs has increased, the success or failure of any one BA has had a lesser effect on overall productivity and variability has decreased over time (Figure 6). With record numbers of breeding pairs and high, stable productivity in the past decade, Arizona's bald eagle population is on track for continued growth.

This year, productivity was relatively poor on the Verde River at 0.59 (n=21 BAs). Productivity was higher at sites on the middle to upper Verde compared to those on the lower Verde, 0.75 (n=10) and 0.44 (n=11) respectively. Overall, productivity was high on the Salt River at 1.1 (n=21), with the lower Salt containing the majority of BAs (n=16). Of five BAs on the upper Salt, only two were occupied and no young were fledged. At 13 high-elevation lakes (>5,500 ft.),

occupancy rate was 100% with productivity of 1.1 (1.2 when including two foster-fledged young). Productivity was 1.5 at each of three other major drainages, Gila River (n=4), Tonto Creek (n=4), and Bill Williams River (n=3).

Table 9. Arizona bald eagle 10-year productivity summary.

	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007
Number of BAs	81	76	68	68	66	62	62	59	56	53
Number of occupied BAs	65	59	52	54	54	55	52	50	48	48
Number of eggs (minimum)	97	90	73	79	80	80	69	78	71	74
Number of active BAs	60	56	47	49	50	51	48	48	44	45
Failed breeding attempts	19	17	17	14	19	17	21	19	14	20
Successful breeding attempts	41	39	30	35	31	34	27	29	30	25
Young hatched	79	75	58	71	66	66	57	68	65	61
Young fledged	65	66	43	58	52	56	44	47	53	42
Nest success	0.63	0.66	0.58	0.65	0.57	0.62	0.52	0.58	0.63	0.52
Mean brood size	1.6	1.7	1.4	1.7	1.7	1.6	1.6	1.6	1.8	1.7
Productivity	1.0	1.12	0.83	1.07	0.96	1.0	0.85	0.94	1.10	0.87

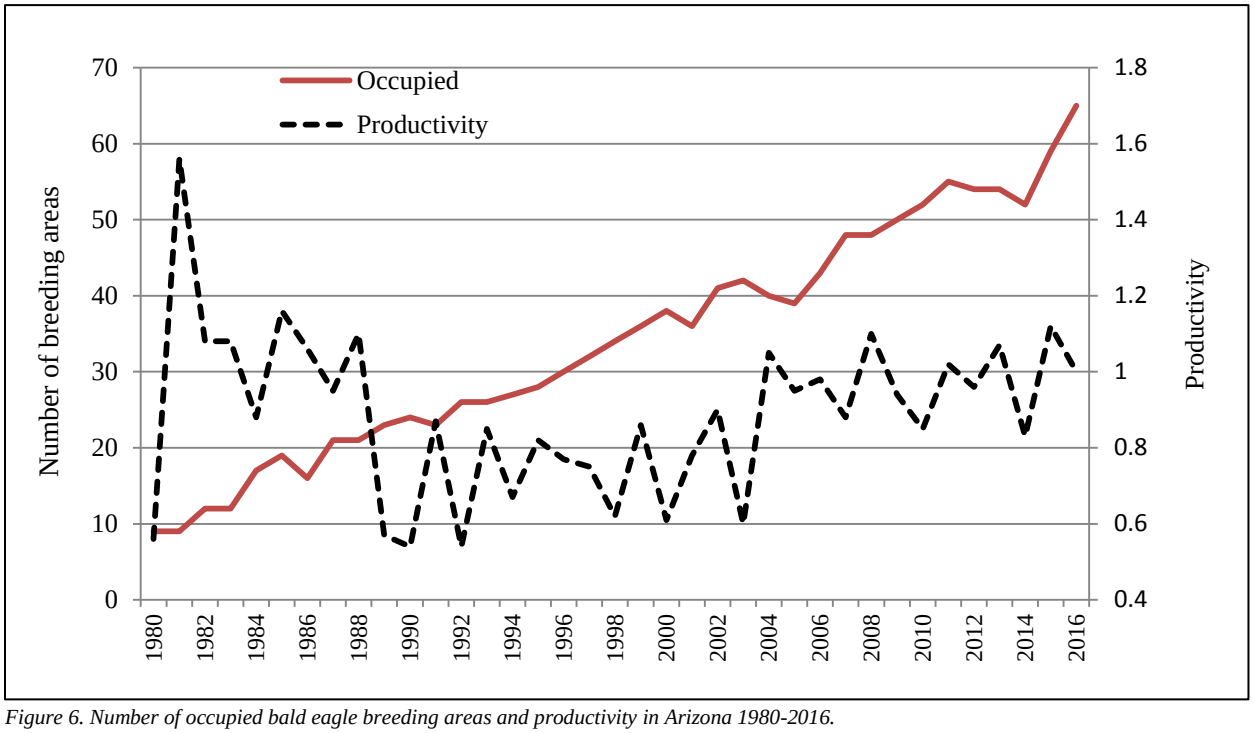

Figure 6. Number of occupied bald eagle breeding areas and productivity in Arizona 1980-2016.

The continued creation of new breeding areas and nests underscores the importance of ORA flights as a means to consistently monitor bald eagle demography including population size, distribution, and reproductive success. The annual loss of alternate nests and the potential for further changes in the distribution further demonstrates the necessity of the surveys. Without the

aid of these flights, we would not be able to accurately document important population parameters in the rugged terrain of Arizona.

MANAGEMENT RECOMMENDATIONS

1. Future survey efforts should continue to monitor historic BAs, potential breeding habitat, large nests, and sightings of adult eagles reported in previous nest survey reports. These documents are useful tools for identifying occupancy trends, locating new BAs, and monitoring population expansion.
2. Surveyors should continue to use the nest survey, ORA, and winter count flights, in concert with follow-up ground surveys to inspect areas. From the air, surveyors can easily cover large sections of bald eagle habitat. From the ground, surveyors can investigate areas in more detail.
3. Confirm the band status and identify blue-banded adults observed at all new and recent breeding areas, including Ashurst, Bachelor Cove, Black Cross, Dogtown, Elaine, Kerr, Mohave, Nevada Bay, Show Low Lake, and White Horse Lake.
4. Identify banded adults at sites where one or both of the pair has long tenure within the breeding area (e.g. Luna Lake) in order to detect when replacement of these important birds has occurred.
5. Determine the identification of the breeding pair at Copper Basin, CA and yearly band the nestlings.
6. Examine the following areas for breeding bald eagles and/or nests:
    - Agua Fria River drainage – Up and downstream from Lake Pleasant.
    - Anderson Mesa and area lakes – Deep Lake, Horse Lake, Kinnikinick Lake, Long Lake, Marshall Lake, Potato Lake, Prim Lake, Tremaine Lake, Yaeger Lake.
    - Bill Williams River drainage – Alamo Lake to Bill Williams National Wildlife Refuge.
    - Black River drainage – Known osprey nesting areas on East and West Fork and main stem of the Black River; George's Basin; Tanks Canyon.
    - Central and Eastern Mountain Lakes – Bear Canyon, Black Canyon, Blue Ridge, Cholla, Dry, JD Dam, Fool Hollow, Kaibab, Knoll, Lyman, Nash Creek, Point of Pines, Rogers, Willow Springs.
    - Colorado River drainage – Havasu National Wildlife Refuge, Topock Marsh, Black Canyon (Lake Mohave to Lake Mead), Lake Mead (Grand Wash), Nankoweap Creek.
    - North Fork of White River – Known osprey nesting locations.
    - Gila River drainage – Lower Blue River, San Francisco River to Gila River confluence, Gila Box.
    - Salt River Drainage – Search at least two miles upstream on major washes and creeks around Roosevelt Lake (e.g., Salome Creek, Pinto Creek); Tonto Creek north of Tonto BA; Cherry Creek; Redmond BA to Canyon BA; Cibecue BA to Cedar Basin BA, side drainages above Highway 60 bridge (e.g., Sawmill Canyon, Carrizo Creek).
    - Verde River drainage – Wet Bottom Creek, Red Creek, Canyon Creek, Houston Creek, Fossil Creek, Camp Verde to Cottonwood, West Clear Creek, Beaver Creek, Oak Creek,
    - White Mountain Lakes – Carnero, Christmas Tree, Horseshoe Cienega, Hawley, Lee Valley Reservoir, Nelson Reservoir, Nutrioso, Pacheta, Reservation.
    - White River – Whiteriver to confluence with Black and Salt Rivers.

ARIZONA BALD EAGLE NESTWATCH PROGRAM

INTRODUCTION

In 1978, the USFS and two Maricopa Audubon Society volunteers monitored bald eagles breeding near Bartlett Reservoir to understand the effects of recreation on nesting behavior and success (Forbis et al. 1985). This monitoring effort eventually expanded to other BAs, and developed into the Arizona Bald Eagle Nestwatch Program (ABENWP). In 1986, the USFWS assumed coordination of the ABENWP on behalf of the SWBEMC, and expanded its scope. Following passage of the Heritage Initiative in 1990, a voter initiative which created a fund from Arizona Lottery proceeds for conservation of wildlife and natural areas, the Department was able to develop and support a comprehensive bald eagle management program. In 1991, the USFWS transferred coordination of the ABENWP to the Department.

To address the continuing management needs for Arizona's breeding bald eagles, the ABENWP operates under three goals: education, data collection, and conservation. Due to high recreation pressures along some of Arizona's lakes and rivers, land management agencies enact seasonal closures when necessary to protect bald eagles during the breeding cycle. Nestwatchers interact with members of the public who enter these closures, educate them about bald eagles, distribute brochures, and/or direct them away from the breeding attempt. To help the land and wildlife agencies make better bald eagle management decisions, nestwatchers collect basic biological information and behavioral responses to human activities. One of the most tangible benefits of the ABENWP is determining when bald eagles are in life-threatening situations, allowing Department biologists to intervene in these situations and either eliminate or reduce the threat, or rescue injured eagles. In this report, we summarize noteworthy discoveries at each BA monitored by the ABENWP in 2016. Detailed reports of each monitored BA are centralized at the Department, and are distributed to the appropriate land and wildlife management agencies.

METHODS

We selected the BAs to be monitored by weighing the level of recreation activity and management needs. Included are those with seasonal closures (Box Bar, Cliff, Crescent, Goldfield, Ladders, Luna, Pleasant, Tonto, Whiskey Spring, and Woods Canyon), those without (Granite Reef, Orme, Rodeo, Sycamore), and those monitored opportunistically for information (Bachelor Cove, Doka, Fort McDowell, Kerr). In the fall of 2015, we advertised the ABENWP contract positions through newsletters, web pages, and at university and college job placement services nationwide. Presentations, brochures, and word-of-mouth also contributed to this year's pool of 36 applicants.

We held two orientation meetings, and three question and answer sessions for the selected ABENWP contractors (nestwatchers). The two meetings offered an introduction to the program, background information on the ABENWP's role in bald eagle management, and an explanation of data forms and emergency protocols. After the orientation meetings, nestwatchers chose a partner, a BA, and were taken into the field. The question and answer sessions occurred after the first 10-day work period, and subsequently after every second 10-day work period. In these

sessions, we discussed filling out data forms, consistency in data collection, requirements for the final report, and any additional concerns or comments. When appropriate, additional problems or questions were handled on an individual basis.

Fieldwork began February 5 and continued until nestlings fledged. If a nesting attempt failed, nestwatchers were moved to alternate sites for the remainder of the season. Teams of two nestwatchers maintained a ten days on/four days off schedule. During each work period, weekend observations were conducted from dawn-to-dusk to cover times of high recreation use and document the resulting habitat use of the breeding pair. Monday through Thursday observations were a minimum of eight hours with emphasis on identifying territory boundaries, home range, and overall habitat use of the breeding pair.

Nestwatchers recorded bald eagle behavior and human activity data from assigned observation points (OP) within the BA. We selected each OP to provide optimal viewing while minimizing the impact to the breeding bald eagles. Alternate OPs were identified when the breeding pair utilized areas out of view of the primary OP. Nestwatchers were provided with spotting scopes, Motorola® radios, and/or USFS radios for viewing and communication needs. We supplied standardized data forms, BA maps with river and/or lake kilometer (rk/lk) designations, and other reference materials. Nestwatchers provided their own transportation, gas, field supplies, binoculars, and housing on days off.

Within an arbitrary 1.0 km (3,281 ft.) radius of a bald eagle or active nest, nestwatchers recorded all human activity and the associated bald eagle behavior. Aircraft flying below the 2,000 foot FAA advisory over bald eagle breeding areas were also recorded. Nestwatchers classified bald eagle behavior in response to human activity into seven categories: none, watched, restless, flushed, left area, bird not in area, and unknown. If the bald eagles performed their normal activities without acknowledging the human activity, nestwatchers recorded a “none” response. “Watched” was a bald eagle looking in the direction of the human activity without displaying any other observable reaction. If the bald eagle vocalized and/or moved noticeably without leaving the nest or perch, nestwatchers recorded “restless.” If a bald eagle left its location quickly in response to a human activity, nestwatchers recorded a “flushed” response. “Left area” was recorded when a bald eagle became intolerant and flew far away. Nestwatchers recorded “bird not in area” if a bald eagle was not present, and “unknown” if a bald eagle was present but its response could not be observed. Activities that caused a change in bald eagle behavior, provoking a response of “restless,” “flushed,” and “left area” were considered significant.

Nestwatchers documented all aspects of bald eagle behavior at their BA including: interactions with other wildlife, habitat use, forage events, type of prey species delivered and frequency of deliveries to the nest, incubation time, time attending the nest, and feeding frequency. In this report, we only describe human activity, foraging attempts, prey deliveries, habitat use, and site-specific management recommendations.

At the Crescent, Granite Reef, Orme, Pleasant and Woods Canyon BAs, nestwatchers recorded human activity differently than described above. At Crescent BA, only activities at the north end of the recreation area and lake were recorded; the majority of activity within the southern half

consisted of regular traffic on the highway. At Granite Reef BA, only aircraft below 1,000 feet were recorded due to the high volume of air traffic; also the view from the observation point of portions of the nest area was obstructed by vegetation and some human activities likely went undetected. At Orme BA, due to the high volume of traffic on Ft. McDowell Road, vehicles were not recorded unless they paused or parked. Human activities occurring at Phon D. Sutton Recreation Area and at the water treatment plant were also excluded. At the Pleasant BA, nestwatchers had a limited view of the area surrounding the new nest location and observations of human activity were restricted within roughly 0.2 to 0.5 km of the nest. At the Woods Canyon BA, there was a high volume of recreationists at the lake. Nestwatchers only recorded eagle responses to activities within the nest area closure or any activities that elicited a significant response from an eagle. They also recorded the number of groups visiting the observation point and hikers on the trail around the lake.

RESULTS AND DISCUSSION

The ABENWP monitored 18 breeding areas in 2016 including Bachelor Cove, Box Bar, Cliff, Crescent, Doka, Fort McDowell, Goldfield, Granite Reef, Kerr, Ladders, Luna, Orme, Pleasant, Rodeo, Sycamore, Tonto, Whiskey Spring, and Woods Canyon. The final status of the monitored BAs was 5 failed, 10 successful, 3 occupied-only, and 22 young fledged (Appendix C).

The Bachelor Cove, Doka, Fort McDowell, Kerr, and Rodeo BAs were either monitored part-time or opportunistically by nestwatchers at nearby BAs. Therefore, data for these sites are not included in the following section of this report.

Box Bar Breeding Area (Appendix E)

Observation Period. – February 5 to March 13. Total monitoring 30 days/274.5 hours.

Bald Eagle Identification. – The male was reported by nestwatchers as unbanded and in adult plumage (unknown origin). The female was reported as having a blue visual identification (VID) band "24/S" on the left leg, USFWS band on the right leg, and was in adult plumage (2010 Sheep nestling).

Management Activities. – 1) The USFS placed "No Entry" signs around the nest area.

Figure 7. Box Bar breeding area. Maricopa County, Arizona. Photo by K. McCarty.

Human Activity. – Nestwatchers recorded 156 human activities. Terrestrial activity of ten types represented 75.0%, aircraft activity (helicopters, small planes, sonic boom, and drones) 19.2%, and water activities (swimmers, canoes/kayaks) 5.8%. One type of activity elicited one significant response from the breeding pair. The bald eagles left the area in response to one helicopter.

Food Habits. – No forage events were observed, and no prey deliveries were observed because the breeding pair never laid eggs.

Habitat Use. – The Box Bar nestwatchers identified 12 separate perch locations, spanning 0.9 km of the Verde River and ranging from river kilometer (rk) 25.0 to 25.9, plus the ponds at the Tonto Verde Golf Course. The bald eagle pair spent 55.0% of the observed time at rk 25.7, 32.0% at rk 25.5, 5.6% at rk 25.4, and 3.2% at rk 25.6 and 4.1% at the remaining locations.

Cliff Breeding Area (Appendix F)
Observation Period. – February 5 to March 22. Total monitoring 35 days/294 hours.

Bald Eagle Identification. – The male was reported by nestwatchers as unbanded and in adult plumage (unknown origin). The female was reported as having a blue VID band on her left leg, USFWS band on the right leg, and was in adult plumage (unknown, but blue band indicative of an Arizona origin).

Management Activities. – 1) The USFS enacted the seasonal BA closure. 2) The USFS maintained "Sensitive Species Area" signs around the nest area, as well as markers, posts, and natural barriers to prevent off-road traffic and to keep people on existing roads.
Human Activity. – Nestwatchers recorded 101 human activities during the monitoring period. Terrestrial activities of nine different types represented 57.4%, aircraft (small planes, helicopters, jets, cargo planes) accounted for 37.6%, and watercraft (kayaks, boats) 5.0%. None of the activities elicited a significant response from the breeding pair.

Food Habits. – Nestwatchers were able to observe four forage events, with fish accounting for 100%. The male was successful in 0% (n=2) and the female in 50% (n=2) of forage events. The breeding pair was observed delivering six prey items to the nest, of which the male delivered 83.3% and the female 16.7%. Fish comprised 33.3% of the deliveries and unknown prey types 66.7%. None of the prey items were further identified.

Figure 8. Cliff breeding area. Maricopa County, Arizona. Photo by K. McCarty.

Habitat Use. – The Cliff nestwatchers identified six separate perch locations, spanning a 6.8 km stretch of the Verde River ranging from rk 66.7 to 73.5. The bald eagle pair spent 88.4% of the observed time at rk 66.8, 5.9% at rk 66.7, 3.0% at rk 67.1, 2.6% at rk 73.5, and 0.1% at rk 67.2.

Crescent Breeding Area (Appendix G)
Observation Period. – March 26 to July 17. Total monitoring 82 days/786 hours.

Bald Eagle Identification. – The male was reported by nestwatchers as having a blue VID band on the left leg, USFWS band on the right leg, and was in adult plumage (unknown, but blue band indicative of an Arizona origin). The female was reported as unbanded and in adult plumage (unknown origin).

Figure 9. Crescent breeding area. Apache County, Arizona. Photo by K. McCarty.

Management Activities. – 1) The USFS maintained "No Entry" signs surrounding the nest area knoll, and a bald eagle information board along the west access road.

Human Activity. – Nestwatchers recorded 344 human activities during the monitoring period. Terrestrial activity of nine different types represented 92.2%, water pursuits (boaters, float tubers, kayaks/canoes) 7.3%, and aircraft (helicopters) 0.6%. One type of activity elicited one significant response from the breeding pair. The bald eagles flushed in response to one hiker.

Food Habits. – The nestwatchers observed 15 forage events, with fish accounting for 46.7%, birds 46.7%, and unknown prey types 6.7%. The male was successful in 41.7% (n=12) and the female in 100% (n=3) of forage events. The breeding pair was observed delivering 94 prey items to the nest, of which the male delivered 69.1% and the female 30.9%. Fish comprised 71.3%, birds 5.3%, mammals 2.1%, and unknown prey 21.3% of these deliveries. Of the 73 prey items further identified, 91.8% were trout species, 2.7% were American coots (*Fulica americana*), 2.7% were unidentified waterfowl species, 1.4% were mountain cottontail (*Sylvilagus audubonii*) and 1.4% were unidentified duck species.

Habitat Use. – The Crescent nestwatchers identified 30 perch locations around Crescent Lake. The bald eagle pair spent 48.8% of the observed time at lake kilometer (lk) 2.2, 22.2% at lk 2.3, 17.4% at lk 2.25, 5.2% at lk 2.15, and 6.3% at the remaining locations.

Goldfield Breeding Area (Appendix H)
Observation Period. – February 5 to May 8. Total monitoring 70 days/654 hours.

Bald Eagle Identification. – The male was reported by nestwatchers as having a blue VID band "19/D" on his left leg, USFWS band on the right leg, and was in adult plumage (2006 Needle Rock nestling). The female was reported as unbanded and in adult plumage (unknown origin).

Management Activities. – 1) The USFS enacted the seasonal BA closure. 2) The USFS closed off vehicle access to the nest area. 3) The USFS maintained wildlife breeding area signs along the river prohibiting entry.

Human Activity. – Nestwatchers recorded 873 human activities during the observation period. Terrestrial activity of 13 different types represented 51.6%, water activities (canoe/kayak, tuber,

rafter, paddleboard, boat) 40.0%, and aircraft (helicopters, small planes, drones) 8.4%. Eight types of activities elicited 13 significant responses from the breeding pair. The bald eagles were restless in response to four helicopters, two canoes/kayaks, one horseback rider, and one small plane. The birds flushed in response to two boats, two helicopters, and one hiker.

Food Habits. – The nestwatchers observed 11 forage events, with fish accounting for 72.7%, and birds, mammals, and unknown prey types 9.1% each. The male was successful in 50.0% (n=8), the female in 100% (n=2), and an unknown adult in 100% (n=1) of forage events. The breeding pair was observed delivering 38 prey items to the nest, of which the male delivered 42.1%, the female 44.7%, and an unidentified adult 13.2%. Fish comprised 21.0% of these deliveries, birds 13.2%, mammals 10.5%, and unknown prey types 55.3%. None of the prey items were further identified.

Habitat Use. – The Goldfield nestwatchers identified 33 perch locations, spanning a 2.2 km stretch of the Salt River ranging from rk 8.8 to 11.0. The bald eagle pair spent 52.9% of the observed time at rk 9.3, 14.6% at rk 9.2, 12.0% at rk 10.5, 5.6% at rk 10.8, 5.2% at rk 10.3, 2.4% at rk 9.5, and 7.3% at the remaining locations.

Figure 10. Goldfield (left) and Granite Reef (right) breeding areas. Maricopa County, Arizona. Photos by K. McCarty.

Granite Reef Breeding Area (Appendix I)
Observation Period. – February 8 to May 22. Total monitoring 55 days/410 hours.

Bald Eagle Identification – The male was reported by nestwatchers as having a blue VID band on his left leg, USFWS band on the right leg, and was in adult plumage (unknown, but blue band indicative of an Arizona origin). The female was reported by nestwatchers as unbanded and in adult plumage (unknown origin).

Management Activities. – 1) The Salt River Pima-Maricopa Indian Community (SRPMIC) continues to restrict non-tribal member use of the northern shore of the river area. 2) Nestwatchers participated in an Earth Day celebration at SRPMIC on April 9 and set up an informational display on bald eagles.

Human Activity. – The nestwatchers recorded 787 human activities. Water pursuits represented 55.8% (canoes/kayaks, paddleboard, rafters, swimmers, tubers, boats), aircraft (helicopters, small planes) accounted for 27.2%, and terrestrial activity of 13 different types for 17.0%. Three types of activity elicited ten significant responses from the breeding pair. The bald eagles flushed in response to eight kayaks/canoes, one airboat, and one helicopter.

Food Habits. – The nestwatchers observed 6 forage events with fish accounting for 100%. The male was successful in 100% (n=1) and the female in 20.0% (n=5) of forage events. The breeding pair was observed delivering 23 prey items to the nest, of which the male delivered 65.2%, the female 21.7%, and an unidentified adult 13.0%. Fish comprised 56.5% of the deliveries, birds 13.0%, mammals 4.3%, and unknown prey types 26.1%. Of the three prey items further identified, 66.7% were sucker species (*Catostomus* sp.), and 33.3% were common carp (*Cyprinus carpio*).

Habitat Use. – The Granite Reef nestwatchers identified 26 separate habitat use areas spanning 1.1 km along the Salt River ranging from rk 3.2 to 4.3. The bald eagle pair spent 43.1% of the observed time at rk 3.7, 20.8% at rk 3.3, 19.6% at rk 3.8, 6.4% at rk 3.5, 5.0% at rk 3.2, 3.9% at rk 3.6, and 1.2% at the remaining locations.

Ladders Breeding Area (Appendix J)
Observation Period. – March 24 to April 23. Total monitoring 22 days/209 hours.

Bald Eagle Identification – The male had a blue VID band on the left leg, USFWS band on the right leg, and was in adult plumage (unknown, but blue band indicative of an Arizona origin). The female was reported by nestwatchers as unbanded and in adult plumage (unknown origin).

Management Activities. – 1) The USFS enacted the seasonal BA closure. 2) On April 27, the Department collected an unhatched egg from the nest after the breeding attempt had failed.

Human Activity. – The nestwatchers recorded 44 human activities. Water pursuits (canoes/kayaks) accounted for 63.6%, aircraft (small planes, helicopters) 22.7%, and terrestrial activities (OHV, photographer) 13.6%. One type of activity elicited two significant responses from the breeding pair. The bald eagles were restless in response to one OHV and flushed in response to one OHV.

Food Habits. – No forage events were observed. Also, because the breeding pair never hatched eggs, no prey deliveries were observed.

Figure 11. Ladders breeding area. Yavapai County, Arizona. Photo by K. McCarty.

Habitat Use. – The Ladders nestwatchers identified 17 separate habitat use areas spanning a 1.8 km stretch of the Verde River ranging from rk 161.6 to 163.4. The bald eagle pair spent 30.5% of the observed time at rk 162.9, 19.9% at rk 163.0, 19.5% at rk 163.2, 11.1% at rk 163.3, 9.7% at rk 161.6, 3.5% at rk 163.1, and 5.7% at the remaining locations.

Luna Breeding Area (Appendix K)
Observation Period. – February 5 to June 10. Total monitoring 95 days/932 hours.

Bald Eagle Identification – The male had a black VID band "Δ/A" on his right leg, USFWS band on the left leg, and was in adult plumage (1988 Texas nestling). The female had a black VID band "Δ/B" on her right leg, USFWS band on the left leg, and was in adult plumage (unknown origin).

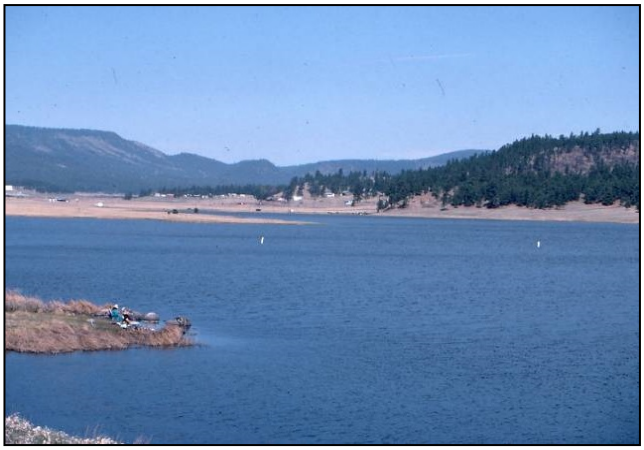

Figure 12. Luna breeding area. Apache County, Arizona. Photo by J. Driscoll.

Management Activities. – 1) The USFS enacted the seasonal BA closure. 2) Nestwatchers were stationed at the boat ramp to talk to visitors. 3) On April 19, two nestlings were blue VID banded "32/R" and "32/W" at 6 weeks of age.

Human Activity. – The nestwatchers recorded 1,405 human activities. Terrestrial activity of ten different types accounted for 82.1%, water pursuits (fishing boats, kayaks/canoes, float tubers) for 16.7%, and aircraft (helicopters, military jets) 1.1%. Three types of activity elicited nine significant responses from the breeding pair. The bald eagles were restless in response to one military jet and one gunshot, and flushed in response to four gunshots, two military jets, and one hiker.

Food Habits. – The nestwatchers observed 84 forage events, with birds accounting for 64.3% and fish 35.7%. The male was successful in 98.0% (n=50) and the female was successful in 100% (n=34) of forage events. The breeding pair was observed delivering 74 prey items to the nest, of which the male delivered 59.5% and the female 40.5%. Birds comprised 67.6% and fish 32.4% of the deliveries. Of the 74 prey items further identified, 59.5% were American coots, 29.7% were rainbow trout (*Oncorhynchus mykiss*), 4.1% were common merganser (*Mergus merganser*), 2.8% were cutthroat trout (*Oncorhynchus clarkii*), and 1.4 % each were Canada goose (*Branta canadensis*), eared grebe (*Podiceps nigricollis*), and waterfowl species.

Habitat Use. – The Luna nestwatchers identified 26 separate habitat use areas around Luna Lake. The bald eagle pair spent 67.0% of the observed time at lk 2.4, 6.1% at lk 1.4, 5.6% at lk 2.6, 4.6% at lk 2.3, 3.0% at lk 2.5, and 13.8% at the remaining locations.

Orme Breeding Area (Appendix L)
Observation Period. – February 8 to April 17. Total monitoring 41 days/314 hours.

Bald Eagle Identification. – The male was reported by nestwatchers as having a blue VID band on his left leg, USFWS band on the right leg, and was in adult plumage (unknown, but blue band indicative of Arizona origin Riverside nestling). The female was reported as having no bands and was in adult plumage (unknown origin).

Management Activities. – 1) The SRPMIC continues to restrict non-tribal member use of the river area. 2) The SRPMIC police routinely visited the ABENWP contractors and patrolled the nesting area during times of elevated recreation use. 3) Nestwatchers participated in an Earth Day celebration at SRPMIC on April 9 and set up an informational display on bald eagles. 4) On April 21, the Department collected two unhatched eggs from the nest after the breeding attempt had failed.

Human Activity. – Nestwatchers recorded 239 human activities. Aircraft (helicopters, small planes) represented 59.0%, terrestrial activities of ten types 40.6%, and water pursuits (canoes/kayaks) 0.4%. One type of activity elicited one significant response from the breeding pair. The bald eagles flushed in response to one hiker.

Food Habits. – The nestwatchers observed one forage event of an unknown prey type. The male was unsuccessful in that attempt. The male was observed delivering one fish (sucker species) to the nest.

Habitat Use. – The Orme nestwatchers identified 18 habitat use locations along the Verde and Salt Rivers, spanning a total of 3.7 km ranging from rk 0.3 to 1.0 on the Verde River and rk 4.8 to 7.8 on the Salt River. The bald eagle pair spent 28.3% of the observed time at rk 1.0 (Verde River), 15.5% at rk 0.6 (Verde River), 13.9% at rk 0.3 (Verde River), 13.9% at rk 6.8 (Salt River), 9.6% at rk 5.1 (Salt River), 6.7% at rk 4.9 (Salt River), 6.5% at rk 0.4 (Verde River), 3.0% at rk 7.8 (Salt River) and 2.6% at the remaining locations.

Figure 13. Orme (left) and Pleasant (right) breeding areas. Maricopa County, Arizona. Photos by K. McCarty.

Pleasant Breeding Area (Appendix M)
Observation Period. – February 5 to March 21. Total monitoring 33 days/300.5 hours.

Bald Eagle Identification. – Nestwatchers reported both eagles as unbanded and in adult plumage (unknown origin).

Management Activities. – 1) The Maricopa County Parks and Recreation Department (MCPRD) enacted a seasonal bald eagle closure. 2) MCPRD marked closure boundaries with buoys and signs. 3) Nestwatchers were supplied a boat by the Department and educated recreationists about the closure and bald eagles. 4) On March 21, the Department collected two unhatched eggs after the breeding attempt failed.

Human Activity. – Nestwatchers recorded 36 human activities. Watercraft (boats, kayaks) accounted for 47.2%, aircraft (small planes, motorized parachutes, and helicopters) for 27.8%, and terrestrial activities (hikers, cyclists, anglers) for 25.0%. One type of activity elicited one significant response from the breeding pair. The bald eagles flushed from a perch in response to one motorized parachute.

Food Habits. – The nestwatchers observed eight forage events, with fish accounting for 50.0% birds 37.5%, and unknown prey types 12.5%. The male was successful in 60.0% (n=5) and the female was successful in 33.3% (n=3) of forage events. The breeding pair was observed delivering three prey items to the nest, of which the male delivered 33.3% and the female 66.7% Birds comprised 66.7% and unknown prey 33.3% of the deliveries. None of the prey items were further identified.

Habitat Use. – At the Pleasant BA, nestwatchers identified 16 separate habitat use areas along the Agua Fria River, spanning a total of 0.6 km and ranging from rk 78.3 to 78.9. The Pleasant bald eagle pair spent 47.8% of the observed time at rk 78.9, 42.8% at rk 78.3, and 9.4% at rk 78.4.

Sycamore Breeding Area (Appendix N)
Observation Period. – February 5 to May 22. Total monitoring 82 days/635 hours.

Bald Eagle Identification. – The male had a blue VID band on the left leg, USFWS band on the right leg, and was in adult plumage (unknown origin, but blue band indicative of an Arizona nestling). The female was unbanded and in adult plumage (unknown origin).

Management Activities. – 1) The FMYN restricts non-tribal member use of the river area. 2) Nestwatchers, Fort McDowell Adventures, Green Zebra Tomcar tours, and community members worked collaboratively to ensure protection of eagles and promote outreach opportunities. 3) On April 12, one nestling was blue VID banded “32/S” at 5.5 weeks old.

Human Activity. – Nestwatchers recorded 162 human activities. Aircraft (helicopters and small planes) accounted for 43.8%, and terrestrial activities of eight types represented 56.2%. Five types of activity elicited 15 significant responses from the breeding pair. The bald eagles were restless in response to one AGFD worker. They flushed in response to five horseback riding groups, three agency workers (FMYN farm), and one helicopter. The birds left the area in response to one rancher.

Food Habits. – The nestwatchers observed 7 forage events, with fish accounting for 28.6%, mammals and birds 14.3% each, and unknown prey types 42.9%. The male was successful in 100% (n=6) and the female was successful in 100% (n=1) of forage events. The breeding pair was observed delivering 41 prey items to the nest, of which the male delivered 53.6% (n=22) and the female 46.3% (n=19). Fish comprised 39.0% (n=16), birds and mammals 4.9% (n=2) each, reptiles 2.4% (n=1), and unknown prey types 48.8% (n=20) of the deliveries. None of the prey items were further identified.

Habitat use. – The Sycamore nestwatchers identified 14 separate habitat use areas, spanning a total of 2.5 km along the Verde River ranging from rk 7.8 to 10.3. The bald eagle pair spent 66.1% of the observed time at rk 10.3, 15.7% at rk 10.1, 7.8% at rk 7.9, 3.0% at rk 9.5, and 7.4% at the remaining locations.

Figure 14. Sycamore (left) and Tonto (right) breeding areas. Maricopa and Gila Counties, Arizona. Photos by K. McCarty.

Tonto Breeding Area (Appendix O)
Observation Period. – February 6 to April 17. Total monitoring 53 days/432 hours.

Bald Eagle Identification. – The male had a blue VID band on the left leg (partial read "?/E"), USFWS band on the right leg, and was in adult plumage (probable 2002 Talkalai nestling). The female had no bands and was in adult plumage (unknown origin).

Management Activities. – 1) A portion of the Indian Point campground remained closed throughout the breeding season. 2) The Southwestern Willow Flycatcher Closure limited recreational activities in the area. 3) The USFS enacted the seasonal bald eagle closure.

Human Activity. – Nestwatchers recorded 17 human activities. Aircraft (helicopters, small planes, motorized parachutes) represented 58.8%, terrestrial activities (gunshots) 23.5%, and watercraft (boats, paddleboards) 17.6%. None of the activities elicited any significant responses from the breeding pair.

Food Habits. – The nestwatchers observed 25 forage events, with fish accounting for 84.0%, mammals 12.0%, and birds 4.0%. The male was successful in 45.5% (n=11), the female in

60.0% (n=5), and an unknown adult in 66.7% (n=9) of forage events. The breeding pair was observed delivering 71 prey items to the nest, of which the male delivered 54.9%, the female 40.9%, and an unidentified adult 4.2%. Fish comprised 62.0%, mammals 12.7%, birds 1.4%, and unknown prey types 23.9% of delivered items. Of the six prey items that were further identified, 50.0% were rainbow trout, and 16.7% each were catfish species, black crappie (*Pomoxis nigromaculatus*), and sucker species.

Habitat use. – The Tonto nestwatchers identified 15 separate perch locations along Tonto Creek, spanning 5.8 km and ranging from rk 12.7 to 18.5. The bald eagle pair spent 85.8% of the observed time at rk 17.0, 4.2% at rk 18.0, and 10.0% at the remaining locations.

Whiskey Spring Breeding Area (Appendix P)
Observation Period. – February 6 to May 8. Total monitoring 78 days/880 hours.

Bald Eagle Identification. – The male was reported by nestwatchers as having a blue VID band and was in adult plumage (unknown, but blue band consistent with Arizona origin). The female was reported as having no bands and was in adult plumage (unknown origin).

Management Activities. – 1) MCPRD enacted the seasonal closure. 2) MCPRD marked closure boundaries with buoys and signs. 3) Nestwatchers were supplied a boat by the Department and educated recreationists about the closure and bald eagles. 4) On March 17, two nestlings were blue VID banded "32/A" and "32/B" at 5.5 weeks old.

Figure 15. Whiskey Spring breeding area. Maricopa County, Arizona. Photo by J. Driscoll.

Human Activity. – Nestwatchers recorded 1,016 human activities. Aircraft of six types (including recreational drones) accounted for 34.3%, water pursuits (boats, jet skis, canoes/kayaks, water skiers) accounted for 29.3%, and other activities (nestwatchers, agency workers, photographers) for 36.4%. Eight types of activities elicited 30 significant responses from the breeding pairs. The bald eagles were restless in response to two jet skis and one small plane, and flushed from a perch in response to seven boats, three small planes, three AGFD biologist, two fishing boats, and one each of nestwatcher, agency worker and helicopter. The eagles left the area in response to six boats, two small planes, and one nestwatcher. Of the 5,039 watercraft that approached the southern closure buoy line, a total of 278 (5.5%) did not comply and entered the closure (agency boats omitted).

Food Habits. – The nestwatchers observed 47 forage events, with fish accounting for 85.1%, birds 6.4%, mammals 4.3%, and unknown prey types 4.3%. The male was successful in 36.0% (n=25), and the female 50.0% (n=22) of forage events. The breeding pair was observed delivering 179 prey items to the nest, of which the male delivered 70.4%, the female 28.5%, and

an unidentified adult 1.1%. Fish comprised 72.1%, birds 11.2%, mammals 1.7%, and carrion and unknown prey types 15.1% of delivered items. Of the 49 prey items further identified, 26.5% were bass species, 18.4% were sucker species, 12.2% each were channel catfish (*Ictalurus punctatus*) and black crappie, 8.2% each were catfish species and bluegill (*Lepomis macrochirus*), 6.1% were cormorant (*Phalacrocorax* sp.), 4.1% were common carp, and 2.0% each were largemouth bass (*Micropterus salmoides*) and gull species.

Habitat use. – At the Whiskey Spring BA, nestwatchers identified 22 separate habitat use areas along the Agua Fria River arm of the lake, spanning a total of 1.1 km and ranging from rk 68.5 to 69.6. The bald eagle pair spent 31.1% of the observed time at rk 69.0, 21.3% at rk 68.8, 20.1% at rk 68.7, 19.4% at rk 68.9, 3.5% at rk 68.5, and 4.6% at the remaining locations.

Woods Canyon Lake Breeding Area (Appendix Q)
Observation Period. – March 25 to July 24. Total monitoring 101 days/907 hours.

Bald Eagle Identification. – Both resident eagles were in adult plumage and unbanded (unknown origins).

Management Activities. – 1) The USFS established a closure around the nest area and placed closure signs. 2) Nestwatchers were supplied a kayak by AGFD and educated recreationists about the closure and bald eagles. 3) On May 25, one nestling was blue VID banded "33/E" at 5.5 weeks old.

Interventions. – On July 9, the Department recovered the pre-fledged juvenile (33/E) from the ground and placed it back in the nest tree. At the same time, a foster juvenile from the Show Low BA (blue band 33/K) was released to the tree. On July 12, the Department again recovered juvenile 33/E from the ground and placed it high in a tree within the BA.

Figure 16. Woods Canyon breeding area. Coconino County, Arizona. Photo by K. McCarty.

Human Activity. – Nestwatchers recorded 996 human activities within or at the closure (including all activities that yielded a negative response from the eagles, plus the number of groups visiting the observation point and hikers on the trail around the lake). Terrestrial activities of seven types accounted for 95.0%, watercraft 4.9%, and aircraft (recreational drones) for 0.1%. One type of activity elicited one significant response from the breeding pair. The bald eagles flushed in response to one recreational drone.

Food Habits. – The nestwatchers observed 44 forage events, with fish accounting for 95.5%, mammals 2.3%, and unknown prey types 2.3%. The male was successful in 75.0% (n=12), the female in 58.3% (n=12), and an unidentified adult in 45.5% (n=20) of forage events. The

breeding pair was observed delivering 83 prey items to the nest, of which the male delivered 36.1%, the female 30.1%, and an unknown adult 33.7%. Fish comprised 91.8%, mammals 2.4% , and unknown prey 6.0% of the delivered items. Of 63 prey items further identified, 81.0% were trout species and 19.0% were rainbow trout.

Habitat Use. – The Woods Canyon nestwatchers identified 51 separate habitat use areas around the lake. The bald eagle pair spent 29.7% of the observed time at lk 5.0, 29.2% at lk 4.8, 14.9% at lk 0.8, 5.9% at lk 4.9, 5.7% at lk 0.9, and 14.6% at the remaining locations.

MANAGEMENT CONSIDERATIONS

Management considerations included below are summarized in an edited format from the individual nestwatch reports and therefore are not opinions of the authors or the Department. We have included them as informational material for land and wildlife management agencies reviewing this report, and for further discussion at SWBEMC meetings.

Box Bar

1. Place two additional closure signs to prevent accidental violations of the closure; one sign on the bluffs on the northwest side and one on the entrance to the horse trail by the Box Bar campground dumpsters.
2. Place a monofilament recycling bin at the cobblestone beach at river kilometer 25.7 to help prevent littering of fishing line.

Cliff

1. Place closure signs along Forest Road 42 before it is re-opened. FR 42 borders much of the southern and western edge of the closure.
2. Add signs along the northwest end of the closure where the large wash leads to FR 205 immediately before mile marker seven to reduce further closure violations from OHVs.

Goldfield

1. Closure signs on the north side of the Salt River seem to be somewhat effective in keeping forest users away from eagle nests and should be maintained in order to keep human activities in the vicinity of the nest to a minimum.
2. Place informational signage about the program at nearby parking areas. this could include a durable map of the closure and a brochure dispenser.
3. If Cottonwood and other nest tree species are not effectively recruiting naturally this may threaten the long-term viability of the Arizona population of bald eagles. Restoration efforts in coordination with the appropriate land management agencies could include identifying suitable habitat, planting, monitoring and maintaining seedlings of future nest trees. Nestwatchers could be involved with these efforts one to two days per ten-day session or by other arrangement.

Granite Reef

1. Due to the location of the 2016 Granite Reef nest, observed human activity within 200 meters of the nest tree was very low. However, activities on the east, USFS side of the

river, especially those occurring farther from the river, were often not visible to nestwatchers. Though no significant responses to these activities were confirmed, it is possible that hikers, horseback riders, or other foot traffic could have an impact on future nesting attempts if unauthorized trails are established in the area. If future nestwatchers observe such impacts, we recommend that a closure be created around the nest tree.

2. Activity on SRPMIC land on the west side of the Salt River produced no significant responses from the eagles, and though river traffic flushed the eagles from nearby perches on several occasions, nestwatchers do not believe that it had a significant negative impact on the 2016 nesting attempt. If the Granite Reef pair nest on SRPMIC land in the future, as they have in several past breeding seasons, signage along the river and a closure would be very important. These measures would discourage non-tribal members from landing on the west riverbank, and hopefully prevent tribal members from approaching the nest tree.
3. All SRPMIC rangers met with nestwatchers before the breeding season concluded, and were helpful and friendly. However, it would be beneficial for nestwatchers and rangers to meet at the beginning of the season to encourage communication and ensure nestwatcher safety. A briefing on past and potential negative nestwatcher experiences with the public could also better prepare nestwatchers to handle such interactions.
4. The north gate on Fort McDowell Road was important in decreasing non-tribal use of Red Mountain Preserve. However, nestwatchers observed that the gate was significantly less effective when it was left open. Tribal members and agency workers should be strongly encouraged to close the gate every time that they enter or exit the preserve. Additionally, signage on and near the gate is minimal and in poor condition. Increasing signage, removing graffiti, and replacing damaged signs should be a priority in order to decrease unauthorized use of the SRPMIC land.
5. The opportunity to participate in more outreach would allow more community involvement for nestwatchers and investment for community members. Nestwatchers found outreach very rewarding and more opportunities would be welcome.

Luna

1. Perhaps the addition of more closure posters and boundary map signs would be effective near the walk through in the fence.
2. Luna Lake is a unique BA and the presence of nestwatchers is of great benefit to the success of the resident breeding pair. The lake area is very popular and has become a destination fishing lake due to the size of fish available and is also a well-used stop over for travelers going to other destinations, sometimes this use borders on the extreme, resulting in conflicting management concerns. Nearby Hulsey Lake has been renovated and already experiencing heavy use by fishermen of all experience levels, especially families. A cooperative effort will allow Luna Lake to continue to be a successful breeding area for Eagles and other species, while still remaining a popular destination for recreational use. It is a very popular and heavily used recreation area and has become ever more popular with birders! Since recreational demands are constantly increasing, it is extremely important to remain proactive in establishing and implementing a well thought out management plan.

Orme

1. While relatively few human activities were recorded in the Orme BA, foot and vehicle traffic had a high likelihood of impacting the Orme nest attempt due to proximity. Nestwatchers did not confirm any significant responses to human activity from eagles in the nest, but it is possible that nearby humans dissuaded them from approaching or spending time in the nest tree early in the breeding attempt. It is highly recommended that the dirt road under the nest be blockaded earlier in the season, before eggs are laid.
2. In addition to the cement blockade, signage along Fort McDowell Road, the dirt roads in the nest vicinity, and the parking area at Pole 4 should be considered. If signs are installed, recreationists should be informed of breeding bald eagles in the area and advised of the importance of limiting human impacts on the nest attempt. They should be instructed to remain inside their vehicles while observing the eagles and to refrain from approaching a perched eagle or the nest tree; all of these behaviors were observed by nestwatchers in 2016.
3. Organizers for the Unity Run and other events should be notified of the Orme nest location and should inform participants of the necessity of limiting impacts on the breeding eagles. If ceremonies will take place on Unity Hill, participants should access the hill from Fort McDowell Road only and should not descend toward the nest. Event organizers should also be informed of the presence of nestwatchers camping in the vicinity.

Pleasant

1. Consider bigger posters and signs to be placed conspicuously at parking lots and boat ramps to increase awareness from visitors.

Sycamore

1. Moving the Sycamore OP downstream where the nest could be observed was a positive turning point in the 2016 season. From that location nest attendance and behavior data could be collected with certainty. In addition, this much more advantageous view allowed for observation of forages and other significant events and behaviors. We suggest the OP remain at the downstream location if the eagles use nest #7 in future years.
2. Advise Fort McDowell Adventures stables of eagle breeding location, schedules and pertinent information throughout the season. This can be done by nestwatchers or FMYN Environmental staff.
3. Continue to emphasize protection of Sycamore BA by signage, law enforcement patrols, verifying the boundary fence in Sycamore Creek is intact and secure, and public awareness.
4. Consider selecting or recruiting FMYN youth to learn about the bald eagle breeding areas and nest watch methods.
5. Continue to keep the road into Rodeo BA locked and accessible only to authorized personnel.
6. Continue the established FMYN practice of excellent communication among all agencies involved with or interested in the bald eagles: education, law enforcement, environmental, public health, elder services, etc.

7. Remain in contact with representatives of Fort McDowell Adventures to discuss any ongoing activities (e.g. Pink Jeep, Green Zebra) or one-time events (e.g. Battlefrog, Craft Beer Relay, fireworks) that may impact the Sycamore BA.

Tonto

1. As stated in the 2015 report, signage could be increased. It is easy to cross parts of the closure boundary without seeing a sign.
2. Given the lack of human activity observed in the breeding area it may make sense to place nestwatchers at a different site where management needs are greater.
3. The Bachelor Cove BA is conveniently located behind the bend in a canyon and therefore, is adequately protected from human activity as well. The minimal management approach already established with this BA seems to be working well. Accordingly, it is recommended that Bachelor Cove management stays the same.

Whiskey Spring

1. Better and more frequent communication is needed between the agencies. We had some staff that communicated with us frequently, but then when personnel changed over, we lost all meaningful communication, and cooperation ended. This results in sheriff boats running high speed right in front of the nest, stopping in front of the nest for photos, and ineffective response by both parties.
2. Install a nestcam on an active nest, make available streaming on the internet, and ensure Nestwatchers have the url to share with visitors. This would provide both a place for Nestwatchers to refer those that are interested in the eagles, provide an educational opportunity for teachers and students, increase public support and understanding.
3. It would be incredibly productive to have one person working on education/outreach all the time, whether that's a single designated nestwatcher, a volunteer, or seasonal staff. Education efforts could occur off-site and/or involve weekly radio or news updates. Public support is value added to the program efforts, but takes real effort.

Woods Canyon

1. The red closure signs would be more effective at preventing violations if the first line read "DO NOT ENTER" instead of "ATTENTION". "Do not enter" is the main message we want to send to people who are nearing the closure boundary. From opinions gathered from closure violators, the signs appear wordy and are easy to overlook while one is trying to enjoy the outdoors. Many believed it was just another sign to help prevent wildfires. A more concise sign may yield more public cooperation around the nest tree.
2. Keep the current closure boundary. While many of the observed closure violations occurred on the east side of the closure boundary, the causes of violations were either disregard for signs or confusion of signage meaning. Redrawing the closure boundary (by moving it to the shore for instance) would do nothing to address the common causes of violations. Furthermore, anglers frequented this stretch of shoreline while imposing no stress on the eagles.

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APPENDIX A: 2016 ARIZONA BALD EAGLE WINTER COUNT RESULTS

Table 10. 2016 Arizona bald eagle winter count volunteer survey results (continued next page).

Route Number	Route Name	Minutes Surveyed	Adults	Subadults	Unknown Bald Eagles	Unknown Eagles
Apache County						
1	Becker Lake	10	2	1	0	0
2	Little Colorado River (LCR)	10	0	0	0	0
3	S. Fork LCR – Campground	10	0	0	0	0
4	Casa Malpais – LCR	10	0	0	0	0
5	Greer Lakes (River, Bunch, and Tunnel Reservoirs)	30	0	0	0	0
6	Sponseller Lake	15	0	0	0	0
7	Mexican Hay Lake	Not surveyed.				
8	White Mountain Hereford Ranch (Trinity, Glen Livet, McKay reservoirs)	90	0	1	0	0
9	The Ranch Lake	60	0	0	0	0
10	Ortega Lake	45	0	0	0	0
11	Concho Lake	45	2	0	0	0
12	Luna Lake	200	2	2	0	0
13	Nelson Reservoir	30	3	0	0	0
14	Nutrioso Reservoir	140	2	2	0	0
16	San Francisco River (Luna Lake to New Mexico line)	240	0	0	0	0
Total		**935**	**11**	**6**	**0**	**0**
Cochise County						
18	Parker Canyon Lake	60	0	0	0	0
19	Willcox Playa	30	1	0	0	0
Total		**90**	**1**	**0**	**0**	**0**
Coconino County						
21	Long Lake Complex	181	1	0	0	0
22	Stoneman Lake	40	2	0	0	0
23	FH-3	50	0	0	0	0
24	I-17, Section to Flagstaff	190	7	1	0	4
25	Bellemont	385	6	7	0	0
26	Townsend/Winona A/B	314	2	0	0	0
27	HWY 89 North /Sunset Crater – Wupatki	315	2	0	0	0
28	FH-3 Lakes (Mary, Mormon, Marshall, Prime, etc.)	450	2	2	0	0
29	Continental Country Club Lakes	150	1	0	0	0
30	Chevelon Canyon Lake	120	1	1	0	0
32	Spring Valley Wash	210	1	0	0	0
33	Red Lake Valley	20	1	0	0	0
34	Kaibab Lake	60	0	0	0	0
35	Pittman Valley	75	0	0	0	0
36	Davenport Lake	135	0	0	0	0
37	Scholz Lake	70	0	0	0	0
38	Cataract Lake	45	0	0	0	0
39	Willow Springs Lake	180	0	0	0	0

Table 10 continued.

Route Number	Route Name	Minutes Surveyed	Adults	Subadults	Unknown Bald Eagles	Unknown Eagles
40	West Chevelon Canyon	60	0	0	0	0
41	Willow Creek	10	0	0	0	0
42	White Horse Lake – Pomeroy Tanks	Not surveyed.				
43	JD Dam Lake	Not surveyed.				
45	Steel/Stone Road	60	0	1	0	0
48	Blue Stem Wash-Babbit property	90	0	1	0	0
49	Glen Canyon Nat'l Rec. Area (Lake Powell to Lee's Ferry)	90	2	0	0	0
118	Bill Williams Loop Road	270	0	0	0	0
119	Johnson Canyon	60	1	2	0	0
120	Highway 64 east	10	0	0	0	0
121	Highway 64	14	1	0	0	0
122	Camp Navajo	170	3	1	0	0
123	Partridge Creek[1]	120	0	0	0	1
124	Odell Lake	85	0	1	0	0
125	Highway 87 north	90	2	0	0	0
126	Highway 180	145	0	0	0	0
Total		**4,264**	**35**	**17**	**0**	**5**
Graham County						
51	Point of Pines Lake area	Not surveyed.				
Mohave County						
57	Alamo Lake	114	3	0	0	0
Total		**114**	**3**	**0**	**0**	**0**
Navajo County						
58	Lake of the Woods	30	1	1	0	0
59	Rainbow Lake	30	0	0	8	4
61	Whipple Lake	15	0	0	0	0
62	Long Lake	50	0	0	0	0
63	Lone Pine Dam	30	0	0	0	0
64	Schoens Reservoir	35	0	0	0	0
65	White Mountain Lake	33	0	0	0	0
67	Jacques Marsh	30	0	3	0	0
68	Scott's Reservoir	45	1	0	0	0
69	Show Low Lake	35	1	0	0	0
70	Pintail Lake	30	0	1	0	0
71	Telephone Lake	37	0	1	0	0
72	Fool Hollow Lake	90	1	1	0	0
75	Cottonwood Wash/ Clay Springs	30	0	0	0	0
76	White Lake	5	0	0	0	0
127	Mortenson Wash	21	0	0	0	0
Total		**546**	**4**	**7**	**8**	**4**
Santa Cruz County						
82	Pena Blanca Lake	60	0	0	0	0
Total		**60**	**0**	**0**	**0**	**0**
Yavapai County						
83	Wet Beaver Creek	360	0	0	0	0
84	Oak Creek	480	2	0	0	0

Table 10 continued.

Route Number	Route Name	Minutes Surveyed	Adults	Subadults	Unknown Bald Eagles	Unknown Eagles
85	Willow Lake	240	2	0	0	0
86	Lynx Lake	230	2	0	0	0
87	Watson Lake	240	1	0	0	0
88	Goldwater Lake	240	0	1	0	0
Total		**1,790**	**7**	**1**	**0**	**0**
Yuma and La Paz Counties						
89	Imperial N.W.R. Cibola/Martinez Lake – Colorado River	240	4	5	0	0
Total		**240**	**4**	**5**	**0**	**0**

Table 11. 2016 Arizona bald eagle winter count helicopter survey results.

Route Number	Route Name	Minutes Surveyed	Adults	Subadults	Unknown Bald Eagles	Unknown Eagles
90	Verde River	171	28	10	0	0
91	Lower East Verde River	7	0	0	0	0
92	Lower West Clear Creek	15	0	0	0	0
93	Lower Salt River	95	27	6	0	0
94	Upper Salt River	52	1	2	0	0
95	Lower Tonto Creek	23	5	0	0	0
97	Lower Canyon Creek	11	0	0	0	0
98	Lower Cibecue Creek	16	0	0	0	0
100	White River	22	2	0	0	0
101	North Fork White River	34	2	2	0	0
102	Lower Black River	62	12	3	0	0
103	Big and Little Bonito Creeks	13	0	0	0	0
104	San Carlos River–Talkalai Lake	15	2	5	0	0
105	San Carlos Reservoir	22	5	3	0	0
106	Upper and Lower Gila River	56	3	1	0	0
107	Eagle Creek	53	2	2	0	0
108	Bonita Creek	14	0	0	0	0
109	Lower San Francisco River	31	1	0	0	0
110	Blue River	9	0	0	0	0
111	Sunrise Lake	3	0	0	0	0
112	Big Lake	9	0	0	0	0
114	Crescent Lake	3	0	0	0	0
115	Lake Pleasant	21	2	1	0	0
116	Del Rio Ponds	1	1	0	0	0
117	Tres Rios	17	3	0	0	0
Total		**775**	**96**	**35**	**0**	**0**

Table 12. 2016 Arizona bald eagle winter count non-standardized survey route results.

Route Number	Route Name	County	Minutes Surveyed	Adults	Subadults	Unknown Bald Eagles	Unknown Eagles
976	Highway 260 and F.R. 618	Yavapai	270	0	0	0	0
977	Blue Ridge Reservoir	Coconino	120	1	1	0	0
986	Kachina Wetlands	Coconino	72	0	0	0	0
991	Clint's Well	Coconino, Yavapai	105	0	0	0	0
Total			**567**	**1**	**1**	**0**	**0**

APPENDIX B: TERMINOLOGY AND RAPTOR REPRODUCTIVE STATUS CRITERIA

Breeding Area (BA): An area containing one or more nests within the range of a mated pair of birds. Operationally, a BA is recognized only after an active nest has been documented. Once a BA is established, we consider it a BA whether it is occupied by bald eagles in a given year or not, until or unless it is designated historic (i.e., ten consecutive years unoccupied).

Historic BA: A BA that has remained unoccupied for ten consecutive years. This term also applies to BAs identified before the 1970s.

Occupied BA: An area with at least one nest structure where at least one of the following activity patterns was observed during the breeding season:

a. Young were raised.
b. Eggs were laid.
c. One adult sitting low in a nest, presumably incubating.
d. Two adults present on or near the nest.
e. One adult and 1 bird in immature plumage at or near a nest, if mating behavior was observed (display flight, nest repair, coition).

Active Nest: One in which eggs have been laid. Activity patterns (a), (b), and (c) above are diagnostic of an active nest.

Unoccupied BA/Nest: A nest or group of nests at which none of the activity patterns diagnostic of occupancy were observed in a given breeding season. BAs must exist as occupied before they can be recognized and classified as unoccupied.

Successful BA/Nest: An active nest from which at least one young fledged during the breeding season under consideration. Nests were successful if at least one young was raised past 80% of fledging age.

Failed BA/Nest: An active nest from which no young fledged regardless of cause.

Productivity: The number of young fledged per occupied BA.

Reoccupied Historic BA: A historic BA which shows signs indicative of being occupied.

Pioneer Effort: The occupancy of a new BA, in previously undocumented breeding habitat, where there is no evidence of prior activity. These occur in areas monitored by the ORA flights before discovery due to: 1) the presence of a large nest built by another or unknown species, or 2) the observed suitability of the habitat.

Previously Existing BA: A new BA that shows signs of prior occupancy (e.g. multiple large nests) and/or signs of prior activity (e.g. prey remains below an existing nest) upon discovery.

APPENDIX C: 2016 ARIZONA BALD EAGLE PRODUCTIVITY

Table 13. Arizona bald eagle breeding area productivity summary, 2016 (continued next page).

Breeding Area	Status[1]	Nest[2]	Incubation Date	Eggs[3]	Hatch Date	Young	Fledged	Fledge Date
Alamo	S	4	<1/12	2	1/12-1/29	2	2	>4/12
Armer Gulch	S	1	<1/13	2	2/2-3/8	2	2	>4/22
Ashurst	F	1	<5/6	1	<5/6	1	Failed 5/9.	
Bachelor Cove	S	1	<1/13	2	1/13-2/9	2	2	3/16-4/22, >4/22
Bagley	U							
Bartlett	U							
Beaver	S	1	1/4-1/29	1	1/29-3/18	1	1	>5/6
Becker	S	2	<2/8	3	2/8-3/29	3	2	>5/27
		One nestling removed due to attempted siblicide and fostered to Show Low BA.						
Bill Williams	U							
Black Cross	F	1	<1/13	1	Failed 3/16 during incubation.			
Blue Point	S	2	<1/13	2	2/2-3/16	2	2	3/16-4/21
Box Bar*	O	Two adults observed throughout season.						
Buckeye	S	1	<1/5	2	1/5-2/10	2	2	4/7-4/27
Bulldog	S	2	<1/13	1	2/2-3/16	1	1	>5/6
Burro Creek	F	2	<3/18	1	Failed by 4/21.			
Campaign Bay	U							
Canyon De Chelly	S	2	<5/5	2	<5/5	2	2	6/15-6/17, >6/17
Cedar Basin	U							
Chevelon	S	4	<3/7	2	3/7-4/26	2	2	>6/7
Cibecue	F	2	1/14-3/16	1	Failed by 4/22.			
Cliff*	F	9	2/6	1	3/14-3/17	1	Failed by 3/21.	
Coldwater	U							
Coolidge	U							
Crescent	S	1	1/14-3/16	1	3/16-4/16	1	1	7/15
Dogtown	S	2	<5/6	2	<5/6	2	2	7/19-7/21
Doka*	O	Pair of adults observed.						
East Verde	S	6	<1/4	2	1/29-3/18	2	2	>4/21
Elaine	S	1	<2/24	2	2/24-4/15	2	2	6/15-6/21
Fish Creek	S	1	<1/13	1	2/2-3/16	1	1	>5/6
Fort McDowell*	F	15	<1/4	1	1/4-1/29	1	Failed by 2/5.	
Gainey	S	1	1/20-2/2	2	6-Mar	2	2	5/19, 5/26
Garden Lakes	F	1	<12/31	1	Failed by 2/26.			
Gilbert	U							
Goldfield	S	4	<1/13	2	1/13-2/2	2	2	4/11-4/15, 4/23
Granite Basin	U							
Granite Reef*	S	6	<1/13	2	2/15-2/18	2	2	5/14-5/15
Greer Lakes	F	6	<3/16	1	Failed by 4/22.			
Horse Mesa	S	4	<1/13	2	2/2-3/16	2	1	>4/22

[1]Breeding area status codes (Postupalsky 1974): U=unoccupied, O=occupied, S=successful, F=failed.

[2]Nest numbers are from Hunt and others 1992; Driscoll and Beatty 1994; Driscoll and others 1992, 1995a, 1995b, 1997, 1998, 1999; Jacobson and others 2004, 2005, 2006, 2007; Koloszar and Driscoll 2001a, 2001b; Koloszar and others 2002; Canaca and others 2004; McCarty and Jacobson 2008-2012; McCarty et al. 2013, 2014, 2015.

[3]Represents minimum number of eggs laid.

*Nests monitored by the Arizona Bald Eagle Nestwatch Program.

Table 13 continued.

Breeding Area	Status[1]	Nest[2]	Incubation Date	Eggs[3]	Hatch Date	Young	Fledged	Fledge Date
Horseshoe	S	16	<2/18	2	2/18-3/18	2	2	>5/6
Ive's Wash	S	5	1/12-1/29	3	1/29-3/4	2	1	>5/20
Kachina Village	F	1	<3/30	1	Failed by 4/21.			
Kerr*	O	Adult and sub-adult in area.						
Ladders*	F	3	1/29-3/18	1	Failed by 4/27.			
Lone Pine	U							
Lower Mary	S	3	<3/3	2	3/3-4/15	2	2	>6/16
Luna*	S	1	<2/8	2	3/8	2	2	5/25, 5/27
Lynx	F	4	1/9-2/10	1	2/10-3/18	1	Failed 4/21.	
Mohave	F	1	<2/10	1	2/10-3/30	1	Failed by 5/2.	
Needle Rock	U							
Nevada Bay	U							
Oak Creek	S	4	1/9-1/29	1	1/29-3/11	1	1	>5/6
Orme*	F	10	2/13-2/19	2	Failed by 4/21.			
Pee Posh Wetlands	S	4	<1/5	1	1/5-1/29	1	1	13-Apr
Perkinsville	F	4	1/29-3/18	1	Failed by 4/21.			
Pinal	U							
Pinto	F	9	1/13-2/2	1	2/2-3/16	1	Failed by 4/22.	
Pleasant*	F	4	<1/21	3	3/4	1	Failed by 3/18.	
Redmond	F	5	1/13-2/2	1	Failed by 4/22.			
Riverside Ruin	S	1	<1/13	1	1/13-2/2	1	1	4/11-4/21
Rock Creek	U							
Rodeo	S	5	1/4-1/29	2	2/11-2/19	1	1	5/5
Saguaro	S	1	<1/13	2	2/2-3/16	2	2	>5/6
San Carlos	U							
Seventy-six	S	6	2/2-3/16	2	3/16-4/22	2	1	>6/3
Sheep	S	7	<1/13	2	2/2-3/8	1	1	>4/22
Sheep Creek	S	1	1/29-3/18	2	3/18-4/21	1	1	>5/25
Show Low Lake	S	1	2/24-3/16	1	3/16-4/5	1	0, 1F[Δ]	>6/16
		[Δ]Foster-fledged one nestling from Becker breeding area. Show low nestling fostered to Woods Canyon.						
Silver Creek	S	2	<2/3	2	2/24-3/15	2	2	>5/28
Suicide	S	1	1/13-2/2	3	2/2-3/16	3	1	>5/9
Sullivan Lake	S	2	<1/3	2	1/29-2/8	2	2	>4/21
Sycamore*	S	7	<1/29	1	2/29-3/4	1	1	5/26
Table Mountain	O	Pair of adults observed.						
Talkalai	F	8	<1/13	1	Failed 1/13-2/2 when nest fell during incubation.			
Tapco	F	5	1/27-1/29	1	1/29-3/18	1	Failed by 4/18.	
Tonto*	S	5	<1/13	2	1/13-2/2	2	2	4/9, 4/15
Tortilla Creek	S	1	<1/13	2	2/2-3/16	2	2	>4/21
Tower	U							
Whiskey Spring*	S	1	<1/4	2	2/5-2/8	2	2	5/1-5/8
White Horse Lake	O	Pair of adults observed.						

[1]Breeding area status codes (Postupalsky 1974): U=unoccupied, O=occupied, S=successful, F=failed.

[2]Nest numbers are from Hunt and others 1992; Driscoll and Beatty 1994; Driscoll and others 1992, 1995a, 1995b, 1997, 1998, 1999; Jacobson and others 2004, 2005, 2006, 2007; Koloszar and Driscoll 2001a, 2001b; Koloszar and others 2002; Canaca and others 2004; McCarty and Jacobson 2008-2012; McCarty et al. 2013, 2014, 2015.

[3]Represents minimum number of eggs laid.

*Nests monitored by the Arizona Bald Eagle Nestwatch Program.

Table 13 continued.

Breeding Area	Status[1]	Nest[2]	Incubation Date	Eggs[3]	Hatch Date	Young	Fledged	Fledge Date
Woods Canyon*	S	9	<3/21	2	4/10-4/14	2°	1, 1F$^{\Delta}$	7/8, 7/9
		°One young survived to fledge, plus $^{\Delta}$one young fostered from Show Low Lake.						
Yellow Cliffs	S	1	1/4-1/29	1	1/29-3/18	1	1	>5/6

[1]Breeding area status codes (Postupalsky 1974): U=unoccupied, O=occupied, S=successful, F=failed.
[2]Nest numbers are from Hunt and others 1992; Driscoll and Beatty 1994; Driscoll and others 1992, 1995a, 1995b, 1997, 1998, 1999; Jacobson and others 2004, 2005, 2006, 2007; Koloszar and Driscoll 2001a, 2001b; Koloszar and others 2002; Canaca and others 2004; McCarty and Jacobson 2008-2012; McCarty et al. 2013, 2014, 2015.
[3]Represents minimum number of eggs laid.
*Nests monitored by the Arizona Bald Eagle Nestwatch Program.

APPENDIX D: NEST SURVEY RESULTS

Table 14. Results of the 2016 bald eagle winter count, ORA, and nest survey flights (continued next page).

Location	Time	Comments
January 4, 2016		
Orme BA	0936	All known nests empty. Two adults near confluence. Nest #9 fallen.
Rodeo BA	0938	All known nests empty. One adult perched.
Sycamore BA	0944	All known nests empty. One adult.
Doka BA	0945	All known nests empty. One adult.
Fort McDowell BA	0948	Adult incubating in nest #15.
Box Bar BA	0952	One adult in nest #5, second adult perched in nest tree.
Needle Rock BA	0952	No nests or eagles.
Bartlett BA	0955	All known nests empty. No eagles.
Yellow Cliffs BA	1008	All known nests empty. Two adults perched at lake.
Sheep Creek BA	1012	All known nests empty. One adult between Yellow Cliffs and Sheep Creek.
Cliff BA	1015	All known nests empty. One adult perched.
Horseshoe BA	1019	Two adults at upper end of Horseshoe Lake. Nest #11 empty, nests 13-15 not checked.
Table Mountain BA	1035	All known nests empty. No eagles.
East Verde River	1041	No nests or eagles.
East Verde BA	1051	Adult incubating in nest #6.
Coldwater BA	1057	All known nests empty. No eagles.
Ladders BA	1100	Two adults standing in nest #3. One near-adult perched nearby.
West Clear Creek	1105	No eagles. New large nest found on cliff.
Beaver BA	1133	All known nests empty. Two adults.
Pleasant BA	1158	Nest #3 empty. One adult.
Whiskey Spring BA	1200	Adult incubating in nest #1.
January 5, 2016		
Whiskey Spring BA	0907	Adult incubating. Second adult perched.
Pee Posh Wetlands BA	0807	Adult incubating in nest #4. Second adult perched.
Buckeye BA	0818	Adult incubating in nest #1.
January 9, 2016		
Lynx BA	0840	Nest #3 fallen. No new nests or eagles.
Sullivan BA	1104	Adult incubating in nest #2.
Granite nest site	1111	All known nests empty. No eagles.
Muldoon	1116	One adult and one immature. No nests.
Hell Point historic BA	1124	All known nests empty. No eagles.
Perkinsville BA	1139	All known nests empty. No eagles.
Mormon Pocket nest site	1145	All known nests empty. No eagles.
Tower BA	1152	All known nests empty. No eagles.
Tapco BA	1200	Nest #4 fallen. All known nests empty. No eagles.
Oak Creek BA	1223	All known nests empty. No eagles.
January 13, 2016		
Riverside BA	0746	Adult incubating in nest #1.
Granite Reef BA	0752	Adult incubating in nest #6.
Orme BA	0756	All known nests empty. Pair of adults perched at Coon Bluff.
Kerr BA	0802	All known nests empty. One adult and one immature in area.
Goldfield BA	0802	Adult incubating in nest #4.
Bulldog BA	0810	Adult incubating in nest #2. Second adult perched.

Table 14 continued.

Location	Time	Comments
Blue Point BA	0815	Adult incubating in nest #10.
Bagley BA	0815	All known nests empty. No eagles.
Saguaro BA	0822	Adult incubating in nest #1.
Tortilla BA	0825	Adult incubating in nest #1.
Black Cross BA	0828	Adult incubating in nest #1.
Fish Creek BA	0832	Adult incubating in nest #1.
Horse Mesa BA	0836	Adult incubating in nest #4.
Two Bar nest site	0842	Two adults, one flew to nest #2 with a stick.
Bachelor Cove BA	0847	Adult incubating in nest #1.
Tonto BA	0852	Adult incubating in nest #5.
Sheep BA	0857	Adult incubating in nest #7. Second adult perched.
76 BA	0908	Two adults perched.
Armer Gulch BA	0947	Adult incubating in nest #1. Second adult flying.
Pinto BA	0953	Nest #8 fallen. All known nests empty. No eagles.
Campaign Bay BA	0954	No eagles or nests.
Pinal BA	1100	All known nests empty. Nest #5 not seen. One adult perched.
Redmond BA	1113	All known nests empty. No eagles.
Canyon historic BA	1146	New large nest found on cliff.
Talkalai BA	1304	Adult incubating in nest #8.
San Carlos BA	1315	One adult and one immature perched by nest #7.
Suicide BA	1328	All known nests empty. No eagles.
Coolidge BA	1335	No nests or eagles.
Porphyry Gulch nest site	1409	All known nests empty. No eagles.
Granite Basin BA	1411	All known nests empty. No eagles.
Winkelman historic BA	1425	No nests or eagles.
January 14, 2016		
Cibecue BA	1006	All known nests empty. No eagles.
Mule Hoof historic BA	1023	All known nests empty. No eagles.
Cedar Basin BA	1040	All known nests empty. No eagles.
Lone Pine BA	1104	All known nests empty. No eagles.
Crescent BA	1216	All known nests empty. No eagles.
Pineasco Creek nest site	1351	All known nests empty. No eagles.
George's Basin nest site	1355	All known nests empty. One adult perched.
January 29, 2016		
Orme BA	0745	All known nests empty. No eagles.
Rodeo BA	0750	Adult incubating in new tree nest #5. Nest #4 fallen.
Sycamore BA	0753	Adult incubating in new tree nest #7.
Doka BA	0755	All known nests empty. Two adults.
Fort McDowell BA	0800	At least one hatchling. Adult perched above nest. Second adult perched.
Box Bar BA	0805	All known nests empty. One adult perched.
Needle Rock BA	0805	No nests or eagles
Bartlett BA	0812	All known nests empty. No eagles.
Yellow Cliffs BA	0819	Adult incubating in nest #1.
Sheep Creek BA	0824	All known nests empty. No eagles.
Cliff BA	0827	Two adults standing in nest #9.
Horseshoe BA	0833	All known nests empty. No eagles.
Table Mountain BA	0842	All known nests empty. No eagles.
East Verde BA	0850	Adult incubating.
Coldwater BA	0857	All known nests empty. No eagles.

Table 14 continued.

Location	Time	Comments
Ladders BA	0905	All known nests empty. No eagles.
Beaver BA	0923	Adult incubating in nest #1. Second adult perched.
Oak Creek BA	0930	Adult incubating in nest #4.
Tapco BA	0939	Adult incubating in new tree nest #5.
Tower BA	0941	All known nests empty. No eagles.
Mormon Pocket nest site	0946	Adult golden eagle standing in nest #1. Three adult bald eagles perched just downstream.
Perkinsville BA	0951	All known nests empty. No eagles.
Hell Point historic BA	1001	All known nests empty. One immature perched.
Granite nest site	1008	All known nests empty. No eagles.
Sullivan Lake BA	1015	Adult incubating.
Watson Lake nest site	1150	All known nests empty. No eagles.
Lynx BA	1155	Adult incubating in new snag nest #4.
Alamo BA	1230	Two adults standing in nest #4 with two hatchlings.
Ive's Wash BA	1237	Adult incubating in nest #5.
Buckeye BA	1329	Adult incubating.
Garden Lakes BA	1338	One adult standing in nest #1.
Pee Posh Wetlands BA	1345	Adult incubating or brooding.
February 2, 2016		
Riverside BA	1026	Adult brooding at least one nestling. Second adult perched.
Granite Reef BA	1035	Adult incubating. Second adult perched. Nest #5 fallen
Orme BA	1038	One adult perched in platform nest #10. Second adult perched.
Kerr BA	1043	One adult and a near-adult perched in nest #1 tree.
Goldfield BA	1044	Two adults in nest, appear to be brooding at least one hatchling.
Bulldog BA	1050	Adult incubating.
Blue Point BA	1054	Adult incubating.
Bagley BA	1054	All known nests empty. No eagles.
Saguaro BA	1056	Adult incubating. Second adult perched.
Tortilla Creek BA	1059	Adult incubating.
Black Cross	1101	Adult incubating.
Fish Creek BA	1106	Adult incubating .
Horse Mesa BA	1108	Adult incubating.
Two Bar nest site	1114	All known nests empty. No eagles.
Pinto BA	1125	Adult incubating in nest #9.
Pinal BA	1130	All known nests empty. One adult perched by new partially-constructed nest #9. New large cliff nest #10 found.
Redmond BA	1141	Adult incubating in nest #5.
Armer Gulch BA	1148	Adult incubating.
Bachelor Cove BA	1156	Adult incubating.
Tonto BA	1200	Adult brooding at least one hatchling.
Sheep BA	1205	Adult incubating.
76 BA	1218	All known nests empty. Pair of adults upstream.
Talkalai BA	1440	Failed. Nest #8 fallen.
San Carlos BA	1448	All known nests empty. No eagles.
Suicide BA	1459	Adult incubating in nest #1.
Coolidge BA	1505	Two immatures perched. Medium-sized nest on cliff.
Needles Eye nest site	1507	All known nests empty. No eagles.
Porphyry Gulch nest site	1513	All known nests empty. No eagles.
Granite Basin BA	1515	One adult standing in nest #2.

Table 14 continued.

Location	Time	Comments
Gainey BA	1605	Adult incubating in nest #1.
February 18, 2016		
Nevada Bay BA	1156	All known nests empty. No eagles.
March 9, 2016		
Nevada Bay BA	1402	Red-tailed hawk in nest #1 with two eggs. All other known nests empty. No eagles
March 16, 2016		
Riverside BA	0739	Adult in nest with one nestling, 7 weeks old.
Granite Reef BA	0749	Two nestlings, 3-4 weeks old. Two adults perched.
Kerr BA	0751	All known nests empty. No eagles.
Goldfield BA	0751	Two nestlings, at least 6 weeks old.
Bulldog BA	0757	Two adults at nest with one nestling, 3 weeks old.
Blue Point BA	0800	Two nestlings, at least 6 weeks old. One adult soaring.
Bagley BA	0800	All known nests empty. No eagles.
Saguaro BA	0804	Adult with at least one nestling, 2-3 weeks old. Second adult flew to nest, feeding young.
Tortilla Creek BA	0808	Two nestlings, 5.5 weeks old. One adult perched.
Black Cross BA	0810	Failed. Nest empty.
Fish Creek BA	0818	Adult with one nestling, 3 weeks old.
Horse Mesa BA	0821	Adult with two nestlings, 4.5 weeks old.
Rock Creek BA	0828	All known nests empty. No eagles.
Two Bar nest site	0833	Two adults standing in nest #2.
Bachelor Cove BA	0839	Adult with two nestlings, 5.5-6 weeks old.
Tonto BA	0843	Adult with two nestlings, 7 weeks old.
Sheep BA	0849	Adult with one nestling, 5 weeks old.
76 BA	0855	Adult incubating in nest #6.
Pinto BA	0915	Adult shading at least one nestling, 1-2 weeks old.
Pinal BA	0918	All known nests empty. Adult perched by nest #9.
Redmond BA	0927	Adult incubating.
Cibecue BA	1107	Adult incubating in nest #2.
Mule Hoof historic BA	1111	All known nests empty. No eagles.
Cedar Basin BA	1119	All known nests empty. No eagles.
Lone Pine BA	1132	All known nests empty. One adult flying.
Pineasco Creek nest site	1146	All known nests empty. No eagles.
George's Basin nest site	1149	Two adults perched above nest #1.
Crescent BA	1217	Adult incubating in nest #1.
Greer Lakes BA	1226	Adult incubating in nest #6. Second adult flying.
Becker BA	1232	Adult in nest #2 incubating or brooding.
Show Low Lake BA	1252	Adult incubating in nest #1. Second adult standing in nest.
Talkalai BA	1430	New snag nest #9 observed. No eagles.
San Carlos BA	1438	All known nests empty. One adult 0.5 mile downstream.
Suicide BA	1452	Adult shading at least two nestlings, 2 weeks old.
Coolidge BA	1455	All known nests empty. No eagles.
Needles Eye nest site	1458	All known nests empty. No eagles.
Porphyry Gulch nest site	1504	New large nest #2 found. Red-tailed hawk incubating.
Granite Basin BA	1508	All known nests empty. No eagles.
March 18, 2016		
Orme BA	0745	Adult incubating in platform nest #10.
Rodeo BA	0748	Adult with one nestling, 4.5 weeks old.

Table 14 continued.

Location	Time	Comments
Sycamore BA	0751	Adult with one nestling, 2.5-3 weeks old. Second adult perched.
Doka BA	0753	All known nests empty. One adult perched by nest #7; appeared to be some greenery in nest.
Fort McDowell BA	0759	Failed. Nest empty. One adult perched in nest tree.
Box Bar BA	0802	All known nests empty. One adult perched in nest tree.
Bartlett BA	0804	All known nests empty. No eagles.
Yellow Cliffs BA	0810	Adult with one nestling, 2 weeks old.
Sheep Creek BA	0812	Adult incubating in nest #1. Second adult in nest.
Cliff BA	0815	Adult incubating.
Horseshoe BA	0819	Adult with two nestlings, 3-4 weeks old, in new tree nest # 16.
Table Mountain BA	0828	All known nests empty. Two adults flying. New nest #6 found.
East Verde BA	0836	At least one nestling, 5 weeks old. One adult flying.
Coldwater BA	0841	All known nests empty. No eagles.
Ladders BA	0845	Adult incubating in nest #3.
Beaver BA	0931	Adult with one nestling, 2 weeks old.
Oak Creek BA	0936	Adult brooding at least one nestling.
Tapco BA	0943	Adult appeared to be brooding young. Second adult perched.
Tower BA	0944	All known nests empty. No eagles.
Mormon Pocket nest site	0948	Golden eagle incubating in nest #1.
Perkinsville BA	0950	Adult incubating in nest #4.
Hell Point historic BA	0956	All known nests empty. No eagles.
Granite nest site	1002	Golden eagle incubating in nest #5.
Sullivan Lake BA	1007	Adult with two nestlings, 6 weeks old.
Lynx BA	1018	Adult brooding at least one nestling, 2 weeks old.
Devil's Post historic BA	1234	All known nests empty. No eagles.
Burro Creek BA	1248	Adult incubating in new tree nest #2.
Alamo BA	1257	Two nestlings, 7.5 weeks old.
Ive's Wash BA	1303	Adult shading two nestlings, 2 weeks old.
Buckeye BA	1358	Two nestlings, at least 7 weeks old.
Garden Lakes BA	1404	Failed. Nest empty.
March 30, 2016		
Alamo BA	0843	Two nestlings, 9-9.5 weeks old.
Ive's Wash BA	0847	Adult with two nestlings, 4 weeks old. Second adult flying.
Bill Williams BA	0935	All known nests empty. Nest #1 fallen. New cliff nest #3 found.
Gene Wash nest site (CA)	0947	All known nests empty. No eagles. New cliff nests #4-6 found.
Copper Basin BA (CA)	0952	All known nests empty. No eagles. Nest #1 fallen. New cliff nests #4 & #5 found.
Steamboat Rock	1011	Pair of adults perched near Steamboat Rock, 0.2 miles from Colorado River. No nests found.
Mohave BA	1027	Adult in nest #1 appeared to be brooding but nestlings not observed.
Topock Marsh	1120	No nests or eagles.
Mount Davis (3NE119)	1147	Golden eagle incubating in new cliff nest #3.
Nevada Bay BA	1152	New cliff nest #4 found. Red-tailed hawk incubating in nest #1.
Black Mts 8 (3NE035)	1201	All known nests empty. No eagles.
Ringbolt Rapids (3NE115)	1230	All known nests empty. No eagles.
Black Canyon BA (NV)	1234	Adult in nest #1 with two nestlings, 4 weeks old.
Castle Cove (Lake Mead)	1238	New large cliff nest (#1) found near Castle Cove. Red-tailed hawk incubating in medium nest near Painters Cove.
Trout Creek	1500	All known nests empty. No bald eagles.

Table 14 continued.

Location	Time	Comments
April 21, 2016		
Riverside BA	0728	One fledgling perched in nest tree.
Granite Reef BA	0737	Two nestlings, 8.5-9 weeks old.
Goldfield BA	0740	One nestling, 12 weeks old. One fledgling perched upstream.
Blue Point BA	0747	Nest empty, presume fledged. One adult at lake.
Bagley BA	0747	All known nests empty. No eagles.
Saguaro BA	0758	Two nestlings 7-8 weeks old.
Tortilla Creek BA	0802	Adult with two nestlings, 10-11 weeks old. Second adult perched.
Orme BA	0811	Failed. Two unattended eggs in nest. No eagles.
Rodeo BA	0814	One nestling, 9 weeks old.
Sycamore BA	0816	One nestling 7-8 weeks old. Two adults perched.
Doka BA	0818	All known nests empty, no eagles.
Yellow Cliffs BA	0832	One nestling, 7 weeks old.
Sheep Creek BA	0833	Adult with one nestling, 5 weeks old.
Horseshoe BA	0841	Two nestlings, 8.5 weeks old.
Table Mountain BA	0852	One adult standing in nest #4, second adult perched.
East Verde BA	0857	Two nestlings, 10 weeks old.
Ladders BA	0909	Adult standing in nest with one egg.
Beaver BA	0922	One nestling 6.5 weeks old.
Oak Creek BA	0928	Adult with one nestling, 6-7 weeks old.
Hidden Valley nest site	0935	All known nests empty. No eagles.
White Horse Lake BA	1123	Nest #2 and #4 fallen. New tree nest #7 empty. Ospreys incubating in nests #5 and #6. Osprey standing in nest #1.
Mormon Pocket nest site	1143	Failed golden eagle breeding attempt. Nest empty
Perkinsville BA	1146	Failed. Nest empty.
Granite nest site	1158	Two golden eagle nestlings, 3 weeks old.
Sullivan Lake BA	1203	Two nestlings, 11 weeks old.
Lynx BA	1219	Failed. Nest #4 fallen. One adult perched.
Burro Creek BA	1336	Failed. Nest empty. One adult perched.
April 22, 2016		
Fish Creek BA	0748	One nestling, 8 weeks old.
Horse Mesa BA	0752	One nestling, 9.5 weeks old. Second nestling not found.
Two Bar nest site	0758	All known nests empty. No eagles.
Bachelor Cove BA	0805	One fledgling perched on cliff. One nestling perched above nest.
Tonto BA	0809	One fledgling upstream of nest.
Sheep BA	0812	One nestling, 10 weeks old.
76 BA	0820	Adult shading one nestling, 4 weeks old.
Armer Gulch BA	0834	Two nestlings, 10 weeks old.
Pinto BA	0839	Failed. Nest #9 fallen. Two adults perched 1 mile downstream.
Pinal BA	0845	All known nests empty. One adult perched by nest #9.
Pinal Creek	0845	Common black hawk incubating on cliff nest for third straight year.
Redmond BA	0852	Failed. Nest empty.
Fool Hollow Lake	0930	One adult flying. Two new nests found in snags (#1 and #2). Osprey incubating in nest #1. Osprey standing in nest #2.
Cibecue BA	1106	Failed. Nest empty.
Cedar Basin BA	1120	All known nests empty. No eagles.

Table 14 continued.

Location	Time	Comments
Lone Pine BA	1130	All known nests empty. No eagles. Pair of red-tailed hawks standing in nest #7. New snag nest #8 found.
Pineasco Creek nest site	1142	All known nests empty. No eagles.
George's Basin nest site	1148	All known nests empty. No eagles.
Crescent BA	1210	Adult brooding at least one hatchling.
Greer Lakes BA	1219	Failed. Nest #6 empty.
Becker BA	1226	At least two nestlings, 5.5-6 weeks old.
Silver Creek BA	1254	Adult with two nestlings, 7 weeks old. Second adult perched.
Show Low Lake BA	1407	Adult incubating or brooding in nest #1. Osprey incubating in new snag nest #3.
Suicide BA	1450	Three nestlings, 7.5 weeks old.
May 6, 2016		
Bulldog BA	0745	One nestling, 10 weeks old.
Saguaro BA	0748	Two nestlings, 9-10 weeks old.
Fish Creek BA	0753	One nestling, 10 weeks old.
Horse Mesa BA	0756	One fledgling perched.
76 BA	0810	Two nestlings, 5.5 weeks old.
Woods Canyon Lake BA	0830	Adult brooding at least one nestling in new nest #9.
Bear Canyon Lake nest site	0833	Ospreys incubating in nests #3 and #4. Nests #1 and #2 not found. No eagles.
Knoll Lake nest site	0840	Osprey incubating in nest #5. No eagles.
Blue Ridge Reservoir nest site	0850	One adult perched by lake. Osprey incubating in nest #2. Nest #6 not found. Osprey perched near new snag nest #7, greenery in nest.
Tremaine/Soldier Annex/ Long Lakes nest site	0912	Adult perched at nest #2.
Kinnickinick Lake	0925	No nests or eagles.
Ashurst Lake	0930	Adult with one nestling, 4 weeks old, in new nest #1.
Lower Lake Mary BA	0942	Adult with two nestlings, 4 weeks old, in nest #3.
Upper Lake Mary nest site	0943	Ospreys incubating in nests #3, #7, and #8. Did not check all known nests.
White Horse Lake BA	1036	Nest #7 empty. No eagles.
Scholtz Lake	1042	No nests or eagles.
Dogtown Lake nest site	1047	Pair of adults with two nestlings, 2 weeks old, in nest #2.
Kaibab Lake nest site	1052	Ospreys incubating in nests #2, #3, and #5. Nests #1 and #4 empty. Osprey standing in nest #6. No eagles.
JD Dam Lake nest site	1110	Osprey incubating in nest #1. Nest #2 not found. New snag nest #3 found. No eagles.
Oak Creek BA	1129	One nestling, 8-9 weeks old.
Beaver BA	1138	One nestling, 8.5 weeks old. One adult perched.
Horseshoe BA	1204	Two nestlings, 10.5 weeks old.
Sheep Creek BA	1210	Two adults with one nestling, 6.5 weeks old.
Yellow Cliffs BA	1215	One nestling, 9 weeks old.

APPENDIX E: BOX BAR BREEDING AREA SUMMARY

Table 15. Observed human activity and bald eagle behavior, Box Bar BA, Arizona, 2016.

Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Hiker	19	--	--	--	--	21	--	40	25.8
Birder	13	--	--	--	--	16	--	29	18.7
Helicopter	7	1	--	--	1	13	--	22	14.2
Camper	4	--	--	--	--	7	1	12	7.7
Horseback rider	5	--	--	--	--	6	--	11	7.1
Fishermen	4	--	--	--	--	6	--	10	6.5
Gunshots	2	2	--	--	--	3	--	7	4.5
Swimmers	1	--	--	--	--	4	--	5	3.2
Low-flying planes	3	--	--	--	--	2	--	5	3.2
Canoe/Kayak	2	--	--	--	--	2	--	4	2.6
Unseen dog barking	3	--	--	--	--	1	--	4	2.6
Sonic boom	2	--	--	--	--	--	--	2	1.3
Photographer	--	--	--	--	--	2	--	2	1.3
Hunter	--	--	--	--	--	1	--	1	0.7
Bicyclist	--	--	--	--	--	1	--	1	0.7
Drone	--	--	--	--	--	1	--	1	0.7
Total	65	3	--	--	1	86	1	156	

[1]Bald eagle response: N=none, W=watched, R=restless, F=flushed, L=left area, B=bird not in area, U=unknown.

Table 16. Bald eagle habitat analysis at the Box Bar BA, Arizona, 2016.

Perch Location[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O	H_2O Type	Land Type[4]
25.0	HS	Left	No	51-75 m	Riffle	WT
25.4	HS	Right	No	0-50 m	Run	GB
25.5a	CL	Right	No	101-200 m	Run	MB
25.5b	CS	Right	No	101-200 m	Run	MB
25.5c	SG	Right	No	101-200 m	Run	MB
25.5d	CL	Right	No	101-200 m	Run	MB
25.6a	SG	Right	No	101-200 m	Run	MB
25.6b	WO	Left	Partial	0 m	Riffle	SO
25.7a	CL	Right	No	101-200 m	Riffle	MB
25.7b	YM	Right	No	101-200 m	Riffle	MB
25.9	DM	Right	No	101-200 m	Run	MB
golf course	DM	Right	Partial	>400 m	Pond	GC

[1]River kilometer (Hunt et. al. 1992).
[2]CL=cottonwood, large/20-30+ m, CS=cottonwood, small/0-10 m, DM=deciduous, medium/10-20 m, HS=hard snag, SG=soft snag, WO=willow, YM=sycamore, medium/5-10 m.
[3]Side of river facing downstream.
[4]GB=gravel bar, GC=golf course, MB=mesquite bosque, SO=shore, WT=willow thicket.

Table 17. Bald eagle habitat use at the Box Bar BA, Arizona, 2016.

River km[1]	PW[2,3]	PV	PP	ET	SC	CO	PI	Total	Percent
25.0	136	--	--	--	--	--	--	136	2.9
25.4	215	7	--	33	2	6	--	263	5.6
25.5	1,177	14	171	102	49	5	--	1,518	32.0
25.6	150	2	--	--	--	--	1	153	3.2
25.7	2,300	234	24	8	11	1	--	2,578	55.0
25.9	7	--	--	--	--	--	--	7	0.2
GC[4]	37	--	7	7	--	--	--	51	1.1
Total	4,022	257	202	150	62	12	1	4,706	
Percent	85.5	5.5	4.3	3.2	1.3	0.3	0.02		

[1]River kilometer (Hunt et al. 1992).
[2]Observation time (minutes).
[3]PW=perched watching, PP=perched preening, CL=perched close to mate, PD=perched drying, PH=perched hunting, PV=perched vocalizing, PG=perched on ground, PE=perched eating, SS=standing on shore, OT=other (includes bathing, gathering nest material, drinking water, perched interaction).
[4]GC=Tonto Verde Golf Course.

APPENDIX F: CLIFF BREEDING AREA SUMMARY

Table 18. Observed human activity and bald eagle behavior, Cliff BA, Arizona, 2016.

Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Small plane	15	4	--	--	--	--	4	23	22.8
Picnicker	19	--	--	--	--	--	--	19	18.8
Driver	14	--	--	--	--	--	--	14	13.9
Helicopter	8	1	--	--	--	--	2	11	10.9
OHV	7	1	--	--	--	--	--	8	7.9
Gunshots	4	1	--	--	--	--	3	8	7.9
Camper	3	--	--	--	--	--	--	3	3.0
Kayaker	3	--	--	--	--	--	--	3	3.0
Hunter	2	--	--	--	--	--	--	2	2.0
Apache helicopter	--	2	--	--	--	--	--	2	2.0
Boater	2	--	--	--	--	--	--	2	2.0
Nestwatcher	--	2	--	--	--	--	--	2	2.0
Birder	1	--	--	--	--	--	--	1	1.0
Jet	--	1	--	--	--	--	--	1	1.0
Cargo Plane	1	--	--	--	--	--	--	1	1.0
Fisherman	1	--	--	--	--	--	--	1	1.0
Total	80	12	0	0	0	0	9	101	

[1]Bald eagle response: N=none, W=watched, R=restless, F=flushed, L=left area, B=bird not in area, U=unknown.

Table 19. Observed forage events and success, Cliff BA, Arizona, 2016.

Sex	Fish		Total	
	E[1]	S-U[2]	E	S-U
Male	2	0-2	2	0-2
Female	2	1-1	2	1-1
Total	4	1-3	4	1-3

[1]E=A single forage event, not the number of attempts during 1 event.
[2]S-U= Successful – Unsuccessful forage events.

Table 20. Observed prey types delivered to the nest, Cliff BA, Arizona, 2016.

Sex	Fish	Unknown	Total	Percent
Male	1	4	5	83.3
Female	1	--	1	16.7
Total	2	4	6	
Percent	33.3	66.7		

Table 21. Bald Eagle Habitat Analysis at the Cliff BA, Arizona, 2016.						
Perch Location[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O	H_2O Type[4]	Land Type[5]
66.7a	Nest	Right	No	101-200 m	RU	MB
66.7b	HS	Right	No	101-200 m	RU	MB
66.8	HS	Right	No	101-200 m	RU	MB
67.1	CL	Right	Partial	76-100 m	RU	CW
67.2	HS	Right	No	76-100 m	RU	MB
73.5	CF	Right	Yes	0 m	RS	CL

[1]River kilometer (Hunt et. al. 1992).
[2]CF=cliff ledge, CL=cottonwood large/20-30m, HS=hard snag (main branches only).
[3]Side of river facing downstream.
[4]RU=run, RS=reservoir main body.
[5]CW=cottonwood grove, MB=mesquite bosque, UP=desert upland, SO=shore.

Table 22. Bald eagle habitat use at the Cliff BA, Arizona, 2016.								
River km[1]	PW[2,3]	PP	PE	PV	PH	PU	Total	Percent
66.7	200	20	8	7	--	--	235	5.9
66.8	2,298	1,176	8	12	--	--	3494	88.4
67.1	69	20	28	--	--	--	117	3.0
67.2	5	--	--	--	--	--	5	0.1
73.5	--	--	15	1	65	22	103	2.6
Total	2572	1216	59	20	65	22	3,954	
Percent	65.0	30.8	1.5	0.5	1.6	0.6		

[1]River kilometer (Hunt et. al. 1992).
[2]Observation time (minutes).
[3]PW=perched watching, PP=perched preening, PE=perched eating, PV=perched vocalizing, PH=perched hunting, PU=perched unknown.

APPENDIX G: CRESCENT BREEDING AREA SUMMARY

Table 23. Observed human activity and bald eagle behavior, Crescent BA, Arizona, 2016.									
Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Fishermen	128	5	--	--	--	--	--	133	38.7
Drivers	92	1	--	--	--	--	--	93	27.0
Hikers	48	14	--	1	--	--	--	63	18.3
Person with dogs	8	13	--	--	--	--	--	21	6.1
Fishing boat	8	8	--	--	--	--	--	16	4.7
Kayakers	3	5	--	--	--	--	--	8	2.3
Horseback riders	--	2	--	--	--	--	--	2	0.6
Helicopter	1	1	--	--	--	--	--	2	0.6
Birder	2	--	--	--	--	--	--	2	0.6
Grater	1	--	--	--	--	--	--	1	0.3
AGFD Biologist	1	--	--	--	--	--	--	1	0.3
Recreation boat	--	1	--	--	--	--	--	1	0.3
Metal detector	1	--	--	--	--	--	--	1	0.3
Total	293	50	--	1	--	--	--	344	

[1]Bald eagle response: N=none, W=watched, R=restless, F=flushed, L=left area, B=birds not in area, U=unknown.

Table 24. Observed forage events and success, Crescent BA, Arizona, 2016.								
Sex	Fish		Birds		Unknown		Total	
	E[1]	S-U[2]	E	S-U	E	S-U	E	S-U
Male	4	2-2	7	2-5	1	1-0	12	5-7
Female	3	3-0	--	--	--	--	3	3-0
Total	7	5-2	7	2-5	1	1-0	15	8-7

[1]E=A single forage event, not the number of attempts during 1 event.
[2]S-U= Successful – Unsuccessful forage events.

Table 25. Observed prey types delivered to the nest, Crescent BA, Arizona, 2016.						
Sex	Fish	Birds	Mammals	Unknown	Total	Percent
Male	44	5	2	14	65	69.1
Female	23	--	--	6	29	30.9
Total	67	5	2	20	94	
Percent	71.3	5.3	2.1	21.3		

Table 26. Observed prey species delivered to the nest, Crescent BA, Arizona 2016.							
Sex	Fish	Mammals	Birds			Total	Percent
	TS[1]	MC	AC	WS	DS		
Male	44	1	2	2	1	50	68.4
Female	23	--	--	--	--	23	31.5
Total	67	1	2	2	1	73	
Percent	91.8	1.4	2.7	2.7	1.4		

[1]TS= trout species, MC=mountain cottontail; AC=American coot, WS=waterfowl species; DS=duck species.

Table 27. Bald eagle habitat analysis at the Crescent BA, Arizona, 2016.

Perch Location[1]	Perch Type[2]	Shade	Distance to H_2O[3]	H_2O Type[4]	Land Type[5]
0.3	SO	No	1	RS	SO
0.5	SO	No	1	RS	SO
0.85	SC	No	8	--	CF
1.2	SO	No	1	RS	SO
1.6	SO	No	1	RS	SO
1.7	SO	No	1	RS	SO
1.95	SO	No	1	RS	SO
2.0	SC	Partial	4	RS	CF
2.05a	SO	No	1	RS	SO
2.05b	SC	No	3	RS	CF
2.1	PS	Partial	5	RS	CF
2.15a	SO	No	1	RS	CF
2.15b	SC	No	5	RS	CF
2.2a	SC	No	5	RS	CF
2.2b	SO	No	1	RS	CF
2.2c	SC	Partial	4	RS	CF
2.25a	SC	No	5	RS	CF
2.25b	SC	No	5	RS	CF
2.25c	PS	Yes	5	RS	CF
2.25d	SC	No	5	RS	CF
2.26	SC	No	5	RS	CF
2.3a	SC	No	4	RS	CF
2.3b	SO	No	1	RS	CF
2.3c	PO	Partial	5	RS	CF
2.3d	SC	No	4	RS	CF
2.4a	SC	No	5	RS	CF
2.4b	SC	No	5	RS	CF
2.4c	SC	Partial	5	RS	CF
2.4d	DF	No	5	RS	CF
2.45	SC	No	5	RS	CF

[1]Lake kilometer (clockwise from north boat ramp) .
[2]DF=Douglas fir, PO=pine/conifer old growth, PS=pine/conifer 2nd growth, SC=snag, conifer, SO=shore.
[3]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.
[4]RS=reservoir main body.
[5]CF=coniferous forest, SO=shore.

Table 28. Bald eagle habitat use at the Crescent BA, Arizona, 2016.

Lake km[1]	PW[2,3]	PP	PE	SS	PV	PD	GN	BA	SH	ES	OT	Total	Percent
0.3	--	--	--	--	--	--	2	--	--	--	--	2	0.1
0.5	--	--	--	1	--	--	--	--	--	--	--	1	0.1
0.85	10	--	--	--	--	--	--	--	--	--	--	10	0.1
1.2	--	--	--	6	--	--	--	--	--	--	--	6	0.1
1.6	--	--	--	--	--	--	--	--	--	--	4	4	0.1
1.7	--	--	--	--	--	--	--	--	--	--	2	2	0.1
1.95	--	--	--	--	--	--	--	--	--	--	3	3	0.1
2.0	--	--	--	--	--	26	--	--	--	--	--	26	0.1
2.05	830	60	--	5	--	--	--	14	--	--	5	914	2.4
2.1	164	8	33	--	--	--	--	--	--	--	1	206	0.5
2.15	1,891	56	--	14	--	--	--	7	6	--	--	1,974	5.2
2.2	18,336	166	--	--	--	--	--	--	--	6	1	18,509	48.8
2.25	5,836	746	--	--	26	--	--	--	--	--	--	6,608	17.4
2.26	285	--	--	--	--	--	--	--	--	--	--	285	0.8
2.3	7,950	424	--	1	--	--	20	--	--	--	--	8,395	22.2
2.4	806	138	--	--	--	--	--	--	--	--	--	944	2.5
2.45	2	--	--	--	--	--	--	--	--	--	--	2	0.1
Total	36,110	1,598	33	27	26	26	22	21	6	6	16	37,891	
Percent	95.3	4.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		

[1]Lake kilometer (clockwise from north boat ramp).
[2]Observation time (minutes).
[3]PW=perched watching, PP=perched preening, PE=perched eating, SS=standing on shore, PV=perched vocalizing, PD=perched drying, GN=gathering nest material, BA=bathing, SH=standing in water, ES=eating on shore, OT=other (includes PI=perched interaction, PX=perched various, DW=drinking water, PU=perched unknown, PK=perched with prey).

APPENDIX H: GOLDFIELD BREEDING AREA SUMMARY

Table 29. Observed human activity and bald eagle behavior, Goldfield BA, Arizona, 2016.

Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Canoe/kayak	159	2	2	--	--	25	7	195	22.3
Hiker	116	3	--	1	--	9	10	139	15.9
Horseback rider	109	2	1	--	--	12	10	134	15.3
Photographer	86	--	--	--	--	12	11	109	12.5
Tuber	103	--	--	--	--	4	--	107	12.3
Helicopter	5	10	2	1	--	1	10	29	3.3
Rafter	22	--	--	--	--	1	2	25	2.9
Apache helicopter	4	5	--	1	--	4	5	19	2.2
Fisherman	16	--	--	--	--	--	1	17	1.9
Birder	14	--	--	--	--	--	3	17	1.9
Stand up paddleboard	13	--	--	--	--	2	1	16	1.8
Driver	11	--	--	--	--	1	1	13	1.5
Small plane	4	3	1	--	--	1	2	11	1.3
Sheriff helicopter	4	1	2	--	--	1	3	11	1.3
Boat	2	--	--	2	--	--	2	6	0.7
Swimmer	5	--	--	--	--	--	--	5	0.6
Cyclist	1	--	--	--	--	3	--	4	0.5
Runner	3	--	--	--	--	1	--	4	0.5
Picnicker	2	--	--	--	--	1	--	3	0.3
Mining/Metal detector	2	--	--	--	--	--	1	3	0.3
Camper	2	--	--	--	--	--	--	2	0.2
Military helicopter (non-Apache)	2	--	--	--	--	--	--	2	0.2
Shooter	--	--	--	--	--	--	1	1	0.1
Drone	1	--	--	--	--	--	--	1	0.1
Total	686	26	8	5	--	78	70	873	

[1]Bald eagle response: N=none, W=watched, R=restless, F=flushed, L=left area, B=birds not in area, U=unknown.

Table 30. Observed forage events and success, Goldfield BA, Arizona, 2016.

Sex	Fish		Birds		Mammals		Unknown		Total	
	E[1]	S-U[2]	E	S-U	E	S-U	E	S-U	E	S-U
Male	6	2-4	1	1-0	--	--	1	1-0	8	4-4
Female	1	1-0	--	--	1	1-0	--	--	2	2-0
Unknown	1	1-0	--	--	--	--	--	--	1	1-0
Total	8	4-4	1	1-0	1	1-0	1	1-0	11	7-4

Table 31. Observed prey types delivered to the nest, Goldfield BA, Arizona, 2016.

Sex	Fish	Birds	Mammals	Unknown	Total	Percent
Male	1	2	--	13	16	42.1
Female	4	3	3	7	17	44.7
Unknown	3	--	1	1	5	13.2
Total	8	5	4	21	38	
Percent	21.0	13.2	10.5	55.3		

Table 32. Bald eagle habitat analysis at the Goldfield BA, Arizona, 2016.

Perch Location[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O[4]	H_2O Type[5]	Land Type[6]
8.8	CM	Right	Partial	5	RU	MB
9.1a	WO	Left	No	1	RU	MB
9.1b	CM	Right	Partial	5	RU	MB
9.1c	CM	Right	Partial	1	RU	WT
9.1d	SO	--	Partial	1	RU	SO
9.1e	HS	Right	No	5	RU	MB
9.15a	CM	Right	Partial	5	RU	MB
9.15b	HS	Right	No	1	RU	SO
9.2a	WO	Right	Partial	1	RU	WT
9.2b	CM	Right	Partial	5	RU	MB
9.2c	SS	Right	No	2	RU	MB
9.25	HS	Right	No	3	RU	MB
9.3a	HS	Right	No	5	RU	CW
9.3b	HS	Right	No	8	RU	PV
9.3c	CM	Right	Partial	7	RU	MB
9.4a	HS	Right	No	4	RU	MB
9.4b	HS	Right	No	5	RU	MB
9.5a	CM	Right	No	1	RI	WT
9.5b	HS	Left	No	1	RI	WT
9.5c	CM	Right	Partial	5	RU	MB
10.0	HS	Right	No	4	RI	MB
10.1	CM	Right	No	2	RU	MB
10.2a	HS	Right	No	1	RU	WT
10.2b	ST	Right	Partial	1	RB	SO
10.3a	CM	Right	No	1	RI	WT
10.3b	CM	Right	No	3	RU	MB
10.4	HS	--	No	1	RB	SO
10.5	CM	Right	No	2	RU	WT
10.6	HS	Right	Partial	1	RU	WT
10.8a	CM	Left	No	2	RU	WT
10.8b	WO	Left	No	1	RU	WT
10.9	CM	Left	Yes	1	RB	WT
11.0	CF	Right	No	1	PO	CL

[1]River kilometer (Hunt et. al. 1992).
[2]CF=cliff, CM=cottonwood medium/10-20+m, HS=hard snag (main branches only), SO=shore, SS=snag shrub, ST=snag top= WO=willow.
[3]Side of river facing downstream.
[4]1=0-25m, 2 =26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.
[5]PO=pool, RB=river bend, RI=riffle, RU=run. (Note that these are conditions before river was raised. Once river was raised, most of the RI became RU).
[6]CL=cliff, CW=cottonwood grove, MB=mesquite bosque, PV=palo verde, SO=shore, WT=willow thicket.

Table 33. Bald eagle habitat use at the Goldfield BA, Arizona, 2016.

River km[1]	PW[2,3]	CL	PP	PH	PV	PD	DW	PX	OT	Total	Percent
8.8	1	--	--	--	--	--	--	--	1	2	0.1
9.1	123	--	1	--	35	--	--	--	1	160	1.8
9.15	2	--	--	--	--	--	--	--	--	2	0.1
9.2	1,198	34	24	--	25	--	--	3	--	1,284	14.6
9.25	166	--	--	--	--	--	--	--	--	166	1.9
9.3	4,003	214	270	--	112	--	--	35	7	4,641	52.8
9.4	5	--	--	--	--	--	--	--	--	5	0.1
9.5	176	--	5	29	3	--		--	--	213	2.4
10.0	--	--	--	--	--	--	16	--	--	16	0.2
10.1	49	--	--	--	--	--	--	--	--	49	0.6
10.2	79	--	--	--	--	--	--	--	10	89	1.0
10.3	248	--	14	179	--	--	--	--	14	455	5.2
10.4	2	--	--	--	--	--	25	--	--	27	0.3
10.5	779	139	64	--	2	67	--	--	--	1,051	12.0
10.6	4	--	--	--	--	--	--	--	--	4	0.1
10.8	428	54	3	--	5	--	--	--	--	490	5.6
10.9	3	--	--	--	--	--	--	--	--	3	0.1
11.0	117	--	--	--	--	--	--	--	--	117	1.3
Total	7,383	441	381	208	182	67	41	38	33	8,774	
Percent	84.1	5.0	4.3	2.4	2.1	0.8	0.5	0.4	0.4		

[1]River kilometer (Hunt et. al. 1992).
[2]Observation time (minutes).
[3]PW=perched watching, CL=perched close to mate, PP=perched preening, PH=perched hunting, PV=perched vocalizing, PD=perched drying, DW=drinking water, PX=perched various, OT=other (includes eating, standing on shore, copulating, unknown behavior, perched unknown, perched on ground).

APPENDIX I: GRANITE REEF BREEDING AREA SUMMARY

Table 34. Observed human activity and bald eagle behavior, Granite Reef BA, Arizona, 2016.									
Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Kayak/canoe	313	3	--	8	--	1	2	327	41.6
Helicopter (civilian)	80	6	--	--	--	--	4	90	11.4
Helicopter (Apache)	66	7	--	--	--	--	3	76	9.7
Stand-up paddleboard	60	--	--	--	--	--	--	60	7.6
Driver	37	2	--	--	--	--	2	41	5.2
Small plane	28	1	--	--	--	--	1	30	3.8
Rafter	27	--	--	--	--	2	--	29	3.7
Picnicker	25	--	--	--	--	--	--	25	3.2
Hiker	19	--	--	--	--	--	--	19	2.4
Helicopter (military)	16	--	--	--	--	--	--	16	2.0
Swimmer	13	--	--	--	--	--	--	13	1.7
Agency worker	12	1	--	--	--	--	--	13	1.7
Horseback rider	11	--	--	--	--	--	--	11	1.4
Fisherman	10	--	--	--	--	--	--	10	1.3
Tuber	8	--	--	--	--	--	--	8	1.0
Camper	3	--	--	--	--	--	--	3	0.4
Nestwatcher	3	--	--	--	--	--	--	3	0.4
OHV	2	--	--	--	--	--	--	2	0.3
Dog	2	--	--	--	--	--	--	2	0.3
Gunshot	2	--	--	--	--	--	--	2	0.3
Photographer	2	--	--	--	--	--	--	2	0.3
Boater (airboat)	1	--	--	1	--	--	--	2	0.3
Helicopter (police)	--	1	--	1	--	--	--	2	0.3
Cyclist	1	--	--	--	--	--	--	1	0.1
Total	741	21	--	10	--	3	12	787	

[1]Bald eagle response: N=none, W=watched, R=restless, F=flushed, L=left area, B=birds not in area, U=unknown.

Table 35. Observed forage events and success, Granite Reef BA, Arizona, 2016.				
Sex	Fish		Total	
	E[1]	S-U[2]	E	S-U
Male	1	1-0	1	1-0
Female	5	1-4	5	1-4
Total	6	2-4	6	2-4

[1]E=A single forage event, not the number of attempts during 1 event.
[2]S-U= Successful – Unsuccessful forage events.

Table 36. Observed prey types delivered to the nest, Granite Reed BA, Arizona, 2016.						
Sex	Fish	Birds	Mammals	Unknown	Total	Percent
Male	9	2	1	3	15	65.2
Female	4	--	--	1	5	21.7
Unknown	--	1	--	2	3	13.0
Total	13	3	1	6	23	
Percent	56.5	13.0	4.3	26.1		

Table 37. Observed prey species delivered to the nest, Granite Reef BA, Arizona 2016.

Sex	Fish		Total	Percent
	SU[1]	CP		
Male	2	1	3	100.0
Female	--	--	--	0
Total	2	1	3	
Percent	66.7	33.3		

[1]SU=sucker species, CP=common carp.

Table 38. Bald eagle habitat analysis at the Granite Reef BA, Arizona, 2016.

Perch Location[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O[4]	H_2O Type[5]	Land Type[6]
3.2	HS	Left	N	1	RU	MB
3.3a	SB	Island	N	1	RU	GB
3.3b	CL	Right	N	3	--	MB
3.5a	WO	Right	N	1	RU	WT
3.5b	SB	Island	N	1	RU	GB
3.5c	CM	Right	N	3	--	CW
3.5d	ST	Left	N	6	--	MB
3.6a	WO	Left	P	1	PW	WT
3.6b	SB	Island	N	1	RI	GB
3.6c	SW	Right	N	1	RU	WT
3.6d	SS	Left	N	6	--	MB
3.7a	WO	Left	P	1	RU	WT
3.7b	CL	Left	N	6	--	MB
3.7c	CM	Left	N	6	--	MB
3.7d	SS	Left	N	6	--	MB
3.7e	CM	Left	N	6	--	MB
3.8a	WO	Island	Y	1	RU	WT
3.8b	HS	Left	N	2	--	UP
3.8c	CM	Left	Y	5	--	MB
3.8d	HS	Left	N	6	--	MB
3.8e	CM	Left	Y	6	--	MB
3.8f	CM	Left	P	6	--	MB
3.8g	SM	Left	N	6	--	MB
3.9	RW	Right	N	1	PW	SO
4.0	CM	Left	N	4	--	MB
4.3	WO	Right	P	1	RU	WT

[1]River kilometer (Hunt et. al. 1992).
[2]CL=cottonwood large (20-30+m), CM=cottonwood medium (10-20+m), HS=hard snag, RW=rock in water, SB=sand bar, SM=snag, mesquite, , SS=soft snag, ST=snag top, SW=stone wall, WO=willow.
[3]Side of river facing downstream.
[4]1=0-25m, 2 =26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.
[5]PW=pocket water, RI=riffle, RU=run.
[6]CW=cottonwood grove, GB=gravel bar, MB=mesquite bosque, UP=desert upland, SO=shore, WT=-willow thicket.

Table 39. Bald eagle habitat use at the Granite Reef BA, Arizona, 2016.

River km[1]	PW[2,3]	PP	PH	PR	PE	PU	PD	CL	DW	OT	Total	Percent
3.2	577	0	184	0	0	0	0	84	0	0	845	5.0
3.3	3,097	190	0	20	0	108	89	0	8	18	3,530	20.8
3.5	453	38	138	0	187	0	1	0	94	167	1,078	6.4
3.6	477	4	175	0	10	2	0	0	1	0	669	3.9
3.7	6,171	358	146	541	0	17	0	54	0	8	7,295	43.1
3.8	2,955	186	3	84	14	27	49	0	0	6	3,324	19.6
3.9	6	0	0	0	0	0	0	0	0	0	6	0.0
4.0	45	0	0	0	0	0	0	0	0	0	45	0.3
4.3	149	0	0	0	0	0	0	0	0	0	149	0.9
Total	13,930	776	646	645	211	154	139	138	103	199	16,941	
Percent	82.2	4.6	3.8	3.8	1.2	0.9	0.8	0.8	0.6	1.2		

[1]River kilometer (Hunt et. al. 1992).
[2]Observation time (minutes).
[3]PW=perched watching, PP=perched preening, PH=perched hunting, PR=perched roosting, PE=perched eating, PU=perched unknown, PD=perched drying, CL=perched close to mate, DW=drinking water, OT=other (includes eating on shore, standing in water, bathing, standing on shore, perched interaction, perched vocalizing).

APPENDIX J: LADDERS BREEDING AREA SUMMARY

Table 40. Observed human activity and bald eagle behavior, Ladders BA, Arizona, 2016.

Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Canoe/Kayak	11	17	--	--	--	--	--	28	63.6
Small Airplane	4	2	--	--	--	--	--	6	13.7
OHV	2	1	1	1	--	--	--	5	11.4
Helicopter	1	2	--	--	--	--	1	4	9.1
Photographer	1	--	--	--	--	--	--	1	2.3
Total	19	22	1	1	--	--	1	44	

[1]Bald eagle response: N=none, W=watched, R=restless, F=flushed, L=Left area, B=bird not in area, U=unknown.

Table 41. Bald eagle habitat analysis at the Ladders BA, Arizona, 2016.

River km[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O[4]	H_2O Type[5]	Land Type[6]
161.6	SJ	Right	No	2	RB	RI
162.5	CF	Left	Partial	2	RU	CL
162.8	CT	Left	Partial	1	RU	CL
162.9a	CF	Left	Yes	1	RU	CL
162.9b	CF	Right	Partial	1	RU	CL
163.0a	CF	Left	Yes	1	RU	CL
163.0b	CT	Left	Yes	1	RU	CL
163.0c	CF	Left	Partial	1	RU	CL
163.1a	SS	Left	Partial	1	RU	CL
163.1b	CF	Left	Partial	1	RU	CL
163.2a	CF	Left	Partial	1	RU	CL
163.2b	CT	Left	Partial	1	RU	CL
163.3a	CF	Left	Partial	1	RU	CL
163.3b	CT	Left	Partial	1	RU	CL
163.3c	CF	Left	Partial	1	RU	CL
163.4a	SS	Left	Partial	1	RU	CL
163.4b	CT	Left	Partial	1	RU	CL

[1]River kilometer (Hunt et. al. 1992).
[2]CF=cliff ledge, CT=cliff top, SJ=snag, juniper, SS=shrub snag.
[3]Side of river facing downstream.
[4]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.
[5]RB=river bend, RU=run.
[6]CL=cliffs, RI=ridge.

Table 42. Bald eagle habitat use at the Ladders BA, Arizona, 2016.									
River km[1]	PW[2,3]	PP	PV	PH	PU	SB	DW	Total	Percent
161.6	--	--	--	--	106	--	--	106	9.7
162.5	--	--	--	--	--	19	--	19	1.7
162.8	8	8	1	--	--	--	8	25	2.3
162.9	271	11	--	--	50	--	--	332	30.5
163.0	181	34	2	--	--	--	--	217	19.9
163.1	12	--	--	26	--	--	--	38	3.5
163.2	191	6	--	--	--	8	8	213	19.5
163.3	92	--	--	29	--	--	--	121	11.1
163.4	12	--	--	7	--	--	--	19	1.7
Total	767	59	3	62	156	27	16	1,090	
Percent	70.4%	5.4%	0.3%	5.7%	14.3%	2.5%	1.5%		

[1]River kilometer (Hunt et. al. 1992).
[2]Observation time (minutes).
[3]Bald Eagle behavior: PW= Perched watching, PP= Perched preening, PV= Perched vocalizing, PH= Perched hunting, PU= Perched unknown, SB= Standing on boulder in water, DW= Drinking

APPENDIX K: LUNA BREEDING AREA SUMMARY

Table 43. Observed human activity and bald eagle behavior, Luna BA, Arizona, 2016.

Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Fisherman	406	--	--	--	--	--	--	406	28.9
Drivers	323	--	--	--	--	--	--	323	23.0
Boaters -fishing	178	--	--	--	--	--	--	178	12.7
Birders	149	--	--	--	--	--	--	150	10.7
Picnickers	120	--	--	--	--	--	--	120	8.5
Hikers	62	--	--	1	--	--	--	62	4.4
Agency Workers	53	--	--	--	--	--	--	53	3.8
Float tubers-fishing	35	--	--	--	--	--	--	35	2.5
Photographers	29	--	--	--	--	--	--	29	2.1
Kayaks/canoes	17	--	--	--	--	--	--	17	1.2
Helicopter	10	--	--	--	--	--	--	10	0.7
Kayak/canoe- fishing	5	--	--	--	--	--	--	5	0.4
Gunshots	2	--	1	4	--	--	--	7	0.5
Military Jet	4	--	1	2	--	--	--	6	0.4
Campers	3	--	--	--	--	--	--	3	0.2
Bicycles	1	--	--	--	--	--	--	1	0.1
Total	1,397	--	2	7	--	--	--	1,405	

[1]Bald eagle response: N=none, W=watched, R=restless, F=flushed, L=Left area, B=bird not in area, U=unknown.

Table 44. Observed forage events and success, Luna BA, Arizona, 2016.

Sex	Birds		Fish		Total	
	E[1]	S-U[2]	E	S-U	E	S-U
Male	31	30-1	19	19-0	50	49-1
Female	23	23-0	11	11-0	34	34-0
Total	54	53-1	30	30-0	84	83-1

[1]E=A single forage event, not the number of attempts during 1 event.
[2]S-U=Successful – Unsuccessful forage events.

Table 45. Observed prey types delivered to the nest, Luna BA, Arizona, 2016.

Sex	Birds	Fish	Total	Percent
Male	29	15	44	59.5
Female	21	9	30	40.5
Total	50	24	74	
Percent	67.6	32.4		

Table 46. Observed prey species delivered to the nest, Luna BA, Arizona 2016.

Sex	Birds					Fish		Total	Percent
	AC[1]	CM	CG	EG	WS	RT	CT		
Male	27	2	--	--	--	14	1	44	59.5
Female	17	1	1	1	1	8	1	30	40.5
Total	44	3	1	1	1	22	2	74	
Percent	59.5	4.1	1.4	1.4	1.4	29.7	2.8		

[1]AC=American coot, CM=common merganser, CG=Canada goose, EG=eared grebe, WS=waterfowl species, RT=rainbow trout, CT=cutthroat trout.

Table 47. Bald eagle habitat analysis at the Luna BA, Arizona, 2016.

Perch Location[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O[4]	H_2O Type[5]	Land Type[6]
0.1	PS	R – E	N	1	RS	--
0.6a	SH	R – E	N	2	RC	--
1.6b	PO	R - E	Y	2	RS	--
1.8	PS	R - E	Y	1	RC	--
1.9	PS	R – NE	Y	1	RC	--
2.0a	PS	R -E	Y	1	RC	--
2.0b	SH	R – N	Y	8	--	CF
2.1	PO	R – N	N	7	--	CF
2.2	SH	L – N	N	7	--	CF
2.3a	PO	L – N	Y/N	7	--	CF
2.3b	PO	R - N	Y	7	--	CF
2.4a	SH	L – N	N	7	--	CF
2.4b	PS	L – N	Y	7	--	CF
2.5	PS	L – NW	N	2	--	CF
2.6a	WF	L – NW	N	1	RS	--
2.6b	SC	L – NW	N	6	--	CF
2.7	PS	L – NW	N	2	RS	--
2.8	PS	L – NW	Y	2	--	CF
3.0	PS	L – NW	Y	2	--	CF
3.2	ST	L - NW	N	2	--	CF
3.5	PO	L – NW	N	1	RC	--
4.5	FP	R - SW	N	1	RC	--
4.6	PS	R – SW	N	1	RC	--
5.1a	FP	R – SW	N	1	RC	--
5.1b	PO	R – SW	Y	8	--	CF
5.2	BO	OP 1	N	1	RS	--

[1]Lake kilometer (counterclockwise from boat ramp).
[2]BO=boulder, FP=fence post, PO=Pine/Conifer, old growth/20-30+ m, PS=pine/conifer 2nd growth, SC=snag conifer, SH=hard snag (main branches only), ST=snag top, WF=waterfowl closure sign.
[3]Direction from observation point. L=left, R=right, E=east, NE=northeast, N=north, NW=northwest, SW=southwest
[4]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.
[5]RS=reservoir main body, RC=reservoir cove.
[6]CF=coniferous forest.

Table 48. Bald eagle habitat use at the Luna BA, Arizona, 2016.

River km[1]	PW[2,3]	PR	PH	PP	PD	ET	PV	Total	Percent
0.1	95	--	1	--	--	--	--	96	0.2
0.3	65	--	--	--	--	--	--	65	0.1
0.6	232	--	117	--	--	--	--	349	0.7
1.4	2318	117	676	--	--	--	--	3,111	6.1
1.6	62	--	162	--	--	--	--	224	0.4
1.7	15	--	164	--	--	--	--	179	0.3
1.8	96	--	267	--	--	--	--	363	0.7
1.9	40	--	250	--	--	--	--	290	0.6
2.1	201	78	--	--	--	--	--	279	0.5
2.2	1,098	309	--	--	--	--	--	1407	2.8
2.3	1184	1,047	--	16	78	6	3	2334	4.6
2.4	26,669	6,927	--	635	2	--	4	34,244	67.0
2.5	1,088	462	--	--	--	--	--	1,550	3.0
2.6	2,027	669	134	30	--	--	--	2860	5.6
2.7	249	--	1,248	--	--	5	--	1,502	2.9
2.8	--	--	253	--	--	--	--	253	0.5
3.0	48	--	--	--	--	--	--	48	0.1
3.4	--	--	10	--	--	--	--	10	0.0
3.5	1,057	--	463	--	--	--	--	1,520	3.0
4.0	--	--	152	--	--	--	--	152	0.3
4.4	--	--	--	--	22	--	--	22	0.1
5.1	213	--	73	--	--	--	--	286	0.6
5.2	2	--	--	--	--	--	--	2	0.1
Total	36,759	9,609	3,970	681	102	18	7	51,146	
Percent	66.4	18.6	5.6	1.3	0.2	0.1	0.1		

[1]Lake kilometer (counterclockwise from boat ramp).
[2]Observation time (minutes).
[3]PW=perched watching, PR=perched roosting, PH=perched hunting, PP=perched preening, PD=perched drying, ET=eating in tree, PV=perched vocalizing.

APPENDIX L: ORME BREEDING AREA SUMMARY

Table 49. Observed human activity and bald eagle behavior, Orme BA, Arizona, 2016.

Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Helicopter (civilian)	51	9	--	--	--	1	2	63	26.4
Driver	48	5	--	--	--	3	2	58	24.3
Small Plane	37	5	--	--	--	1	1	44	18.4
Helicopter (Apache)	24	6	--	--	--	3	--	33	13.8
Agency Worker	8	3	--	--	--	--	--	11	4.6
Hiker	7	1	--	1	--	--	--	9	3.8
Runner	7	--	--	--	--	--	--	7	2.9
Cyclist	4	--	--	--	--	--	--	4	1.7
Fisherman	2	--	--	--	--	--	--	2	0.8
Horseback Rider	1	--	--	--	--	--	1	2	0.8
Ceremony	--	2	--	--	--	--	--	2	0.8
Camper	1	--	--	--	--	--	--	1	0.4
Dog	--	--	--	--	--	--	1	1	0.4
Canoe/Kayak	1	--	--	--	--	--	--	1	0.4
Helicopter (sheriff)	1	--	--	--	--	--	--	1	0.4
Total	192	31	--	1	--	8	7	239	

[1]Bald eagle response: N=none, W=watched, R=restless, F=flushed, L=Left area, B=bird not in area, U=unknown.

Table 50. Observed forage events and success, Orme BA, Arizona, 2016.

Sex	Unknown		Total	
	E[1]	S-U[2]	E	S-U
Male	1	0-1	1	0-1
Female	--	--	--	--
Total	1	0-1	1	0-1

[1]E=A single forage event, not the number of attempts during 1 event.
[2]S-U=Successful – Unsuccessful forage events.

Table 51. Observed prey types delivered to the nest, Orme BA, Arizona, 2016.

Sex	Fish*	Total	Percent
Male	1	1	100.0
Female	--	--	--
Total	1	1	
Percent	100.0		

*Sucker species.

Table 52. Bald eagle habitat analysis at the Orme BA, Arizona, 2016.

Perch Location[1]	Perch Type[2]	Side	Shade	Distance to H_2O[3]	H_2O Type[4]	Land Type[5]
V 0.3	CL	Right	No	4	--	CW
V 0.4a	ST	Left	No	1	RU	WT
V 0.4b	CM	Right	Partial	5	--	WT
V 0.5	HS	Left	No	1	RU	WT
V 0.6a	SS	Left	No	1	RU	MB
V 0.6b	SS	Left	No	1	RU	MB
V 0.6c	SP	Right	No	2	--	UP
V 1.0	MS	Left	No	2	RU	MB
S 4.8	SD	Right	Partial	--	--	CW
S 4.9	CL	Right	No	2	--	CW
S 5.1	SD	Right	No	2	--	UP
S 5.4	CM	Right	Yes	3	--	CW
S 6.5	CF	Left	No	1	RU	CL
S 6.8a	BO	Left	No	1	RU	CL
S 6.8b	PV	Left	Partial	6	--	UP
S 7.8a	CM	Left	Partial	5	--	MB
S 7.8b	CL	Right	Yes	6	--	MB
S 7.8c	CM	Right	No	--	--	CW

[1]River kilometer (Hunt et. al. 1992). V=Verde River, S=Salt River.
[2]BO=boulder, CF=cliff, CL= cottonwood large (20+m), CM=cottonwood medium (10-20+m), HS=hard snag (main branches only),MS=mesquite snag, PV=palo verde, SD=cottonwood snag, SP=stump, SS=soft snag, ST=snag top.
[3]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.
[4]RU=run.
[5]MB=mesquite bosque, UP=desert upland, WT=-willow thicket.

Table 53. Bald eagle habitat use at the Orme BA, Arizona, 2016.

Perch Location[1]	PW[2,3]	PP	PH	PU	PE	PV	PL	CL	Total	Percent
V 0.3	307	214	--	9	--	--	--	4	534	13.9
V 0.4	123	79	42	--	2	5	--	--	251	6.5
V 0.5	8	--	--	--	--	--	--	--	8	0.2
V 0.6	477	83	38	--	--	--	--	--	598	15.5
V 1.0	910	10	168	--	--	--	--	--	1,088	28.3
S 4.8	4	--	--	--	--	--	--	--	4	0.1
S 4.9	236	22	--	--	--	--	--	--	258	6.7
S 5.1	270	60	--	--	38	--	--	--	368	9.6
S 5.4	29	--	--	6	--	--	--	--	35	0.9
S 6.5	15	--	--	--	39	--	--	--	54	1.4
S 6.8	429	70	--	17	--	--	19	--	535	13.9
S 7.8	72	--	--	44	--	--	--	--	116	3.0
Total	2,880	538	248	76	79	5	19	4	3,849	
Percent	74.8	14.0	6.4	2.0	2.1	0.1	0.5	0.1		

[1]River kilometer (Hunt et. al. 1992). V=Verde River, S=Salt River.
[2]Observation time (minutes).
[3]PW=perched watching, PP=perched preening, PH=perched hunting, PU=perched unknown, PE=perched eating, PV= perched vocalizing, PL=perched, CL=perched close to mate.

APPENDIX M: PLEASANT BREEDING AREA SUMMARY

Table 54. Observed human activity and bald eagle behavior, Pleasant BA, Arizona, 2016.

Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Small boats	3	--	--	--	--	6	--	9	25.0
Kayaks	1	--	--	--	--	4	--	5	13.9
Small planes	5	--	--	--	--	--	--	5	13.9
Hikers	5	--	--	--	--	--	--	5	13.9
Helicopters	3	--	--	--	--	--	--	3	8.3
AZGFD boats	3	--	--	--	--	--	--	3	8.3
Bicyclists	2	--	--	--	--	--	--	2	5.6
Fishermen	2	--	--	--	--	--	--	2	5.6
Sheriff Helicopter	1	--	--	--	--	--	--	1	2.8
Motor parachute	--	--	--	1	--	--	--	1	2.8
Total	25	--	--	1	--	10	--	36	

[1]Bald eagle response: N=none, W=watched, R=restless, F=flushed, L=left area, B=birds not in area, U=unknown.

Table 55. Observed forage events and success, Pleasant BA, Arizona, 2016.

Sex	Fish		Birds		Unknown		Total	
	E[1]	S-U[2]	E	S-U	E	S-U	E	S-U
Male	3	3-0	2	0-2	--	--	5	3-2
Female	1	1-0	1	0-1	1	0-1	3	1-2
Total	4	4-0	3	0-3	1	0-1	8	4-4

[1]E=A single forage event, not the number of attempts during 1 event.
[2]S-U= Successful – Unsuccessful forage events.

Table 56. Observed prey types delivered to the nest, Pleasant BA, Arizona, 2016.

Sex	Birds	Unknown	Total	Percent
Male	--	1	1	33.3
Female	2	--	2	66.7
Total	2	1	3	
Percent	66.7	33.3		

Table 57. Bald eagle habitat analysis at the Pleasant BA, Arizona, 2016.

Perch Location[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O[4]	H_2O Type[5]	Land Type[6]
78.3	CT	Right	No	1	RU	CL
78.4a	CT	Right	No	1	RU	CL
78.4b	MS	Right	No	1	RU	SO
78.7	ID	Right	Partial	1	RU	SO
78.9a	EU	Right	No	1	RU	SO
78.9b	EU	Right	Yes	1	RU	TA
78.9c	SM	Right	Yes	1	RU	SO
78.9d	EU	Right	No	1	RU	SO
78.9e	SO	Right	No	1	RU	SO
78.9f	EU	Right	No	1	RU	SO
78.9g	SM	Right	No	1	RU	SO
78.9h	SM	Right	No	1	RU	TA
78.9i	SM	Right	No	1	RU	SO
78.9j	SM	Right	No	1	RU	SO
78.9k	EU	Right	Partial	1	RU	SO
79.5	CT	Left	No	2	RU	CL

[1]River kilometer (Hunt et. al. 1992).
[2]CL=cottonwood, large (20+m), CT=cliff top, EU=eucalyptus, HS=hard snag (main branches only), SO=shore, SS=soft snag (dead but branches still intact).
[3]Side of river facing downstream.
[4]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.
[5]RU=run.
[6]CL=cliffs, SO=shore, TA=talus.

Table 58. Bald eagle habitat use at the Pleasant BA, Arizona, 2016.

River km[1]	PW[2,3]	PP	PK	CL	PG	ES	DW	Total	Percent
78.3	1,402	18	--	--	--	--	--	1,420	42.8
78.4	311	--	--	--	--	--	--	311	9.4
78.9	1,209	332	6	16	5	14	2	1,584	47.8
Total	2,922	350	6	16	5	14	2	3,315	
Percent	88.1	10.6	0.2	0.5	0.2	0.4	0.1		

[1]River kilometer (Hunt et al. 1992).
[2]Observation time (minutes).
[3]PW=perched watching, PP=perched preening, PK=perched with prey, CL=perched close to mate, PG=perched ground, ES=eating on shore, DW=drinking.

APPENDIX N: SYCAMORE BREEDING AREA SUMMARY

Table 59. Observed human activity and bald eagle behavior, Sycamore BA, Arizona, 2016.									
Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Horseback groups	51	6	--	5	--	--	--	62	38.3
Helicopter	27	1	--	1	--	1	--	30	18.5
Small plane	20	--	--	--	--	2	1	23	14.2
Agency worker	6	--	--	3	--	--	--	9	5.6
Apache helicopter	7	--	--	--	--	1	--	8	4.9
Rancher	6	--	--	--	1	--	--	7	4.3
OHV	5	--	--	--	--	1	--	6	3.7
MCSO helicopter	5	--	--	--	--	--	--	5	3.1
Military helicopter	5	--	--	--	--	--	--	5	3.1
Driver	4	--	--	--	--	--	--	4	2.5
Construction	1	--	--	--	--	--	--	1	0.6
Campers	1	--	--	--	--	--	--	1	0.6
AGFD worker	--	--	1	--	--	--	--	1	0.6
Total	138	7	9	1	5	1	1	162	

[1]Bald eagle response: N=none, W=watched, R=restless, F=flushed, L=Left area, B=birds not in area, U=unknown.

Table 60. Observed forage events and success, Sycamore BA, Arizona, 2016.										
Sex	Fish		Mammals		Birds		Unknown/Carrion		Total	
	E[1]	S-U[2]	E	S-U	E	S-U	E	S-U	E	S-U
Male	2	2-0	1	1-0	1	1-0	2	2-0	6	6-0
Female	--	--	--	--	--	--	1	1-0	1	1-0
Total	2	2-0	1	1-0	1	1-0	3	3-0	7	7-0

[1]E=A single forage event, not the number of attempts during 1 event.
[2]S-U=Successful – Unsuccessful forage events.

Table 61. Observed prey types delivered to the nest, Sycamore BA, Arizona, 2016.							
Sex	Fish	Birds	Mammals	Reptiles	Unknown	Total	Percent
Male	5	2	1	1	13	22	53.6
Female	11	--	1	--	7	19	46.3
Total	16	2	2	1	20	41	
Percent	39.0	4.9	4.9	2.4	48.8		

Table 62. Bald eagle habitat analysis at the Sycamore BA, Arizona, 2016.

Perch Location[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O[4]	H_2O Type[5]	Land Type[6]
7.8	SG	Left	No	1	RU / PN	SO
7.9	CL	Left	Yes	1	RI	SO
9.4	G	Right	No	8	--	FL
9.5a	WO	Right	No	1	RI	WT
9.5b	SM	Left	No	1	RI	WT
9.6	WO	Right	Partial	1	RI	WT
9.8	CL	Left	Yes	5	RU	CW
9.9	CL	Left	Yes	4	RU	CW
10.0	CM	Left	Partial	5	RU	CW
10.1 (nest)	CL	Left	Yes	6	RI	CW
10.1b	WO	Right	Yes	1	RI	WT
10.2	SM	Right	No	2	RU	TX
10.3a	HS	Left	No	6	RI	MB
10.3b	WO	Right	Partial	2	RI	MB

[1]River kilometer (Hunt and others 1992).
[2]CL=cottonwood, large/20-30+ m, CM=cottonwood, medium/10-20+ m, G=ground, HS=hard snag, SG=soft snag, SM=snag, mesquite, WO=willow.
[3]Side of river facing downstream.
[4]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400.
[5]PN=pond, RI=riffle, RU=run.
[6]CW=cottonwood grove, FL=farmland, MB=mesquite bosque, SO=shore, TX=tamarisk thicket, WT=willow thicket.

Table 63. Bald eagle habitat use at the Sycamore BA, Arizona 2016.

River km[1]	PW[2,3]	PH	PP	CL	PG	PD	ET	PK	PE	Total	Percent
7.8	0	15	0	0	0	0	0	0	0	15	0.1
7.9	1,134	561	0	0	0	16	0	0	0	1,711	7.8
9.4	0	0	0	0	347	0	0	0	11	358	1.6
9.5	422	206	25	0	0	6	0	0	0	659	3.0
9.6	0	24	0	0	0	0	0	0	0	24	0.1
9.8	288	0	68	0	0	0	0	0	0	356	1.6
9.9	199	0	73	0	0	0	0	0	0	272	1.2
10.0	202	0	0	0	0	0	0	5	0	207	1.0
10.1	2,720	656	71	0	0	0	0	0	0	3,447	15.7
10.2	205	158	0	0	0	25	0	0	0	388	1.8
10.3	12,286	67	1,436	410	0	142	87	60	0	14,488	66.1
Total	17,456	1,687	1,673	410	347	189	87	65	11	21,925	
Percent	79.6	7.7	7.6	1.9	1.6	0.8	0.4	0.3	0.1		

[1]River kilometer (Hunt and others 1992).
[2]Observation time (minutes).
[3]PW=perched watching, PH=perched hunting, PP=perched preening, CL=perched close to mate, PG=perched on ground, PD=perched drying, ET=eating in tree, PK=perched with prey, PE=perched eating on ground.

APPENDIX O: TONTO BREEDING AREA SUMMARY

Table 64. Observed human activity and bald eagle behavior, Tonto BA, Arizona, 2016.

Human Activity	N[1]	W	R	F	L	B	Total	Percent
Small Plane	--	3	--	--	--	--	3	17.7
Private Helicopter	1	1	--	--	--	--	2	11.8
Apache Helicopter	1	1	--	--	--	--	2	11.8
Military Helicopter	--	1	--	--	--	--	1	5.9
Motorized Parachute	--	2	--	--	--	--	2	11.8
Gun shot	2	2	--	--	--	--	4	23.5
Boater	--	2	--	--	--	--	2	11.8
Stand up paddle boarder	1	--	--	--	--	--	1	5.9
Total	5	12	--	--	--	--	17	

[1]Bald eagle response: N=none, W=watched, R=restless, F=flushed, L=Left area, B=birds not in area, X=returned to nest.

Table 65. Observed forage events and success, Tonto BA, Arizona, 2016.

Sex	Fish		Mammals		Birds		Total	
	E[1]	S-U[2]	E	S-U	E	S-U	E	S-U
Male	9	4-5	1	0-1	1	1-0	11	5-6
Female	4	3-1	1	0-1	--	--	5	3-2
Unknown	8	6-2	1	0-1	--	--	9	6-3
Total	21	13-8	3	0-3	1	1-0	25	14-11

[1]E=A single forage event, not the number of attempts during 1 event.
[2]S-U=Successful – Unsuccessful forage events.

Table 66. Observed prey types delivered to the nest, Tonto BA, Arizona, 2016.

Sex	Fish	Mammals	Birds	Unknown	Total	Percent
Male	25	5	1	8	39	54.9
Female	16	4	--	9	29	40.9
Unknown	3	--	--	--	3	4.2
Total	44	9	1	17	71	
Percent	62.0	12.7	1.4	23.9		

Table 67. Observed prey species delivered to the nest, Tonto BA, Arizona 2016.

Sex	Fish				Total	Percent
	RT[1]	CS	BC	SU		
Male	1	--	1	1	3	50.0
Female	2	1	--	--	3	50.0
Total	3	1	1	1	6	
Percent	50.0	16.6	16.6	16.6		

[1]RT=rainbow trout, CS=catfish species, BC=black crappie, SU=sucker species.

Table 68. Bald eagle habitat analysis at the Tonto BA, Arizona, 2016.

Perch Location[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O[4]	H_2O Type[5]	Land Type[6]
12.7	HS	Middle	No	1	RS	SO
15.7	SP	Middle	No	1	PO	SO
16.0	TX	Middle	Partial	1	PO	TX
16.9	SO	Middle	No	2	PO	TX
17.0a	HS, SD	--	Partial	3	RI,PO,RU,RB	TX
17.0b	SO	Middle	Partial	1	RB	SO
17.2a	SS	Middle	Partial	4	PW	TX
17.2b	SO	Middle	No	1	PW	TX
17.5a	HS, SD	Middle	No	3	RI,PO,RU,RB	TX
17.5b	SS	Middle	No	2	RI, RU	TX
18.0a	TX	Middle	Partial	1	RI,PO,RU	TX
18.0b	TX	Middle	Partial	2	RI,PO,RU	TX
18.25	TX	Middle	Partial	2	RI,PO,RU	TX
18.30	CL	--	Partial	3	RI	CW
18.50	CL	--	Partial	3	PO	CW

[1]River kilometer (Hunt et. al. 1992).
[2]CL=large cottonwood/20+m, HS=hard snag, SD=snag, cottonwood, SO=shore, SP=fallen tree, SS=soft snag, TX=tamarisk.
[3]Side of river facing downstream.
[4]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.
[5]PO=pool, PW=pocket water, RB=river bend, RU=run ,RI=riffle, RS=reservoir.
[6]CW=cottonwood grove, SO=shore, TX=tamarisk thicket.

Table 69. Bald eagle habitat use at the Tonto BA, Arizona, 2016.

River km[1]	PW[2,3]	PU	PP	PK	PG	PE	Total	Percent
12.7	185	10	--	--	--	--	195	1.7
15.7	126	--	--	--	--	--	126	1.1
16.0	104	43	4	--	--	--	151	1.3
16.9	--	--	--	--	2	--	2	0.1
17.0	9,732	85	36	30	4	10	9,897	85.8
17.2	161	--	--	--	6	--	167	1.4
17.5	376	--	--	--	4	--	380	3.3
18.0	476	4	9	--	--	--	489	4.2
18.2	2	--	--	--	--	--	2	0.1
18.3	5	20	5	--	--	--	30	0.3
18.5	101	--	--	--	--	--	101	0.9
Total	11,268	162	54	30	16	10	11,540	
Percent	97.6	1.4	0.5	0.3	0.1	0.1		

[1]River kilometer (Hunt et al. 1992).
[2]Observation time (minutes).
[3]PW=perched watching, PU=perched unknown, PP=perched preening, PK=perched with prey, PG=perched on ground, PE=perched eating.

APPENDIX P: WHISKEY SPRING BREEDING AREA SUMMARY

Table 70. Observed human activity and bald eagle behavior, Whiskey Spring BA, Arizona, 2016.

Human Activity	N[1]	W	R	F	L	X	U	Total	Percent
Nestwatcher	276	22	--	1	1	1	3	304	29.9
Small plane	185	45	1	3	2	--	--	236	23.2
Boater	145	38	--	7	3	--	2	195	19.2
Military Jet	41	20	--	--	--	2	--	63	6.2
Agency	43	12	--	1	--	--	--	56	5.5
Fishing by Boat	38	7	--	2	3	--	2	52	5.1
Helicopter	26	7	--	1	--	--	--	34	3.3
Jet ski	20	22	2	--	--	--	--	44	4.3
AZGFD biologist	5	1	--	3	--	--	--	9	0.9
Military Helicopter	7	2	--	--	--	--	--	9	0.9
Water skier	3	1	--	--	--	--	--	4	0.4
Canoe/kayak	1	2	--	--	--	--	--	3	0.3
Sheriff helicopter	1	2	--	--	--	--	--	3	0.3
Flyer (ultralight)	--	1	--	--	--	--	--	1	0.1
Motorized parachute	1	--	--	--	--	--	--	1	0.1
Drone (recreational)	--	1	--	--	--	--	--	1	0.1
Photographer	--	1	--	--	--	--	--	1	0.1
Total	792	184	3	18	9	3	7	1,016	

[1]Bald eagle response: N=none, W=watched, R=restless, F=flushed, L=Left area, X=other, U=unknown.

Table 71. Watercraft compliance, Whiskey Spring BA, Arizona, 2016.

	Watercraft at closure line[1]	Watercraft in closure	Total
Total	4,761	278	5,039
Percent	94.5	5.5	

[1]Approached but did not enter closure.

Table 72. Observed forage events and success, Whiskey Spring BA, Arizona, 2016.

Sex	Fish		Birds		Mammals		Unknown/Carrion		Total	
	E[1]	S-U[2]	E	S-U	E	S-U	E	S-U	E	S-U
Male	22	9-13	2	0-2	--	--	1	0-1	25	9-16
Female	18	9-9	1	0-1	2	1-1	1	1-0	22	11-11
Total	40	18-22	3	0-3	2	1-1	2	1-1	47	20-27

[1]E=A single forage event, not the number of attempts during 1 event.
[2]S-U=Successful – Unsuccessful forage events.

Table 73. Observed prey types delivered to the nest, Whiskey Spring BA, Arizona, 2016.

Sex	Fish	Birds	Mammal	Carrion	Unknown	Total	Percent
Male	94	14	--	2	16	126	70.4
Female	35	4	3	--	9	51	28.5
Unknown	--	2	--	--	--	2	1.1
Total	129	20	3	2	25	179	
Percent	72.1	11.2	1.7	1.1	14.0		

Table 74. Observed prey species delivered to the nest, Whiskey Spring BA, Arizona 2016.

Sex	Fish[1]								Birds		Total	Percent
	BS	SU	BC	CC	CS	BG	CP	LB	CO	GU		
Male	9	8	5	5	4	2	1	0	2	1	37	75.5
Female	4	1	1	1	0	2	1	1	1	0	12	24.5
Total	13	9	6	6	4	4	2	1	3	1	49	
Percent	26.5	18.4	12.2	12.2	8.2	8.2	4.1	2.0	6.1	2.0		

[1]BS=bass species, SU=sucker species, BC=black crappie, CC=channel catfish, CS=catfish species, BG=bluegill, CP=common carp, LB=largemouth bass, CO=cormorant species, GU=gull species.

Table 75. Bald eagle habitat analysis at the Whiskey Spring BA, Arizona, 2016.

Perch Location[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O[4]	H_2O Type[5]	Land Type[6]
68.5a	DW/BO	Left	Partial	1	RS	SO
68.5b	BO	Left	Partial	1	RS	SO
68.7a	CF	Left	Yes	1	RS	CL
68.7b	CT	Left	No	1	RS	CL
68.7c	DW	Right	No	1	RS	LG
68.7d	BO	Right	Yes	1	RS	TA
68.8a	HS/CT	Left	No	2	RS	CL
68.8b	CF	Left	Partial	1	RS	CL
68.8c	CF	Left	Partial	1	RS	CL
68.9a	CF/CT	Left	Yes	1	RS	CL
68.9b	CF	Left	Yes	1	RS	CL
68.9c	CF/CT	Left	Partial	1	RS	CL
68.9d	CF	Left	Yes	1	RS	CL
68.9e	CF	Left	Yes	1	RS	CL
68.9f	CT	Left	No	1	RS	CL
68.9g	CF	Left	Yes	1	RS	CL
69.1	CF	Left	No	1	RS	CL
69.2	MS/BO	Left	Partial	1	RS	CL
69.4	DW/SO	Left	No	1	RS	CL
69.5a	PV	Left	No	4	RS	UP
69.5b	DW/SO	Left	No	1	RS	SO
69.6	DW	Left	No	1	RS	SO

[1]River kilometer (Hunt et. al. 1992).
[2]BO=boulder, CF=cliff, CT= cliff top, DW= driftwood, HS=hard snag, MS=mesquite, PV=palo verde, SO=shore.
[3]Side of river facing downstream.
[4]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.
[5]RS=reservoir.
[6]CL=cliff, LG=floating log, SO=shore, TA=talus, UP=upland.

Table 76. Bald eagle habitat use at the Whiskey Spring BA, Arizona, 2016.

Perch Location[1]	PW[2,3]	PD	DW	PE	PP	BA	PK	PV	PI	PH	OT	Total	Percent
67.0	5	--	--	--	--	--	--	--	--	--	--	5	0.1
67.7	62	--	--	--	--	--	--	--	--	--	--	62	0.2
67.9	8	--	--	--	--	--	--	--	--	--	--	8	0.1
68.0	18	--	--	--	--	--	--	--	--	--	--	18	0.1
68.1	22	--	--	--	--	--	--	--	--	--	--	22	0.1
68.4	87	--	--	--	--	--	--	--	--	--	--	87	0.3
68.5	522	59	404	--	13	27	--	2	--	7	11	1,045	3.5
68.6	313	--	7	25	--	--	--	2	--	--	--	347	1.2
68.7	5,641	233	--	16	43	--	19	16	--	16	3	5,987	20.1
68.8	6,221	100	--	25	--	--	4	5	1	1	--	6,357	21.3
68.9	5,720	--	--	13	20	--	24	1	15	1	1	5,795	19.4
69.0	9,178	57	--	24	--	--	6	16	10	--	--	9,291	31.1
69.1	189	--	--	--	--	--	--	1	--	--	--	190	0.6
69.2	201	55	--	--	--	--	--	--	--	--	--	256	0.9
69.3	241	--	--	1	--	--	--	--	--	--	--	242	0.8
69.4	30	--	23	--	--	17	--	--	--	--	25	95	0.3
69.5	23	3	--	--	--	13	--	--	--	--	--	39	0.1
69.7	8	--	--	--	--	--	--	--	--	--	--	8	0.1
Total	28489	507	434	104	76	57	53	43	26	25	40	29,854	
Percent	95.4	1.7	1.5	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1		

[1]River kilometer (Hunt et al. 1992).
[2]Observation time (minutes).
[3]PW=perched watching, PD=perched drying, DW=drinking water, PE=perched eating, PP=perched preening, BA=bathing, PK=perched with prey, PV=perched vocalizing, PU=perched interaction, PH=perched hunting, OT=other (includes perched on ground, standing in water).

APPENDIX Q: WOODS CANYON BREEDING AREA SUMMARY

Table 77. Observed human activity and bald eagle behavior, Woods Canyon BA, Arizona, 2016.

Human Activity[1]	N[2]	W	R	F	L	B	U	Total	Percent
Hiker	797	3	--	--	--	--	--	800	80.3
Fishermen	120	--	--	--	--	--	--	120	12.1
Kayaker	45	--	--	--	--	--	--	45	4.5
Agency Worker	14	--	--	--	--	--	--	14	1.4
Birder	7	--	--	--	--	--	--	7	0.7
Boater	3	--	--	--	--	--	--	3	0.3
Bicyclist	3	--	--	--	--	--	--	3	0.3
Nestwatcher	1	--	--	--	--	--	--	1	0.1
Photographer	1	--	--	--	--	--	--	1	0.1
Stand Up Paddleboard	1	--	--	--	--	--	--	1	0.1
Drone	--	--	--	1	--	--	--	1	0.1
Total	992	3	--	1	--	--	--	996	

[1]Includes only certain activities in or at the closure (number of people at the OP, closure violations, activities that yielded a negative response from the eagles, and the number of hikers on the trail around the lake).
[2]Bald eagle response: N=none, W=watched, R=restless, F=flushed, L=left area, B=birds not in area, U=unknown.

Table 78. Observed forage events and success, Woods Canyon BA, Arizona, 2016.

Sex	Fish		Mammals		Birds		Total	
	E[1]	S-U[2]	E	S-U	E	S-U	E	S-U
Male	11	9-2	--	--	1	0-1	12	9-3
Female	12	7-5	--	--	--	--	12	7-5
Unknown	19	11-8	1	0-1	--	--	20	11-9
Total	42	27-15	1	0-1	1	0-1	44	27-17

[1]E=A single forage event, not the number of attempts during 1 event.
[2]S-U=Successful – Unsuccessful forage events.

Table 79. Observed prey types delivered to the nest, Woods Canyon BA, Arizona, 2016.

Sex	Fish	Mammals	Unknown	Total	Percent
Male	28	1	1	30	36.1
Female	20	1	4	25	30.1
Unknown	28	--	--	28	33.7
Total	76	2	5	83	
Percent	91.8	2.4	6.0		

Table 80. Observed prey species delivered to the nest, Woods Canyon BA, Arizona 2016.

Sex	Fish		Total	Percent
	TR[1]	RT		
Male	19	5	24	38.1
Female	13	5	18	28.6
Unknown	19	2	21	33.3
Total	51	12	63	
Percent	81.0	19.0		

[1]TR=trout species, RT=rainbow trout

Table 81. Bald eagle habitat analysis at the Woods Canyon BA, Arizona, 2016 (continued next page).

Lake km[1]	Perch Type[2]	Shade	Distance to H_2O[3]	H_2O Type[4]	Land Type[5]
0.0	LG	No	1	RS	DA
0.1	LG	No	1	RS	SO
0.2a	PI	Yes	1	RS	DA
0.2b	PI	Partial	1	RS	CF
0.4a	PI	No	2	RS	CF
0.4b	SC	No	4	RC	CF
0.5a	SC	No	1	RC	CF
0.5b	SO	No	1	RC	SO
0.5c	PI	Yes	1	RC	CF
0.6a	PI	Partial	2	RC	CF
0.6b	PI	No	1	RC	CF
0.7a	PI	No	1	RC	CF
0.7b	PI	Yes	2	RC	CF
0.7c	PI	Partial	3	RC	CF
0.7d	ST	Yes	1	RC	CF
0.7e	PI	Yes	1	RC	CF
0.8a	PI	No	2	RC	CF
0.8b	SC	No	2	RC	CF
0.8c	PI	Partial	4	RC	CF
0.8d	SO	No	1	RC	SO
0.8e	HS	No	3	RC	CF
0.8f	PI	Partial	1	RC	CF
0.8g	PI	Yes	1	RC	CF
0.8h	PI	Yes	1	RC	CF
0.8i	SG	Partial	3	RC	CF
0.8j	PI	No	1	RC	CF
0.8k	PS	No	1	RC	SO
0.9a	SO	No	1	RS	SO
0.9b	SP	No	1	RS	CF
0.9c	PI	Yes	2	RS	CF
0.9d	SG	No	2	RS	CF
1.0	PI	Yes	4	RS	CF
1.3	PI	No	4	RS	CF
1.4	PI	Partial	1	RC	CF
4.5	PI	Partial	1	RS	CF
4.6a	PI	Yes	1	RS	CF
4.6b	PI	Yes	2	RS	CF
4.6c	PI	Yes	1	RS	CF
4.7a	SO	Yes	1	RS	SO
4.7b	PS	Yes	1	RS	CF
4.8	ST	Partial	1	RS	CF
4.9	PI	Yes	2	RS	CF
5.0a	PI	No	1	RS	CF

[1]Lake kilometer (counterclockwise from middle of dam).
[2]HS=hard snag, LG=log, PI=, PO=pine/conifer, old growth/20-30+ m., PS=pine/conifer, 2nd growth/10-20+ m, RW=rock in water, SC=conifer snag, SG=soft snag, SO=shore, ST=Snag top.
[3]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>401m.
[4]RC=reservoir cove, RS=reservoir main body.
[5]CF=conifer forest, DA=dam or spillway, SO=shore.

Table 81. continued.

Lake km[1]	Perch Type[2]	Shade	Distance to H_2O[3]	H_2O Type[4]	Land Type[5]
5.0b	PI	Yes	1	RS	CF
5.0c	PI	Partial	1	RS	CF
5.0d	SO	Partial	1	RS	SO
5.0e	HS	Partial	3	RS	CF
5.1a	ST	No	2	RS	CF
5.1b	SG	Partial	1	RS	CF
5.2a	PI	Yes	1	RS	CF
5.2b	PI	Partial	1	RS	CF

[1]Lake kilometer (counterclockwise from middle of dam).
[2]HS=hard snag, LG=log, PI=, PO=pine/conifer, old growth/20-30+ m., PS=pine/conifer, 2nd growth/10-20+ m, RW=rock in water, SC=conifer snag, SG=soft snag, SO=shore, ST=Snag top.
[3]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>401m.
[4]RC=reservoir cove, RS=reservoir main body.
[5]CF=conifer forest, DA=dam or spillway, SO=shore.

Table 82. Bald eagle habitat use at the Woods Canyon BA, Arizona, 2016.

Lake km[1]	PW[2,3]	DW	PV	ET	PH	GN	BA	PP	PI	Total	Percent
0.0	1	--	--	--	--	--	--	--	--	1	0.1
0.1	5	--	--	--	--	--	--	--	--	5	0.1
0.2	58	--	--	--	--	--	--	--	1	59	0.3
0.4	407	--	1	--	--	--	--	--	1	409	2.4
0.5	146	--	--	--	2	--	--	--	--	148	0.9
0.6	396	--	--	--	3	1	--	--	--	400	2.3
0.7	460	--	2	6	2	--	--	--	--	470	2.8
0.8	2,425	51	27	25	--	8	8	--	--	2,544	14.9
0.9	936	24	1	--	2	3	3	6	5	980	5.7
1.0	127	--	--	--	--	--	--	--	--	127	0.7
1.3	23	--	--	--	--	--	--	--	--	23	0.1
1.4	3	--	--	--	--	--	--	--	--	3	0.1
4.5	--	--	--	--	18	--	--	--	--	18	0.1
4.6	281	--	10	--	--	--	--	--	--	291	1.7
4.7	366	--	--	--	1	--	--	--	--	367	2.2
4.8	4,959	--	20	--	--	--	--	--	--	4,979	29.2
4.9	1,003	--	--	--	--	--	--	--	--	1,003	5.9
5.0	5,056	--	4	--	--	--	--	--	--	5,060	29.7
5.1	156	--	--	--	--	2	--	--	--	158	0.9
5.2	11	--	--	--	--	--	--	--	--	11	0.1
Total	16,819	75	65	31	28	14	11	6	5	17,056	
Percent	98.6	0.4	0.4	0.2	0.2	0.1	0.1	0.1	0.1		

[1]Lake kilometer (counterclockwise from middle of dam).
[2]Observation time (minutes).
[3]PW=perched watching, DW=drinking water, PV=perched vocalizing, ET=eating in tree, PH=perched hunting, GN=gathering nest materials, BA=bathing, PP=perched preening, PI=perched interaction.