

ARIZONA BALD EAGLE MANAGEMENT PROGRAM 2018 SUMMARY REPORT

Kyle M. McCarty, Eagle Field Projects Coordinator
Kurt Licence, Birds and Mammals Biologist
Kenneth V. Jacobson, Raptor Management Coordinator



Photo by Mary McSparen



Technical Report 321
Nongame and Endangered Wildlife Program
Terrestrial Wildlife Branch
Wildlife Management Division
Arizona Game and Fish Department
5000 West Carefree Highway
Phoenix, Arizona 85086
December 2018

CIVIL RIGHTS AND DIVERSITY COMPLIANCE

The Arizona Game and Fish Commission receives federal financial assistance in Sport Fish and Wildlife Restoration. Under Title VI of the 1964 Civil Rights Act, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, the U.S. Department of the Interior prohibits discrimination on the basis of race, color, religion, national origin, age, sex, or disability. If you believe you have been discriminated against in any program, activity, or facility as described above, or if you desire further information please write to:

Arizona Game and Fish Department
Office of the Deputy Director, DOHQ
5000 W. Carefree Highway
Phoenix, Arizona 85086

and

U.S. Fish and Wildlife Service
Office of Diversity and Inclusive Workforce Management
Public Civil Rights Accessibility & Disability Coordinator
5275 Leesburg Pike
Falls Church, Virginia 22041

AMERICANS WITH DISABILITIES ACT COMPLIANCE

The Arizona Game and Fish Department complies with all provisions of the Americans with Disabilities Act. This document is available in alternative format by contacting the Arizona Game and Fish Department, Office of the Deputy Director at the address listed above, or by calling (602) 942-3000, or TTY 1-800-367-8939.

PROJECT FUNDING

Funding for this project was provided by: Arizona Game and Fish Department's Heritage Fund; Arizona Public Service; Fort McDowell Yavapai Nation; Pittman-Robertson Funds (U.S. Fish and Wildlife Service); Salt River Pima-Maricopa Indian Community; Salt River Project; Scorpion Bay Marina; U.S. Bureau of Land Management; U.S. Bureau of Reclamation; U.S. Forest Service (Apache-Sitgreaves, Kaibab, Prescott, and Tonto National Forests); and Verde Canyon Railroad.

RECOMMENDED CITATION

McCarty, K.M., K.L. Licence, and K.V. Jacobson. 2018. Arizona bald eagle management program 2018 summary report. Nongame and Endangered Wildlife Program Technical Report 321. Arizona Game and Fish Department, Phoenix, Arizona.

ACKNOWLEDGMENTS

The authors acknowledge and appreciate the assistance of the following people: Arizona Department of Transportation; Nicole Rodriguez, Arizona Public Service; Sarah Kirk, Arizona State Parks Department; Arizona Army National Guard; Heather Finden, City of Phoenix; Forest Highlands Golf Club; Mark Frank and Karen Shaw, Fort McDowell Yavapai Nation; Damien Smith and Brendan Kinyon, Gainey Ranch Golf Club; Russell Benford and Charles Enos, Gila River Indian Community; The Hopi Tribe; Jan Miller, Joe Miller, and Megan Mosby, Liberty Wildlife Rehabilitation Foundation; Terry Gerber, David Jordan, Kyle Randall, and Bob Vandenburg, Maricopa County Parks and Recreation Department (and Desert Outdoor Center at Lake Pleasant); Arthur Benally and Mike Wrigley, National Park Service; Chad Smith, Navajo Department of Fish and Wildlife; Ann George and Duff Sorrels, Freeport McMoRan; Mike Brinkworth, Josh Coplan, Borden Miller, Chelsea Nelson, and Taylor Williamson, Papillon Helicopters, Inc.; Christopher Horan and Gina Leverette, Salt River Pima-Maricopa Indian Community; Rob Ackerman, John Barlund, Jeff Campbell, Nina Grimaldi, Mike Houser, Julie Keith, John Knotts, Shea Meyer, Lesly Swanson, and Ruth Valencia, Salt River Project; Daniel Juan, San Carlos Apache Tribe; Tonto Apache Tribe; Sheri Fox, U.S. Air Force (Luke Air Force Base); Wade Eakle, U.S. Army Corps of Engineers; Chip Lewis, U.S. Bureau of Indian Affairs; Elroy Masters, U.S. Bureau of Land Management; Carol Evans and Nichole Olsker, U.S. Bureau of Reclamation; Greg Beatty, Eldon Brown, Kathleen Blair, Shaula Hedwall, Carrie Marr, Mary Richardson, and Katie Wade-Matthews, U.S. Fish and Wildlife Service; Janie Agyagos, Christina Akins, Tony Bush, Charles Denton, Noel Fletcher, Jill Holderman, Roger Joos, Kelly Kessler, Travis Largent, Ariel Leonard, Loren LeSueur, Nicole Mayerhofer, Jacob Naranjo, Steve Plunkett, and Justin Schofer, U.S. Forest Service; Robin Brean, Teresa Propeck, and Ellen Roberts, Verde Canyon Railroad; Cynthia Dale and Tim Gatewood, White Mountain Apache Tribe; George Andrejko, Donna Bailloux, Erin Butler, James Driscoll, Suzanne Ehret, Nathan Gonzalez, Dan Groebner, Callie Hartson, Sharon Lashway, Susi MacVean, David Majure, Gloria Morales, Lin Piest, Jennifer Presler, Austin Smith, and Tim Snow, Arizona Game and Fish Department. A special thanks goes out to the winter count surveyors and coordinators for their hard work and dedication, and to volunteers Gordo Douglas, Melanie Herring, Claudia Kirscher, and Marta Peddie. A donation was made to the bald eagle management program in memory of Raymond Kosloski.

This report, in part, summarizes the results of monitoring by the Arizona Bald Eagle Nestwatch Program using the breeding area reports submitted in 2018. Those include: Victoria Hawk and Emilee Sparks, Box Bar Breeding Area (BA); Russell Seeley and Kalyn Miller, Cataract Lake and Fool Hollow BAs; Lindy Gasta and Nicholas Riso, Concho and Tonto BAs; Joe and Marta Peddie, Luna and Crescent BAs; Matthew Pierle and Eduardo Martinez-Leyva, Goldfield & Kerr BAs; Zoe Johnston and Maria Icenogle, Orme and Granite Reef BAs; Leah Vader and Jen Ottinger, Doka, Fort McDowell, Rodeo, and Sycamore BAs; Lindsay Gedacht and Curtis Hart, Tapco and Woods Canyon BA; Forrest Rosenbower and Elaine Gallenberg, Whiskey Spring BA; Victoria Hawk and Eduardo Martinez-Leyva, Woods Canyon BA.

TABLE OF CONTENTS

Introduction.....	1
Study Area	2
Arizona Bald Eagle Winter Count	4
Introduction.....	4
Methods.....	5
Results and Discussion	6
Management Recommendations.....	7
Occupancy and Reproductive Assessment	8
Introduction.....	8
Methods.....	8
Results.....	9
Overview.....	10
New Locations Surveyed	11
Historical Breeding Areas.....	16
Breeding Areas.....	16
Breeding Areas in Surrounding States.....	20
Management Recommendations.....	20
Bald Eagle Monitoring in Sonora, Mexico.....	21
Arizona Bald Eagle Nestwatch Program	22
Introduction.....	22
Methods.....	23
Results and Discussion	25
Box Bar Breeding Area.....	25
Cataract Breeding Area.....	26
Concho Breeding Area.....	27
Crescent Breeding Area	28
Fool Hollow Breeding Area.....	29
Goldfield Breeding Area.....	29
Granite Reef Breeding Area.....	30
Luna Breeding Area.....	31
Sycamore Breeding Area	32
Tapco Breeding Area	33
Whiskey Spring Breeding Area	33
Woods Canyon Breeding Area	35
Management Considerations.....	35
Literature Cited.....	41

LIST OF TABLES

Table 1. Summary of the Arizona bald eagle winter count 2018. 7
Table 2. Summary of Arizona bald eagle winter counts 2005-2018. 7
Table 3. Summary of Arizona bald eagle productivity 2018..... 9
Table 4. Arizona bald eagle 10-year productivity summary..... 11
Table 5. Arizona bald eagle nest survey summary, 2018 new locations. 13
Table 6. Arizona bald eagle nest survey summary, 2018 potential nest sites..... 14
Table 7. Arizona bald eagle nest survey summary, 2018 historic breeding areas. 16
Table 8. Arizona bald eagle nest survey summary, 2018 breeding areas. 19
Table 9. Bald eagle breeding area observations in surrounding states, 2018. 20

LIST OF FIGURES

Figure 1. Location of known bald eagle breeding areas in Arizona, 2018. 3
Figure 2. Map of the 2018 Arizona bald eagle winter count survey routes..... 4
Figure 3. Productivity at bald eagle breeding areas in Arizona, 1980-2018..... 10
Figure 4. Cataract and OW breeding areas. 12
Figure 5. Scholz Lake breeding area and Kaibab Lake nest site. 14
Figure 6. Installation of nest platform (#8) at Pee Posh Wetlands 18
Figure 7. Nestling at the Hecho BA and nest at the Sierra BA, Sonora, Mexico. 22
Figure 8. Box Bar and Cataract breeding areas.. 26
Figure 9. Concho and Crescent breeding areas..... 28
Figure 10. Fool Hollow and Goldfield breeding areas. 29
Figure 11. Granite Reef and Luna breeding areas. 31
Figure 12. Sycamore and Tapco breeding areas. 33
Figure 13. Whiskey Spring and Woods Canyon breeding areas. 34

LIST OF APPENDICES

Appendix A: 2018 Arizona Bald Eagle Winter Count Results..... 47
Appendix B: Terminology and Raptor Reproductive Status Criteria..... 51
Appendix C: 2018 Arizona Bald Eagle Productivity..... 52
Appendix D: Nest Survey Results 55
Appendix E: Box Bar Breeding Area Summary..... 64
Appendix F: Cataract Breeding Area Summary 66
Appendix G: Concho Breeding Area Summary 68
Appendix H: Crescent Breeding Area Summary..... 71
Appendix I: Fool Hollow Breeding Area Summary 73
Appendix J: Goldfield Breeding Area Summary..... 75
Appendix K: Granite Reef Breeding Area Summary 78
Appendix L: Luna Breeding Area Summary 80
Appendix M: Sycamore Breeding Area Summary 83
Appendix N: Tapco Breeding Area Summary..... 86
Appendix O: Whiskey Spring Breeding Area Summary..... 87
Appendix P: Woods Canyon Breeding Area Summary..... 91

ARIZONA BALD EAGLE MANAGEMENT PROGRAM 2018 SUMMARY REPORT

Kyle M. McCarty, Kurt L. Licence, and Kenneth V. Jacobson

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 2012 finding was upheld by a U.S. District Court in 2014, and that decision was affirmed by an appellate court in 2017.

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 rule in 2016 to reinstate a 30-year permit and other revisions to take permit implementation (USFWS 2016, 2017).

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 2018 results

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

STUDY AREA

Monitoring and surveys were conducted statewide, and Arizona bald eagle breeding areas (BAs) were located within eight biotic communities (Brown 1994, The Nature Conservancy 2004): Sonoran Desertscrub (n=51 BAs) [Arizona Upland Subdivision (n=43); Lower Colorado River Valley Subdivision (n=8)], Rocky Mountain (Petran) Montane Conifer Forest (n=13), Semidesert Grassland (n=8), Plains and Great Basin Grasslands (n=7), Interior Chaparral (n=3), Great Basin Conifer Woodland (n=3), Mohave Desertscrub (n=1), and Subalpine Grassland (n=1). Other biotic communities visited included Chihuahuan Desertscrub and Madrean Evergreen Woodland.

The majority of bald eagle BAs in 2018 (69.0%, n=60) occurred at elevations below 3,500 ft. (1,067 m), and were located primarily in central Arizona within the riparian areas of the Sonoran Riparian Scrubland and Sonoran Interior Strands as described in Brown (1994) (Figure 1). Fewer BAs were at elevations between 3,500 and 7,000 ft. (1,067 to 2134 m) (24.1%, n=21) or above 7,000 ft. (>2,134 m) (6.9%, n=6). Representative riparian vegetation at lower elevations included Fremont cottonwood (*Populus fremonti*), Goodding willow (*Salix gooddingii*), Arizona sycamore (*Platanus wrightii*), and nonnative salt cedar (*Tamarix* spp.), with surrounding uplands of the Sonoran Desertscrub-Arizona Upland subdivision, Interior Chaparral, Semidesert Grassland and Great Basin Conifer Woodland. These areas are commonly vegetated with blue palo verde (*Parkinsonia florida*), mesquite (*Prosopis* spp.), ironwood (*Olneya tesota*), saguaro (*Carnegiea gigantea*), teddy bear cholla (*Cylindropuntia bigelovii*), juniper (*Juniperus* spp.), and pinyon pine (*Pinus edulis*).

In northwestern Arizona, two bald eagle BAs (Black Canyon and Nevada Bay) were located adjacent to the Colorado River within Mohave Desertscrub, where riparian vegetation was similar and uplands included creosote bush (*Larrea tridentata*), blackbrush (*Coleogyne ramosissima*), saltbush (*Atriplex* spp.), catclaw acacia (*Acacia* sp.), and a variety of cacti (e.g. silver cholla, *Cylindropuntia echinocarpa*). 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. Grassland communities contained a suite of mixed grasses and vegetation such as grama (*Bouteloua* spp.), agave (*Agave* spp.), yucca (*Yucca* spp.), and prickly pear cacti (*Opuntia* spp.), with degrees of invasion by scrubs, shrubs, and nonnative plants. In these areas, bald eagle nests occurred in stands of cottonwoods, ponderosa pine (*Pinus ponderosa*), or riverine cliffs. At higher elevations, BAs were found in Rocky Mountain Montane Conifer Forest, dominated by ponderosa pine, where riparian vegetation included narrow-leaf cottonwood (*Populus angustifolia*), thin-leaf alder (*Alnus tenuifolia*), Bebb's willow (*Salix bebbiana*), and coyote willow (*S. exigua*) (Brown 1994). Interior Chaparral consisted of pinyon-juniper woodland, shrub live oak (*Quercus turbinella*), and pointed (*Arctostaphylos pungens*) and pringle manzanita (*A. pringlei*).

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 (*Cynomys gunnisoni*) at Canyon de Chelly and Silver Creek, and may also influence habitat selection. Several BAs are located in the Phoenix metropolitan area and include no natural riparian communities, primarily containing artificial water formations such as recharge basins, urban ponds and lakes, and canals.

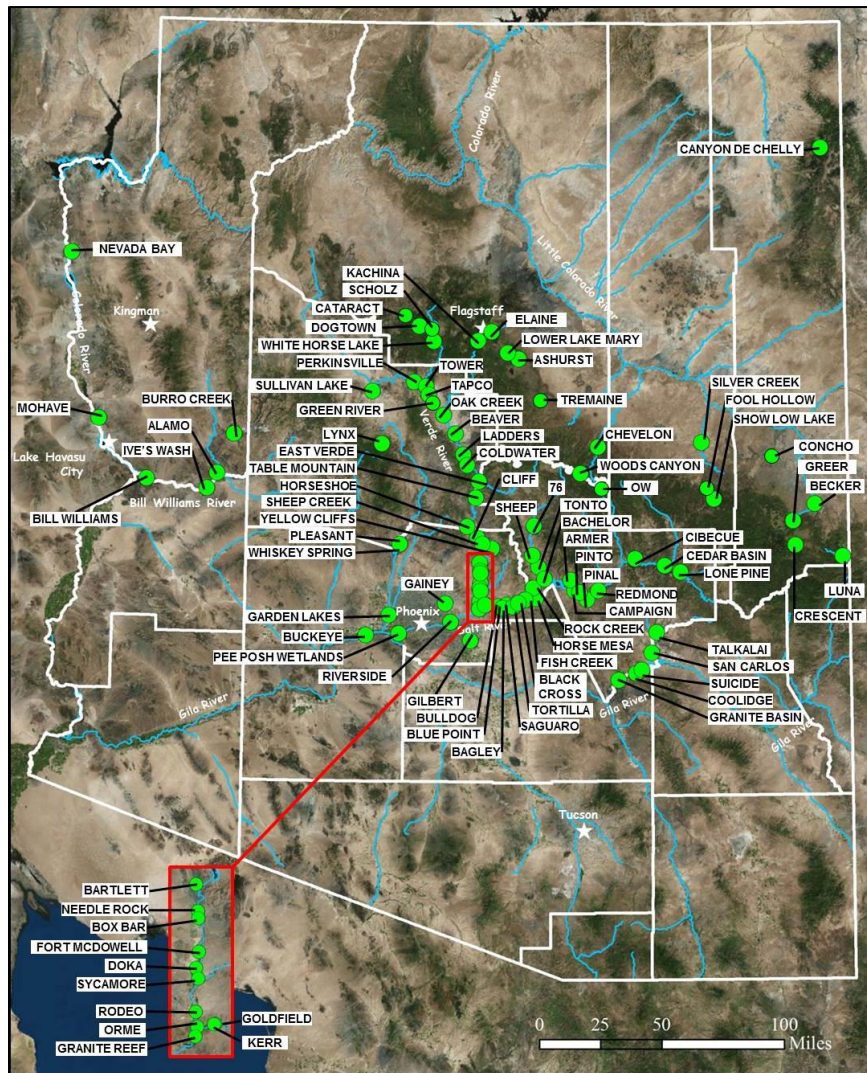


Figure 1. Location of known bald eagle breeding areas in Arizona, 2018.

In 2018, BAs were located along: Burro, Canyon, Cibecue, Oak, Pinal, Silver, Tonto, and Walnut creeks; Alamo, Apache, Ashurst, Bartlett, Canyon, Cataract, Chevelon Canyon, Crescent, Dogtown, Fool Hollow, Greer, Horseshoe, Lower Lake Mary, Luna, Lynx, Pleasant, Roosevelt, Saguaro, San Carlos, Scholz, Show Low, Talkalai, Tremain, 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 or ponderosa pine trees. However they have also occurred in sycamore, juniper, pinyon pine, willow, eucalyptus (*Eucalyptus sp.*), snags, and artificial structures (Grubb 1980, Hunt et al. 1992, McCarty and Jacobson 2012, McCarty et al. 2016).

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 Nankowep Creek (Brown and Stevens 1992).

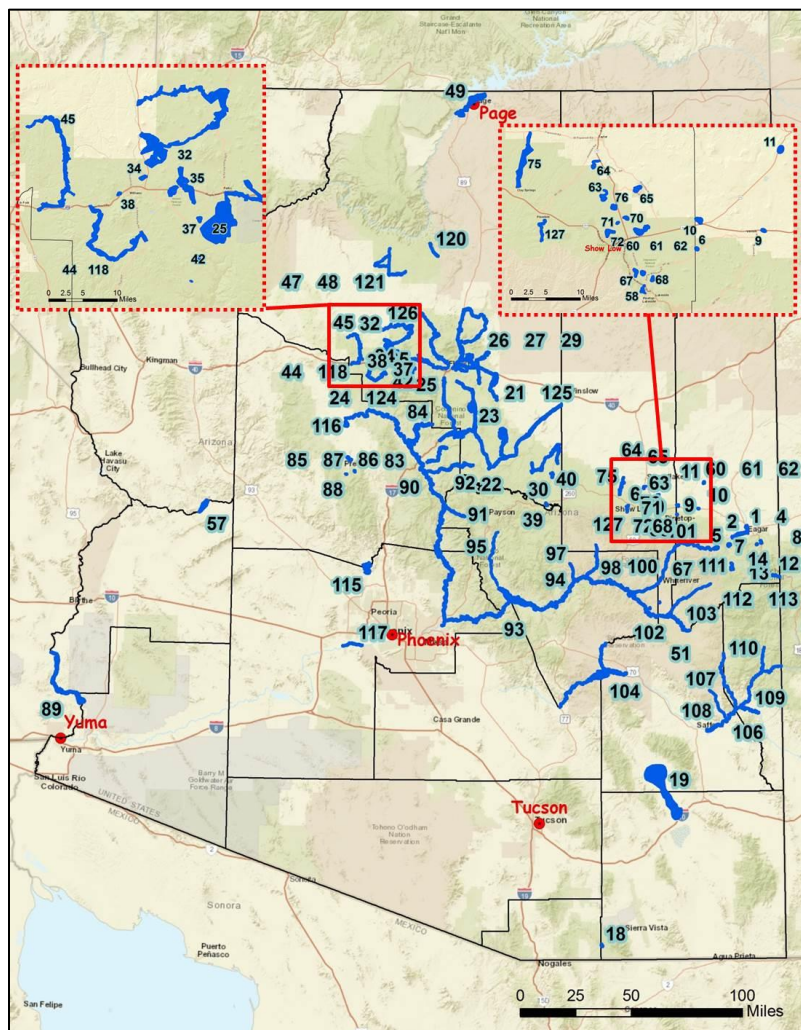


Figure 2. Map of the 2018 Arizona Bald Eagle Winter Count survey routes (blue outlines). County lines in black. See Appendix A for the associated route names.

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).

METHODS

We continued to use, and strived to complete, the established 102 standardized survey routes for the 2018 Arizona bald eagle winter count. Additionally, six non-standard routes were completed and integrated into this document for management purposes and were included as non-standard routes in the results submitted to the ACE. We scheduled the winter count for January 8 to 14, 2018, 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 26 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. This route will now be covered by air to ensure completion.

RESULTS AND DISCUSSION

The 2018 Arizona bald eagle winter count tallied 244 bald eagles, including 172 adults (70%), 63 subadults (26%), and 9 unknown eagles (4%). Participants covered 101 of 102 standardized routes (99%) with a total survey effort of 9,045 minutes (150.8 hours) (Tables 1 and 2).

The highest total number of bald eagles observed during ground surveys occurred in Coconino County (n=56) (Table 1), and the largest concentration on a single ground survey occurred near Flagstaff, AZ (n=12) (Appendix A). Also, a large number of bald eagles were observed by helicopter along the Verde River (n=38).

An additional 30 bald eagles were counted on six non-standard routes (Appendix A). Two of these routes totaled 26 bald eagles, including ten at Buckhead Mesa Landfill and 16 at Point of Pines Lake (aerial). The Point of Pines route was historically surveyed by ground, but a new route number was assigned last year for the aerial method. These two new routes will be included in the standardized route analysis of future Department technical reports, and will be included in the national trend analysis after four consecutive years of survey.

The total of 244 bald eagles in 2018 was slightly lower than the average of 248 birds observed annually during standardized counts, 2005-2017. Although the 2018 winter count was slightly above the 10-year average (n=240), long-term winter count trends in the Southwest have decreased by 2.2% per year over 25 years (Eakle et al. 2015). The age composition of this year's count (70% adult, 26% 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=99), most responded that this year's weather was either mild (38.4%) or very mild (36.4%), followed by normal (24.2%), and harsh (1.0%). There were no responses for very harsh weather. Similarly, of those that rated ice cover (n=94), most responded that it was much less than normal (46.8%), followed by normal (31.9%), and less than normal (21.3%). There were no responses for more than normal or much more 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.

Survey areas	Routes	Minutes	Adults	Subadults	Unknown ¹	Total	Total/ Hr.
Apache County	15	795	18	9	0	27	2.0
Cochise County	2	320	2	2	0	4	0.8
Coconino County	35	4,855	34	18	4	56	0.7
Graham County	Not surveyed.						
Mohave County	1	55	4	0	0	4	4.4
Navajo County	16	576	10	2	5	17	1.8
Santa Cruz County	1	60	0	0	0	0	0.0
Yavapai County	6	1,325	8	3	0	11	0.5
Yuma and La Paz County	1	300	0	0	0	0	0.0
Verde River drainage	3	202	28	10	0	38	11.3
Salt River drainage	9	321	46	15	0	61	11.4
Gila River drainage	8	207	14	1	0	15	4.3
Various helicopter	5	29	8	3	0	11	22.8
Totals	101	9,045	172	63	9	244	1.6

¹ Unknown age bald eagles and unidentified eagles.

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
2017	9,522	101 (99%)	1.6	169 (65%)	84 (32%)	8 (3%)	261
2018	9,045	101 (99%)	1.6	172 (70%)	63 (26%)	9 (4%)	244
Average	9,507	98 (96%)	1.6	170 (69%)	69 (28%)	9 (4%)	248

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.

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 four bald eagles. The national coordinators require at least four years of data before a route is included in trend analyses, although highly productive routes will be added to Department standardized route analysis immediately.

3. Compile spatial data from winter count survey maps to document the location and abundance of wintering bald eagles, identify important habitat use areas, and develop statewide maps for distribution to cooperating agencies.
4. Continue to collect data on other wintering raptors along survey routes in addition to eagles, and investigate the potential to standardize methods for wintering raptor data collection with other states and organizations.
5. Work with partners and volunteers to improve route coverage, especially in underrepresented areas of the state. Investigate assigning new routes in nontraditional bald eagle wintering locations in urban areas.

OCCUPANCY AND REPRODUCTIVE ASSESSMENT AND NEST SURVEY

INTRODUCTION

The 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. Glinski 1985, Hildebrandt and Glinski 1987, McCarty et al. 2017). The Department administered and performed the 2018 surveys in cooperation with the SWBEMC.

METHODS

We monitored breeding activity at current and historic BAs, nest sites discovered between 1992 and 2017, and also investigated reports of bald eagles and nests by other agencies, biologists, and the public. Outside of known BAs, the presence of large nests, habitat quality, previous sightings of bald eagles, and spacing between BAs prioritized survey effort. A two to three-person team conducted surveys between January and June 2018. 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, were flown 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. 2017).

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, some territories have been segmented into multiple smaller territories as pairs of eagles move in and create occupancies. Breeding area names are assigned to each of the new segments. In the event of a reduction in the number of occupied BAs, leaving one pair in an area previously occupied by two or more pairs, then occupancy status will be assigned to the breeding area that existed first.

RESULTS

All known BAs (n=87) were examined for breeding activity (Figure 1). Of 69 occupied BAs, 63 were active, and 44 pairs successfully produced 70 fledglings (Table 3; Appendix C) for a productivity of 1.01 statewide. The average estimated hatch date was March 2 (n=49), ranging from January 19 (Alamo BA) to April 25 (Dogtown BA). Hatch date was earlier at lower elevations, averaging February 21 at BAs below 3,500 ft. (1,067m) (n=31), March 14 at BAs from 3,500 to 7,000 ft. (1,067 to 2,134 m) (n=13), and March 25 at BAs above 7,000 ft. (n=5).

Number of BAs	87	Number of Active BAs	63
Number of Occupied BAs	69	Number of Failed Breeding Attempts	19
Number of Eggs (minimum)	102	Number of Successful Breeding Attempts	44
Nest Success = 44/69	0.64	Number of Young Hatched	87
Mean Brood Size = 70/44	1.6	Number of Young Fledged	70
		Productivity = 70/69	1.01

Noteworthy findings of the 2018 nest survey included three new bald eagle BAs, 19 new alternate nests within BAs (Ashurst #2, Bartlett #4, Burro Creek #3-4, Cedar Basin #9, Chevelon Canyon #5, Concho #2, Granite Reef #7, Ladders #9, Luna #2, Mohave #5-8, Pee Posh Wetlands #8, Tapco #6, Tonto #8, White Horse Lake #8, and Woods Canyon #12), 9 fallen nests within BAs (Ashurst #1, Greer Lakes #3, Horseshoe #11, Tapco #5, Tower #8, White Horse Lake #4 and #7, and Woods Canyon #4 and #10), and eleven new potential nests at six sites (Christopher

Creek #1, Dry Lake Crater #1, Horseshoe Cienega #1-5, San Bernardino #1-2, San Francisco #1, Willow Springs Lake #9).

Overview

Statewide productivity at Arizona bald eagle BAs in 2018 was 1.01 young fledged per occupied BA, with some differences among river systems and habitats. Most of this year's occupied BAs (74%, n=51) were along the Salt River, Verde River, or at high-elevation lakes. Among these groups, productivity on the Verde River was lowest (0.64, n=17) and BAs on the regulated Verde River had similar productivity (0.67, n=9) compared to those on the unregulated portion of the river (0.63, n=8). Productivity on the Salt River was highest (1.3, n=17). BAs on the regulated and unregulated Salt River (downstream vs. upstream of the Highway 288 bridge) had above-average (1.4, n=14) and average production respectively (1.0, n=3). At the high-elevation lake BAs (>5,500 ft.), productivity was slightly higher than the state average (1.1, n=17). The remainder of occupied BAs were spread out at various creeks, lakes, and rivers across the state with productivity at 1.0 (n=18). While statewide productivity varies from year to year, the trend since 2004 has hovered around 1.0 (Figure 3) and 2018 was slightly higher than the ten-year average (0.97) (Table 4).

The number of known bald eagle breeding areas in Arizona continues to grow steadily. This trend has been consistent since the 1990s, but has been especially apparent in the 2000s. From 2005 to 2018 approximately three new BAs have been identified each year. The three new BAs found this year (Cataract, OW, and Scholz) were all located on U.S. Forest Service (USFS) lands and add to the many high-elevation nest sites discovered in the state (41.5% of all new BAs since 2005 were found >5,500 ft.).

The continued creation of new breeding areas and discovery of new nests underscores the importance of ORA and survey 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.

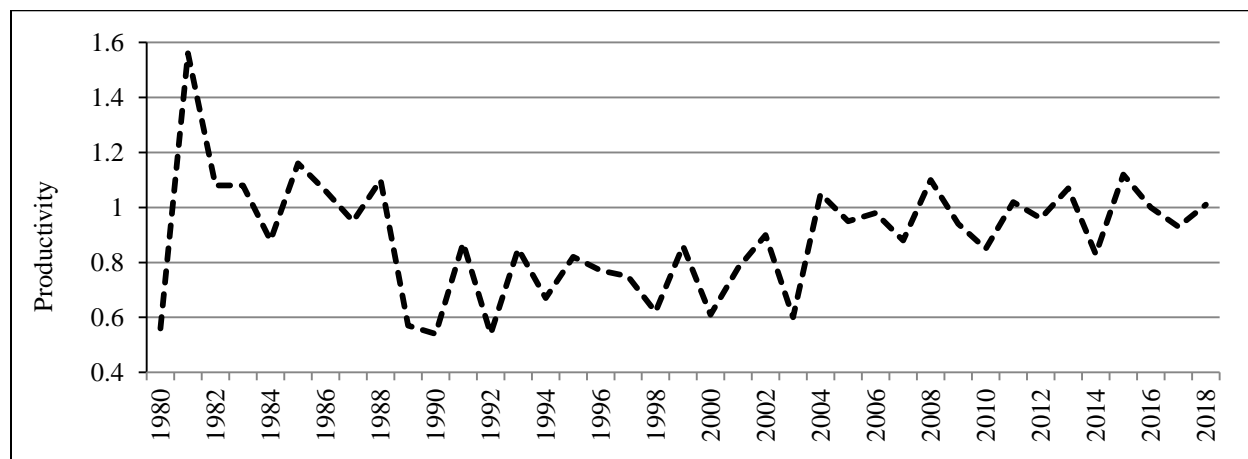


Figure 3. Productivity at bald eagle breeding areas in Arizona, 1980-2018.

	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009
Number of BAs	87	85	81	76	68	68	66	62	62	59
Number of occupied BAs	69	68	65	59	52	54	54	55	52	50
Occupancy rate (%)	79.3	80.0	80.2	77.6	76.5	79.4	81.8	88.7	83.9	84.7
Number of eggs (minimum)	102	97	97	90	73	79	80	80	69	78
Number of active BAs	63	60	60	56	47	49	50	51	48	48
Failed breeding attempts	19	25	19	17	17	14	19	17	21	19
Successful breeding attempts	44	35	41	39	30	35	31	34	27	29
Young hatched	87	82	79	75	58	71	66	66	57	68
Young fledged	70	63	65	66	43	57	52	56	44	47
Nest success	0.64	0.51	0.63	0.66	0.58	0.65	0.57	0.62	0.52	0.58
Mean brood size	1.6	1.8	1.6	1.7	1.4	1.6	1.7	1.6	1.6	1.6
Productivity	1.01	0.93	1.0	1.12	0.83	1.06	0.96	1.0	0.85	0.94

Results of the individual survey flights are located in Appendix D. Areas worthy of further discussion (new nests, potential nest sites, historic BAs, new breeding areas, bald eagle observations, fallen nests) are described below. 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)

Included below are descriptions of new large nests found in suitable habitat (new nest sites), new breeding areas discovered, and survey results and bald eagle sightings outside of known breeding areas.

Bluebell (new nest site). – On April 18, a new large nest (#1) was found on a cliff along the Bill Williams River. No eagles were seen.

Cataract Lake (new breeding area). – On April 30, a wildlife manager for the Department reported an active bald eagle nest at the lake. On May 4, a pair of adults was seen with two nestlings in the new nest (#1) in a live ponderosa pine tree (Figure 4).

Christopher Creek (new nest site). – On May 4, an osprey was found incubating in a new large nest (#1).

Dry Lake Crater (new nest site). – On April 24, a new large nest was found in a live ponderosa pine tree in Dry Lake Crater near Flagstaff. The nest was checked again on May 4 but there was no sign of activity.

Horseshoe Cienega Lake (new nest site). – On April 20, an adult bald eagle was seen flying low at the lake. Five new large nests (#1-5) were found in snags with ospreys incubating in nests #1 and #4. Another osprey flew from nest #5 but no eggs were observed.

OW (new breeding area). – On March 16, birdwatchers reported an active bald eagle nest on upper Canyon Creek. On March 22, an adult bald eagle was confirmed incubating in the new nest (#1) in a live pine tree (Figure 4).



Figure 4. Cataract (left) and OW (right) breeding areas.

Red Creek (Verde River). – On January 29, we searched Red Creek, a small tributary of the Verde River. There were some water flowing and large trees that could serve as substrate for bald eagles however no eagles or nests were seen.

Reservation Lake. – On April 20, one immature bald eagle was seen at the lake.

San Bernardino (new nest site). – On April 18, two large nests (#1-2) were found on cliffs on the California side of the Colorado River near Lake Havasu City.

Sunset Moonshine (new nest site). – On January 11, a new large nest (#1) was found on a cliff along the San Francisco River between Sunset and Moonshine Canyons.

Sycamore Creek (Verde River). – On January 19, we searched Sycamore Creek, a tributary of the Verde River near the sheep bridge (across from Tangle Creek). Many large trees line the creek and appear to be suitable for nesting bald eagles however no eagles or nests were seen.

Tonto Creek. – On April 20, we searched Tonto Creek from Gisela north to Hells Gate. No eagles or nests were found.

Location (*)	Date(s)	Survey Method	Results
Bluebell (4NE090)	4/18	Helicopter	New large nest (#1) found on cliff. No eagles.
Cataract Lake	5/4, 5/7	Ground, Helicopter	5/4: Two 6-week old nestlings. One adult in nest, second adult flew to nest.
Christopher Creek	5/4	Helicopter	Osprey incubating in new large nest (#1).
Dry Lake Crater	4/24, 5/4	Helicopter	4/24: New large nest (#1) found in tree. No eagles.
Horseshoe Cienega Lake	4/20	Helicopter	One adult bald eagle flying. Five new large nests found in snags (#1-5). Ospreys incubating in nests #1 and #4.
Kinnikinick Lake	5/4	Helicopter	No nests or eagles.
OW	3/22, 4/20, 5/4	Ground, Helicopter	3/22: Adult incubating in new large nest (#1).
Red Creek	1/29	Helicopter	No nests or eagles.
Reservation Lake	4/20	Helicopter	No nests. One immature bald eagle seen.
San Bernardino	4/18	Helicopter	Two new large nests (#1-2) found.
Sunset Moonshine	1/11	Helicopter	New large nest (#1) found on cliff.
Sycamore Creek	1/19	Helicopter	No nests or eagles.
Tonto Creek	4/20	Helicopter	No nests or eagles.

*Parentheses indicates site identification number in the Department's golden eagle database.

Potential Nest Sites (Table 6)

Below are findings at previously documented potential nest sites, including observations of bald eagles, new nests, fallen nests, and nesting activity of other species.

Buckskin 2. – On April 18, a new large nest (#3) was found on a cliff. A pair of adult peregrine falcons were flying and vocalizing in front of the cliff face, and a falcon egg was seen in a small indent of the cliff (no nest materials present).

Buckskin 5. – On April 18, a new large nest (#6) was found on a cliff.

Havasu Wilderness 1. – On April 18, two new large nests (#3 and #4) were found on cliffs.

Malpais. – On April 18, a new large nest (#3) was found on a cliff.

Pineasco Creek. – On January 30, two adult bald eagles were seen, one just downstream and one just upstream of nest #1.

Scholz Lake (new breeding area). – On May 4, an adult bald eagle was seen in nest #1 with two nestlings about two weeks old (Figure 5), and a second adult was seen at the lake. We suspect the breeding pair moved to here from the White Horse BA based on several observations: The White Horse BA was not confirmed to be occupied this year; satellite telemetry data from a 2017 White Horse Lake juvenile showed use of Scholz Lake in the post-fledging period; and nestwatcher observations from previous seasons of monitoring at White Horse BA indicated that the breeding pair seldom foraged at the lake there. Still, we designated Scholz as a new BA because the distance between the two lakes is over five miles, which is enough space for two pairs to occupy.

Bear Canyon Lake. – On May 4, ospreys (*Pandion haliaetus*) were incubating in nests #3 and #5. Nests #1, #2, and #4 were considered fallen. No bald eagles were seen.

George’s Basin. – On January 12 and March 16, two adult bald eagles were perched together. Nest #1 was empty.

Granite. – On March 19, a golden eagle was incubating in nest #2.

JD Dam Lake. – On May 4, an osprey was incubating in nest #1. Nest #3 was not found.

Kaibab Lake. – On May 4, ospreys were incubating in nests #1, #2, #3, and #5 (Figure 5). Nests #4 and #6 not found.



Figure 5. Bald eagle at Scholz Lake breeding area (left) and Osprey at Kaibab Lake nest site (right).

Knoll Lake. – On May 4, an osprey was perched near nest #5 which had some greenery inside. Nests #6 and #7 were not found.

Upper Lake Mary. – On May 4, ospreys were incubating in nests #1, 2, 9, and 11. A pair of ospreys was copulating at nest #5, and one osprey was standing by nest #7. Nests #3, 4, and 6 were not found.

Willow Springs Lake. – On May 4, ospreys were seen incubating in nests #2, 4-6, and in a new snag nest (#9). Nest #3 was fallen.

Table 6. Arizona bald eagle nest survey summary, 2018 potential nest sites.			
Location*	Date(s)	Survey Method	Results
Bear Canyon Lake	5/4	Helicopter	Ospreys incubating in nest #3 and #5. Nests #1, 2, 4 fallen.
Big Sand Bar (3NE123)	4/18	Helicopter	Nest #1 empty. No eagles.
Buckskin 1 (4NE083)	4/18	Helicopter	Nest #1 empty. No eagles.
Buckskin 2 (4NE084)	4/18	Helicopter	Nests #1-2 empty. New large nest (#3) found. Pair of peregrine falcons, one egg seen in cliff aerie.

Table 6 continued.			
Location*	Date(s)	Survey Method	Results
Buckskin 3 (4NE085)	4/18	Helicopter	Nests #1-2 empty. No eagles.
Buckskin 4 (4NE087)	4/18	Helicopter	Nest #1 empty. No eagles.
Buckskin 5 (4NE088)	4/18	Helicopter	Nests #1-5 empty. new large nest (#6) found. No eagles.
Buckskin 6 (4NE089)	4/18	Helicopter	Nests #1-4 empty. No eagles.
Buckskin Mesa (4NE086)	4/18	Helicopter	Nests #1-5 empty. No eagles. Adult red-tailed hawk nearby.
Cross Current (3NE122)	4/18	Helicopter	Nests #1-2 empty. No eagles.
Havasu Wilderness 1 (4NE055)	4/18	Helicopter	Nest #1 empty. Two new large nests (#3-4) found on cliff. No eagles.
George's Basin	1/12, 3/16, 4/20	Helicopter	1/12 & 3/16: Pair of adults perched.
Granite (2GE049)	1/8, 1/29, 2/15, 3/19, 4/24, 5/22, 6/15	Ground, Helicopter	3/19: Adult golden eagle incubating in nest #2. 4/24: One golden eagle nestling, one week old.
Hidden Valley	3/19	Helicopter	All known nests empty. No eagles.
Indian Rapids (3NE124)	4/18	Helicopter	Nest #1 empty. New large nest (#2) found. No eagles.
JD Dam Lake	5/4	Helicopter	Osprey incubating in nest #1. Nest #3 not found.
Kaibab Lake	5/4	Helicopter	Ospreys incubating in nests #1, 2, 3, and 5. Nests #4 and #6 not found. Nest #7 empty.
Knoll Lake	5/4	Helicopter	Nest #5 empty but with greenery. Nests #6 and #7 not found.
Lost Mule (1GE056)	1/12, 3/16	Helicopter	Nests #1-2 empty. No eagles.
Malpais (3NE126)	4/18	Helicopter	Nests #1-2 empty. New large nest (#3) found. No eagles.
Mile 320 (3NE127)	4/18	Helicopter	Nests #3-5 empty. #1-2 not seen. No eagles.
Mount Davis (3NE119)	4/18	Helicopter	Red-tailed hawk incubating or brooding in nest #2. No eagles.
Mormon Pocket (2GE031)	1/8, 1/29, 3/19, 4/24	Helicopter	Nests #1-2 empty. No eagles.
Needles Eye (6NE107)	1/30, 3/16	Helicopter	1/30: nests #1-2 empty. 6/16: Nest #1 empty, #2 not found. No eagles.
Pineasco Creek	1/30, 3/16, 4/20	Helicopter	1/30: Two adults in area.
Porphyry Gulch (6NE129)	1/30, 3/16	Helicopter	All known nests empty. No eagles.
Rankin Ranch (3NE118)	4/18	Helicopter	Nest #1 empty. No eagles.
Rawhide 1 (3NE054)	4/18	Helicopter	Nest #3 empty. No eagles.
Roaring Rapids (3NE125)	4/18	Helicopter	Nests #1-2 empty. No eagles.
Ringbolt Rapids (3NE115)	3/20	Helicopter	Nests #1-2 empty. No eagles.
Two Bar	1/18, 1/30	Helicopter	Nests #1-3 empty. No eagles.
Upper Lake Mary	5/4	Helicopter	Ospreys incubating in nests #1-2, 9, 11. Pair of ospreys copulating at nest #5. Osprey standing by nest #7. Nest #8 empty. Nests #3, 4, 6 not found.
Watson Lake (3GE010)	3/19	Helicopter	Nest #1 empty. Nest #2 gone/deteriorated.
Willow Springs Lake	5/4	Helicopter	Nest #3 fallen. Ospreys incubating in nests #2, 4-6 and new large nest in snag (#9). Nest #8 empty.

*Parentheses indicates corresponding site identification number in the Department's golden eagle database.

Historic Breeding Areas (Table 7)

Below are findings at historic breeding areas including observations of bald eagles, new nests, fallen nests, and nesting activity of other species.

Cedar Basin. – On January 12, a new large nest (#9) was found in a sycamore tree.

Devil’s Post. – On March 19, we observed three large nests in the same vicinity which included nests #6 and #7. The third nest was in poor condition and appears to have been first seen in 2011 according to survey notes from that year mentioning additional nests near #6 and #7 but no new nest numbers were assigned. This “new” nest will be designated as nest #9 with a discovery year of 2011.

Table 7. Arizona bald eagle nest survey summary, 2018 historic breeding areas.			
Location	Date(s)	Survey Method	Results
Canyon	1/18	Helicopter	No new nests or eagles.
Cedar Basin	1/12, 1/30	Helicopter	1/12: New nest (#9) found. No eagles.
Devil’s Post	3/19	Helicopter	Nests #5, 7-9 empty. No eagles.
Hell Point	1/8, 1/29, 3/19	Helicopter	Nest #2-5empty. No eagles.
Mule Hoof	1/12	Helicopter	Nest #1 empty. No eagles.
Winkelman	1/18	Helicopter	No new nests or eagles.

Breeding Areas (Table 8)

Below are findings at known breeding areas, limited to observations of bald eagles without active nests, new nests, fallen nests, and breeding activity of other species.

Ashurst BA. – On February 24, nest #1 was fallen. During a ground visit on April 2, an adult bald eagle was seen flying with a fish toward a new nest (#2) in a snag. An adult was sitting in the new nest and nestlings were assumed to be present.

Bartlett BA. – On April 24, a new large nest (#4) was found on a cliff.

Burro Creek BA. – On January 29, two new large nests were found on cliffs (#3, 4).

Chevelon Canyon Lake BA. – On March 29, the USFS found an adult bald eagle in a new nest (#5) in a live pine tree.

Cliff BA. – On January 29 and February 2, two adults were seen perched near Horseshoe Dam. Nestwatchers observed the adults throughout February but no nesting behavior occurred.

Concho BA. – On January 30, a pair of adult bald eagles was seen perched by a new nest (#2) in a live cottonwood tree.

Coolidge BA. – On March 16, one adult bald eagle was seen perched.

Doka BA. – On January 8, two adult bald eagles were perched together. On January 29 they were perched by nest #3, and on March 19 they were both standing in nest #3. Nestwatchers observed the adults perched at or moving materials within nest #7 in February but no eggs were laid in either nest.

East Verde BA. – On January 8, two adult bald eagles were seen upstream of nest #6. On January 29, a near-adult was in the area. A pair of adults was standing in nest #6 on March 19 but no eggs were observed.

Fort McDowell. – On October 10, FMYN reported that nest #15 and the entire nest tree had fallen.

Granite Basin BA. – On January 18, an adult bald eagle was perched near nest #2. On January 30, an adult was again perched by nest #2 which appeared to have some soft materials on it.

Granite Reef BA. – In early November 2017, SRP personnel reported a pair of adult bald eagles building a nest (#7) near Granite Reef Diversion Dam. On January 11 and 18, a pair of adults was seen at the new nest, and incubation was observed on January 29.

Greer BA. – On March 16, nest #3 was fallen.

Horseshoe BA. – On March 19, nest #11 was fallen.

Kachina BA. – On February 24, one adult bald eagle was perched on the nest platform (#1). A second adult was seen flying toward the platform carrying a large stick, then flew around it and continued to the west. The perched adult followed and both flew out of view. There were very few (or no) sticks on the platform, and no new nests were found. On April 24 and May 4, an osprey was incubating in nest #1.

Kerr BA. – A pair of adults was regularly observed by nestwatchers from February through most of April.

Ladders BA. – On January 8, a new large nest (#9) was found on a cliff.

Luna BA. – On January 15, nestwatchers Joe and Marta Peddie located a new nest (#2) in a live pine tree, and observed an adult incubating in the new nest by February 2.

Mohave BA. – On April 18, four new large nests (#5-8) were found on cliffs . No eagles were seen.

Orme BA. – On January 18, one adult bald eagle was standing in nest #10 and a second adult flew to a perch by the nest. On January 29, one adult was perched downstream of the nest area. Nestwatchers observed a pair of adults on several occasions until mid-March, but no eggs were laid.

Pee Posh Wetlands BA. – On September 29, 2017, SRP, the Gila River Indian Community, and the Department collaborated to install an artificial nest platform on a pole placed within the breeding area (Figure 6). The only previously-existing nest (#7) was in a snag vulnerable to falling, and currently there are no live trees in the area large enough to hold an eagle nest. Concern about the state of nest #7 was elevated when a neighboring snag was toppled by high winds on April 12 this year and fell against the nest tree, force-fledging one of the nestlings. The new platform nest (#8) will provide a stable nest site should other alternatives fail.



Figure 6. Installation of nest platform (#8) at Pee Posh Wetlands BA on September 29, 2017. Photos by K. McCarty.

Perkinsville BA. – On January 29, an adult bald eagle was seen upstream of nest #4, and on March 19 one adult was soaring in the area. On June 14, a blue VID band was found (still attached to the leg bone) by the public in Chino Valley, AZ. The band number (5 over S) belonged to a female bald eagle banded as a nestling in 1994 at the 76 BA, and was confirmed through band-reading efforts as a breeder at the Perkinsville BA starting in 2000. We assume this bird continued breeding at Perkinsville through 2017 and died prior to the 2018 breeding season because there was no nest activity this year and only one adult was observed.

Pleasant BA. – On January 29, an adult bald eagle was seen flying along the river.

Riverside Ruin BA. – On October 3, SRPMIC reported that nest #1 and the nest branch had fallen.

Rock Creek BA. – During two surveys (March 16 and April 20) no eagles were seen and no new nests were found. Nest #2 was in very poor condition and there were no signs of occupancy, making 2018 the tenth consecutive year that this BA has been unoccupied. Rock Creek will now be designated a historic BA, although it will be monitored during future aerial surveys.

Tapco BA. – On January 8, nest #5 was partially fallen. On January 29, an adult bald eagle was incubating in a nest (#6) in a live cottonwood tree.

Tower BA. – On January 8, nest #8 was considered deteriorated beyond recognition. The nest had been steadily degrading after many years of neglect.

White Horse BA. – On April 24, nest #7 was mostly fallen, and nest #4 (platform) was considered fallen with only two boards remaining. An osprey was incubating in a new nest (#8). Ospreys were standing by nests #1 and #6.

Woods Canyon BA. – On March 23 the USFS reported nest #10 had fallen since last year, and they found a new active nest (#12) in a snag on March 26. On May 4, ospreys were incubating in nests #6, 7, and 11. Nests #4 and 5 were also fallen.

Location	Date(s)	Survey Method	Results
Ashurst	2/24, 4/2, 4/24, 5/4, 5/22	Ground, Helicopter	2/24: Nest #1 fallen. 4/2: Adult standing in new nest in snag (#2), possibly brooding.
Bartlett	1/8, 1/29, 3/19, 4/24	Helicopter	4/24: New large nest found on cliff (#4).
Burro Creek	1/29, 3/19	Helicopter	1/29: Two new large nests found (#3-4).
Chevelon Canyon Lake	4/20, 5/4	Helicopter	4/20: Adult possibly brooding in new nest (#5).
Cliff	1/8, 1/29, 2/2, 3/19	Ground, Helicopter	1/29 & 2/2: Pair of adults perched near dam.
Concho	1/30, 3/16, 4/19	Ground, Helicopter	1/30: Two adults perched by new nest (#2).
Coolidge	1/18, 1/30, 3/16	Helicopter	3/16: One adult perched.
Doka	1/8, 1/29, 3/19	Helicopter	1/8: Pair of adults perched. 1/29 & 3/19: Pair of adult perched at nest #3.
East Verde	1/8, 1/29, 3/19, 4/24	Helicopter	1/8: Pair of adults in area. 1/29: Near-adult in area. 3/19: Pair of adults perched in nest #6.
Fort McDowell	1/8, 1/29, 3/19, 4/24, 5/4	Helicopter	10/10: Nest #15 fallen.
Granite Basin	1/18, 1/30, 3/16	Helicopter	1/18 & 1/30: One adult perched near nest #1.
Granite Reef	11/21, 1/11, 1/18, 1/29, 3/16, 4/20, 5/4	Ground, Helicopter	11/21: New nest (#7) observed, one adult in area. 1/29: Adult incubating in new nest #7.
Greer	3/16, 4/20, 5/3	Ground, Helicopter	3/16: Nest #3 fallen.
Horseshoe	1/8, 1/29, 3/15, 3/19, 4/24	Helicopter	3/19: Nest #11 fallen.
Kachina	2/24, 4/2, 4/24, 5/4	Ground, Helicopter	2/24: Pair of adults at nest #1, one carrying a stick. 4/24 & 5/4: Osprey incubating in nest #1.
Kerr	1/18, 1/30	Helicopter	All known nests empty. No eagles.
Ladders	1/8, 1/29, 3/19, 4/23, 4/24, 5/4	Ground, Helicopter	1/8: New nest (#9) found on cliff. One adult downstream.

Table 8 continued.			
Location	Date(s)	Survey Method	Results
Luna	4/12, 4/13	Ground	4/12: New nest (#2) empty, failed.
Mohave	4/18	Helicopter	Four new large nests found (#5-8).
Nevada Bay	2/16, 4/18	Helicopter	2/16: Nest #1, 4 fair. #2 not found. Two other nests found.
Orme	1/8, 1/18, 1/29, 3/19	Helicopter	1/18: Two adults at nest #10. 1/29: One adult downstream.
Pee Posh Wetlands	9/29, 1/8, 1/29, 3/29	Ground, Helicopter	9/29/17: Installation of artificial nest platform (#8).
Perkinsville	1/8, 1/29, 3/19, 4/24	Helicopter	1/29: One adult upstream. 3/19: One adult soaring.
Pleasant	1/8, 1/29, 3/19	Helicopter	1/29: One adult flying along river.
Riverside	1/8, 1/18, 1/29, 2/27, 3/19, 4/16, 4/24	Helicopter, Ground	10/3: Nest #1 fallen.
Rock Creek	3/16, 4/20	Helicopter	Nest #2 empty. No eagles.
Tapco	1/8, 1/29, 3/19	Helicopter	1/8: Nest #5 partially fallen. 1/29: Adult incubating in new nest (#6).
Tower	1/8, 1/29, 3/19	Helicopter	1/8: Nest #8 gone.
White Horse	4/24, 5/4	Helicopter	4/24: Nests #4 and 7 mostly fallen. Osprey incubating in new nest #8. Ospreys standing by nests #1 and #6. nest #5 empty.
Woods Canyon	4/20, 5/4	Helicopter	4/20: Adult incubating in new nest (#12). 5/4: Ospreys incubating in nests #6-7, 11. Nests #4-5 fallen.

Breeding Areas in Surrounding States (Table 9)

Black Canyon BA (Nevada). – On April 18, two adults were perched near nest #1. No eggs or young were seen, and no new nests were found.

Copper Basin BA (California). – Personnel from the Metropolitan Water District of Southern California reported observations of one nestling flexing and flapping its wings at a cottonwood tree nest on May 12, and that the bird had fledged by May 23.

Table 9. Bald eagle breeding area observations in surrounding states, 2018.			
Location	Date(s)	Survey Method	Results
Black Canyon, NV	4/18	Helicopter	Pair of adults perched near nest #1.
Copper Basin, CA	--	--	5/23: One fledgling observed.

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 recently discovered breeding areas, including Ashurst, Bachelor Cove, Black Cross, Chevelon, Concho, Dogtown, Elaine, Fool Hollow, Green River, Kachina, Mohave, OW, Nevada Bay, Scholz Lake, Sheep Creek, 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. Examine the following areas for breeding bald eagles and/or nests:
 - Agua Fria River drainage – Upstream from Lake Pleasant.
 - Anderson Mesa and area lakes – Deep Lake, Horse Lake, Kinnikinick Lake, Long Lake, Marshall Lake, Potato Lake, Prim Lake, Yaeger Lake.
 - Big Sandy River drainage – upper Trout Creek.
 - 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, Dry, Knoll, Lyman, Nash Creek, Point of Pines, Rogers, Willow Springs.
 - Colorado River drainage – Gene Wash Reservoir (CA), 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.
 - Prescott area lakes – Watson, Willow, and Goldwater.
 - Gila River drainage – Lower Blue River, San Francisco River, Gila Box, Gila River bottom through Phoenix metro area.
 - Salt River Drainage – Search at least two miles upstream on major washes and creeks around Roosevelt Lake (e.g., Greenback Creek, Salome Creek, Pinto Creek); Tonto Creek north of Tonto BA; Cherry Creek; Redmond BA to Lone Pine BA; major 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 – Big Lake, Carnero, Christmas Tree, Horseshoe Cienega, Hawley, Lee Valley Reservoir, Nelson Reservoir, Nutrioso, Pacheta, Reservation.
 - White River – Whiteriver to confluence with Black and Salt Rivers.
 - Williams area lakes – JD Dam, Kaibab, and Santa Fe Reservoir.

BALD EAGLE MONITORING IN SONORA, MEXICO

In 2018 the Comisión de Ecología y Desarrollo Sustentable del Estado de Sonora (CEDES), a government wildlife agency in Sonora, Mexico, received funding to conduct surveys for nesting bald eagles in the Yaqui-Bavispe River Basin. The first active bald eagle nest in the Yaqui River

drainage was discovered in 1986 (Brown et al. 1987), and four other breeding areas were found along the Yaqui and Aros Rivers in 1987 (Brown 1988, Brown and Olivera 1988). Additional surveys were conducted during the nesting season through 1992 and included the discovery of a sixth breeding area in 1991 along the Bavispe River (Brown et al. 1989, Brown et al. 1990, Mesta et al. 1991, Mesta and Romero 1993). Personnel from CEDES traveled to Arizona in early February 2018 and met for several days with the Department, USFWS, and Robert Mesta (Liberty Wildlife). In addition to information exchange, the meeting served as a training session for the CEDES researchers on bald eagle monitoring, life history, and management. The Department also led a field trip to observe bald eagles and nests along the Salt River and Saguaro Lake.

In March and April 2018, the CEDES team and Robert Mesta surveyed three of the historic breeding areas (Hecho, Sierra, and Sahuaripa). On March 23 at the Hecho BA, near the town of Soyopa along the Yaqui River, a new nest was found in a tree with one nestling present and a pair of adult bald eagles in flight. During a second visit on April 23, one nestling was observed at approximately 6 weeks old (Figure 7). The Sierra BA, also near Soyopa, was surveyed on March 24 and April 24. A nest was found on a cliff in good condition but no eagles were observed during either visit (Figure 7). The Sahuaripa BA was surveyed on March 25 and a cliff nest was found with an adult bald eagle in incubation posture. The next morning, a pair of adults was seen perching. During surveys on April 25, no eagles were seen at the Sahuaripa nest. However the following morning both adults were observed perched away from the nest, and the nesting attempt was considered failed.



Figure 7. Nestling at the Hecho BA on April 23, 2018 (left), and nest at the Sierra BA (right), Sonora, Mexico. Photos courtesy of CEDES.

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 2018. 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 BAs to be monitored by weighing the level of recreation activity and management needs. Included are those with seasonal closures (Box Bar, Cliff, Concho, Crescent, Fool Hollow, Goldfield, Luna, Tonto, Whiskey Spring, and Woods Canyon), those without (Cataract, Granite Reef, Orme, Rodeo, Sycamore, and Tapco), and those monitored opportunistically for information (Bachelor Cove, Doka, Fort McDowell, Kerr, and Scholz). In the fall of 2017, 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 44 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 2 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 to 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.

At the Box Bar, Cataract Lake, Concho, Fool Hollow, Whiskey Spring, and Woods Canyon BAs, nestwatchers recorded human activity differently than described above. At the Box Bar BA, nestwatchers had a limited view of the area to the north, east, and south of the nest tree and no view to the west, and therefore were only able to observe human activity occurring within about 250 m of the nest tree. At Cataract Lake, nestwatchers only recorded human activity north of the dam. At Concho, because Highway 61, residences, and other permanent structures occur within 1 km of the nest tree, nestwatchers limited their recording of human activity to the lake area east of the highway. At Fool Hollow Lake, nestwatchers had a limited view of their surroundings and were only able to document human activity occurring within about 200 m of the nest tree. At the Whiskey Spring BA, nestwatchers monitored compliance with the closure by documenting the number of boats and jet skis approaching the buoy line and those that entered. If the watercraft entered the closure and proceeded past the nestwatchers, they were documented as “inside the closure.” They recorded compliance with the closure or those who were contacted by the nestwatchers as “at the closure.” At the Woods Canyon BA, there was a high volume of recreationists at the lake. There, nestwatchers only recorded eagle responses to activities within

about 200 m of the nest or an eagle, as well as visitors to the observation point and any activity that elicited a significant response from an eagle.

In addition to recording human activity and associated eagle responses, nestwatchers documented 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.

RESULTS AND DISCUSSION

The ABENWP monitored 23 breeding areas (either full or part-time) in 2018 including Bachelor Cove, Box Bar, Cataract, Cliff, Concho, Crescent, Doka, Fool Hollow, Fort McDowell, Goldfield, Granite Reef, Kerr, Luna, Needle Rock, Orme, Pleasant, Rodeo, Scholz, Sycamore, Tapco, Tonto, Whiskey Spring, and Woods Canyon. The final status of these monitored BAs was 4 failed, 13 successful, 4 occupied-only, and 18 young fledged (Appendix C).

The Bachelor Cove, Cliff, Doka, Fort McDowell, Kerr, Needle Rock, Orme, Pleasant, Rodeo, Scholz, and Tonto 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, Figure 8)

Observation Period. – February 2 to May 24. Total monitoring 939 hours over 86 days.

Bald Eagle Identification. – The male was unbanded and in adult plumage (unknown origin). The female had a blue Visual Identification (VID) band “24/S” on her 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. 2) On April 3, two nestlings were blue VID banded “42/A” and “43/A” at 4.5-5 weeks of age. 3) On May 2, backpack transmitters were attached to both nestlings at 9 weeks of age.

Interventions. – On May 11, the Department recovered a pre-fledged juvenile from the ground below the nest tree. It was placed back into the nest, subsequently the second juvenile left the nest and was not located. On May 12, the second juvenile was found, recovered, and placed back in the nest tree. On May 16, one juvenile was again on the ground below the nest and the Department placed it back in the nest tree. On May 17, nestwatchers again reported one of the juveniles was on the ground; the eagle was recovered by the Department and took it to Liberty Wildlife Rehabilitation. The juvenile was replaced to the nest on May 22.

Human Activity. – Nestwatchers recorded 1,494 human activities. Aircraft activity (small planes, helicopters, drones, and jets) represented 58.8%, terrestrial activity of 16 types 37.1%, and water pursuits (canoe/kayak, rafter/tuber, stand-up paddleboard) 4.0%. Six types of activities elicited

24 significant responses from the breeding pair. The bald eagles were restless in response to six nestwatchers and six Department personnel (mainly during banding and rescues activities), three small plane, two helicopter, one hiker, and one unknown noise. The eagles flushed in response to three nestwatchers and two Department personnel (mainly during banding and rescues activities).

Food Habits. – The nestwatchers observed 14 forage events, with fish accounting for 100%. The male was successful in 100% (n=6) and the female in 87.5% (n=8) of forage events. The breeding pair was observed delivering 103 prey items to the nest, of which the male delivered 49.5%, the female 48.5%, and an unidentified adult 1.9%. Fish comprised 77.7%, mammals 3.9%, birds 1.9%, and unknown prey 16.5% of the deliveries. Of the 13 prey items further identified, 30.8% (n=4) were unidentified bass species, 15.4% (n=2) were tilapia (*Oreochromis sp.*), and 7.7% (n=1) each were rainbow trout (*Oncorhynchus mykiss*), catfish species, sunfish species, sucker species, rabbit species, and double-crested cormorant (*Phalacrocorax auritus*).

Habitat Use. – The Box Bar nestwatchers identified ten separate perch locations spanning 3.2 km of the Verde River ranging from river kilometer (rk) 25.3 to 28.5, and one perch location at the Tonto Verde Golf Course. The bald eagle pair spent 97.2% of the observed time at rk 25.7 and 2.8% at the remaining locations.



Figure 8. Box Bar (left) and Cataract (right) breeding areas. Maricopa and Coconino Counties, Arizona. Photos by K. McCarty and C. Hartson.

Cataract Breeding Area (Appendix F, Figure 8)

Observation Period. – May 25 to June 21. Total monitoring 124 hours over 25 days.

Bald Eagle Identification. – The male had a blue VID band “28/K” on his left leg, USFWS band on the right leg, and was in adult plumage (2012 Lower Lake Mary nestling). The female was unbanded and in adult plumage (unknown origin).

Management Activities. – 1) On May 7, two nestlings were blue VID banded “65/A” and “66/A” at 5.5 weeks of age.

Interventions. – On June 2, a wildlife manager for the Department recovered a pre-fledged juvenile from the ground below the nest tree and transferred it to Liberty Wildlife Rehabilitation

the next day. A backpack satellite transmitter was attached to this juvenile on June 6, and the eagle was placed back in the nest tree on June 8.

Human Activity. – Nestwatchers recorded 94 human activities. Terrestrial activity of 6 types represented 98.9%, and aircraft (small planes) 1.1%. Five types of activities elicited 17 significant responses from the breeding pair. The bald eagles flushed in response to 7 anglers, 4 hikers, 3 dogs, 2 birdwatchers, and 1 photographer.

Food Habits. – The nestwatchers observed one forage event by the male eagle, who was unsuccessful in chasing an unidentified waterfowl. The breeding pair was observed delivering 11 prey items to the nest, of which the male delivered 63.6%, the female 36.4%. Fish comprised 54.5% and unknown prey 45.6% of the deliveries. Of the 6 prey items further identified, 50% each (n=3) were rainbow trout and channel catfish (*Ictalurus punctatus*).

Habitat Use. – The Cataract nestwatchers identified seven separate perch locations, all on the north side of the lake. The bald eagle pair spent 46.3% of the observed time at perch 1 (above the nest), 23.4% at perch 2 (near shore), 20.3% at perch 3 (near shore), and 9.9% at the remaining locations.

Concho Breeding Area (Appendix G, Figure 9)

Observation Period. – March 16 to May 22. Total monitoring 379 hours over 52 days.

Bald Eagle Identification. – The male and female were in adult plumage. The band status of the resident adult eagles at Concho Lake was not determined.

Management Activities. – 1) “No Entry” signs were placed around the perimeter of the nest area. 2) On April 19, one male nestling was blue VID banded “57/A” at 5.5 weeks of age.

Human Activity. – Nestwatchers recorded 44 human activities. Terrestrial activity of six types represented 75.0%, aircraft activity (small planes, helicopters) 18.2%, and water pursuits (canoe/kayak, boat) 6.8%. Three types of activities elicited five significant responses from the breeding pair. The bald eagles were restless in response to one angler. The eagles flushed in response to three hikers and one cattle.

Food Habits. – The nestwatchers observed 36 forage events, with fish accounting for 83.3%, mammals 8.3%, birds 2.8%, and unknown prey 5.6%. The male was successful in 45.5% (n=22), the female in 23.1% (n=13), and an unidentified adult in 0% (n=1) of forage events. The breeding pair was observed delivering 26 prey items to the nest, of which the male delivered 50.0% and the female 50.0%. Fish comprised 65.4%, mammals 3.8%, and unknown prey 30.8% of the deliveries. Of the 8 prey items further identified, 75.0% (n=6) were common carp (*Cyprinus carpio*), and 12.5% (n=1) each were desert cottontail (*Sylvilagus audubonii*) and rainbow trout.

Habitat Use. – The Concho nestwatchers identified 35 separate perch locations at the lake. The bald eagle pair spent 43.2% of the observed time at perch A (near the nest tree), 16.3% at perch

B (by shore near the nest tree), 9.3% at perch G (~275 m east of the nest tree), 6.9% at perch C (by shore near the nest tree), and 24.4% at the remaining locations (none more than 3.7%).



Figure 9. Concho (left) and Crescent (right) breeding areas. Apache County, Arizona. Photos by K. McCarty.

Crescent Breeding Area (Appendix H, Figure 9)

Observation Period. – April 16 to July 8. Total monitoring 598 hours over 61 days.

Bald Eagle Identification. – The male and female were in adult plumage. The band status of the resident adult eagles at Crescent Lake was not determined.

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 787 human activities during the monitoring period. Terrestrial activity of 11 different types represented 92.9, water pursuits (boaters, float tubers, kayaks/canoes, swimmers) 7.0%, and aircraft (small planes) 0.1%. Four types of activity elicited five significant responses from the breeding pair. The bald eagles were restless in response to one hiker, and left the area in response to one picnicker, one hiker, one canoe/kayak, and one swimmer.

Food Habits. – The nestwatchers observed 78 forage events, with fish accounting for 96.2% and birds 3.8%. The male was successful in 100% (n=46) and the female in 96.9% (n=32) of forage events. The breeding pair was observed delivering 73 prey items to the nest, of which the male delivered 60.3% and the female 39.7%. Fish comprised 97.3% and birds 2.7% of these deliveries. Of the 73 prey items further identified, 74.0% were rainbow trout, 23.3% were cutthroat trout (*Salvelinus fontinalis*), and 1.4% each were American coots (*Fulica americana*) and common mergansers (*Mergus merganser*).

Habitat Use. – The Crescent nestwatchers identified 13 perch locations around Crescent Lake. The bald eagle pair spent 38.5% of the observed time at lake kilometer (lk) 2.3, 30.7% at lk 2.25, 14.0% at lk 2.15, 8.4% at lk 2.2, 6.0% at lk 2.1, and 2.2% at the remaining locations.

Fool Hollow Breeding Area (Appendix I, Figure 10)

Observation Period. – February 16 to May 6. Total monitoring 527 hours over 57 days.

Bald Eagle Identification. – The male and female were in adult plumage. The band status of the resident adult eagles at Fool Hollow was not determined.

Management Activities. – 1) The USFS and Arizona State Parks maintained “No Entry” signs surrounding the nest area. 2) On March 22, one male nestling was blue VID banded “35/A” at 5 weeks of age.

Human Activity. – Nestwatchers recorded 13 human activities during the observation period (within ~200 m of the nest). Terrestrial activity (OHVs) of one type represented 76.9% and aircraft (helicopters, small planes) 23.1%. None of the activities elicited a significant response from the breeding pair.

Food Habits. – The nestwatchers were unable to observe any forage events. The breeding pair was observed delivering 64 prey items to the nest, of which the male delivered 81.2% and the female 18.8%. Birds comprised 42.2% of these deliveries, fish 10.9%, mammals 9.4%, and unknown prey types 37.5%. Of the 40 prey items further identified, 67.5% (n=27) were American coots, 12.5% (n=5) were mountain cottontail (*Sylvilagus nuttallii*), 10.0% were rainbow trout, 5.0% (n=2) were bluegill (*Lepomis macrochirus*), and 2.5% (n=1) each were jackrabbit (*Lepus* spp.) and pike (*Esox lucius*).

Habitat Use. – The Fool Hollow nestwatchers identified 14 perch locations at the lake. The bald eagle pair spent the majority of the observed time within 100 m of the nest including 41.3% of the time at perch 7, 11.6% at perch 6, 11.3% at perch 5, 9.9% at perch 2, 9.7% at perch 1, and 6.0% at perch 4, and 10.3% at the remaining locations.



Figure 10. Fool Hollow (left) and Goldfield (right) breeding areas. Navajo and Maricopa County, Arizona. Photos by K. McCarty.

Goldfield Breeding Area (Appendix J, Figure 10)

Observation Period. – February 2 to April 26. Total monitoring 654 hours over 73 days.

Bald Eagle Identification. – The male had 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 unbanded and in adult plumage (unknown origin).

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

Human Activity. – Nestwatchers recorded 3,325 human activities during the observation period. Water activities of five different types represented 50.0%, terrestrial activities 48.4%, and aircraft (helicopters, small planes, drones, ultralights) 1.7%. Five types of activities elicited seven significant responses from the breeding pair. The bald eagles were restless in response to one dog walker. The birds flushed in response to three canoes/kayaks, one hiker, one horse rider, and one photographer.

Food Habits. – The nestwatchers observed six forage events, with fish and birds each accounting for 50%. The male was successful in 50% (n=4) and the female in 0% (n=2) of forage events. The breeding pair was observed delivering 77 prey items to the nest, of which the male delivered 58.4%, the female 35.1%, and an unidentified adult 6.5%. Fish comprised 66.2% of these deliveries, mammals 1.3%, and unknown prey types 32.5%. None of the prey items were further identified.

Habitat Use. – The Goldfield nestwatchers identified 30 perch locations, spanning a 3.0 km stretch of the Salt River ranging from rk 8.5 to 11.5. The bald eagle pair spent 28.2% of the observed time at rk 11.0, 21.6% at rk 9.3, 18.4% at rk 9.5, 10.3% at rk 10.1, 6.4% at rk 9.7, 6.0% at rk 9.4, 5.3% at rk 9.2, and 3.8% at the remaining locations.

Granite Reef Breeding Area (Appendix K, Figure 11)

Observation Period. – February 2 to May 13. Total monitoring 576 hours over 71 days.

Bald Eagle Identification – The male and female were in adult plumage. The band status of the resident adult eagles at Granite Reef was not determined.

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 21 and set up an informational display on bald eagles.

Human Activity. – The nestwatchers recorded 412 human activities. Aircraft represented 50.5%, (helicopters, small planes, jets) water pursuits 37.4% (canoes/kayaks, paddleboard, rafters, boats), and terrestrial activity of five types 12.1%. Two types of activity elicited three significant responses from the breeding pair. The bald eagles flushed in response to two helicopters, and left the area in response to one kayaker.

Food Habits. – The nestwatchers observed 14 forage events with fish accounting for 85.7% and carrion 14.3%. The male was successful in 66.7% (n=3) and the female in 72.7% (n=11) of forage events. The breeding pair was observed delivering 95 prey items to the nest, of which the male delivered 30.5% and the female 69.5%. Fish comprised 96.8% of the deliveries, and birds, carrion, and unknown prey types 1.1% each. Of the 77 prey items further identified, 45.5% (n=35) were bluegill, 31.2% (n=24) were rainbow trout, 7.8% (n=6) were sucker species, 6.5% (n=5) were largemouth bass (*Micropterus salmoides*), 5.2% (n=4) were black crappie (*Pomoxis nigromaculatus*), 2.6% (n=2) were common carp, and 1.3% (n=1) were waterfowl species.

Habitat Use. – The Granite Reef nestwatchers identified 18 perch locations spanning 4.8 km along the Salt River ranging from rk 0.0 to 4.8. The bald eagle pair spent 79.9% of the observed time at rk 0.4, 7.6% at rk 0.0, 6.4% at rk 0.5, 2.9% at rk 3.9, and 3.2% at the remaining locations.



Figure 11. Granite Reef (left) and Luna (right) breeding areas. Maricopa and Apache Counties, Arizona. Photos by K. McCarty and J. Driscoll.

Luna Breeding Area (Appendix L, Figure 11)

Observation Period. – February 2 to April 15. Total monitoring 507 hours over 53 days.

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 blue VID band her left leg, unconfirmed band status of right leg, and was in adult plumage (unknown, but blue band consistent with Arizona origin).

Management Activities. – 1) The USFS enacted the seasonal BA closure. 2) Nestwatchers were stationed at the boat ramp to talk to visitors.

Human Activity. – The nestwatchers recorded 505 human activities. Terrestrial activity of 15 different types accounted for 88.1%, water pursuits (fishing boats, float tubers) for 10.3%, and aircraft (helicopters, military jets, small planes) 1.6%. Seven types of activity elicited ten significant responses from the breeding pair. The bald eagles were restless in response to three gunshots and two military jets. The eagles flushed in response to one boater, one float tuber, one driver, one construction activity, and one rancher.

Food Habits. – The nestwatchers observed 38 forage events, with birds accounting for 52.6%, fish 44.7%, and unknown prey types 2.6%. The male was successful in 92.3% (n=26) and the female in 100% (n=12) of forage events. The breeding pair was observed delivering 30 prey items to the nest, of which the male delivered 66.7% and the female 33.3%. Birds comprised 50.0%, fish 46.7%, and unknown prey 3.3% of the deliveries. Of the 29 prey items further identified, 48.3% were American coots, 44.8% were rainbow trout, and 3.4% each were cutthroat trout and common merganser.

Habitat Use. – The Luna nestwatchers identified 25 separate habitat use areas around Luna Lake. The bald eagle pair spent 33.6% of the observed time at lk 5.1, 29.3% at lk 4.9, 11.3% at lk 4.8, 5.9% at lk 5.0, 3.7% at lk 2.7, and 16.2% at the remaining locations.

Sycamore Breeding Area (Appendix M, Figure 12)

Observation Period. – February 2 to May 20. Total monitoring 614.5 hours over 83 days.

Bald Eagle Identification. – Nestwatchers reported 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 Fort McDowell Yavapai Nation (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.

Human Activity. – Nestwatchers recorded 99 human activities. Aircraft (helicopters and small planes) accounted for 50.5%, terrestrial activities of eleven types 44.4%, and water pursuits (swimming, kayak) 5.1%. Eleven types of activities elicited 12 significant responses from the breeding pair. The bald eagles were restless in response to one small plane, and flushed in response to two drivers and one each of horseback rider, gunshot, farmer, nestwatcher, motorcycle, helicopter, and kayak. The birds left the area in response to one photographer and one dog.

Food Habits. – The nestwatchers observed five forage events, with carrion accounting for 80% and fish 20%. The male (n=3) and female (n=2) were each successful in 100% of forage events. The breeding pair was observed delivering 15 prey items to the nest, of which the male delivered 46.7% and the female 53.3%. Fish comprised 13.3% and unknown prey types 86.7% of the deliveries. None of the prey items were further identified.

Habitat use. – The Sycamore nestwatchers identified 20 separate habitat use areas, spanning a total of 2.9 km along the Verde River ranging from rk 7.8 to 10.7. The bald eagle pair spent 32.4% of the observed time at rk 10.3, 19.9% at rk 9.9, 17.5% at rk 7.8, 15.6% at rk 10.1, and 14.6% at the remaining locations.



Figure 12. Sycamore (left) and Tapco(right) breeding areas. Maricopa and Yavapai Counties, Arizona. Photos by K. McCarty and K. Jacobson.

Tapco Breeding Area (Appendix N, Figure 12)

Observation Period. – March 2 to March 25. Total monitoring 192 hours over 20 days.

Bald Eagle Identification. – Nestwatchers reported 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), and the female had a blue VID band on the left leg, no band on the right leg, and was in adult plumage (unknown origin, but blue band indicative of an Arizona nestling).

Management Activities. – 1) No Trespassing signs were maintained along the private property line. 2) A portion of the private land was accessible to nestwatchers for management purposes.

Human Activity. – Nestwatchers recorded 10 human activities. Water pursuits (kayaks) accounted for 40.0%, aircraft (small planes and helicopters) 30.0%, and terrestrial activities (hikers) 30.0%. None of the activities elicited a significant response from the breeding pair

Food Habits. – Nestwatchers were unable to observe any forage events, and because the nesting attempt failed early no prey deliveries were observed.

Habitat use. – The Tapco nestwatchers identified 12 separate perch locations, spanning 3.9 km along the Verde River and ranging from rk 236.9 to 240.8. The bald eagle pair spent 39.4% of the observed time at rk 240.8, 29.6% at rk 237.5, 17.5% at rk 237.1, 7.4% at rk 238.2, and 6.2% at the remaining locations.

Whiskey Spring Breeding Area (Appendix O, Figure 13)

Observation Period. – February 2 to April 26. Total monitoring 708 hours over 64 days.

Bald Eagle Identification. – The male had a blue VID band “21/X” on the left leg, no band on the right leg, and was in adult plumage (2008 Box Bar nestling). The female had no bands and was in adult plumage (unknown origin).

Management Activities. – 1) MCPRD enacted the seasonal closure and marked closure boundaries with buoys and signs. 2) Nestwatchers were supplied a boat by the Department and

educated recreationists about the closure and bald eagles. 3) On March 28, one female nestling and one male nestling were blue VID banded “38/A” and “39/A”, respectively, at 5 weeks old. 4) During banding, ticks (*Argas* sp.) were collected and removed from around the nest, and nestlings were treated with a pyrethrin-based spray.

Human Activity. – Nestwatchers recorded 256 human activities. Water pursuits (boats, jet skis, kayaks) accounted for 82.8%, aircraft (jets, small planes, helicopters) for 11.7%, and terrestrial activities of five types for 5.5%. Seven types of activities elicited 12 significant responses from the breeding pair. The bald eagles were restless in response to two jets and one each of boat, small plane, and helicopter. The eagles flushed from a perch in response to three boats, two jets, and one nestwatcher, and left the area in response to one jet ski. Of the 2,350 watercraft that approached the southern closure buoy line, a total of 209 (8.9%) did not comply and entered the closure. Non-compliance was slightly higher on weekends (9.5%) compared to weekdays (8.3%).

Food Habits. – The nestwatchers observed 36 forage events, with fish accounting for 94.4%, and birds and unknown prey for 2.8% each. The male was successful in 64.3% (n=14), the female in 71.4% (n=21), and an unknown adult in 100% (n=1) of forage events. The breeding pair was observed delivering 70 prey items to the nest, of which the male delivered 41.4%, the female 57.1%, and an unidentified adult 1.4%. Fish comprised 74.3%, mammals 4.3%, and unknown prey types 21.4% of delivered items. Of the 13 prey items further identified, 46.2% (n=6) were channel catfish, 23.1% (n=3) were sunfish (*Lepomis* sp.), 15.4% were sucker species (n=2), and 7.7% (n=1) each were common carp and flathead catfish (*Pylodictis olivaris*).

Habitat use. – The Whiskey Spring nestwatchers identified 57 perch locations at the lake and along the Agua Fria River, spanning a total of 5.7 km and ranging from rk 68.0 to 73.7. The bald eagle pair spent 59.1% of the observed time at rk 68.8, 16.5% at rk 68.7, 15.6% at rk 69.0, 2.9% at rk 68.9, and 6.0% at the remaining locations.



Figure 13. Whiskey Spring (left) and Woods Canyon (right) breeding areas. Maricopa and Coconino Counties, Arizona. Photos by J. Driscoll and K. McCarty.

Woods Canyon Lake Breeding Area (Appendix P, Figure 13)

Observation Period. – March 30 to July 25. Total monitoring 894 hours over 99 days.

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

Management Activities. – 1) Nestwatchers were supplied a kayak by the Department and educated recreationists about the closure and bald eagles.

Human Activity. – Nestwatchers recorded 1,139 human activities. Terrestrial activities of six types accounted for 90.4%, watercraft (canoes/kayaks, boats, stand-up paddleboards) 8.6%, and aircraft (recreational drones, helicopters) for 1.0%. Five types of activity elicited seven significant responses from the breeding pair. The bald eagles were restless in response to one angler and flushed in response to two canoes/kayaks, two recreational drones, one photographer, and one boat.

Food Habits. – The nestwatchers observed 64 forage events, with fish accounting for 98.4% and birds 1.6%. The male was successful in 80.9% (n=26) and the female in 65.8% (n=38) of forage events. The breeding pair was observed delivering 105 prey items to the nest, of which the male delivered 52.4% and the female 47.6%. Fish comprised 95.2%, birds 1.9%, and mammals, reptiles, and unknown prey each 1.0% of the delivered items. None of the prey items were further identified.

Habitat Use. – The Woods Canyon nestwatchers identified 43 perch locations around the lake. The bald eagle pair spent 24.6% of the observed time at lk 1.0, 21.9% at lk 0.9, 16.9% at lk 0.8, 15.0% at lk 4.9, 5.4% at lk 4.7, 5.3% at lk 1.1, and 10.9% 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. The installation of more closure signs would prove helpful in keeping people out of the closure area. Suggested locations include: a) starting at the horse gate down to the main trail, b) a sign at the northwest edge of the closure on the mud bluffs, and c) across the western edge of the closure. Many closure violations occurred when people entered from these locations and never saw the bright red closure signs. Nestwatchers hiked these sections and found it is entirely possible to enter the closure area from the horse gate, from the mud bluffs, and from the parking area on Needle Rock Road without ever seeing a sign.
2. Many visitors to Box Bar Recreation Area were unaware that a wildlife closure was in effect. Placing educational signs about closures and maps showing where closures areas

are located would help limit the number of people trespassing. Nestwatchers suggest posting this information at the main Box Bar Recreation Area parking lot and the parking area off Needle Rock Road.

3. A translation of the current educational brochures into Spanish is highly recommended. A large percentage of the recreating public that nestwatchers engaged with at Box Bar were Spanish speaking families. Often the older generations, who were just as excited to learn about bald eagles, spoke little or no English. Younger family members frequently acted as translators.
4. The Box Bar BA closure should be extended to include the west bank of the Verde River to the mud bluffs from river kilometer 29.0 to 23.0 as the 2018 resident pair were observed perching or flying frequently over these areas.

Cataract

1. Enact a nest closure at the lake, closing off the area on the north end of the dam (beginning at where the runoff), to the nest and 100 meters north of the nest. It would be up to managers if they want to close the shoreline as well. The nest location is relatively new, so as more and more locals find out about the nest, the nest might attract more visitors.
2. Biologists should be careful who they bring up close for bald eagle bandings. The photographer and bird watcher who attended the banding became somewhat too involved in the care of the eagles. They thought since they went to the banding they had more authority to get close to the nest and watch the eagles. They were told that they were endangering the eagles by being so close, but never stopped getting close.

Concho

1. The seasonal closure area needs to be more permanently signed on all extents before the next breeding season begins.
2. Nestwatcher safety is a high priority and should be given special attention at this site because Concho is known to be a crime-prone area of Arizona. Local Law Enforcement contact information should be provided, and a meeting should be arranged during the first days of observations. Regular check-ins should also be encouraged throughout the season (including days-off) to establish a Law Enforcement presence. The Department provided a trailer for the season, which remained on site and allowed nestwatchers to safely store equipment. This was greatly appreciated and offered peace of mind when operating in the field. It is also recommended that a co-ed team be assigned to CBA.

Crescent

1. Consider changing the closure boundary lines. There have been severe environmental changes on SU Knoll due to fire, wind and drought. We recommend that the boundary on the east (lake) side be moved lower to just above the trail along the shoreline. This would eliminate visual access to the nest tree and help prevent birds being flushed by human activity. On the north and west sides, there are few standing trees remaining and our recommendation is to re-align this side of the closure boundary directly with the existing fence line until it reaches the remaining stand of timber on the southwest side. At the remaining tree line on the west side, maintain the closure boundary around the timber

continuing south until the boundary connects on the south end. Additional closure signs will need to be purchased.

2. Attempt to band read the adult eagles at Crescent. It would be informative to see if the mountain birds are surviving and breeding longer than the desert birds. It would also be good to know if the male is the same bird that we started at the breeding area.

Fool Hollow

1. The area around the nest was properly posted early in the season, but as the season progressed the signs began to fall down and got destroyed by off-road vehicles. Particularly, the signs on the south west end of the closure were completely destroyed by motorcyclists. Fences were also cut around the closure area. Nestwatchers recommend placing boulders that block the off-road trails would be the only long term solution to preventing OHVs from riding in the closure.

Goldfield

1. Place informational signage about the program at nearby parking areas. This could include a durable map of the closure and a brochure dispenser.
2. 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.
3. We have not witnessed Goldfield or Kerr eagles feeding from the garbage cans placed along the Salt River by the Salt River Tubing company but when these cans are not emptied nightly (as seems to be the case at least some of the time) this danger exists.
4. Although there were significantly less trash during the 2018 season compared to 2017, looking at the amount of trash still accumulated along the shores of the river, the tubing company seems not to be doing enough to clean up the Salt River after the summer season. Maybe the proper authorities (i.e. Salt River Project, USFS, AZGFD, etc.) should ask them to do a better job.

Granite Reef and Orme

1. We propose closing the dirt roads surrounding the Orme nest trees to vehicular traffic for the course of future breeding seasons, including the time prior to incubation. If a total closure does not occur, consider placing signage at least around the perimeter of the nest trees. Though vehicular traffic through the breeding areas is low in comparison to other breeding areas in close proximity to recreational use areas, the amount of traffic surrounding and directly under the Orme nests is significant, both in terms of recreating individuals, agency and construction workers. Though only one eagle behavioral response was directly observed, we hypothesize that the activity in the area is a factor that dissuaded the Orme pair from making a nesting attempt.
2. Post signage surrounding the perimeter of the Granite Reef nest. There is a certain amount of human activity surrounding the nest that, due to the angle of observation and

the densely forested area, is not visible from the nestwatch observation point. Signage could prove a deterrent for such activities.

3. We recommend new, eye-catching signage be placed at the north gate on Fort McDowell Road and that all agency workers and community members be educated on the importance of keeping the gate closed to limit the unauthorized use of SRPMIC land. More frequent patrols by law enforcement may also help to slow the problem, but just keeping the gate closed would solve most of it. Throughout the season, Nestwatchers noticed that the north gate on Fort McDowell Road was ineffective at discouraging non-tribal members from entering Red Mountain Preserve. From the vantage point of the A-Frame, Nestwatchers frequently observed the recreating public driving into the community without pause. This was especially true when the gate was left open.
4. Arrange a meet-and-greet between SRPMIC law enforcement rangers and Nestwatchers at the beginning of the season. Nestwatchers appreciated the efforts of the rangers to ensure safety within Red Mountain Preserve. However meeting at the beginning would give Nestwatchers a better idea of who to contact in the event personal safety is compromised.
5. We very much appreciated the signage and road blockades placed around the Nestwatch campsite when issues arose, and recommend the continuation of this practice in the future, perhaps laminating the signs if possible to protect against the elements.
6. Nestwatchers appreciated the invitation to be involved in outreach events throughout the season, and found such events to be excellent opportunities to educate and encourage community members' involvement in bald eagle conservation. At the SRPMIC Earth Day Fair, many children enjoyed the hands-on learning experience afforded them by attempting to construct a bald eagle out of foam pieces. While still educational, we found that many of the bald eagle parts were missing from the set. We suggest replacing this kit with a new one for next year's event. Additional interactive materials would be most welcomed as well, as would more opportunities for outreach.

Luna

1. Repair the downed fence on the south side waterfowl closure at the water's edge.
2. Set up some dates in January to scout the new BA for alternate observation post, perch trees, hazards, encroachment, etc.
3. All USFS projects impacting the Luna Lake Breeding Area should be discussed in advance with the Department's Bald Eagle management team and Nest Watchers prior to implementation.
4. Luna Lake is a unique BA and the presence of Nest Watchers is of great benefit to the success of the resident breeding pair. Since recreational demands are constantly increasing, it is extremely important to remain proactive in establishing and implementing a well thought out management plan.
5. Maintain closure boundaries as they are, including Group Campsite A (depending on nest site selection); adding mini kiosks at walk thru and closure gates showing map and closure order.

Sycamore

1. Continue closure of any horse trail proximate to the Sycamore nest from December-June. Advise Fort McDowell Adventures Stables of this and notify them of any changes.
2. Remain in conversation with council regarding hunting in bald eagle breeding areas during December-June. Consider voluntary limitations or other methods to keep breeding eagles safe.
3. Establish training standards for Green Zebra, Segway and other guides at Adventures to include basics of bald eagle breeding areas and cultural respect issues.
4. Continue inter-disciplinary meetings and on-going communication between nestwatch, environmental, materials, law enforcement, Fort McDowell Adventures etc. to share information and tips.
5. Consider slight alteration of Sycamore nest tree during the non-breeding season, in order to facilitate viewing of the nest. A better view of the nest may have been critical to knowing when the nestlings were in trouble in 2018.
6. Use a sturdy outdoor easel to mark bald eagle viewing areas at the camp road and OP. These could serve as informational signs, with updated nest status, guidelines for considerate viewing, attribution to FMYN Environmental Department and ABENWP, etc.
7. Research options and funds for durable optics (e.g. binoculars, scopes) especially suited to young viewers and those with special needs.
8. Initiate discussion with council and cultural department regarding interpretive themes and goals for bald eagle educational exhibits.
9. Continue to emphasize protection of Sycamore BA by signage, law enforcement patrol and response, verifying the boundary fence in Sycamore Creek is intact and secure, and ongoing public awareness.
10. Continue community awareness of Sycamore and Fort McDowell OP bald eagle viewing opportunities. Possibly set specific dates and times and publicize via Facebook, The Yavapai News or other sources.

Tapco

1. If future nestwatchers will be using the same camping location, have signs on the road leading to the campsite stating that it's not open to the public. There was regular traffic on the road and people were often camped in the first pull-off.

Whiskey Spring

1. There were two occasions that people entered the closure on the ATV trail north of the OP. Though these activities did not affect the eagles, we still recommend better signage on the ATV trail to make it clear where the closure begins.
2. To aid in the Nestwatcher's tracking of the eagles' use of habitat outside the breeding closure, a way for visitors to list where they saw the eagles would be very helpful. This could be in the form of a bulletin board at the visitor's center where the public could list their sightings, an index card handed out at the pay station that the public could turn in when they leave, or an app that visitors could download and submit their observations, similar to eBird.

Woods Canyon

1. Drone activity at the lake and elsewhere was relatively frequent and is likely to keep increasing over the years. It will be helpful to post signage at the boat dock and campgrounds warning recreationists about flying drones near the eagle's nest (with updated nest and OP locations) and provide nestwatchers with current information about laws permitting (or not) flying drones inside the different recreational areas.

LITERATURE CITED

- Brown, B.T., P.L. Warren, and L.S. Anderson. 1987. First bald eagle nesting record from Sonora, Mexico. *Wilson Bulletin* 99:279-280.
- Brown, B.T. 1988. Additional bald eagle nesting records from Sonora, Mexico. *J. Raptor Res.* 22:30-32.
- Brown, B.T., and J.A. Olivera. 1988. Bald eagles of northwest Mexico: 1988 monitoring and research findings. Final report submitted to Arizona Projects Office, U.S. Dept. Int., Bureau of Reclamation, and Salt River Project, Phoenix, AZ.
- Brown, B.T., W.C. Leibfried, and J.A. Olivera. 1989. Bald eagles of northwest Mexico: Food habits, populations status, and reproductive success. Final report submitted to U.S. Dept. Int., Bur. Reclamation, and Salt River Project, Phoenix, AZ.
- Brown, B.T., R. Mesta, and W.C. Liebfried. 1990. Bald eagles of northwest Mexico: Reproductive success of the 1990 nesting season. Report submitted to Bureau of Reclamation and Salt River Project.
- Brown, B.T. and L.E. Stevens. 1992. Winter abundance, age structure, and distribution of bald eagles along the Colorado River, Arizona. *Southwestern Naturalist* 37:404-435.
- Brown, D.E. (ed.). 1994 *Biotic Communities, Southwestern United States and Mexico*. The University of Utah Press. Salt Lake City.
- Canaca J.S., K.V. Jacobson, and J.T. Driscoll. 2004. Arizona bald eagle 2003 nest survey. Nongame and Endangered Wildlife Program Technical Report 229. Arizona Game and Fish Department, Phoenix, Arizona.
- Driscoll, J.T., G.L. Beatty, and J.D. Hanna. 1992. 1992 Arizona bald eagle nest survey: Final report and recommendations. Nongame and Endangered Wildlife Program Technical Report. Arizona Game and Fish Dept., Phoenix, AZ.
- Driscoll J.T. and G.L. Beatty. 1994. 1993 Arizona bald eagle nest survey. Nongame Endangered Wildlife Program Technical Report 31. Arizona Game and Fish Department, Phoenix, Arizona.
- Driscoll J.T., G.L. Beatty and M.C. Siemens. 1995a. Arizona bald eagle 1994 nest survey. Nongame Endangered Wildlife Program Technical Report 71. Arizona Game and Fish Department, Phoenix, Arizona.
- Driscoll J.T., G.L. Beatty and J.G. Koloszar. 1995b. Arizona bald eagle 1995 nest survey. Nongame Endangered Wildlife Program Technical Report 87. Arizona Game and Fish Department, Phoenix, Arizona.

- Driscoll J.T., G.L. Beatty, and J.G. Koloszar. 1997. Arizona bald eagle 1996 nest survey. Nongame Endangered Wildlife Program Technical Report 117. Arizona Game and Fish Department, Phoenix, Arizona.
- Driscoll J.T., G.L. Beatty, and J.G. Koloszar. 1998. Arizona bald eagle 1997 nest survey. Nongame and Endangered Wildlife Program Technical Report 127. Arizona Game and Fish Department, Phoenix, Arizona.
- Driscoll J.T., G.L. Beatty, and J.G. Koloszar. 1999. Arizona bald eagle 1998 nest survey. Nongame and Endangered Wildlife Program Technical Report 138. Arizona Game and Fish Department, Phoenix, Arizona.
- Driscoll, J.T., K.V. Jacobson, G. Beatty, J.S. Canaca, and J.G. Koloszar. 2006. Conservation Assessment and Strategy for the Bald Eagle in Arizona. Technical Report 173, Nongame and Endangered Wildlife Program, Arizona Game and Fish Dept., Phoenix, AZ.
- Driscoll, D.E. 2010. Protocol for golden eagle occupancy, reproduction, and prey population assessment. American Eagle Research Institute, Apache Junction, AZ.
- Eakle, W.L., L. Bond, M.R. Fuller, R.A. Fischer, and K. Steenhof. 2015. Wintering bald eagle count trends in the coterminous United States, 1986-2010. *Journal of Raptor Research* 49:259-268.
- Forbis, L.A, T.G. Grubb, and W.D. Zeedyk. 1985. "Eagle Beagles": A volunteer bald eagle nest watcher program on Arizona National Forests. Pp. 246-254 in *The Bald Eagle in Canada*, J.M. Gerrard and T.M. Ingram (eds.). White Horse Plains Publishers and The Eagle Foundation, Headingley, MB, CA and Apple River, IL.
- Glinski, R.L. 1985. Bald eagle nesting survey in Arizona: 1985 reconnaissance and recommendations. Federal Aid Project W-95-R-2 special report. Arizona Game and Fish Department.
- Grubb, T. G. 1980. An artificial bald eagle nest structure. U.S. Dep. Agric., For. Serv. Res. Note RM-383. 4pp.
- Grubb, T.G., and W.L. Eakle. 1987. Comparative morphology of bald and golden eagle nests in Arizona. *J. Wildlife Management* 51:744-748.
- Hildebrandt, T.D., and R.L. Glinski. 1987. Bald eagle nesting survey in Arizona: 1987 reconnaissance and recommendations. Federal Aid Project W-95-R-4 special report. Arizona Game and Fish Department.
- Hunt, W.G., D.E. Driscoll, E.W. Bianchi, and R.E. Jackman. 1992. Ecology of bald eagles in Arizona. Volumes A-F. Report to U.S. Bureau of Reclamation, Contract 6-CS-30-04470. BioSystems Analysis, Inc., Santa Cruz, California.

- Jacobson, K.V., J.S. Canaca, J.G. Koloszar, and J.T. Driscoll. 2004. Arizona bald eagle management program 2004 summary report. Nongame and Endangered Wildlife Program Technical Report 247. Arizona Game and Fish Department, Phoenix, Arizona.
- Jacobson, K.V., J.S. Canaca, and J.T. Driscoll. 2005. Arizona bald eagle management program 2005 summary report. Nongame and Endangered Wildlife Program Technical Report 237. Arizona Game and Fish Department, Phoenix, Arizona.
- Jacobson, K.V., K.M. McCarty, and J.T. Driscoll. 2006. Arizona bald eagle management program 2006 summary report. Nongame and Endangered Wildlife Program Technical Report 239. Arizona Game and Fish Department, Phoenix, Arizona.
- Jacobson, K.V., K.M. McCarty, and J.T. Driscoll. 2007. Arizona bald eagle management program 2007 summary report. Nongame and Endangered Wildlife Program Technical Report 250. Arizona Game and Fish Department, Phoenix, Arizona.
- Koloszar, J.G. and J.T. Driscoll. 2001a. Arizona bald eagle 1999 – 2000 nest survey. Nongame and Endangered Wildlife Program Technical Report 182. Arizona Game and Fish Department, Phoenix, Arizona.
- Koloszar, J.G. and J.T. Driscoll. 2001b. Arizona bald eagle 2001 nest survey. Nongame and Endangered Wildlife Program Technical Report 189. Arizona Game and Fish Department, Phoenix, Arizona.
- Koloszar J.G., K.V. Jacobson, J.S. Canaca and J.T. Driscoll. 2002. Arizona bald eagle 2002 nest survey. Nongame and Endangered Wildlife Program Technical Report 206. Arizona Game and Fish Department, Phoenix, Arizona.
- Mesta, R., A.V. Romero, and E.S. Monarque. 1991. 1991 bald eagle population survey, Rio Yaqui, Sonora: A joint U.S.-Mexico research project. Final report submitted to U.S. Fish and Wildlife Service, Albuquerque, NM.
- Mesta, R., and A.V. Romero. 1993. 1992 bald eagle population survey, Rio Yaqui, Sonora: A joint U.S.-Mexico research project. Final report submitted to U.S. Fish and Wildlife Service, Albuquerque, NM.
- McCarty, K.M., and K.V. Jacobson. 2008. Arizona bald eagle management program 2008 summary report. Nongame and Endangered Wildlife Program Technical Report 252. Arizona Game and Fish Department, Phoenix, Arizona.
- McCarty, K.M., and K.V. Jacobson. 2009. Arizona bald eagle management program 2009 summary report. Nongame and Endangered Wildlife Program Technical Report 260. Arizona Game and Fish Department, Phoenix, Arizona.

- McCarty, K.M., and K.V. Jacobson. 2010. Arizona bald eagle management program 2010 summary report. Nongame and Endangered Wildlife Program Technical Report 261. Arizona Game and Fish Department, Phoenix, Arizona.
- McCarty, K.M., and K.V. Jacobson. 2011. Arizona bald eagle management program 2011 summary report. Nongame and Endangered Wildlife Program Technical Report 266. Arizona Game and Fish Department, Phoenix, Arizona.
- McCarty, K.M., and K.V. Jacobson. 2012. Arizona bald eagle management program 2012 summary report. Nongame and Endangered Wildlife Program Technical Report 270. Arizona Game and Fish Department, Phoenix, Arizona.
- McCarty, K.M., K.L. Licence, and K.V. Jacobson. 2013. Arizona bald eagle management program 2013 summary report. Nongame and Endangered Wildlife Program Technical Report 276. Arizona Game and Fish Department, Phoenix, Arizona.
- McCarty, K.M., K.L. Licence, and K.V. Jacobson. 2014. Arizona bald eagle management program 2014 summary report. Nongame and Endangered Wildlife Program Technical Report 283. Arizona Game and Fish Department, Phoenix, Arizona.
- McCarty, K.M., K.L. Licence, and K.V. Jacobson. 2015. Arizona bald eagle management program 2015 summary report. Nongame and Endangered Wildlife Program Technical Report 299. Arizona Game and Fish Department, Phoenix, Arizona.
- McCarty, K.M., K.L. Licence, and K.V. Jacobson. 2016. Arizona bald eagle management program 2016 summary report. Nongame and Endangered Wildlife Program Technical Report 304. Arizona Game and Fish Department, Phoenix, Arizona
- McCarty, K.M., K.L. Licence, and K.V. Jacobson. 2017. Arizona bald eagle management program 2017 summary report. Nongame and Endangered Wildlife Program Technical Report 311. Arizona Game and Fish Department, Phoenix, Arizona
- Millsap, B.A. 1986. Status of wintering bald eagles in the coterminous 48 states. *Wildlife Society Bulletin* 14:433-440.
- The Nature Conservancy in Arizona, 2004, *Biotic Communities of the Southwest* (Brown and Lowe Vegetation 1981).
- Postupalsky, S. 1974. Raptor reproductive success: some problems with methods, criteria, and terminology. *In* F.N. Hammerstrom, B.E. Harrell and R.R. Olendorff, Eds. *Management of raptors. Proceedings of the conference on raptor conservation techniques.* Raptor Research Report 2:21-31.

- Postupalsky, S. 1983. Techniques and terminology for surveys of nesting bald eagles. Appendix D in J.W. Grier and others, eds. Northern States bald eagle recovery plan. U.S. Dept. Inter., U.S. Fish and Wildlife Service, Twin Cities, Minn.
- Rubink, D.M. and K. Podborny. 1976. The southern bald eagle in Arizona: a status report. U.S. Fish and Wildlife Service Endangered Species Report 1. Albuquerque, New Mexico.
- Salt River Project. 2015. Bald Eagle Nesting Areas: Arizona. Tempe, Arizona.
- Stalmaster, M.V. 1987. *The bald eagle*. Universe Books, New York, New York.
- Steenhof, K. and M.N. Kochert. 1982. An evaluation of methods used to estimate raptor nesting success. *Journal of Raptor Management*. 46:885-893.
- Steenhof, K., L. Bond, K.K. Bates, and L.L. Leppert. 2002. Trends in midwinter counts of bald eagles in the contiguous United States, 1986-2000. *Bird Populations* 6:21-32.
- Steenhof, K., L. Bond, and L. L. Dunn. 2008. The midwinter bald eagle survey results and analysis 1986-2005. U.S. Geological Survey, National Biological Information Infrastructure, and Northwest Alliance for Computational Science and Engineering. Available online at <http://www.nacse.org/nbii/eagles> (accessed September 13, 2018).
- Todd, R.L. 1981. Multi-agency findings on the distribution of bald eagles for Arizona in the January months of 1979, 1980, 1981. Arizona Game and Fish Department, Phoenix, Arizona.
- U.S. Fish and Wildlife Service. 1982. Bald eagle recovery plan (southwestern population). U.S. Fish and Wildlife Service, Albuquerque, New Mexico.
- U.S. Fish and Wildlife Service. 1995. Endangered and threatened species: bald eagle reclassification; final rule. *Federal Register*. 60(133):36000-10. Department of the Interior, Washington, D.C.
- U.S. Fish and Wildlife Service. 2007a. Endangered and threatened wildlife and plants; removing the bald eagle in the lower 48 states from the list of endangered and threatened wildlife; final rule. *Federal Register*. 72(130):37346-37372. Department of the Interior, Washington, D.C.
- U.S. Fish and Wildlife Service. 2007b. Protection of eagles; definition of “disturb”. Final rule. *Federal Register*. 72(107):31132-31140. Department of the Interior, Washington, D.C.
- U.S. Fish and Wildlife Service. 2008. Endangered and threatened wildlife and plants; listing the potential Sonoran Desert bald eagle distinct population segment as threatened under the endangered species act; final rule. *Federal Register*. 73(85):23966-23970. Department of the Interior, Washington, D.C.

- U.S. Fish and Wildlife Service. 2009. Eagle permits; take necessary to protect interests in particular localities; final rule. Federal Register. 74(175):46836-46879. Department of the Interior, Washington, D.C.
- U.S. Fish and Wildlife Service. 2010. Endangered and threatened wildlife and plants; 12-month finding on a petition to list the Sonoran Desert population of the bald eagle as a threatened or endangered distinct population segment. Federal Register. 75(37):8601-8621. Department of the Interior, Washington, D.C.
- U.S. Fish and Wildlife Service. 2011. Endangered and threatened wildlife and plants; bald eagles nesting in Sonoran Desert Area of central Arizona removed from the list of endangered and threatened wildlife. Federal Register. 76(171):54711-54713. Department of the Interior, Washington, D.C.
- U.S. Fish and Wildlife Service. 2012a. Endangered and threatened wildlife and plants; 12-month finding on a petition to list the Sonoran Desert Area bald eagle as threatened or endangered. Federal Register. 77(84):25792-25828. Department of the Interior, Washington, D.C.
- U.S. Fish and Wildlife Service. 2012b. Eagle permits; changes in the regulations governing eagle permitting. Federal Register. 77(72):22267-22278. Department of the Interior, Washington, D.C.
- U.S. Fish and Wildlife Service. 2016. Eagle permits; revisions to regulations for eagle incidental take and take of eagle nests; final rule. 81(242):91494-91554. Department of the Interior, Washington, D.C.
- U.S. Fish and Wildlife Service. 2017. Eagle permits; revisions to regulations for eagle incidental take and take of eagle nests; final rule, information and collection requirements. 82(13):7708-7711. Department of the Interior, Washington, D.C.

APPENDIX A: 2018 ARIZONA BALD EAGLE WINTER COUNT RESULTS

Table 10. 2018 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	44	1	0	0	0
2	Little Colorado River (LCR)	30	0	0	0	0
3	S. Fork LCR – Campground	40	1	0	0	0
4	Casa Malpais – LCR	24	0	0	0	0
5	Greer Lakes (River, Bunch, and Tunnel Reservoirs)	80	2	2	0	0
6	Sponseller Lake	20	0	0	0	0
7	Mexican Hay Lake	60	0	0	0	0
8	White Mountain Hereford Ranch (Trinity, Glen Livet, McKay reservoirs)	140	5	0	0	0
9	The Ranch Lake	30	0	0	0	0
10	Ortega Lake	30	0	0	0	0
11	Concho Lake	60	2	0	0	0
12	Luna Lake	41	2	4	0	0
13	Nelson Reservoir	24	1	0	0	0
14	Nutriosio Reservoir	17	0	1	0	0
16	San Francisco River (Luna Lake to New Mexico line)	155	4	2	0	0
Total		795	18	9	0	0
Cochise County						
18	Parker Canyon Lake	60	2	1	0	0
19	Willcox Playa	260	0	1	0	0
Total		320	2	2	0	0
Coconino County						
21	Long Lake Complex	75	0	0	0	0
22	Stoneman Lake	135	1	4	0	0
23	FH-3	45	1	0	0	0
24	I-17, Section to Flagstaff	211	3	1	0	1
25	Bellemont	297	0	0	0	0
26	Townsend/Winona A/B	424	1	0	0	0
27	HWY 89 North /Sunset Crater – Wupatki	370	8	4	0	0
28	FH-3 Lakes (Mary, Mormon, Marshall, Prime, etc.)	450	4	4	0	0
29	Continental Country Club Lakes	180	2	1	0	0
30	Chevelon Canyon Lake	180	4	0	0	0
32	Spring Valley Wash	240	1	1	0	0
33	Red Lake Valley	90	0	0	0	0
34	Kaibab Lake	45	0	0	0	0
35	Pittman Valley	62	0	0	0	0
36	Davenport Lake	82	0	0	0	1
37	Scholz Lake	45	2	1	0	0
38	Cataract Lake	29	0	0	0	0
39	Willow Springs Lake	120	0	0	0	0

Table 10 continued.						
Route Number	Route Name	Minutes Surveyed	Adults	Subadults	Unknown Bald Eagles	Unknown Eagles
40	West Chevelon Canyon	84	0	0	0	0
41	Willow Creek	79	0	0	0	0
42	White Horse Lake – Pomeroy Tanks	30	0	0	0	0
43	JD Dam Lake	56	1	1	0	0
45	Steel/Stone Road	180	1	0	0	1
48	Blue Stem Wash-Babbit property	166	0	0	0	0
49	Glen Canyon Nat'l Rec. Area (Lake Powell to Lee's Ferry)	80	1	0	0	0
118	Bill Williams Loop Road	260	0	0	0	0
119	Johnson Canyon	120	0	1	0	1
120	Highway 64 east	15	0	0	0	0
121	Highway 64	15	0	0	0	0
122	Camp Navajo	195	0	0	0	0
123	Partridge Creek	208	1	0	0	0
124	Odell Lake	80	1	0	0	0
125	Highway 87 north	37	2	0	0	0
126	Highway 180	170	0	0	0	0
Total		4,855	34	18	0	4
Graham County						
51	Point of Pines Lake area (ground)	Not surveyed.				
Mohave County						
57	Alamo Lake	55	4	0	0	0
Total		55	4	0	0	0
Navajo County						
58	Lake of the Woods	65	2	0	0	0
59	Rainbow Lake	30	4	0	0	5
61	Whipple Lake	30	0	0	0	0
62	Long Lake	40	0	0	0	0
63	Lone Pine Dam	55	0	1	0	0
64	Schoens Reservoir	25	0	0	0	0
65	White Mountain Lake	35	1	0	0	0
67	Jacques Marsh	50	0	0	0	0
68	Scott's Reservoir	30	1	0	0	0
69	Show Low Lake	0	1	1	0	0
70	Pintail Lake	55	0	0	0	0
71	Telephone Lake	40	0	0	0	0
72	Fool Hollow Lake	45	1	0	0	0
75	Cottonwood Wash/ Clay Springs	17	0	0	0	0
76	White Lake	5	0	0	0	0
127	Mortenson Wash	54	0	0	0	0
Total		576	10	2	0	5
Santa Cruz County						
82	Pena Blanca Lake	60	0	0	0	0
Total		60	0	0	0	0
Yavapai County						
83	Wet Beaver Creek	160	2	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	0	0	0	0	0
86	Lynx Lake	240	2	0	0	0
87	Watson Lake	240	0	0	0	0
88	Goldwater Lake	205	2	3	0	0
Total		1,325	8	3	0	0
Yuma and La Paz Counties						
89	Imperial N.W.R. Cibola/Martinez Lake – Colorado River	300	0	0	0	0
Total		300	0	0	0	0

Table 11. 2018 Arizona bald eagle winter count helicopter survey results.						
Route Number	Route Name	Minutes Surveyed	Adults	Subadults	Unknown Bald Eagles	Unknown Eagles
90	Verde River	181	28	10	0	0
91	Lower East Verde River	6	0	0	0	0
92	Lower West Clear Creek	15	0	0	0	0
93	Lower Salt River	92	23	7	0	0
94	Upper Salt River	60	3	1	0	0
95	Lower Tonto Creek	20	5	0	0	0
97	Lower Canyon Creek	6	0	0	0	0
98	Lower Cibecue Creek	13	0	0	0	0
100	White River	15	0	1	0	0
101	North Fork White River	36	0	0	0	0
102	Lower Black River	65	13	5	0	0
103	Big and Little Bonito Creeks	14	2	1	0	0
104	San Carlos River–Talkalai Lake	13	5	0	0	0
105	San Carlos Reservoir	14	4	1	0	0
106	Upper and Lower Gila River	59	2	0	0	0
107	Eagle Creek	49	1	0	0	0
108	Bonita Creek	15	0	0	0	0
109	Lower San Francisco River	34	0	0	0	0
110	Blue River	11	0	0	0	0
111	Sunrise Lake	2	1	0	0	0
112	Big Lake	5	3	3	0	0
114	Crescent Lake	2	0	0	0	0
115	Lake Pleasant	19	2	0	0	0
116	Del Rio Ponds	1	2	0	0	0
117	Tres Rios	12	2	0	0	0
Total		759	96	29	0	0

Table 12. 2018 Arizona bald eagle winter count non-standardized survey route results.							
Route Number	Route Name	County	Minutes Surveyed	Adults	Subadults	Unknown Bald Eagles	Unknown Eagles
128	Point of Pines Lake area (aerial)	Graham	26	5	11	0	0
975	Buckhead Mesa Landfill	Gila	35	5	5	0	0
976	West Clear Creek	Yavapai	165	1	0	0	0
977	Blue Ridge Reservoir	Coconino	40	0	0	0	0
986	Kachina Wetlands	Coconino	85	1	0	0	0
991	Clint's Well	Coconino, Yavapai	75	2	0	0	0
Total			426	14	16	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: 2018 ARIZONA BALD EAGLE PRODUCTIVITY

Breeding Area	Status ¹	Nest ²	Incubation Date	Eggs	Hatch Date	Young	Fledged	Fledge Date
Alamo	F	4	<1/29	2	<1/29	1	Failed by 3/2.	
Armer Gulch	S	1	<1/18	3	1/30-3/16	3	3	>5/4
Ashurst	S	2	<4/2	2	4/2-4/24	2	1	>5/22
Bachelor Cove	S	1	<1/18	2	1/30-3/16	2	2	>5/4
Bagley	U							
Bartlett	U							
Beaver	S	1	1/8-1/29	2	1/29-3/19	2	2	>5/4
Becker	S	2	<1/30	1	1/30-3/16	1	1	>5/18
Bill Williams	U							
Black Cross	S	1	<1/18	1	1/30-3/16	1	1	>5/4
Blue Point	S	10	<1/18	3	1/30-3/16	3	3	>4/20
Box Bar*	S	5	1/12-1/29	2	2/26-3/1	2	1	5/23
Buckeye	F	1	1/29-3/19	1	1/29-3/19	1	Failed by 5/13.	
Bulldog	F	2	<1/18	1	Failed by 3/16.			
Burro Creek	U							
Campaign Bay	U							
Canyon de Chelly	S	2	<5/21	1	<5/21	1	1	5/21-6/19
Cataract Lake*	S	1	<5/4	2	<5/4	2	2	6/10, 6/18
Cedar Basin	U							
Chevelon	F	5	<3/29	1	3/29-4/20	1	Failed by 5/4.	
Cibecue	F	2	1/30-3/16	1	Failed by 4/20.			
Cliff*	O	Pair of adults observed.						
Coldwater	U							
Concho	S	2	1/30-3/16	2	1/30-3/16	1	1	>5/22
Coolidge	U							
Crescent*	S	1	1/30-3/16	1	3/16-4/20	1	1	6/28
Dogtown	S	3	<4/24	1	4/24-5/4	1	1	>6/28
Doka*	O	Pair of adults observed.						
East Verde	O	Pair of adults observed.						
Elaine	S	1	1/18-2/15	2	2/15-4/2	2	2	5/30-6/16
Fish Creek	F	1	<1/18	1	Failed by 3/16.			
Fool Hollow*	S	3	<1/12	2	1/12-2/14	1	1	5/6
Fort McDowell*	S	15	<1/8	2	2/5	2	1	4/24-5/4
Gainey Ranch	S	2	1/21-1/22	2	3/4-3/10	2	1	4/30
Garden Lakes	S	2	<12/30	1	1/8-1/27	1	1	4/11-4/12
Gilbert	--							
Goldfield*	S	4	<1/18	2	1/18-1/30	2	2	4/16-4/17
Granite Basin	U							
Granite Reef*	S	7	1/11-1/29	2	3/1	2	1	5/12
Green River	S	1	1/8-1/29	2	1/29-3/19	2	2	>5/4
Greer Lakes	S	4	<3/16	2	3/16-4/20	2	2	>6/8

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

²Nest numbers are from Hunt and others 1992; Driscoll and Beatty 1994; Driscoll and others 1992, 1995a, 1995b, 1997-1999; Jacobson and others 2004-2007; Koloszar and Driscoll 2001a, 2001b; Koloszar and others 2002; Canaca and others 2004; McCarty and Jacobson 2008-2012; McCarty et al. 2013-2017.

³Represents 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	Hatch Date	Young	Fledged	Fledge Date
Horse Mesa	F	4	1/18-1/30	1	Failed by 4/20.			
Horseshoe	F	13	1/29-2/14	1	Failed by 4/20.			
Ive's Wash	F	4	1/3-1/29	1	Failed by 4/18.			
Kachina Village	O	Pair of adults observed.						
Kerr*	O	Pair of adults observed.						
Ladders	F	3	1/29-3/19	2	1/29-3/16	2	Failed by 5/30.	
Lone Pine	S	2	<1/12	1	1/30-3/16	1	1	>4/20
Lower Lake Mary	S	3	<2/24	2	2/24-4/24	2	2	>6/9
Luna*	F	2	1/29-2/3	1	3/7	1	Failed by 4/12.	
Lynx	S	6	1/18-1/29	2	1/29-3/19	2	2	>5/9
Mohave	U							
Needle Rock*	U							
Nevada Bay	U							
Oak Creek	S	4	1/8-1/29	1	1/29-3/19	1	1	>5/4
OW	F	1	<3/22	1	Failed by 5/4.			
Orme*	O							
Pee Posh Wetlands	S	7	12/22	2	1/25	2	2	4/12, >4/12
Perkinsville	U							
Pinal	S	9	1/18-1/30	2	1/30-3/16	2	2	>5/4
Pinto	S	10	<1/18	2	1/30-3/16	2	2	4/20-5/4
Pleasant*	U	One adult observed.						
Redmond	U							
Riverside	S	1	1/8-1/29	2	1/29-2/27	2	2	>4/24
Rock Creek	U							
Rodeo*	S	5	1/8-1/29	2	2/26-3/1	2	1	5/19-5/24
Saguaro	F	1	<1/8	1	1/30-3/16	1	Failed by 4/20.	
San Carlos	F	7	<1/18	1	Failed by 3/16.			
Scholz Lake*	S	1	<5/4	2	<5/4	2	2	>6/28
76	S	6	1/30-3/16	2	3/16-4/20	2	1	>5/31
Sheep	S	7	1/18-1/30	2	1/30-3/16	2	2	>5/4
Sheep Creek	S	1	<1/29	1	1/29-3/19	1	1	>5/16
Show Low Lake	S	1	1/30-2/17	2	3/16-3/29	2	1	6/12-6/18
Silver Creek	S	2	1/30-2/2	2	2/2-3/16	2	2	>5/18
Suicide	S	1	<1/17	1	1/30-3/16	1	1	>4/26
Sullivan Lake	S	2	1/2-1/6	2	1/29-3/12	2	2	>5/11
Sycamore*	F	7	2/26-3/2	2	3/2-4/24	2	Failed by 5/20.	
Table Mountain	F	4	1/29-3/19	1	Failed by 4/24.			
Talkalai	S	9	<1/17	2	1/30-3/5	2	2	>4/26
Tapco*	F	6	<1/29	1	Failed by 3/25.			
Tonto*	F	6*	1/18-1/24	1	Failed by 2/19.			
Tortilla Creek	S	1	<1/18	3	1/30-3/16	3	3	4/20-5/4
Tower	U							
Tremaine	F	2	<2/22	1	Failed by 5/4.			

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

²Nest numbers are from Hunt and others 1992; Driscoll and Beatty 1994; Driscoll and others 1992, 1995a, 1995b, 1997-1999; Jacobson and others 2004-2007; Koloszar and Driscoll 2001a, 2001b; Koloszar and others 2002; Canaca and others 2004; McCarty and Jacobson 2008-2012; McCarty et al. 2013-2017.

³Represents 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	Hatch Date	Young	Fledged	Fledge Date
Whiskey Spring*	S	1	<1/8	2	2/11-2/16	2	2	4/27-5/4
White Horse	U	Based on 2017 Juvenile Transmitter Data suspect moved to Scholz Lake.						
Woods Canyon*	S	12	<3/26	1	4/15	1	1	7/6
Yellow Cliffs	S	1	1/8-1/29	2	3/19-4/24	2	2	>5/16

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

²Nest numbers are from Hunt and others 1992; Driscoll and Beatty 1994; Driscoll and others 1992, 1995a, 1995b, 1997-1999; Jacobson and others 2004-2007; Koloszar and Driscoll 2001a, 2001b; Koloszar and others 2002; Canaca and others 2004; McCarty and Jacobson 2008-2012; McCarty et al. 2013-2017.

³Represents minimum number of eggs laid.

*Nests monitored by the Arizona Bald Eagle Nestwatch Program.

APPENDIX D: NEST SURVEY RESULTS

Table 14. Results of the 2018 bald eagle winter count, ORA, and nest survey flights (continued next page).		
Location	Time	Comments
January 8, 2018		
Riverside BA	0804	Two adults standing in nest #1.
Orme BA	0811	All known nests empty. No eagles.
Rodeo BA	0815	All known nests empty. No eagles.
Sycamore BA	0820	All known nests empty. Two adults downstream at gravel ponds.
Doka BA	0823	All known nests empty. Pair of adults perched together.
Fort McDowell BA	0826	Adult incubating in nest #15. Second adult perched upstream.
Box Bar BA	0830	All known nests empty. No eagles.
Needle Rock BA	0830	No new nests or eagles.
Bartlett BA	0834	All known nests empty. No eagles.
Yellow Cliffs BA	0840	All known nests empty. Pair of adults perched at Bartlett Lake.
Sheep Creek BA	0851	One adult standing by nest #1. Second adult downstream.
Cliff BA	0855	All known nests empty. No eagles.
Horseshoe BA	0906	Nests #11, 17-18 empty. Pair of adults perched at Horseshoe Lake.
Table Mountain BA	0917	All known nests empty. No eagles.
East Verde BA	0946	All known nests empty. Pair of adults at river upstream.
East Verde River	0954	No new nests or eagles.
Coldwater BA	1001	All known nests empty. No eagles.
Ladders BA	1010	All known nests empty. One adult perched downstream. New large nest (#9) found on cliff.
West Clear Creek	1031	No new nests or eagles.
Beaver BA	1044	All known nests empty. Pair of adults perched upstream.
Oak Creek BA	1244	All known nests empty. One adult perched near nest #4.
Green River BA	1248	All known nests empty. No eagles.
Tapco BA	1253	All known nests empty. Nest #5 partially fallen. One adult flying.
Tower BA	1259	All known nests empty. Nest #8 deteriorated/gone. No eagles.
Mormon Pocket (golden eagle BA)	1303	All known nests empty. No eagles.
Perkinsville BA	1306	All known nests empty. No eagles.
Hell Point historic BA	1320	All known nests empty. No eagles.
Granite (golden eagle BA)	1334	All known nests empty. No eagles.
Sullivan Lake BA	1341	Adult incubating in nest #2. Second adult perched.
Lynx BA	1420	All known nests empty. One adult perched.
Pleasant BA	1441	All known nests empty. No eagles.
Whiskey Spring BA	1446	Adult incubating in nest #1.
Buckeye BA	1524	All known nests empty. No eagles.
Pee Posh Wetlands BA	1531	Adult incubating in nest #7. Second adult perched.
Garden Lakes BA	1537	Adult incubating in nest #2.
January 11, 2018		
Granite Reef BA	0754	Adult standing in new tree nest (#7). Second adult flew to nest.
January 12, 2018		
Fool Hollow BA	0840	Adult incubating in nest #3. Second adult flying.
Cibecue BA	0957	All known nests empty. No eagles.
Mule Hoof historic BA	1015	All known nests empty. No eagles.
Cedar Basin historic BA	1033	All known nests empty. New large nest (#9) found in sycamore tree. No eagles.

Table 14 continued.		
Location	Time	Comments
Lone Pine BA	1041	Adult incubating in nest #2. Second adult perched.
Crescent BA	1239	All known nests empty. Three adults and 3 immatures at Big Lake.
George's Basin nest site	1341	All known nests empty. Pair of adults perched.
Pineasco Creek nest site	1356	All known nests empty. No eagles.
January 18, 2018		
Riverside BA	0758	Adult incubating in nest #1.
Granite Reef BA	0805	All known nests empty. Pair of adults perched.
Orme BA	0808	All known nests empty. One adult standing in nest #10, second adult flew to nest perch.
Kerr BA	0812	All known nests empty. No eagles.
Goldfield BA	0812	Adult incubating in nest #4. Second adult perched upstream.
Bulldog BA	0819	Adult incubating in nest #2.
Blue Point BA	0823	Adult incubating in nest #10.
Bagley BA	0826	All known nests empty. No eagles.
Saguaro BA	0828	Adult incubating in nest #1.
Tortilla BA	0834	Adult incubating in nest #1. Second adult perched near dam.
Black Cross BA	0836	Adult incubating in nest #1.
Fish Creek BA	0839	Adult incubating in nest #1. Second adult perched in nest.
Horse Mesa BA	0846	All known nests empty. No eagles.
Two Bar nest site	0853	All known nests empty. No eagles.
Bachelor Cove BA	0859	Adult incubating in nest #1.
Tonto BA	0902	All known nests empty. Pair of adults perched by new nest (#8) in snag.
Sheep BA	0909	All known nests empty. Two adults perched in area.
76 BA	0917	All known nests empty. No eagles.
Canyon historic BA	0937	No new nests or eagles.
Redmond BA	0955	All known nests empty. No eagles.
Pinal BA	0959	One adult standing in nest #9. All other known nests empty.
Pinto BA	1007	Adult incubating in nest #10.
Campaign Bay BA	1010	All known nests empty. No eagles.
Armer Gulch BA	1116	Adult incubating in nest #1.
Talkalai BA	1254	Adult incubating in nest #9. Second adult perched.
San Carlos BA	1300	Adult incubating in nest #7. Second adult perched.
Suicide BA	1311	Adult incubating in nest #1.
Coolidge BA	1318	No new nests or eagles.
Granite Basin BA	1351	All known nests empty. One adult perched near nest #2.
Winkelman historic BA	1406	No new nests or eagles.
January 29, 2018		
Riverside BA	0746	Adult incubating in nest #1.
Granite Reef BA	0751	Adult incubating in nest #7.
Orme BA	0758	All known nests empty. One adult perched downstream.
Rodeo BA	0800	Adult incubating in nest #5. Second adult upstream.
Sycamore BA	0804	All known nests empty. Pair of adults perched at gravel ponds.
Doka BA	0805	All known nests empty. Pair of adults perched near nest #3.
Fort McDowell BA	0807	Adult incubating in nest #15.
Box Bar BA	0811	Adult incubating in nest #5.
Bartlett BA	0815	All known nests empty. No eagles.
Yellow Cliffs BA	0822	Adult incubating in nest #1.
Sheep Creek BA	0824	Two adults standing in nest #1. Appeared to be one egg in nest.

Table 14 continued.		
Location	Time	Comments
Cliff BA	0829	All known nests empty. Pair of adults perched near Horseshoe Dam.
Horseshoe BA	0839	Nests #11, 17-18 empty. Pair of adults perched at lake.
Table Mountain BA	0853	Pair of adults standing in nest #4.
East Verde BA	0858	All known nests empty. One near-adult in area.
Coldwater BA	0910	All known nests empty. New large nest (#10) found in poor condition on cliff. No eagles.
Ladders BA	0915	All known nests empty. No eagles.
Beaver BA	0929	Adult incubating in nest #1. Second adult perched nearby.
Oak Creek BA	0935	Adult incubating in nest #4.
Green River BA	0939	Adult incubating in nest #1. Second adult upstream.
Tapco BA	0945	Adult incubating in new nest (#6) in tree.
Tower BA	0952	All known nests empty. No eagles.
Mormon Pocket (golden eagle BA)	1052	All known nests empty. No eagles.
Perkinsville BA	1054	All known nests empty. One adult upstream.
Hell Point historic BA	1107	All known nests empty. No eagles.
Granite golden eagle BA	1116	All known nests empty. No eagles.
Sullivan Lake BA	1120	Adult incubating in nest #1.
Lynx BA	1133	Adult incubating in nest #6.
Goldwater Lake	11340	No new nests. Two immature bald eagles perched by lake.
Burro Creek BA	1348	All known nests empty. Found two new large nests (#3, 4) on cliff. No eagles.
Alamo BA	1403	Adult in nest #4 with one nestling, 1.5 weeks old, and one egg. Second adult flying.
Ive's Wash BA	1407	Adult incubating in nest #4.
Pleasant BA	1450	All known nests empty. One adult flying along river.
Whiskey Spring BA	1455	Adult incubating in nest #1.
Garden Lakes BA	1538	Adult in nest #2 appeared to be brooding a small nestling. Prey remains in nest. Second adult flew to nest.
Buckeye BA	1545	All known nests empty. No eagles.
Pee Posh Wetlands BA	1555	Adult brooding at least one small nestling. Prey remains in nest.
January 30, 2018		
Kerr BA	0753	All known nests empty. No eagles.
Goldfield BA	0753	Adult in nest #4 feeding at least one nestling, then started brooding.
Bulldog BA	0800	Adult incubating in nest #2.
Blue Point BA	0803	Adult incubating in nest #10.
Bagley BA	0806	Adult standing in nest #1 (probable second adult of Blue Point pair).
Saguaro BA	0809	Adult incubating in nest #1.
Tortilla Creek BA	0811	Adult incubating in nest #1.
Black Cross BA	0815	Adult incubating in nest #1.
Fish Creek BA	0818	Adult incubating in nest #1.
Horse Mesa BA	0825	Adult incubating in nest #4.
Two Bar nest site	0832	All known nests empty. No eagles.
Bachelor Cove BA	0836	Adult incubating in nest #1.
Tonto BA	0839	Adult incubating in nest #6. All other known nests empty.
Sheep BA	0847	Adult incubating in nest #7.
76 BA	0855	All known nests empty. One adult perched near ranch house.
Armer Gulch BA	0913	Adult incubating in nest #1.
Pinto BA	0918	Adult incubating in nest #10.

Table 14 continued.		
Location	Time	Comments
Pinal BA	0922	Adult incubating in nest #9.
Redmond BA	0927	All known nests empty. Nest #5 falling apart. No eagles.
Cibecue BA	0944	All known nests empty. One adult perched.
Fool Hollow BA	1011	Adult incubating in nest #3.
Show Low Lake BA	1045	All known nests empty. Two adults perched in area.
Cedar Basin historic BA	1102	All known nests empty. No eagles.
Lone Pine BA	1112	Adult incubating in nest #2.
Pineasco Creek nest site	1119	All known nests empty. One adult downstream, one adult upstream.
George's Basin nest site	1124	All known nests empty. No eagles.
Becker BA	1156	Adult incubating in nest #2.
Concho BA	1212	All known nests empty. Pair of adults perched by new large nest (#2) in tree.
Silver Creek BA	1227	All known nests empty. No eagles.
Talkalai BA	1409	Adult incubating in nest #9. Second adult perched at lake.
San Carlos BA	1415	Adult incubating in nest #7.
Suicide BA	1421	Adult incubating in nest #1.
Coolidge BA	1425	No new nests or eagles.
Granite Basin BA	1433	All known nests empty. One adult perched by nest #2.
February 16, 2018		
Nevada Bay BA	1247	2/16: Nest #1, 4 fair. #2 not found. Two other nests found.
February 24, 2018		
Ashurst BA	1220	Nest #1 fallen. No eagles.
Lower Lake Mary BA	1226	Adult incubating in nest #3.
Kachina BA	1245	One adult perched on nest #1, second adult flying with a stick. Both adults flew out of view to west.
March 15, 2018		
Horseshoe BA	1057	Adult incubating in nest #13, stood up, two eggs seen.
Two Bar nest site	1349	Nests #1-3 empty. No eagles.
March 16, 2018		
Talkalai BA	0838	Two nestlings, 4.5-5.5 weeks old.
San Carlos BA	0844	Nest empty, failed.
Suicide BA	0848	One nestling, 5.5 weeks old. Two adults perched.
Coolidge BA	0854	No new nests. One adult perched.
Granite Basin BA	0902	All known nests empty. No eagles.
Show Low Lake BA	0958	Adult incubating in nest #1.
Lone Pine BA	1107	Adult with one nestling, 4-4.5 weeks old.
Pineasco Creek nest site	1113	All known nests empty. No eagles.
Lost Mule (golden eagle BA)	1117	All known nests empty. No eagles.
George's Basin nest site	1119	All known nests empty. Pair of adults perched in area.
Crescent BA	1144	Adult incubating in nest #1. Second adult perched.
Greer Lakes BA	1151	Adult incubating in nest #4. Nest #3 fallen.
Becker BA	1158	Adult with one nestling, 2 weeks old. Second adult perched.
Concho BA	1215	Adult standing in nest with one hatchling and one egg. Second adult perched.
Silver Creek BA	1232	Adult brooding two nestlings, 1-2 weeks old. Second adult perched.
Fool Hollow BA	1243	Adult with one nestling, 4.5-5 weeks old. One egg in nest.
Cibecue BA	1412	Adult incubating in nest #2.
Redmond BA	1426	All known nests empty. No eagles.

Table 14 continued.		
Location	Time	Comments
Pinal BA	1430	Adult with two nestlings, 3 weeks old.
Pinto BA	1436	Two nestlings, 4.5-5.5 weeks old.
Armer Gulch BA	1440	Adult with three nestlings, 4-4.5 weeks old.
76 BA	1457	Adult incubating in nest #6.
Sheep BA	1506	Adult brooding at least one nestling, 2 weeks old.
Bachelor Cove BA	1512	Adult with two nestlings, 4-4.5 weeks old.
Rock Creek BA	1518	All known nests empty. No eagles.
Horse Mesa BA	1523	Adult incubating in nest #4 (likely a failure, past expected hatch date).
Fish Creek BA	1526	Nest empty, failed. One adult perched above nest.
Black Cross BA	1533	One nestling, 4 weeks old. One adult flying.
Tortilla Creek BA	1535	Adult feeding three nestlings, 6 weeks old.
Saguaro BA	1538	Adult brooding at least one nestling, 3 weeks old.
Blue Point BA	1541	Three nestlings, 5-6 weeks old. One adult flying.
Bulldog BA	1543	Nest empty, failed.
Goldfield BA	1547	Adult with two nestlings, 7 weeks old.
Granite Reef BA	1552	Adult with two nestlings, 2-2.5 weeks old.
March 19, 2018		
Riverside BA	0718	One adult with two nestlings, 4.5-5 weeks old.
Orme BA	0727	All known nests empty. No eagles.
Rodeo BA	0731	Adult brooding at least one nestling, 2.5 weeks old.
Sycamore BA	0734	Adult incubating in nest #7.
Doka BA	0735	Two adults standing in nest #3.
Fort McDowell BA	0737	Two nestlings, 6 weeks old.
Box Bar BA	0740	Adult brooding at least one nestling, 3 weeks old. Second adult perched.
Bartlett BA	0745	All known nests empty. No eagles.
Yellow Cliffs BA	0750	Adult incubating in nest #1 Second adult flew to nest.
Sheep Creek BA	0756	Two adults at nest, one brooding at least one nestling/hatchling.
Cliff BA	0758	All known nests empty. No eagles.
Horseshoe BA	0806	Nests #17, 18 empty. Nest #11 fallen.
Table Mountain BA	0821	Adult possibly brooding. Unable to confirm nestlings.
East Verde BA	0827	Pair of adults standing in nest #6. No eggs seen.
Coldwater BA	0837	All known nests empty. One adult golden eagle perched near nest #9.
Ladders BA	0841	Adult with one hatchling and one egg. Second adult flew to nest.
Beaver BA	0849	Adult with one at least nestling, 2-3 weeks old.
Hidden Valley nest site	0934	All known nests empty. No eagles.
Oak Creek BA	0945	Adult with one nestling, 3 weeks old.
Green River BA	0950	Adult with two nestlings, 3 weeks old.
Tapco BA	0954	Adult incubating in nest #6. Second adult in area.
Tower BA	0958	All known nests empty. No eagles.
Mormon Pocket (golden eagle BA)	1002	All known nests empty. No eagles.
Perkinsville BA	1005	All known nests empty. One adult soaring.
Hell Point historic BA	1023	All known nests empty. No eagles.
Granite (golden eagle BA)	1027	Adult golden eagle incubating in nest #2.
Sullivan Lake BA	1034	Two nestlings, 4-4.5 weeks old. Two adults perched.
Lynx BA	1045	Adult brooding at least one nestling, 3 weeks old.
Devil's Post historic BA	1232	All known nests empty. No eagles.
Burro Creek BA	1246	All known nests empty. No eagles.

Table 14 continued.		
Location	Time	Comments
Ive's Wash BA	1256	Adult incubating in nest #4.
Pleasant BA	1332	All known nests empty. No eagles.
Whiskey Spring BA	1338	Adult with at least one nestling 3.5-4 weeks old.
Garden Lakes BA	1355	One nestling, 7 weeks old.
Buckeye BA	1404	Pair of adults at nest #1 with one hatchling.
April 18, 2018		
Ive's Wash BA	0815	Nest empty, failed. No eagles.
Bluebell nest site	0819	New large nest (#1) on cliff. No eagles.
Rankin Ranch nest site	0827	All known nests empty. No eagles.
Buckskin 1 nest site	0834	All known nests empty. No eagles.
Rawhide 1 nest site	0840	Nest #3 empty. No eagles.
Buckskin 2 nest site	0848	All known nests empty. New large nest (#3) on cliff. No eagles. Pair of adult peregrine falcons flying. Observed an egg in a small indent of cliff, no nest materials.
Bill Williams BA	0855	All known nests empty. No eagles.
Buckskin 3 nest site	0904	All known nests empty. No eagles.
Buckskin Mesa nest site	0908	All known nests empty. No eagles.
Buckskin 4 nest site	0912	All known nests empty. No eagles.
Buckskin 5 nest site	0915	All known nests empty. New large nest (#6) on cliff. No eagles.
Buckskin 6 nest site	0921	All known nests empty. No eagles.
Mohave BA	0938	All known nests empty. Four new large nests found (#5-8). No eagles.
Havasu Wilderness 1 nest site	0952	All known nests empty. Two large nests found on cliff (#3-4). No eagles.
Mount Davis (golden eagle BA)	1124	Red-tailed hawk incubating or brooding in nest #2(?).
Nevada Bay BA	1127	All known nests empty. No eagles.
Mile 320 nest site	1142	Nests #3-5 empty. Nests #1-2 not seen. No eagles.
Malpais nest site	1149	All known nests empty. No eagles.
Roaring Rapids nest site	1156	All known nests empty. No eagles.
Black Canyon BA	1200	All known nests empty. Pair of adult bald eagles perched.
Indian Rapids nest site	1204	All known nests empty. New nest found (#2). No eagles.
Ringbolt Rapids nest site	1207	All known nests empty. No eagles.
Cross Current nest site	1211	All known nests empty. No eagles.
Big Sand Bar nest site	1212	All known nests empty. No eagles.
April 20, 2018		
Granite Reef BA	0744	Adult with two nestlings, 7+ weeks old.
Goldfield BA	0749	Nest empty, fledged. One adult perched.
Blue Point BA	0752	Three nestlings, 10-11 weeks old.
Saguaro BA	0758	Nest empty, failed. no eagles.
Tortilla Creek BA	0800	Three nestlings 10-11 weeks old.
Black Cross BA	0803	One nestling, 9 weeks old.
Horse Mesa BA	0810	Nest empty, failed.
Rock Creek BA	0815	All known nests empty. No eagles.
Bachelor Cove BA	0819	Adult with two nestlings, 9-9.5 weeks old.
Pinto BA	0829	Two nestlings, 9.5 weeks old.
Pinal BA	0832	Two nestlings, 7 weeks old.
Armer Gulch BA	0839	Three nestlings, 9-9.5 weeks old.
Sheep BA	0850	One adult with two nestlings, 6.5-7 weeks old, Second adult perched.
76 BA	0859	One adult with two nestlings, 4-5 weeks old.

Table 14 continued.		
Location	Time	Comments
OW BA	0925	Adult incubating in nest #1.
Woods Canyon BA	0932	Adult incubating in new nest (#12) in snag.
Chevelon Canyon Lake BA	0940	Adult standing in new nest (#5) in live pine tree, possibly brooding. Second adult flying.
Show Low Lake BA	1009	Two nestlings, 3.5 weeks old.
Horseshoe Cienega Lake	1118	One adult bald eagle flying. Five new nests found (#1-5), ospreys incubating in two of them (#1, #4). Osprey flew off nest #5, no eggs.
Greer Lakes BA	1139	Adult with two nestlings, 3 weeks old.
Becker BA	1145	One nestling 6.5-7 weeks old.
Crescent Lake BA	1200	Adult in nest with one nestling, 2-3 weeks old.
Reservation Lake	1205	No new nests. One immature bald eagle perched.
George's Basin nest site	1235	All known nests empty. No eagles.
Pineasco Creek nest site	1241	All known nests empty. No eagles.
Lone Pine BA	1245	One nestling, 9-9.5 weeks old.
Cibecue BA	1302	Nest empty, failed.
April 24, 2018		
Riverside BA	0752	Two nestlings, 10 weeks old.
Rodeo BA	0759	Two nestlings, 7.5-8 weeks old.
Sycamore BA	0803	Two nestlings, 2.5-3 weeks old.
Fort McDowell BA	0805	Two nestlings, 11 weeks old.
Box Bar BA	0809	Two nestlings, 7.5 weeks old. One adult perched.
Bartlett BA	0812	All known nests empty. New large nest found on cliff (#4). No eagles.
Yellow Cliffs BA	0820	Two nestlings, six weeks old.
Sheep Creek BA	0824	Adult with one nestling, 6 weeks old.
Horseshoe BA	0934	Nest empty, failed. Pair of adults perched at lake.
Table Mountain BA	0942	Nest empty, failed.
East Verde BA	0946	All known nests empty. No eagles.
Ladders BA	0953	Two nestlings, 4.5 weeks old.
Beaver BA	0958	Two nestlings, 7+ weeks old. One adult perched.
Oak Creek BA	1003	One nestling, 8 weeks old.
Green River BA	1006	Two nestlings, 8 weeks old.
Lower Lake Mary BA	1100	Two nestlings, 4 weeks old. One adult perched.
Ashurst BA	1105	Two nestlings, 4-6 weeks old (younger nestling may have been dead). Adult perched.
Elaine BA	1114	Adult with two nestlings, 6+ weeks old.
Kachina BA	1118	Osprey incubating in nest #1. No new nests or eagles.
Dry Lake Crater nest site	1124	New nest (#1) found in snag. No eagles.
White Horse Lake BA	1133	Nests #4 fallen and #7 mostly fallen. Osprey incubating new nest in snag (#8). Ospreys standing by nests #1 and #6. Nest #5 empty. No eagles.
Dogtown BA	1143	Adult incubating in nest #3.
Mormon Pocket (golden eagle BA)	1153	All known nests empty. No eagles.
Perkinsville BA	1155	All known nests empty. No eagles.
Granite (golden eagle BA)	1209	Adult with one nestling, 1 week old.
Sullivan Lake BA	1213	Two nestlings, 9-9.5 weeks old. Pair of adults perched.
Lynx BA	1354	Two nestlings, 7+ weeks old.
Whiskey Spring BA	1413	Two nestlings, 9-9.5 weeks old.
Buckeye BA	1434	Adult with one nestling, 4.5 weeks old.

Table 14 continued.		
Location	Time	Comments
May 4, 2018		
Granite Reef BA	0730	Two nestlings, 9 weeks old. One adult perched.
Tortilla Creek BA	0740	One nestling in nest, one fledgling perched nearby, 12-13 weeks old. Third juvenile not seen, assumed fledged.
Black Cross BA	0742	Adult with one nestling, 11 weeks old.
Pinto BA	0756	Nest empty, assume fledged. One adult flying nearby.
Pinal BA	0801	Two nestlings, 9 weeks old. One adult perched.
Pinal Creek	0803	Black hawk nest empty.
Armer Gulch BA	0808	Three nestlings, 11-11.5 weeks old. One adult flying.
Bachelor Cove BA	0815	Adult with two nestlings, 11-11.5 weeks old.
Sheep BA	0820	Two nestlings, 8.5-9 weeks old.
76 BA	0830	One nestling, 7 weeks old. One adult perched.
Christopher Creek	0840	Osprey incubating in new nest (#1) in snag.
OW BA	0900	Nest empty, failed.
Willow Springs Lake nest site	0905	Osprey incubating in nests #2, #4-6, and in new snag nest (#9). Nest #3 fallen. #8 empty.
Chevelon Canyon Lake BA	0920	Nest empty, failed.
Woods Canyon Creek	0930	Osprey incubating in nests #6-7, 11. Nests #4-5 fallen.
Woods Canyon Lake BA	0937	Adult brooding at least one nestling in nest #12.
Bear Canyon Lake nest site	0940	Ospreys incubating in nests #3 and #5. Nests #1-2, 4 fallen.
Knoll Lake nest site	1049	Nest #5 with greenery and osprey perched nearby. Nests #6-7 not found.
Tremaine BA	1115	Nest #2 empty, failed.
Kinnickinick Lake	1120	No new nests or eagles.
Ashurst BA	1133	Two adults with one nestling, 7.5 weeks old. Second nestling dead in nest.
Lower Lake Mary BA	1138	Adult with two nestlings, 4-4.5 weeks old. Osprey incubating in nest #4.
Upper Lake Mary nest site	1140	Ospreys incubating in nests #1-2, 9, and 11. Ospreys copulating at nest #5. One ospreys standing in nest #7. Nests #3, 4, and 6 not found. Nest #8 empty.
Lake Elaine BA	1155	Two nestlings, 7.5 weeks old.
Kachina BA	1200	Osprey incubating in nest #1. No new nests or eagles.
Dry Lake Crater nest site	1205	All known nests empty. No eagles.
JD Dam Lake nest site	1458	Osprey incubating in nest #1. Nest #3 not seem.
White Horse Lake BA	1500	No new nests or eagles.
Scholz Lake nest site	1514	Adult bald eagle in nest #1 with two nestlings, 2 weeks old. Second adult at lake. Two immatures at lake.
Dogtown BA	1519	Adult with one nestling, 1-2 weeks old.
Kaibab Lake nest site	1525	Ospreys incubating in #1-3, 5. Nests #4, 6 not found. Nest #7 empty. No eagles.
Cataract Lake	1535	Adult in new nest (#1) with two nestlings, 6 weeks old. Second adult flew to nest.
Green River BA	1556	Two nestlings, 9.5 weeks old.
Oak Creek BA	1559	One nestling, 9.5 weeks old.
Beaver BA	1605	Two nestlings, 8.5 weeks old.
Ladders BA	1611	One nestling, 6 weeks old. Second nestling gone.
Sheep Creek BA	1630	One nestling, 7.5 weeks old.

Table 14 continued.		
Location	Time	Comments
Yellow Cliffs BA	1633	Two nestlings, 7.5 weeks old.
Fort McDowell BA	1640	Adult with two nestlings, 12.5 weeks old.
Sycamore BA	1644	One nestling, 3 weeks old. Second nestling gone.
Rodeo BA	1646	One nestling, 8.5-9 weeks old.
May 16, 2018		
Sheep Creek BA	1125	One nestling, 9 weeks old.
Yellow Cliffs BA	1130	Two nestlings, 9 weeks old. Adult flew to nest with fish.
Sycamore BA	1145	One nestling, 4-4.5 weeks old.
76 BA	1508	Adult with one nestling, 8.5 weeks old.
Sheep BA	1518	Two nestlings, 10+ weeks old.
May 22, 2018		
Lake Elaine BA	1435	Two nestlings, 8.5-9 weeks old.
Lower Lake Mary BA	1513	Two nestlings, 6 weeks old.
Ashurst BA	1516	One nestling, 10 weeks old.

APPENDIX E: BOX BAR BREEDING AREA SUMMARY

Table 15. Observed human activity and bald eagle behavior, Box Bar BA, Arizona, 2018.

Human Activity	N ¹	W	R	F	L	B	U	Total	Percent
Small plane	516	80	3	--	--	85	18	702	47.0
Hiker	217	47	1	--	--	41	3	309	20.7
Helicopter	59	38	2	--	--	6	9	114	7.6
Photographer	53	9	--	--	--	16	--	78	5.2
Horseback rider	35	8	--	--	--	1	2	46	3.1
Canoe/Kayak	19	13	--	--	--	3	1	36	2.4
Helicopter (Apache)	15	11	--	--	--	8	--	34	2.3
Fisher	25	4	--	--	--	4	--	33	2.2
Birders	16	5	--	--	--	2	--	23	1.5
Nestwatcher	1	2	6	3	--	4	--	16	1.1
Helicopter, Sheriff	3	7	--	--	--	--	3	13	0.9
Rafter/Tuber	6	1	--	--	--	5	--	12	0.8
Stand up paddleboard	8	2	--	--	--	1	1	12	0.8
Nest entry/Banding	1	--	6	2	--	1	1	11	0.7
Camper	7	2	--	--	--	--	--	9	0.6
Drone	6	3	--	--	--	--	--	9	0.6
Gunshots	1	5	--	--	--	--	1	7	0.5
Cyclers	4	--	--	--	--	--	1	5	0.3
Helicopter, Military	1	3	--	--	--	--	1	5	0.3
Motorbike	2	3	--	--	--	--	--	5	0.3
Picnicker	5	--	--	--	--	--	--	5	0.3
Dog	3	--	--	--	--	--	--	3	0.2
Hunter	3	--	--	--	--	--	--	3	0.2
Jet	1	--	--	--	--	--	--	1	0.1
Jet, Military	--	1	--	--	--	--	--	1	0.1
Runner	1	--	--	--	--	--	--	1	0.1
Unknown noise	--	--	1	--	--	--	--	1	0.1
Total	1,008	244	19	5	--	177	41	1,494	

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

Table 16. Observed forage events and success, Box Bar BA, Arizona, 2018.

Sex	Fish		Total	
	E ¹	S-U ²	E	S-U
Male	6	6-0	6	6-0
Female	8	7-1	8	7-1
Total	14	13-1	14	13-1

¹E=A single forage event, not the number of attempts during 1 event.

²S-U= Successful – Unsuccessful forage events.

Table 17. Observed prey types delivered to the nest, Box Bar BA, Arizona, 2018.

Sex	Fish	Mammals	Birds	Unknown	Total	Percent
Male	42	1	1	7	51	49.5
Female	37	3	1	9	50	48.5
Unknown	1	--	--	1	2	1.9
Total	80	4	2	17	103	
Percent	77.7	3.9	1.9	16.5		

Table 18. Observed prey species delivered to the nest, Box Bar BA, Arizona 2018.

Sex	Fish							Mammal	Bird	Total	Percent
	BA ¹	TI	LB	RT	CS	SS	SU	RS	DC		
Unknown	4	2	1	1	1	1	1	1	1	13	100
Total	4	2	1	1	1	1	1	1	1	13	
Percent	30.8	15.4	7.7	7.7	7.7	7.7	7.7	7.7	7.7		

¹BA=bass species, TI=tilapia, LB=large-mouth bass, RT=rainbow trout, CS=catfish species, SS=sunfish species, SU=sucker species, RS=rabbit species, DC=double-crested cormorant.

Table 19. Bald eagle habitat analysis at the Box Bar BA, Arizona, 2018.

Perch Location ¹	Perch Type ²	Side ³	Shade	Distance to H ₂ O ⁴	H ₂ O Type ⁵	Land Type ⁶
25.3	WO	Left	Partial	1	RU	WT
25.4	HS	Right	No	1	RU	UP
25.5	CL	Right	Partial	4	RU	UP
25.5	CL	Right	Partial	4	RU	UP
25.5	YL	Left	No	1	RU	WT
25.7	CL	Right	No	4	RU	CW
25.9	WO	Left	No	1	RU	WT
26.8	HS	Right	Partial	2	RU	CW
27.0	SG	Right	No	1	RU	UP
28.5	WO	Left	No	1	RI	WT
TVGC	CM	--	No	1	PN	GC

¹River kilometer (Hunt et. al. 1992). TVGC=Tonto Verde Golf Course.

²CL=cottonwood, large/20-30+ m, CM=cottonwood, medium/10-20 m, HS=hard snag, main branches only, SG=soft snag, dead but branches still intact, WO=willow, YL=sycamore, large 10-20+ m.

³Side of river facing downstream.

⁴1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.

⁵RU=River run, RI=riffle, PN=pond.

⁶CW=cottonwood grove, GC= golf course, UP= desert uplands, WT= willow thicket.

Table 20. Bald eagle habitat use at the Box Bar BA, Arizona, 2018.

River km ¹	PW ^{2,3}	PP	PD	PH	PU	PR	PE	PK	PX	OT	Total	Percent
25.3	--	--	--	2	--	--	--	--	--	--	2	<0.1
25.4	23	29	--	--	--	--	36	--	--	--	88	0.4
25.5	21	--	--	54	51	--	--	--	--	--	126	0.6
25.7	16,611	1,836	329	--	157	136	39	56	19	59	19,242	97.2
25.9	--	--	--	5	--	--	--	--	--	1	6	<0.1
26.8	10	--	--	1	--	--	--	--	--	--	11	<0.1
27.0	--	--	--	123	--	--	--	--	--	--	123	0.6
28.5	--	--	--	6	--	--	--	--	--	--	6	<0.1
GC	151	3	--	20	--	--	21	--	--	--	195	1.0
Total	16,816	1,868	329	211	208	136	96	56	19	60	19,799	
Percent	84.9	9.4	1.7	1.1	1.1	0.7	0.5	0.3	0.1	0.3		

¹River or lake kilometer (Hunt et al. 1992). GC=golf course.

²Observation time (minutes).

³PW=perched watching, PP=perched preening, PD=perched drying or sunning, PU=perched, unknown, PR=perched roosting, PE=perched eating, PX=perched various activities, PK=perched with prey, OT=other (includes perched vocalizing and perched interaction).

APPENDIX F: CATARACT BREEDING AREA SUMMARY

Table 21. Observed human activity and bald eagle behavior, Cataract BA, Arizona, 2018.

Human Activity	N ¹	W	R	F	L	B	U	Total	Percent
Fishermen	39	--	--	7	--	--	--	46	48.9
Hikers	25	--	--	4	--	--	--	29	30.9
Dogs	8	--	--	3	--	--	--	11	11.7
Runners	4	--	--	--	--	--	--	4	4.3
Birdwatchers	--	--	--	2	--	--	--	2	2.1
Photographer	--	--	--	1	--	--	--	1	1.1
Planes	1	--	--	--	--	--	--	1	1.1
Total	77	--	--	17	--	--	--	94	

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

Table 22. Observed prey types delivered to the nest, Cataract BA, Arizona, 2018.

Sex	Fish	Unknown	Total	Percent
Male	4	3	7	63.6
Female	2	2	4	36.4
Total	6	5	11	
Percent	54.5	45.6		

Table 23. Observed prey species delivered to the nest, Cataract BA, Arizona 2018.

Sex	Fish		Total	Percent
	RT ¹	CC		
Male	1	3	4	66.7
Female	2	--	2	33.3
Total	3	3	6	
Percent	50.0	50.0		

¹RT=rainbow trout, CC=channel catfish.

Table 24. Bald eagle habitat analysis at the Cataract BA, Arizona, 2018.

Perch Location ¹	Perch Type ²	Side of lake	Shade	Distance to H ₂ O ³	H ₂ O Type ⁴
1	PO	North	Yes	3	RS
2	HS	North	No	1	RS
3	PO	North	Yes	1	RS
4	PO	North	No	3	RS
5	PS	North	Yes	1	RS
6	SO	North	No	1	RS
7	PO	North	Yes	3	RS

¹Coordinates for perches are provided in the corresponding Nestwatch report.

²HS=hard snag (only main branches), PO= Pine/Conifer, old growth/20-30+ m, PS= Pine/Conifer, 2nd growth/10-20 m, SO=shore.

³1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.

⁴RS=reservoir main body.

Table 25. Bald eagle habitat use at the Cataract BA, Arizona, 2018.						
Perch Location ¹	PW ^{2,3}	PE	PV	PP	Total	Percent
1	2,637	-	5	2	2,644	46.3
2	1,107	44	2	5	1,158	20.3
3	1,338	-	-	-	1,338	23.4
4	255	-	-	-	255	4.5
5	106	-	-	-	106	1.9
6	20	-	-	-	20	0.4
7	186	-	-	-	186	3.3
Total	5,649	44	7	7	5,707	
Percent	98.9	0.9	0.1	0.1		

¹Coordinates for perches are provided in the corresponding Nestwatch report.

²Observation time (minutes).

³PW=perched watching, PE=perched eating, PV=perched vocalizing, PP=perched preening.

APPENDIX G: CONCHO BREEDING AREA SUMMARY

Table 26. Observed human activity and bald eagle behavior, Concho BA, Arizona, 2018.

Human Activity	N ¹	W	R	F	L	B	U	Total	Percent
Hiker	2	8	--	3	--	--	4	17	38.6
Cattle	--	5	--	1	--	--	--	6	13.6
Small plane	6	--	--	--	--	--	--	6	13.6
Angler/Fisher	1	3	1	--	--	--	--	5	11.4
Picnicker	--	3	--	--	--	--	--	3	6.8
Canoe/Kayak	--	2	--	--	--	--	--	2	4.5
Helicopter	--	2	--	--	--	--	--	2	4.5
Boater	--	1	--	--	--	--	--	1	2.3
Camper	--	1	--	--	--	--	--	1	2.3
Driver	--	1	--	--	--	--	--	1	2.3
Total	9	26	1	4	--	--	4	44	

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

Table 27. Observed forage events and success, Concho BA, Arizona, 2018.

Sex	Fish		Mammal		Bird		Unknown		Total	
	E ¹	S-U	E	S-U	E	S-U	E	S-U	E	S-U
Male	17	8-9	3	1-2	1	0-1	1	1-0	22	10-12
Female	12	3-9	--	--	--	--	1	0-1	13	3-10
Unknown	1	0-1	--	--	--	--	--	--	1	0-1
Total	30	11-19	3	1-2	1	0-1	2	1-1	36	13-23

Table 28. Observed prey types delivered to the nest, Concho BA, Arizona, 2018.

Sex	Fish	Mammals	Unknown	Total	Percent
Male	9	--	4	13	50.0
Female	8	1	4	13	50.0
Total	17	1	8	26	
Percent	65.4	3.8	30.8		

Table 29. Observed prey species delivered to the nest, Concho BA, Arizona 2018.

Sex	Fish		Mammals	Total	Percent
	CC ¹	RT	DC		
Unknown	6	1	1	8	100
Total	6	1	1	8	
Percent	75.0	12.5	12.5		

¹CC=common carp, RT=rainbow trout, DC=desert cottontail.

Perch Location ¹	Perch Type ²	Shade	Distance to H ₂ O ³	Land Type ⁴
A	CL	Partial	1	CW
B	CL	Partial	1	CW
C	CL	Partial	1	CW
D	CL	No	1	CW
E	SO	No	1	SO
F	JN	No	3	JW
G	SJ	No	4	JW
H	SO	No	1	SO
I	LG	Partial	1	SO
J	JN	No	2	JW
K	SO	No	1	SO
L	SO	No	1	SO
M	CM	No	1	SO
N	CL	Partial	1	JW
O	SO	No	1	SO
P	JN	No	2	JW
Q	SO	No	1	SO
R	SO	No	1	SO
S	SJ	No	3	JW
T	JN	No	1	JW
U	JN	No	1	JW
V	JN	No	1	SO
W	SO	No	1	JW
X	CM	Partial	1	CW
Y	SO	Partial	1	CW
Z	SP	Partial	1	SO
AA	CM	Partial	1	CW
BB	SJ	No	4	JW
CC	JN	No	3	JW
DD	SO	Partial	1	SO
EE	SO	No	1	SO
FF	SO	No	1	SO
GG	SO	No	1	SO
HH	SJ	No	3	JW
II	SO	Partial	1	SO

¹Perch locations are described and mapped in the corresponding Nestwatch report.

²CM=cottonwood medium/10-20m, CL=cottonwood large/20-20+m, JN=Juniper, LG=log, SJ=snag juniper, SO=shore, SP=stump.

³1=0-25m, 2 =26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.

⁴CW=cottonwood grove, JW=juniper woodland, SO=shore.

Perch Location ¹	PW ^{2,3}	PG	CL	ES	PH	PP	PD	PK	DW	OT	Total	Percent
A	6,936	--	760	--	36	101	17	--	--	4	7,854	43.2
B	2,395	--	280	--	126	43	117	--	--	--	2,961	16.3
C	1,078	--	37	--	35	65	36	--	--	--	1,251	6.9
D	20	--	--	--	117	--	--	--	--	--	137	0.8
E	8	208	7	119	--	5	--	44	98	39	528	2.9
F	397	--	--	--	--	9	8	--	--	--	414	2.3
G	1,505	5	88	--	19	26	37	11	--	--	1,691	9.3
H	5	432	--	70	--	--	3	43	49	16	618	3.4
I	59	1	--	--	--	23	--	9	--	54	146	0.8
J	123	--	--	--	--	--	8	--	--	--	131	0.7
K	--	--	--	156	--	--	--	--	--	3	159	0.9
L	14	91	--	--	--	--	--	17	--	17	139	0.8
M	68	--	--	--	27	--	17	--	--	--	112	0.6
N	37	--	--	--	--	--	--	--	--	--	37	0.2
O	--	35	--	--	--	--	--	--	34	5	74	0.4
P	112	--	1	--	23	--	--	--	--	--	136	0.7
Q	--	114	31	--	--	--	--	--	10	--	155	0.9
R	--	222	20	--	--	--	--	84	2	13	341	1.9
S	418	--	--	--	--	--	--	--	--	--	418	2.3
T	7	--	--	--	21	--	--	--	--	--	28	0.2
U	3	--	--	--	--	--	--	--	--	--	3	0.02
V	51	--	--	--	--	4	--	--	--	--	55	0.3
W	--	1	--	--	--	--	--	--	--	--	1	<0.1
X	--	--	--	--	--	--	--	--	--	3	3	<0.1
Y	--	--	--	--	--	--	--	--	--	2	2	<0.1
Z	2	4	--	--	--	--	--	--	--	--	6	<0.1
AA	15	--	--	--	--	--	--	--	--	--	15	0.1
BB	9	--	--	--	--	--	--	--	--	--	9	<0.1
CC	27	--	--	--	--	--	--	--	--	--	27	0.1
DD	--	1	--	--	11	--	--	10	--	--	22	0.1
EE	--	7	--	--	--	--	--	--	--	--	7	<0.1
FF	17	443	54	118	--	--	9	--	10	22	673	3.7
GG	--	2	--	--	--	--	--	--	--	--	2	<0.1
HH	35	--	--	--	--	--	--	--	--	--	35	0.2
II	--	--	--	--	--	--	--	--	4	--	4	<0.1
Total	13,341	1,566	1,278	463	415	276	252	218	207	178	18,194	
Percent	73.3	8.6	7.0	2.5	2.3	1.5	1.4	1.2	1.1	1.0		

¹Perch locations are described and mapped in the corresponding Nestwatch report.

²Observation time (minutes).

³PW=perched watching, PG=perched on ground, CL=perched close to mate, ES=eating on shore, PH=perched hunting, PP=perched preening, PD=perched drying, PK=perched with prey, DW=drinking water, OT=other (includes perched eating, gathering nest materials, bathing, perched unknown, weird behavior, and swimming with prey).

APPENDIX H: CRESCENT BREEDING AREA SUMMARY

Table 32. Observed human activity and bald eagle behavior, Crescent BA, Arizona, 2018.

Human Activity	N ¹	W	R	F	L	B	U	Total	Percent
Anglers	447	--	--	--	--	--	--	447	56.8
Drivers	100	--	--	--	--	--	--	100	12.7
Birders	65	--	--	--	--	--	--	65	8.3
Picnickers	45	--	--	--	1	--	--	46	5.8
Hikers	17	--	1	--	1	--	--	20	2.5
Float tubers fishing	19	--	--	--	--	--	--	19	2.4
Boater - fishing	17	--	--	--	--	--	--	17	2.2
Photographer	17	--	--	--	--	--	--	17	2.2
Canoe - kayak	16	--	--	--	1	--	--	17	2.2
Agency Workers	17	--	--	--	--	--	--	17	2.2
Rancher	8	--	--	--	--	--	--	8	1.0
Motorcycles	4	--	--	--	--	--	--	4	0.5
Horseback Riders	3	1	--	--	--	--	--	4	0.5
Cattle	3	--	--	--	--	--	--	3	0.4
Swimmers	1	--	--	--	1	--	--	2	0.3
Small Plane	1	--	--	--	--	--	--	1	0.1
Total	780	1	1	--	4	--	--	787	

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

Table 33. Observed forage events and success, Crescent BA, Arizona, 2018.

Sex	Fish		Birds		Total	
	E ¹	S-U ²	E	S-U	E	S-U
Male	44	44-0	2	2-0	46	46-0
Female	31	31-0	1	0-1	32	31-1
Total	75	75-0	3	2-1	78	77-1

¹E=A single forage event, not the number of attempts during 1 event.

²S-U=Successful – Unsuccessful forage events.

Table 34. Observed prey types delivered to the nest, Crescent BA, Arizona, 2018.

Sex	Fish	Birds	Total	Percent
Male	42	2	44	60.3
Female	29	--	29	39.7
Total	71	2	73	
Percent	97.3	2.7		

Table 35. Observed prey species delivered to the nest, Crescent BA, Arizona 2018.

Sex	Fish		Birds		Total	Percent
	RT ¹	CT	AC	CM		
Male	35	7	1	1	44	60.3
Female	19	10	--	--	29	39.7
Total	54	17	1	1	73	
Percent	74.0	23.3	1.4	1.4		

¹RT=rainbow trout, CT=cutthroat trout, AC=American coot, CM=common merganser.

Perch Location ¹	Perch Type ²	Side ³	Shade	Distance to H ₂ O ⁴	H ₂ O Type	Land Type ⁵
0.7	PO	E	Yes	8	--	CF
2.0	HS	S	Partial	6	--	CF
2.1a	PO	S	Yes	4	--	CF
2.1b	PS	S	Yes	5	--	CF
2.15	PO	S	Yes	8	--	CF
2.2	PO	S	Yes	8	--	CF
2.25a	PO	W	Yes	8	--	CF
2.25b	HS	Nest	No	8	--	CF
2.3a	PO	N	No	8	--	CF
2.3b	HS	N	Yes	8	--	CF
2.3c	HS	N	Yes	7	--	CF
2.3d	PS	N	Yes	6	--	CF
2.4	SC	N	No	7	--	CF

¹Lake kilometer (counterclockwise from boat ramp).

²PO=Pine/Conifer, old growth/20-30+ m, PS=pine/conifer 2nd growth, SC=snag conifer, HS=hard snag (main branches only).

³Direction from observation point. E=east, N=north, S=south, W=west

⁴1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.

⁵CF=coniferous forest.

Perch Location ¹	PW ^{2,3}	PR	PP	ET	PK	Total	Percent
0.7	92	--	--	--	--	92	0.3
2.0	55	--	--	--	--	55	0.2
2.1	1,691	211	--	--	--	1,902	6.0
2.15	3,304	1,108	11	--	2	4,425	14.0
2.2	2,649	--	--	--	2	2,651	8.4
2.25	9,242	438	12	--	--	9,692	30.7
2.3	10,449	1,660	39	12	--	12,160	38.5
2.4	583	--	16	--	--	599	1.9
Total	28,065	3,417	78	12	4	31,576	
Percent	88.9	10.8	0.2	0.04	0.01		

¹Lake kilometer (counterclockwise from boat ramp).

²Observation time (minutes).

³PW=perched watching, PR=perched roosting, PP=perched preening, ET=eating in tree, PK=perched with prey.

APPENDIX I: FOOL HOLLOW BREEDING AREA SUMMARY

Table 38. Observed human activity and bald eagle behavior, Fool Hollow BA, Arizona, 2018.

Human Activity	N ¹	W	R	F	L	B	U	Total	Percent
Off-highway vehicle	10	--	--	--	--	--	--	10	76.9
Helicopter	2	--	--	--	--	--	--	2	15.4
Small plane	1	--	--	--	--	--	--	1	7.7
Total	13	--	--	--	--	--	--	13	

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

Table 39. Observed prey types delivered to the nest, Fool Hollow BA, Arizona, 2018.

Sex	Birds	Fish	Mammals	Unknown	Total	Percent
Male	23	4	6	19	52	81.2
Female	4	3	--	5	12	18.8
Total	27	7	6	24	64	
Percent	42.2	10.9	9.4	37.5		

Table 40. Observed prey species delivered to the nest, Fool Hollow BA, Arizona 2018.

Sex	Birds	Fish			Mammals		Total	Percent
	AC ¹	RT	BG	PK	MC	JK		
Male	23	3	1	--	5	1	33	82.5
Female	4	1	1	1	--	--	7	17.5
Total	27	4	2	1	5	1	40	
Percent	67.5	10.0	5.0	2.5	12.5	2.5		

¹AC=American coot, RT=rainbow trout, BG=bluegill, PK=pike, MC=mountain cottontail, JK=jackrabbit.

Table 41. Bald eagle habitat analysis at the Fool Hollow BA, Arizona, 2018.

Perch Location ¹	Perch Type ²	Shade	Distance to H ₂ O ³	H ₂ O Type ⁴
1	PO	Yes	6	TR
2	PO	No	5	TR
3	HS	Yes	6	TR
4	PO	Yes	6	TR
5	PO	Yes	6	TR
6	SC	No	5	TR
7	PO	Yes	6	TR
8	PO	Yes	6	TR
9	PO	Yes	6	TR
10	PS	No	8	TR
11	PO	Yes	6	TR
12	SC	No	1	RS
13	PO	No	5	TR
14	PO	Yes	6	TR

¹Coordinates for perches are provided in the corresponding Nestwatch report.

²HS=hard snag (main branches only), PO=Pine/Conifer, old growth/20-30+ m, PS=pine/conifer 2nd growth, SC=snag, conifer.

³1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.

⁴RS=reservoir main body, TR=tail race of dam.

Perch Location ¹	PW ^{2,3}	PP	PV	Total	Percent
1	872	39	2	913	9.7
2	911	23	--	934	9.9
3	250	55	2	307	3.3
4	554	8	--	562	6.0
5	1,036	28	2	1,066	11.3
6	1,062	38	--	1,100	11.6
7	3,860	24	15	3,899	41.3
8	47	5	--	52	0.56
9	36	--	--	36	0.4
10	166	--	--	166	1.8
11	250	--	--	250	2.7
12	43	--	--	43	0.5
13	18	--	--	18	0.2
14	104	--	--	104	1.1
Total	9,209	220	21	9,450	
Percent	97.5	2.3	0.2		

¹Coordinates for perches are provided in the corresponding Nestwatch report.

²Observation time (minutes).

³PW=perched watching, PP=perched preening, PV= perched vocalizing.

APPENDIX J: GOLDFIELD BREEDING AREA SUMMARY

Table 43. Observed human activity and bald eagle behavior, Goldfield BA, Arizona, 2018.

Human Activity	N ¹	W	R	F	L	B	U	Total	Percent
Canoe/Kayak	1,246	1	--	3	--	--	14	1264	38.0
Hiker	685	--	--	1	--	--	--	686	20.7
Horse Rider	472	--	--	1	--	--	--	473	14.2
Photographer	235	--	--	1	--	--	--	236	7.1
Stand Up Paddler	177	--	--	--	--	--	--	177	5.3
Tuber/Rafter	131	--	--	--	--	--	--	131	3.9
Swimmer	81	--	--	--	--	--	5	86	2.6
Dog walker	73	--	1	--	--	--	--	74	2.2
Fisherman	46	--	--	--	--	--	--	46	1.4
Birder	27	--	--	--	--	--	--	27	0.8
Helicopter	1	19	--	--	--	--	4	24	0.7
Agency Worker	11	6	--	--	--	--	1	18	0.5
OHV	5	5	--	--	--	--	6	16	0.5
Cycler	12	--	--	--	--	--	--	12	0.4
Sm. Plane	--	6	--	--	--	--	4	10	0.3
Drone	2	6	--	--	--	--	2	10	0.3
Metal Detector	10	--	--	--	--	--	--	10	0.3
Sherriff Helicopter	2	5	--	--	--	--	--	7	0.2
Driver	5	--	--	--	--	--	--	5	0.1
Airboat	3	--	--	--	--	--	1	4	0.1
Apache Helicopter	--	1	--	--	--	--	2	3	0.1
Nestwatcher	--	3	--	--	--	--	--	3	0.1
Runner	2	--	--	--	--	--	--	2	0.1
Ultra-light plane	--	--	--	--	--	--	1	1	<0.1
Total	3,226	52	1	6	--	--	40	3,325	

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

Table 44. Observed forage events and success, Goldfield BA, Arizona, 2018.

Sex	Fish		Birds		Total	
	E ¹	S-U ²	E	S-U	E	S-U
Male	2	0-2	2	2-0	4	2-2
Female	1	0-1	1	0-1	2	0-2
Total	3	0-3	3	2-1	6	2-4

¹E=A single forage event, not the number of attempts during 1 event.

²S-U= Successful – Unsuccessful forage events.

Table 45. Observed prey types delivered to the nest, Goldfield BA, Arizona, 2018.

Sex	Fish	Mammals	Unknown	Total	Percent
Male	33	1	11	45	58.4
Female	15	--	12	27	35.1
Unknown	3	--	2	5	6.5
Total	51	1	25	77	
Percent	66.2	1.3	32.5		

Perch Location ¹	Perch Type ²	Side ³	Shade	Distance to H ₂ O ⁴	H ₂ O Type ⁵	Land Type ⁶
8.5	WO	L	No	5	RU	MB
9.0a	CM	R	Yes	5	RU	MB
9.0b	WO	R	Partial	1	RU	WT
9.2a	CM	R	No	5	RU	MB
9.2b	SS	R	No	4	RU	MB
9.3a	SP	R	No	3	RU	MB
9.3b	CL	R	No	5	RU	MB
9.3c	HS	R	No	4	RU	MB
9.3d	SP	R	No	3	RU	MB
9.3e	CM	R	Partial	5	RU	MB
9.4a	SD	R	No	5	RU	MB
9.4b	WO	L	No	1	RU	MB
9.4c	CM	R	No	1	RU	MB
9.4d	HS	R	No	5	RU	MB
9.5a	CM	R	No	1	RU	WT
9.5b	RW	C	No	0	RI	MB
9.6a	SG	R	No	5	RU	MB
9.6b	SO	L	No	1	RU	SO
9.7a	SB	I	No	0	RU	SO
9.7b	HS	R	No	1	RU	WT
9.7c	CM	R	Yes	5	RU	MB
9.7d	SO	R	No	1	RU	MB
9.9	HS	R	No	2	RU	MB
10.0	WO	R	No	1	RU	WT
10.1	CM	L	No	1	RU	MB
10.2	CL	R	No	1	RU	MB
10.3	MS	L	No	1	RU	MB
11.0	CF	R	No	2	RU	CL
11.3	CM	L	Yes	1	RU	MB
11.5	CL	L	Partial	2	RU	CW

¹River kilometer (Hunt et. al. 1992).

²CF=cliff ledge; CL=cottonwood, large/20-30+ m, CM=cottonwood, medium/10-20 m, HS=hard snag (main branches only), MS=mesquite, RW=rock in water, SB=sand bar, SD=snag, cottonwood, SG=soft snag (dead, but branches still intact), SO=shore, SP=stump or fallen tree, SS=snag, shrub, WO=willow.

³L=river left, R=river right, C=channel (in river or lake), I=island.

⁴1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400.

⁵RI=riffle, RU=river run

⁶CL=cliffs, CW=cottonwood grove, MB=mesquite bosque, SO=shore, WT=willow thicket.

Table 47. Bald eagle habitat use at the Goldfield BA, Arizona, 2018.												
Perch Location ¹	PW ^{2,3}	PP	PH	CL	PD	PX	PV	DW	PU	OT	Total	Percent
8.5	1	--	--	--	--	--	--	--	--	--	1	<0.1
8.6	26	--	--	--	--	--	--	--	11	--	37	0.3
9.0	148	--	--	--	--	--	--	--	2	--	150	1.2
9.2	340	--	331	--	--	--	8	--	--	--	679	5.3
9.3	1,865	418	17	355	58	47	15	--	--	8	2,783	21.6
9.4	707	18	32	5	--	--	6	--	--	--	768	6.0
9.5	2,308	33	--	--	--	2	4	13	--	--	2,360	18.4
9.7	712	5	95	7	--	--	--	--	--	--	819	6.4
9.9	105	35	--	--	16	--	--	--	--	--	156	1.2
10.0	--	--	--	--	--	--	--	21	--	4	25	0.2
10.1	1,302	--	--	17	--	--	--	--	--	--	1,319	10.3
10.3	15	--	--	--	--	--	--	--	--	--	15	0.1
11.0	3,253	196	56	113	--	2	4	--	--	--	3,624	28.2
11.3	106	7	--	--	--	--	--	--	--	--	113	0.9
11.5	6	--	--	--	--	--	--	--	--	--	6	<0.1
Total	10,894	712	531	497	74	51	37	34	13	12	12,855	
Percent	84.7	5.5	4.1	3.9	0.6	0.4	0.3	0.3	0.1	0.1		

¹River kilometer (Hunt et al. 1992).

²Observation time (minutes).

³PW=perched watching, PP=perched preening, PH=perched water / hunting, CL= perched close to mate, PD=perched drying, PX=perched various / other, PV=perched vocalizing, DW=drinking water, PU=perched unknown, OT=other (includes perched eating, bathing, and copulating).

APPENDIX K: GRANITE REEF BREEDING AREA SUMMARY

Table 48. Observed human activity and bald eagle behavior, Granite Reef BA, Arizona, 2018.

Human Activity	N ¹	W	R	F	L	B	U	Total	Percent
Helicopter	94	23	--	1	--	3	--	121	29.4
Kayak/Canoe	98	5	--	--	1	--	--	104	25.2
Apache Helicopter	42	3	--	1	--	--	--	46	11.2
Paddleboard	43	--	--	--	--	--	--	43	10.4
Fisherman	23	--	--	--	--	--	--	23	5.6
Dynamite Blasts	15	--	--	--	--	7	--	22	5.3
Small Plane	13	2	--	--	--	3	--	18	4.4
Patrol Helicopter	6	5	--	--	--	--	--	11	2.7
Military Helicopter	5	2	--	--	--	--	--	7	1.7
Commercial Raft	5	--	--	--	--	--	--	5	1.2
AZGFD Helicopter	1	1	--	--	--	--	--	2	0.5
Logger	2	--	--	--	--	--	--	2	0.5
Military Plane	2	--	--	--	--	--	--	2	0.5
Picnicker	2	--	--	--	--	--	--	2	0.5
Swamp Boat	--	1	--	--	--	1	--	2	0.5
Passenger Jet	1	--	--	--	--	--	--	1	0.2
Tree Trimmer	--	1	--	--	--	--	--	1	0.2
Total	352	43	--	2	1	14	--	412	

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

Table 49. Observed forage events and success, Granite Reef BA, Arizona, 2018.

Sex	Fish		Carrion		Total	
	E ¹	S-U ²	E	S-U	E	S-U
Male	3	2-1	--	--	3	2-1
Female	9	6-3	2	2-0	11	8-3
Total	12	8-4	2	2-0	14	10-4

¹E=A single forage event, not the number of attempts during 1 event.

²S-U= Successful – Unsuccessful forage events.

Table 50. Observed prey types delivered to the nest, Granite Reef BA, Arizona, 2018.

Sex	Fish	Birds	Carrion	Unknown	Total	Percent
Male	28	1	--	--	29	30.5
Female	64	--	1	1	66	69.5
Total	92	1	1	1	95	
Percent	96.8	1.1	1.1	1.1		

Table 51. Observed prey species delivered to the nest, Granite Reef BA, Arizona 2018.

Sex	Fish						Birds	Total	Percent
	BL ¹	RT	SU	LB	BC	CC	WA		
Male	3	8	4	2	3	1	1	22	28.6
Female	32	16	2	3	1	1	--	55	71.4
Total	35	24	6	5	4	2	1	77	
Percent	45.5	31.2	7.8	6.5	5.2	2.6	1.3		

¹BL=bluegill, RT=rainbow trout, SU=sucker species, LB=largemouth bass, BC=black crappie, CC=common carp, WA=waterfowl species.

Table 52. Bald eagle habitat analysis at the Granite Reef BA, Arizona, 2018.

Perch Location ¹	Perch Type ²	Side ³	Shade	Distance to H ₂ O ⁴	H ₂ O Type ⁵	Land Type ⁶
0.0a	UP	Right	No	1	DA	SO
0.0b	UP	Right	No	2	DA	UP
0.0c	SO	Channel	No	1	TR	SO
0.0d	DA	Channel	No	1	DA	SO
0.1a	LP	Right	No	1	DA	SO
0.1b	FP	Right	No	1	RS	SO
0.1c	UP	Right	No	1	RS	SO
0.1d	SP	Right	No	1	RS	SO
0.2	SO	Left	Partial	1	RS	SO
0.4a	SG	Right	Partial	3	RC	CW
0.4b	CL (NT)	Right	No	3	RC	CW
0.5a	ST	Right	No	1	RC	--
0.5b	RW	Right	No	1	RC	SO
0.5c	SB	Right	No	1	RC	SO
3.9	CL	Right	Partial	3	RU	CW
4.0a	CM	Right	Partial	4	RI	CW
4.0b	BO	Right	No	4	RI	UP
4.8	CM	Right	Partial	4	RU	UP

¹River kilometer (Hunt and others 1992).

²BO=boulder, CL=cottonwood, large/20-30+ m, CM=cottonwood, medium/10-20+ m, DA=dam, FP=fence post, LP=light pole, RW=rock in water, SB=sand bar, SG=soft snag, SO=shore, SP=stump or fallen tree, ST=snag top, UP=utility pole.

³Side of river facing downstream.

⁴1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400.

⁵DA=dam, RC=reservoir cove, RS=reservoir, RI=riffle, RU=run, TR=tail race.

⁶CW=cottonwood grove, SO=shore, UP=desert upland.

Table 53. Bald eagle habitat use at the Granite Reef BA, Arizona, 2018.

Perch Location ¹	PW ^{2,3}	PH	PP	PD	BA	CL	PV	DW	Total	Percent
0.0	745	171	85	67	--	25	18	--	1,111	7.6
0.1	114	50	--	--	--	26	--	--	190	1.3
0.2	--	29	--	--	--	--	--	--	29	0.2
0.4	6,637	4,527	343	187	--	25	18	--	11,737	79.9
0.5	236	421	--	5	243	22	--	14	941	6.4
3.9	432	--	--	--	--	--	--	--	432	2.9
4.0	122	--	--	--	--	--	--	--	122	0.8
4.8	125	--	--	--	--	--	--	--	125	0.9
Total	8,411	5,198	428	259	243	98	36	14	14,687	
Percent	57.3	35.4	2.9	1.8	1.7	0.7	0.2	0.1		

¹River kilometer (Hunt and others 1992).

²Observation time (minutes).

³PW=perched watching, PH=perched hunting, PP=perched preening, PD=perched drying, BA=bathing, CL=perched close to mate, PV=perched vocalizing, DW=drinking water.

APPENDIX L: LUNA BREEDING AREA SUMMARY

Table 54. Observed human activity and bald eagle behavior, Luna BA, Arizona, 2018.

Human Activity	N ¹	W	R	F	L	B	U	Total	Percent
Angler	152	--	--	--	--	--	--	152	30.1
Driver	139	--	--	1	--	--	--	140	27.7
Birder	46	--	--	--	--	--	--	46	9.1
Boater (fishing)	44	--	--	1	--	--	--	45	8.9
Picnicker	34	--	--	--	--	--	--	34	6.7
Hiker	23	1	--	--	--	--	--	24	4.8
Agency Worker	18	--	--	--	--	--	--	18	3.6
Photographer	9	--	--	--	--	--	--	9	1.8
Float tuber (fishing)	6	--	--	1	--	--	--	7	1.4
Gunshot	4	--	3	--	--	--	--	7	1.4
Motorcycle	4	--	--	--	--	--	--	4	0.8
Helicopter	4	--	--	--	--	--	--	4	0.8
Department biologist	3	--	--	--	--	--	--	3	0.6
Logging	3	--	--	--	--	--	--	3	0.6
Small plane	2	--	--	--	--	--	--	2	0.4
Nestwatcher	2	--	--	--	--	--	--	2	0.4
Military jet	--	--	2	--	--	--	--	2	0.4
Camper	1	--	--	--	--	--	--	1	0.2
Construction	--	--	--	1	--	--	--	1	0.2
Rancher	--	--	--	1	--	--	--	1	0.2
Total	494	1	5	5	--	--	--	505	

¹Bald 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, Luna BA, Arizona, 2018.

Sex	Birds		Fish		Unknown		Total	
	E ¹	S-U ²	E	S-U	E	S-U	E	S-U
Male	16	14-2	9	9-0	1	1-0	26	24-2
Female	4	4-0	8	8-0	--	--	12	12-0
Total	20	18-2	17	17-0	1	1-0	38	36-2

¹E=A single forage event, not the number of attempts during 1 event.

²S-U= Successful – Unsuccessful forage events.

Table 56. Observed prey types delivered to the nest, Luna BA, Arizona, 2018.

Sex	Birds	Fish	Unknown	Total	Percent
Male	12	7	1	20	66.7
Female	3	7	--	10	33.3
Total	15	14	1	30	
Percent	50.0	46.7	3.3		

Table 57. Observed prey species delivered to the nest, Luna BA, Arizona 2018.

Sex	Birds		Fish		Total	Percent
	AC ¹	CM	RT	CT		
Male	11	1	7	--	19	65.5
Female	3	--	6	1	10	34.5
Total	14	1	13	1	29	
Percent	48.3	3.4	44.8	3.4		

¹AC=American coot, CM=common merganser, RT=rainbow trout, CT=cutthroat trout.

Table 58. Bald eagle habitat analysis at the Luna BA, Arizona, 2018.

Perch Location ¹	Perch Type ²	Shade	Distance to H ₂ O ³	H ₂ O Type ⁴	Land Type ⁵
0.1	PS	Yes	1	RS	--
0.3	PO	Yes	1	RS	--
0.6	HS	No	2	RC	--
1.4	PO	Yes	2	RS	--
2.5	PS	No	2	--	CF
2.6a	WF	No	1	RS	--
2.6b	SC	No	6	--	CF
2.7	PS	No	2	RS	--
2.8	PS	Yes	2	--	CF
3.0	PS	Yes	2	--	CF
3.3	ST	No	2	--	CF
3.5	PO	No	1	RC	--
4.6	PS	No	2	--	CF
4.8	HS	No	8	--	CF
4.9a	HS	No	8	--	CF
4.9b	HS	Yes	8	--	CF
4.9c	PO	Yes	8	--	CF
5.0	PO	Yes	8	--	CF
5.1	FP	No	1	RC	--
5.1a	HS	No	8	--	CF
5.1b	HS	No	8	--	CF
5.1c	PO	Yes	8	--	CF
5.1d	PO	Yes	8	--	CF
5.2	BO	No	1	RS	--
5.3	PO	Yes	8	--	CF

¹Lake kilometer (counterclockwise from boat ramp).

²BO=boulder, FP=fence post, HS=hard snag (main branches only), PO=Pine/Conifer, old growth/20-30+ m, PS=pine/conifer 2nd growth, SC=snag conifer, ST=stump or fallen tree, WF=waterfowl closure sign.

³1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400.

⁴RC=reservoir cove, RS=reservoir main body.

⁵CF=coniferous forest.

Table 59. Bald eagle habitat use at the Luna BA, Arizona, 2018.										
Perch Location ¹	PW ^{2,3}	PR	PH	PP	PD	CL	ET	PV	Total	Percent
0.1	--	--	34	--	--	--	--	--	34	0.2
0.3	27	--	--	--	--	--	--	--	27	0.2
0.6	41	--	--	--	--	--	--	--	41	0.3
1.4	--	--	67	--	--	--	--	--	67	0.5
2.5	--	--	7	--	--	--	--	--	7	0.0
2.6	142	--	226	8	--	--	--	1	377	2.6
2.7	110	--	335	--	104	--	--	--	549	3.7
2.8	74	--	149	--	--	--	--	--	223	1.5
3.0	119	--	--	--	--	--	--	--	119	0.8
3.3	--	--	17	--	--	--	--	--	17	0.1
3.5	--	120	--	--	--	--	--	--	120	0.8
4.6	301	120	7	20	--	--	--	--	448	3.0
4.8	553	1,119	--	--	--	--	--	--	1,672	11.3
4.9	2,562	1,597	29	124	--	--	--	--	4,312	29.3
5.0	376	404	--	45	--	41	--	--	866	5.9
5.1	3,105	1,495	116	100	104	8	20	2	4,950	33.6
5.2	216	237	--	--	--	--	--	--	453	3.1
5.3	10	118	--	297	25	--	--	--	450	3.1
Total	7,636	5,210	987	594	233	49	20	3	14,732	
Percent	51.8	35.4	6.7	4.0	1.6	0.3	0.1	<0.1		

¹Lake kilometer (counterclockwise from boat ramp).

²Observation time (minutes).

³PW=perched watching, PR=perched roosting, PH=perched hunting, PP=perched preening, PD=perched drying, CL=perched close to mate, ET=eating in tree, PV=perched vocalizing.

APPENDIX M: SYCAMORE BREEDING AREA SUMMARY

Table 60. Observed human activity and bald eagle behavior, Sycamore BA, Arizona, 2018.

Human Activity	N ¹	W	R	F	L	B	U	Total	Percent
Horseback riders	16	--	--	1	--	6	--	23	23.2
Helicopter	16	1	--	1	--	3	--	21	21.2
Small plane	7	2	1	--	--	2	--	12	12.1
Apache helicopter	5	1	--	--	--	1	1	8	8.1
Driver	4	1	--	2	--	--	--	7	7.1
Military helicopter	4	--	--	--	--	1	--	5	5.2
MCSO helicopter	2	--	--	--	--	2	--	4	4.1
Gunshot	1	--	--	1	--	--	1	3	3.0
Kayak	--	1	--	1	--	1	--	3	3.0
OHV	2	--	--	--	--	1	--	3	3.0
Farmer/Rancher	1	--	--	1	--	--	--	2	2.0
Swimmer	2	--	--	--	--	--	--	2	2.0
Picnicker	1	--	--	--	--	--	--	1	1.0
Hiker	1	--	--	--	--	--	--	1	1.0
Nestwatcher	--	--	--	1	--	--	--	1	1.0
Photographer	--	--	--	--	1	--	--	1	1.0
BMX Motorcycle	--	--	--	1	--	--	--	1	1.0
Dog	--	--	--	--	1	--	--	1	1.0
Total	62	6	1	9	2	17	2	99	

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

Table 61. Observed forage events and success, Sycamore BA, Arizona, 2018.

Sex	Fish		Carrion		Total	
	E ¹	S-U ²	E	S-U	E	S-U
Male	--	--	3	3-0	3	3-0
Female	1	1-0	1	1-0	2	2-0
Total	1	1-0	4	4-0	5	5-0

¹E=A single forage event, not the number of attempts during 1 event.

²S-U=Successful – Unsuccessful forage events.

Table 62. Observed prey types delivered to the nest, Sycamore BA, Arizona, 2018.

Sex	Fish	Unknown	Total	Percent
Male	1	6	7	46.7
Female	1	7	8	53.3
Total	2	13	15	
Percent	13.3	86.7		

Perch Location ¹	Perch Type ²	Side ³	Shade	Distance to H ₂ O ⁴	H ₂ O Type ⁵	Land Type ⁶
7.8	UP	Left	No	2	RU	SO
7.9	CL	Left	Yes	1	RU / PN	SO
8.7	CM	Right	Partial	1	RI	CW
9.1	UP	Right	No	8	--	FL
9.2	WO	Right	Partial	1	RU	WT
9.4	UP	Right	No	8	--	FL
9.5a	IS	Right	No	8	--	FL
9.5b	GR	Right	No	8	--	FL
9.6	WO	Right	Partial	1	RI	WT
9.8	SM	Left	No	6	RU	MB
9.9	UP	Right	No	2	RI	FL
10.0	WO	Right	Partial	1	RU	WT
10.1	CL	Left	Yes	6	RU	CW
10.2a	MS	Right	No	1	RU	MB
10.2b	WO	Left	Partial	1	RU	WT
10.3a	HS	Left	No	6	RU	MB
10.3b	UP	Right	No	3	RU	FL
10.4a	WO	Left	Yes	6	RU	CW
10.4b	SG	Left	No	5	RU	CW
10.7	CM	Left	Partial	4	RU	MB

¹River kilometer (Hunt et. al. 1992).

²CL=Cottonwood, large/20-30+ m, CM=Cottonwood, medium/10-20+ m, GR=Ground, HS=Hard snag, IS=Irrigation structure, MS=Mesquite, SG=Soft snag, SM=Snag, mesquite, UP=Utility pole, WO=Willow.

³Side of river facing downstream.

⁴1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.

⁵PN=pond RI=riffle, RU=run.

⁶CW=Cottonwood grove, FL=Farmland, MB=Mesquite bosque, SO=Shore, WT=Willow thicket.

Table 64. Bald eagle habitat use at the Sycamore BA, Arizona, 2018.												
Perch Location ¹	PW ^{2,3}	PH	PP	PG	PD	CL	PE	ET	SH	PK	Total	Percent
7.8	2,302	910	15	--	--	--	--	--	--	--	3,227	17.5
7.9	254	237	--	--	--	--	--	--	--	--	491	2.7
8.7	--	7	--	--	--	--	--	--	--	--	7	<0.1
9.1	48	--	--	--	--	--	--	--	--	--	48	0.3
9.2	--	28	--	--	--	--	--	--	--	--	28	0.2
9.4	369	--	23	--	--	--	--	--	--	--	392	2.1
9.5	267	22	--	367	--	--	22	--	--	--	678	3.7
9.6	--	163	--	--	--	--	--	--	21	--	184	1.0
9.8	54	--	--	--	--	--	--	--	--	--	54	0.3
9.9	2,937	434	196	--	51	--	46	--	--	4	3,668	19.9
10.0	--	68	--	--	--	--	--	--	17	--	85	0.4
10.1	2,822	--	59	--	--	--	--	--	--	--	2,881	15.6
10.2	78	24	--	--	10	--	--	--	--	--	112	0.6
10.3	4,849	--	786	--	215	98	11	18	--	12	5,989	32.4
10.4	23	--	--	--	--	--	--	32	--	--	55	0.3
10.7	483	--	61	--	--	14	--	--	--	--	558	3.0
Total	14,486	1,893	1,140	367	276	112	79	50	38	16	18,457	
Percent	78.5	10.2	6.2	2.0	1.5	0.6	0.4	0.3	0.2	0.1		

¹River kilometer (Hunt et al. 1992).

²Observation time (minutes).

³PW=Perched watching, PH=Perched hunting, PP=Perched preening, PG=Perched on ground, PD=Perched drying, CL=Perched close to mate, PE=Perched eating on ground, ET=Eating in tree, SH=Standing in water, PK=Perched with prey.

APPENDIX N: TAPCO BREEDING AREA SUMMARY

Table 65. Observed human activity and bald eagle behavior, Tapco BA, Arizona, 2018.

Human Activity	N ¹	W	R	F	L	B	U	Total	Percent
Kayak	2	--	--	--	--	2	--	4	40.0
Hiker	3	--	--	--	--	--	--	3	30.0
Helicopter	1	1	--	--	--	--	--	2	20.0
Small plane	1	--	--	--	--	--	--	1	10.0
Total	7	1	--	--	--	2	--	10	

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

Table 66. Bald eagle habitat analysis at the Tapco BA, Arizona, 2018.

River km ¹	Perch Type ²	Side	Shade	Distance to H ₂ O ³	H ₂ O Type ⁴	Land Type ⁵
236.9	CS	Left	No	1	RI	CW
237.1	CL	Right	Partial	5	RU	CW
237.1	CL	Right	No	1	RU	CW
237.3	CL	Right	Partial	1	RU	CW
237.4	CM	Right	No	1	RU	CW
237.5	HS	Right	No	1	RU	CW
237.5	ID	Island	No	1	RU	SO
237.7	CS	Right	Partial	1	PO	CW
238.1	WO	Right	Partial	1	RU	WT
238.2	HS	Left	No	1	RU	CW
238.2	SS	Left	No	1	RU	CW
240.8	HS	Right	No	3	PO	UP

¹River kilometer (Hunt et. al. 1992).

²CS=cottonwood small (0-10m), CL=cottonwood large (20-30m), CM=cottonwood medium (10-20m), HS=hard snag (main branches only), ID=island, WO=willow, SS=snag, shrub.

³1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>401m.

⁴RI=riffle, RU=run, PO=pool.

⁵CW=cottonwood grove, SO=shore, WT=willow thicket, UP=upland desert.

Table 67. Bald eagle habitat use at the Tapco BA, Arizona, 2018.

River km ¹	PW ^{2,3}	PP	DW	PU	Total	Percent
236.9	23	--	--	--	23	2.1
237.1	62	117	--	14	193	17.5
237.3	--	--	--	1	1	0.1
237.4	15	19	--	--	34	3.1
237.5	282	28	17	--	327	29.6
237.7	8	--	--	--	8	0.7
238.1	2	--	--	--	2	0.2
238.2	82	--	--	--	82	7.4
240.8	411	24	--	--	435	39.4
Total	885	188	17	15	1,105	
Percent	80.1	17.0	1.5	1.4		

¹River kilometer (Hunt et. al. 1992).

²Observation time (minutes).

³PW=perched watching, PP=perched preening, DW=drinking water, PU=perched unknown.

APPENDIX O: WHISKEY SPRING BREEDING AREA SUMMARY

Table 68. Observed human activity and bald eagle behavior, Whiskey Spring BA, Arizona, 2018.

Human Activity	N ¹	W	R	F	L	B	U	Total	Percent
Boat	86	44	--	3	--	44	3	180	70.3
Jet ski	6	5	--	--	1	6	--	18	7.0
Fisherman	7	2	--	--	--	1	--	10	3.9
Small plane	1	4	1	--	--	3	--	9	3.5
Sheriff Helicopter	2	3	1	--	--	3	--	9	3.5
Sheriff Boat	4	3	--	--	--	2	--	9	3.5
Helicopter	5	2	--	--	--	1	--	8	3.1
Jet	--	--	2	2	--	--	--	4	1.6
Maricopa Boat	--	2	1	--	--	1	--	4	1.6
Nestwatchers ²	--	--	--	1	--	--	--	1	0.4
Kayak	--	1	--	--	--	--	--	1	0.4
Driver	1	--	--	--	--	--	--	1	0.4
Hiker	1	--	--	--	--	--	--	1	0.4
Off-highway vehicle	1	--	--	--	--	--	--	1	0.4
Total	114	66	5	6	1	61	3	256	

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

²Only includes Nestwatcher activities that provoked a significant response.

Table 69. Watercraft compliance at the southern closure boundary, Whiskey Spring BA, Arizona, 2018.

Date	Watercraft <i>at</i> closure ¹	Watercraft <i>in</i> closure	Total	Percent ²
2/2-2/11	103	21	124	16.9
2/16-2/25	117	26	143	18.2
3/2-3/11	183	11	192	5.7
3/16-3/25	251	31	282	11.0
3/30-4/8	704	69	764	8.9
4/13-4/22	664	46	717	6.5
4/23-4/26	119	5	129	4.0
Total	2,141 (91.1%)	209 (8.9%)	2,350	8.9

¹Includes boats, anglers, kayaks and jet skis that were in the closure.

²Percentage of non-compliance per observation period (water craft in closure / total watercraft for the period).

Table 70. Watercraft compliance: weekend vs. weekday, Whiskey Spring BA, Arizona, 2018.

Date	Boats at Closure ¹	Boats in Closure	Jet Skis at Closure	Jet Skies in Closure	Total	Percent ²
Weekend	1,073	107	56	11	1,247	9.5%
Weekday	956	84	56	7	1,103	8.3%
Total	2,029	191	112	18	2,350	

¹Boats include boaters, fisherman, and kayaks.

²Percentage of non-compliance. (boats and jet skis in closure / total watercraft).

Sex	Fish		Birds		Unknown		Total	
	E ¹	S-U ²	E	S-U	E	S-U	E	S-U
Male	14	9-5	--	--	--	--	14	9-5
Female	20	15-5	1	0-1	--	--	21	15-6
Unknown	--	--	--	--	1	1-0	1	1-0
Total	34	24-10	1	0-1	1	1-0	36	25-11

¹E=A single forage event, not the number of attempts during 1 event.

²S-U=Successful – Unsuccessful forage events.

Sex	Fish	Mammals	Unknown	Total	Percent
Male	24	1	4	29	41.4
Female	28	2	10	40	57.1
Unknown	--	--	1	1	1.4
Total	52	3	15	70	
Percent	74.3	4.3	21.4		

Sex	Fish					Total	Percent
	CC ¹	LE	SU	CP	FC		
Male	2	1	1	1	--	5	38.5
Female	4	2	1	--	1	8	61.5
Total	6	3	2	1	1	13	
Percent	46.2	23.1	15.4	7.7	7.7		

¹LE=sunfish, CP=common carp, CC=channel catfish, SU=sucker species, FC=flathead catfish.

River km ¹	Perch Type ²	Side ³	Shade	Distance to H ₂ O ⁴	H ₂ O Type ⁵	Land Type ⁶
22.4	CC	Lake	No	2	RC	UP
23.0a	HS	Lake	Partial	1	RC	SO
23.0b	HS	Lake	Partial	1	RC	SO
68.0	CT	R	Partial	1	PO	CL
68.1	CT	R	Partial	1	PO	CL
68.4	CF	R	No	1	PO	CL
68.5a	BO	L	Partial	1	PO	CL
68.5b	CF	R	Partial	1	PO	CL
68.5c	CT	R	Partial	1	PO	CL
68.5d	HS	L	No	1	RB	SO
68.5e	SO	L	No	1	RB	SO
68.6a	CF	L	Partial	1	PO	CL
68.6b	CT	R	Partial	1	PO	CL
68.6c	CT	L	Partial	1	PO	CL
68.6d	SO	L	Partial	1	PO	SO
68.7a	CF	L	Partial	1	PO	CL
68.7b	CF	L	Partial	1	PO	CL
68.7c	CT	L	No	1	PO	CL
68.7d	CT	L	Partial	1	PO	CL
68.7e	CT	L	Partial	1	PO	CL
68.8a	CF	L	Partial	1	PO	CL
68.8b	CF	L	Partial	1	PO	CL
68.8c	CF	L	Partial	1	PO	CL
68.8d	CT	L	No	1	PO	CL
68.8e	CT	L	No	1	PO	CL
68.8f	HS	L	No	1	PO	CL
68.9a	CF	L	Partial	1	PO	CL
68.9b	CF	L	Partial	1	PO	CL
68.9c	CT	L	No	1	PO	CL
68.9d	CT	L	Partial	1	PO	CL
68.9e	CT	L	Partial	1	PO	CL
68.9f	CT	L	No	1	PO	CL
69.0a	CF	L	Yes	1	PO	CL
69.0b	CF	L	Yes	1	PO	CL
69.0c	CF	L	Partial	1	PO	CL
69.0d	CF	L	Partial	1	PO	CL
69.0e	CF	L	Partial	1	PO	CL
69.0f	CF	L	Partial	1	PO	CL
69.0g	CF	L	Partial	1	PO	CL
69.0h	CF	L	Partial	1	PO	CL
69.0i	CT	L	Partial	1	PO	CL
69.0j	CT	L	Partial	1	PO	CL
69.0k	CT	L	No	1	PO	CL
69.1a	CF	L	Partial	1	PO	CL

¹River kilometer (Hunt et. al. 1992).

²BO=boulder, CC=cactus, CF=cliff ledge, CT=cliff top, HS=hard snag (main branches only), SO=shore, SS=snag, shrub.

³Side of river facing downstream.

⁴1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>401m.

⁵PO=river pool, RB=river bend, RC=reservoir cove.

⁶CL=cliffs, SO=shore, UP=upland desert.

Table 74 continued.

River km ¹	Perch Type ²	Side ³	Shade	Distance to H ₂ O ⁴	H ₂ O Type ⁵	Land Type ⁶
69.1b	CF	L	Partial	1	PO	CL
69.1c	CF	L	Partial	1	PO	CL
69.2a	CF	L	Partial	1	PO	CL
69.2b	CF	L	Partial	1	PO	CL
69.2c	CT	L	Partial	1	PO	CL
69.3a	BO	L	Partial	1	PO	CL
69.3b	SS	L	Partial	1	PO	CL
69.5	HS	L	Partial	1	PO	SO
69.8	SO	L	Partial	1	PO	SO
70.0	CF	L	Partial	1	PO	CL
73.6	CF	L	Partial	1	RB	CL
73.7a	CF	L	Partial	1	RB	CL
73.7b	CT	L	Partial	1	RB	CL

¹River kilometer (Hunt et. al. 1992).

²BO=boulder, CC=cactus, CF=cliff ledge, CT=cliff top, HS=hard snag (main branches only), SO=shore, SS=snag, shrub.

³Side of river facing downstream.

⁴1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>401m.

⁵PO=river pool, RB=river bend, RC=reservoir cove.

⁶CL=cliffs, SO=shore, UP=upland desert.

Table 75. Bald eagle habitat use at the Whiskey Spring BA, Arizona, 2018.

River kilometer ¹	PW ^{2,3}	PP	PD	SS	PE	SH	DW	PV	ES	OT	Total	Percent
22.4	16	--	--	--	--	--	--	--	--	--	16	0.1
23.0	14	--	--	--	--	--	--	--	--	--	14	0.1
68.0	8	--	--	--	--	--	--	--	--	--	8	<0.1
68.1	10	--	--	--	--	--	--	--	--	--	10	0.1
68.4	7	--	--	--	--	--	--	--	--	--	7	<0.1
68.5	29	4	31	3	7	--	--	1	--	--	75	0.5
68.6	87	--	--	--	8	--	--	--	16	--	111	0.7
68.7	2,594	112	9	--	19	--	--	7	--	--	2,741	16.5
68.8	8,914	765	138	--	--	--	--	14	--	2	9,833	59.1
68.9	377	56	43	--	--	--	--	--	--	--	476	2.9
69.0	2,533	49	1	--	8	--	--	1	--	5	2,597	15.6
69.1	46	--	40	--	--	--	--	--	--	--	86	0.5
69.2	16	--	--	--	--	--	--	--	--	--	16	0.1
69.3	75	--	24	12	--	--	--	--	--	--	111	0.7
69.4	--	--	--	13	--	20	23	--	--	--	56	0.3
69.5	152	--	--	17	--	17	13	--	--	--	199	1.2
69.6	--	--	--	4	--	--	--	--	--	--	4	<0.1
69.8	--	--	--	8	--	--	--	--	--	--	8	<0.1
70.0	29	--	--	--	--	--	--	--	--	--	29	0.2
73.6	1	--	--	--	--	--	--	--	--	9	10	0.1
73.7	223	8	--	--	--	--	--	--	--	--	231	1.4
Total	15,131	994	286	57	42	37	36	23	16	16	16,638	
Percent	90.9	6.0	1.7	0.3	0.3	0.2	0.2	0.1	0.1	0.1		

¹River kilometer (Hunt et. al. 1992).

²Observation time (minutes).

³PW=perched watching, PP=perched preening, PD=perched drying, SS=standing on shore, PE=perched eating, SH=standing in water, DW=drinking water, PV=perched vocalizing, ES=eating on shore, OT=other (includes eating on cliff and perched interaction).

APPENDIX P: WOODS CANYON BREEDING AREA SUMMARY

Table 76. Observed human activity and bald eagle behavior, Woods Canyon BA, Arizona, 2018.

Human Activity ¹	N ²	W	R	F	L	B	U	Total	Percent
Hiker	871	31	--	--	--	--	--	902	82.7
Angler	98	1	1	--	--	--	--	100	9.2
Canoe/Kayak	81	5	--	2	--	--	--	88	8.1
Picnicker	18	--	--	--	--	--	--	18	1.6
Photographer	7	--	--	1	--	--	--	8	0.7
Drone	2	4	--	2	--	--	--	8	0.7
Boat	5	--	--	1	--	--	--	6	0.5
Paddleboard	--	4	--	--	--	--	--	4	0.4
Helicopter	1	1	--	--	--	--	--	2	0.2
Runner	1	--	--	--	--	--	--	1	0.1
Woodcutter	1	--	--	--	--	--	--	1	0.1
Small Plane	1	--	--	--	--	--	--	1	0.1
Total	1,086	46	1	6	--	--	--	1,139	

¹Due to constant human activity, the table includes only the number of people visiting the OP, the number of hikers on the trail directly in front of the nest (up to approximately 200 m), plus activities that yielded a negative response from the eagles.

²Bald eagle response: N=none, W=watched, R=restless, F=flushed, L=left area, B=birds not in area, U=unknown.

Table 77. Observed forage events and success, Woods Canyon BA, Arizona, 2018.

Sex	Fish		Birds		Total	
	E ¹	S-U ²	E	S-U	E	S-U
Male	26	21-5	--	--	26	21-5
Female	37	25-12	1	0-1	38	25-13
Total	63	46-17	1	0-1	64	46-18

¹E=A single forage event, not the number of attempts during 1 event.

²S-U=Successful – Unsuccessful forage events.

Table 78. Observed prey types delivered to the nest, Woods Canyon BA, Arizona, 2018.

Sex	Fish	Birds	Mammals	Reptiles	Unknown	Total	Percent
Male	51	1	1	1	1	55	52.4
Female	49	1	--	--	--	50	47.6
Total	100	2	1	1	1	105	
Percent	95.2	1.9	1.0	1.0	1.0		

Lake km ¹	Perch Type ²	Shade	Distance to H ₂ O ³	H ₂ O Type ⁴	Land Type ⁵
0.2a	SO	Yes	1	RS	SO
0.2b	PO	No	3	RS	CF
0.2c	SC	No	1	RS	CF
0.3a	SO	No	1	RS	SO
0.3b	PO	Partial	2	RS	CF
0.4a	SC	No	1	RS	CF
0.4b	SO	Yes	1	RS	CF
0.5	SC	No	1	RS	CF
0.7	SG	No	3	RS	CF
0.8a	SG	No	3	RS	CF
0.8b	SO	No	1	RS	SO
0.8c	SC	No	2	RS	CF
0.9a	SG	No	1	RS	CF
0.9b	SC	No	2	RS	CF
0.9c	LG	Partial	1	RS	SO
0.9d	SP	Yes	1	RS	CF
1.0a	SG	No	3	RS	CF
1.0b	PO	No	2	RS	CF
1.0c	LG	Partial	1	RS	SO
1.0d	PS	Partial	1	RS	CF
1.1a	SG	No	3	RS	CF
1.1b	PS	No	1	RS	CF
1.1c	SO	No	1	RS	CF
1.2	SC	No	1	RS	CF
1.3a	SC	No	1	RS	CF
1.3b	HS	Partial	1	RS	CF
1.4	SO	Partial	1	RS	CF
1.5	PS	No	1	RS	CF
1.7	BO	Partial	1	RS	SO
4.2	PS	Partial	1	RS	CF
4.4	PS	No	1	RS	CF
4.6	PO	No	1	RS	CF
4.7a	PO	No	1	RS	CF
4.7b	PO	Partial	1	RS	CF
4.7c	PO	Partial	2	RS	CF
4.8a	PO	F	1	RS	SO
4.8b	PO	Partial	1	RS	SO
4.8c	HS	No	2	RS	CF
4.9a	SG	No	1	RS	CF
4.9b	PO	Partial	1	RS	CF
4.9c	PS	No	1	RS	CF
5.0	PO	Partial	1	RS	CF
5.1	PS	Partial	1	RS	CF

¹Lake kilometer (counterclockwise from middle of dam).

²BO=boulder, HS=hard snag (main branches only), LG=log, PO=pine/conifer, old growth/20-30+ m., PS=pine/conifer, 2nd growth/10-20+ m, SC=conifer snag, SG=soft snag (dead but branches still intact), SO=shore, SP=stump or fallen tree.

³1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>401m.

⁴RS=reservoir main body.

⁵CF=conifer forest, SO=shore.

Table 80. Bald eagle habitat use at the Woods Canyon BA, Arizona, 2018.												
Lake km ¹	PW ^{2,3}	PP	SS	PH	PV	PE	PD	CL	PK	OT	Total	Percent
0.2	218	--	225	--	13	--	--	--	--	7	463	2.9
0.3	94	--	68	--	16	--	--	--	1	13	192	1.2
0.4	13	--	--	--	2	--	--	--	--	--	15	0.1
0.5	60	--	--	--	--	--	--	--	--	--	60	0.4
0.7	3	--	--	--	--	--	--	--	--	--	3	<0.1
0.8	2,610	24	--	2	15	2	5	21	2	24	2,705	16.9
0.9	3,125	246	--	65	13	18	11	18	11	--	3,507	21.9
1	3,546	256	--	22	37	17	40	--	10	3	3,931	24.6
1.1	772	70	--	--	4	--	--	--	3	--	849	5.3
1.2	277	11	--	30	11	51	4	--	--	--	384	2.4
1.3	70	--	--	--	--	5	--	--	--	--	75	0.5
1.4	36	--	--	--	--	--	--	--	--	25	61	0.4
1.5	96	--	--	--	--	--	--	--	--	--	96	0.6
1.7	--	--	23	--	--	--	--	--	--	--	23	0.1
4.2	17	--	--	--	--	--	--	--	--	--	17	0.1
4.4	32	--	--	--	--	--	--	--	--	--	32	0.2
4.6	54	--	--	19	--	--	--	--	--	--	73	0.5
4.7	767	32	--	30	14	--	25	4	--	--	872	5.4
4.8	198	19	--	--	--	--	--	--	--	--	217	1.4
4.9	2,150	92	--	71	71	--	--	9	2	--	2,395	15.0
5.0	12	--	--	--	--	--	--	--	--	--	12	0.1
5.1	--	--	--	6	--	--	--	--	--	--	6	<0.1
999.9*	--	--	--	--	14	--	--	--	--	--	14	0.1
Total	14,150	750	316	245	210	93	85	52	29	72	16,002	
Percent	88.4	4.7	2.0	1.5	1.3	0.6	0.5	0.3	0.2	0.4		

¹Lake kilometer (counterclockwise from middle of dam).

²Observation time (minutes).

³PW=perched watching, PP=perched preening, SS=standing on shore, PH=perched hunting, PV=perched vocalizing, PE=perched eating, PD=perched drying/sunning, CL=perched close to mate, PK=perched with prey, OT=other (includes bathing, drinking water, eating on shore, and gathering nest materials).

*999.9=out of view (audible)