ARIZONA BALD EAGLE MANAGEMENT PROGRAM
2019 SUMMARY REPORT

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Photo by J. Presler

Technical Report 325
Nongame and Endangered Wildlife Program
Terrestrial Wildlife Branch
Wildlife Management Division
Arizona Game and Fish Department
5000 West Carefree Highway
Phoenix, Arizona 85086
December 2019

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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. Department of Defense (Luke Air Force Base); U.S. Forest Service (Apache-Sitgreaves, Kaibab, Prescott, and Tonto National Forests); and Verde Canyon Railroad.

Recommended Citation

McCarty, K.M., J.K. Presler, and K.V. Jacobson. 2019. Arizona bald eagle management program 2019 summary report. Nongame and Endangered Wildlife Program Technical Report 325. 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; Brendan Kinyon, Gainey Ranch Golf Club; Russell Benford and Charles Enos, Gila River Indian Community; The Hopi Tribe; Jan Miller, Joe Miller, Megan Mosby, and Alex Stofko, Liberty Wildlife Rehabilitation Foundation; Terry Gerber, David Jordan, Kyle Randall, and Bob Vandenburgh, Maricopa County Parks and Recreation Department (and Desert Outdoor Center at Lake Pleasant); Kristen Philbrook and Mike Wrigley, National Park Service; Navajo Nation Department of Fish and Wildlife; Ann George and Duff Sorrels, Freeport McMoRan; Mike Brinkworth, Josh Coplan, Rick Green, Ethan Smith, and Patrick Zahm, Papillon Helicopters, Inc.; Christopher Horan, Gina Leverette, and Baltazar Solis, Salt River Pima-Maricopa Indian Community; Nina Grimaldi, Julie Keith, Shea Meyer, Dave Scott, Lesly Swanson, and Ruth Valencia, Salt River Project; Daniel Juan, San Carlos Apache Tribe; Tonto Apache Tribe; Tiffany Shepherd, 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, 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 Murray, Jacob Naranjo, Steve Plunkett, and Justin Schofer, U.S. Forest Service; Teresa Propeck, and Ellen Roberts, Verde Canyon Railroad; Cynthia Dale, White Mountain Apache Tribe; George Andrejko, Randy Babb, Donna Bailloux, Erin Butler, Tim Carlson, James Driscoll, Suzanne Ehret, Nathan Gonzalez, Dan Groebner, Holly Hicks, Sharon Lashway, Jeff Meyers, Susi MacVean, David Majure, Gloria Morales, Lin Piest, 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.

This report, in part, summarizes the results of monitoring by the Arizona Bald Eagle Nestwatch Program using the breeding area reports submitted in 2019. Those include: Leticia Cruz-Paredes and Eduardo Martinez-Leyva, Box Bar Breeding Area (BA); David Drever and Russell Seeley, Concho, Crescent, and Fool Hollow BAs; Colton Langell and Amanda Rohr, Tonto and Bachelor Cove BAs; Joe and Marta Peddie, Luna and Crescent BAs; Matthew Pierle and Nora Hanke, Goldfield & Kerr BAs; Victoria Hawk and Maria Icenogle, Orme and Granite Reef BAs; Leah Vader and Jen Ottinger, Doka, Fort McDowell, Rodeo, and Sycamore BAs; Kurt Anderson and Kaia Hayes, Saguaro BA; Lindsay Gedacht and Curtis Hart, Tapco and Pinto BAs; Leticia Cruz-Paredes, Maria Icenogle, Colton Langell, Eduardo Martinez-Leyva, Amanda Rohr, Woods Canyon BA.

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ARIZONA BALD EAGLE MANAGEMENT PROGRAM 2019 SUMMARY REPORT

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INTRODUCTION

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

Bald eagles in central Arizona were temporarily designated as a Distinct Population Segment (DPS) and listed as threatened in 2008 due to a court order requiring a 12-month status review of the Sonoran Desert Area population (USFWS 2008). As a result of the status review, the USFWS determined the population did not satisfy the definition of a DPS and was therefore not eligible for listing (USFWS 2010). Bald eagles in the Sonoran Desert Area were removed from the list of endangered and threatened species in 2011 (USFWS 2011). Further legal challenges resulted in a subsequent 12-month finding which supported the previous conclusions (USFWS 2012a). The 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 included 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 2019 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=52 BAs) [includes Arizona Upland Subdivision (n=44) and 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=8), 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 the 89 bald eagle BAs in 2019 occurred at elevations below 3,500 ft (1,067 m) (68.5%, n=61), 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) (24.7%, n=22) or above 7,000 ft (>2,134 m) (6.7%, 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*).

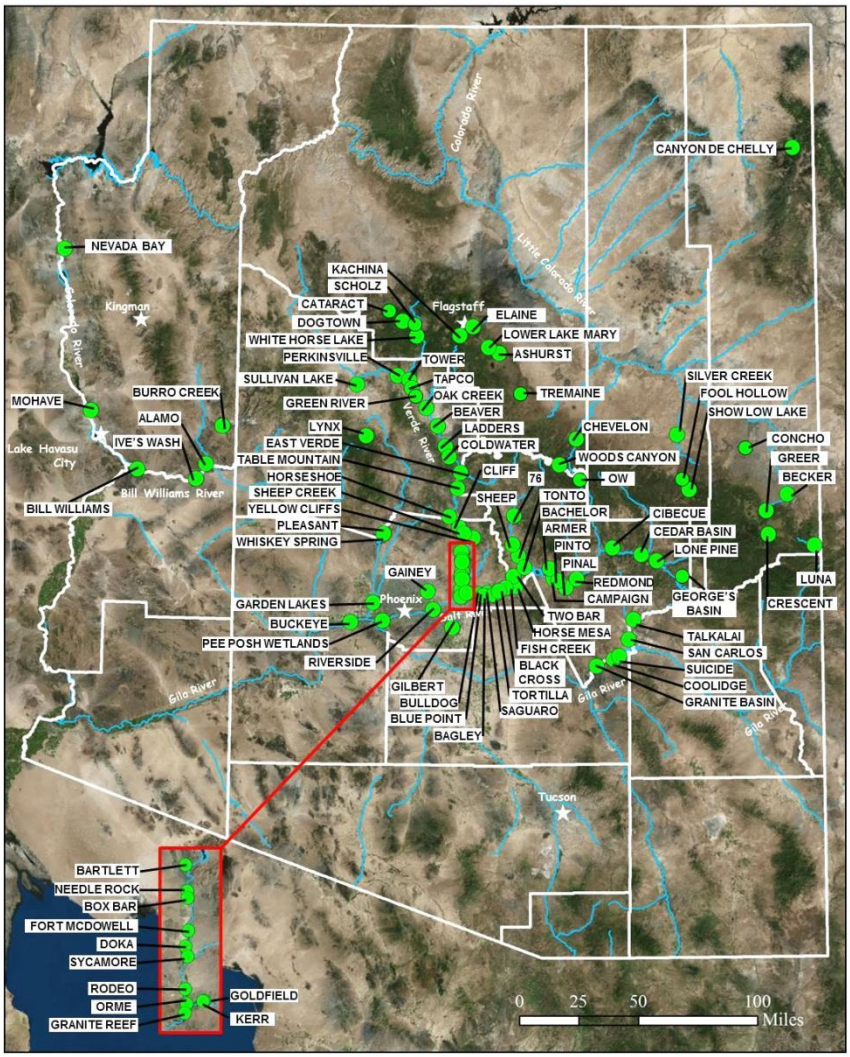

Figure 1. Location of known bald eagle breeding areas in Arizona, 2019.

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 or lake levels (e.g., Alamo Lake and Roosevelt Lake) and the distance of alternate nests. Terrestrial prey comprises an important dietary proportion at some BAs, most notably Gunnison's prairie dogs (*Cynomys gunnisoni*) at Canyon de Chelly, Concho, and Silver Creek, and may also influence habitat selection. Several BAs are located in the Phoenix metropolitan area and include disturbed or highly modified riparian communities, primarily containing artificial water formations such as recharge basins, urban ponds and lakes, and canals.

In 2019, 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, Tremaine, White Horse, and

Woods Canyon lakes or reservoirs; and the Agua Fria, Bill Williams, Black, 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. 2018).

ARIZONA BALD EAGLE WINTER COUNT

INTRODUCTION

National winter surveys are an effective tool to monitor bald eagles throughout their range (Millsap 1986, Stalmaster 1987, Eakle et al. 2015). The knowledge of wintering bald eagle habitat use allows for the consideration and implementation of management actions to protect important wintering areas. Even though the USFWS delisted the species nationwide in 2007, the importance of the national winter count persists. Through each state's consistent efforts, the winter count will continue to provide post-delisting data on national population trends and help to ensure implementation of Eagle Act permits remain compatible with stable or increasing populations (Steenhof et al. 2002, 2008; Eakle et al. 2015).

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

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

METHODS

We continued to use, and strived to complete, the established 102 standardized survey routes for the 2019 Arizona bald eagle winter count. Additionally, seven 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 7 to 13, 2019, 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.

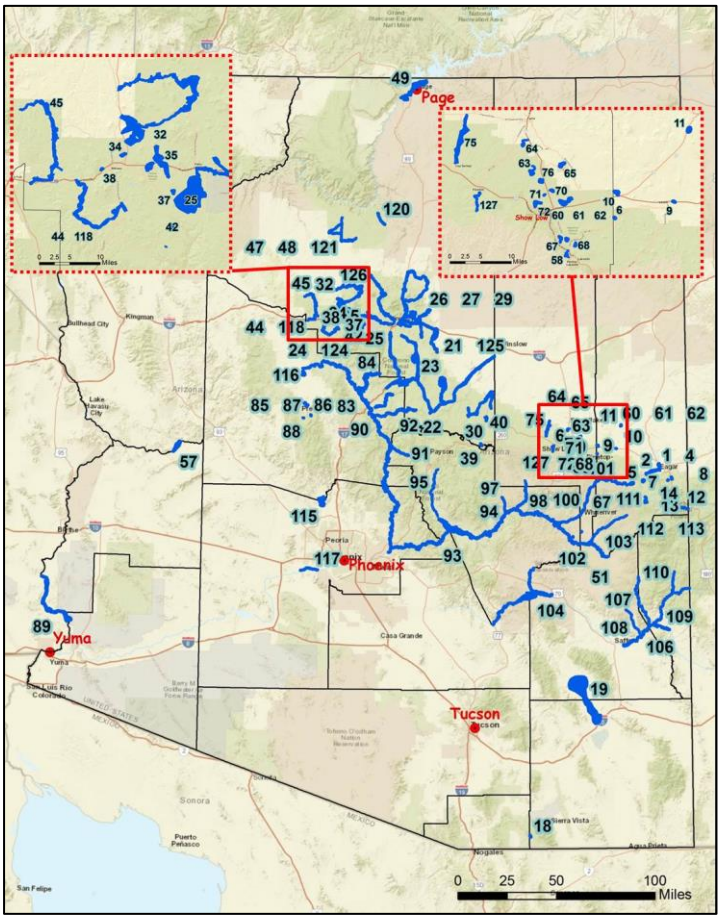

Figure 2. Map of the 2019 Arizona Bald Eagle Winter Count survey routes (blue outlines). County lines in black. See Appendix A for the associated route names.

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, the one route representing Graham County was not surveyed in multiple years. This route is now being covered by air to ensure completion, but will not be included as a standard route until four years of data have been gathered due to the change in method from ground-based to aerial.

RESULTS AND DISCUSSION

The 2019 Arizona bald eagle winter count tallied 212 bald eagles, including 137 adults (65%), 74 subadults (35%), and 1 unknown eagle (0.5%). Participants covered 79 of 102 standardized routes (77%) with a total survey effort of 6,645 minutes (110.8 hours) (Tables 1 and 2). An additional 40 were counted on seven non-standard routes (Appendix A).

The highest total number of bald eagles observed during ground surveys occurred in Coconino County (n=37) (Table 1), and the largest concentration on a single ground survey occurred near Flagstaff, AZ (n=10) (Appendix A). Also, a large number of bald eagles were observed by helicopter along the lower Salt River (n=34). Among the non-standard routes, two surveys totaled 36 bald eagles including 25 at Buckhead Mesa Landfill and 11 at a new route (Elwood Tank). The age composition of this year's count (65% adult, 35% subadult) approximated the average ratio of adults to subadults in Arizona's winter counts since 2005 (Table 2).

The total of 212 bald eagles in 2019 was lower than the average of 248 birds observed annually during standardized counts in 2005-2018. However, because many of the surveys are normally completed by USFS personnel, a partial shutdown of the federal government in January affected this year's survey effort. The loss of available personnel, along with impacts due to weather, led to an unusually high number of routes not completed (23). Excluding those same 23 routes from the previous ten-year period (2009-2018) counts averaged 216 total bald eagles, suggesting that the 2019 count would have been comparable to the recent average with a more typical rate of completed surveys.

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=68), most responded that this year's weather was normal (64.7%), followed by harsh (30.9%), and mild (4.4%). There were no responses for very mild or very harsh weather. Similarly, of those that rated ice cover (n=66), most responded that it was normal (54.5%), followed by more than normal (33.3%), much more than normal (6.1%), and less than normal (6.1%). There were no responses for much less than normal ice cover.

Nationally, winter count trends for bald eagles increased significantly from 1986 to 2010, particularly in twelve northern and eastern states (Eakle et al. 2015). However, despite growth of its bald eagle breeding population, Arizona was one of only four states with significantly decreasing winter count trends. Potentially, the distribution of wintering eagles has been impacted by climate change such that milder conditions allow eagles to stay farther north than in previous years.

Table 1. Summary of the Arizona bald eagle winter count 2019.

Survey areas	Routes	Minutes	Adults	Subadults	Unknown[1]	Total	Total/ Hr.
Apache County	12	825	8	5	0	13	0.9
Cochise County	2	330	2	1	0	3	0.5
Coconino County	21	2,939	20	17	0	37	0.8
Graham County	Not surveyed.						
Mohave County	1	95	4	0	0	4	2.5
Navajo County	15	406	10	10	0	20	3.0
Santa Cruz County	Not surveyed.						
Yavapai County	5	1,185	8	14	1	23	1.2
Yuma and La Paz County	Not surveyed.						
Verde River drainage	3	228	24	4	0	28	7.4
Salt River drainage	9	389	41	18	0	59	9.1
Gila River drainage	8	215	14	2	0	16	4.5
Various helicopter	3	33	6	3	0	9	16.4
Totals	79	6,645	137	74	1	212	1.9

[1] Unknown age bald eagles and unidentified eagles.

Table 2. Summary of Arizona bald eagle winter counts 2005-2019.

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
2019[4]	6,645	79 (77%)	1.9	137 (65%)	74 (35%)	1 (0.5%)	212
Average	9,317	97 (96%)	1.6	168 (69%)	69 (28%)	9 (4%)	245

[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.
[4]Federal government shutdown affected survey effort and number of eagles.
*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. After the 2020 winter count, routes 128 (Point of Pines – aerial) and 129 (Buckhead Mesa Landfill) will be eligible for inclusion as standard routes.
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. 2018). The Department administered and performed the 2019 surveys in cooperation with the SWBEMC.

METHODS

We monitored breeding activity at current and historic BAs, nest sites discovered between 1992 and 2018, 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 2019. 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), handheld GPS units, and nest map atlases from Hunt et al. (1992) and SRP (2015), 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. 2018).

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=89) were examined for breeding activity (Figure 1). Of 74 occupied BAs, 67 were active, and 41 pairs successfully produced 65 fledglings (Table 3; Appendix C) for a productivity of 0.88 statewide. The average estimated hatch date was March 8 (N=45), ranging from January 31 to May 2. Hatch date was earlier at lower elevations, averaging February 23 at BAs below 3,500 ft (1,067m) (n=30), March 31 at BAs from 3,500 to 7,000 ft (1,067 to 2,134 m) (n=11), and April 7 at BAs above 7,000 ft (n=4).

Noteworthy findings of the 2019 nest survey included two new bald eagle BAs (George's Basin and Two Bar), one re-occupied historic BA (Cedar Basin), one new BA in California (Whipple Mountains), 17 new alternate nests within BAs (Ashurst #3, Bartlett #5, Bulldog #3, Burro Creek #5, Cataract Lake #3, Coolidge #5, Fort McDowell #19, Kerr #2, Lynx #7, Mule Hoof #3, Orme #11, Riverside Ruin #2 and #3, Rodeo #6, Silver Creek #3, Tonto #9, Woods Canyon #13), 14

fallen nests within BAs (Ashurst #2, Box Bar #6, Buckeye #1, Kerr #1, Lynx #6, Needle Rock #3, Riverside Ruin #1, Rock Creek #2, Rodeo #5, Silver Creek #2, Tonto #8, and White Horse #1, #5, and #7), and 17 new potential nests at 14 sites (Blue Ridge Reservoir #9, Blue River #1, Bluebell #2, Buckskin 3 #3, Buckskin Mesa #6, Burro Narrows #1, Cibecue Crossing #2, #3, and #4, Cross Current #2, Gila Box #1, Gila River #1, Horseshoe Cienega #6, Rawhide 1 #4, Sunrise Lake #1, and Willow Springs Lake #10 and #11).

Table 3. Summary of Arizona bald eagle productivity 2019.

Number of BAs	89	Number of Active BAs	67
Number of Occupied BAs	74	Number of Failed Breeding Attempts	26
Number of Eggs (minimum)	99	Number of Successful Breeding Attempts	41
Nest Success = 41/74	0.55	Number of Young Hatched	72
Mean Brood Size = 65/41	1.56	Number of Young Fledged	65
		Productivity = 65/74	0.88

Overview

Statewide productivity at Arizona bald eagle BAs in 2019 was 0.88 young fledged per occupied BA, with some differences among river systems and habitats. Most of this year's occupied BAs (73%, n=54) were along the Verde River, Salt River, or at high-elevation lakes. Among these systems, productivity on the Verde River matched the statewide average (0.89, n=18) and BAs on the regulated Verde River had the same productivity (0.89, n=9) compared to those on the unregulated portion of the river (0.89, n=9). Productivity on the Salt River was high (1.0, n=20), where BAs on the regulated and unregulated Salt River (downstream vs. upstream of the Highway 288 bridge) had above-average (1.1, n=15) and below-average production respectively (0.60, n=5). At the high-elevation lake BAs (>5,500 ft), productivity equaled the statewide average (0.88, n=16). The remainder of occupied BAs were spread out at various creeks, lakes, rivers, and urban areas across the state with productivity at 0.70 (n=20). While statewide productivity varies from year to year (Figure 3), it has been relatively high since 2004 and averaged 0.97 over the last ten years (Table 4).

The number of known bald eagle breeding areas in Arizona continues to grow. This increase has been consistent since the 1990s, but has been especially apparent in the 2000s, with two to three new BAs identified each year from 2005 to 2019. Two new BAs (George's Basin and Two Bar) were confirmed this year and one historic territory was re-occupied as a BA (Cedar Basin), however the net increase in number of BAs from last year is only two because Rock Creek was designated as a historic BA after the conclusion of the 2018 nesting season (Table 4). Additionally, we discovered a new BA (Whipple Mountains) this year near the Colorado River in southern California. The closest known BA, four miles away at Copper Basin, was also active. Although the identity of adult bald eagles was not confirmed at either of these California BAs, one adult wearing a blue band on its left leg was photographed at Copper Basin, indicating an Arizona origin for this bird. The continued creation of new breeding areas, discovery of new nests, and changes in occupancy demonstrates 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 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.

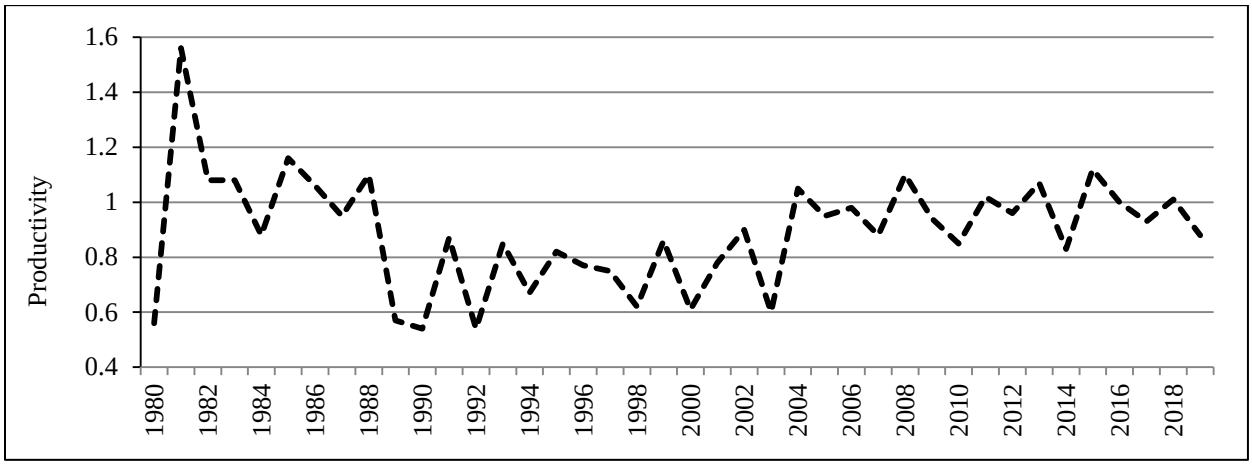

Figure 3. Productivity at bald eagle breeding areas in Arizona, 1980-2019.

Table 4. Arizona bald eagle ten-year productivity summary.

	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Number of BAs	89	87	85	81	76	68	68	66	62	62
Number of occupied BAs	74	69	68	65	59	52	54	54	55	52
Occupancy rate (%)	83.1	79.3	80.0	80.2	77.6	76.5	79.4	81.8	88.7	83.9
Number of eggs (minimum)	97	102	97	97	90	73	79	80	80	69
Number of active BAs	67	63	60	60	56	47	49	50	51	48
Failed breeding attempts	26	19	25	19	17	17	14	19	17	21
Successful breeding attempts	41	44	35	41	39	30	35	31	34	27
Young hatched	72	87	82	79	75	58	71	66	66	57
Young fledged	65	70	63	65	66	43	57	52	56	44
Nest success	0.55	0.64	0.51	0.63	0.66	0.58	0.65	0.57	0.62	0.52
Mean brood size	1.6	1.6	1.8	1.6	1.7	1.4	1.6	1.7	1.6	1.6
Productivity	0.88	1.01	0.93	1.0	1.12	0.83	1.06	0.96	1.0	0.85

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 results of surveys (including bald eagle sightings) outside of known breeding areas.

Blue River. – During the winter count survey on January 9, a new large nest (#1) was found on a cliff on the lower Blue River.

Burro Narrows (Burro Creek). – On January 28, a new large nest (#1) was found on a cliff downstream of the Highway 93 bridge across Burro Creek.

Cibecue Crossing. – In 2014, a large nest (#1) was found on a cliff on Cibecue Creek well upstream of the Cibecue BA. This year, during surveys on January 10 and April 19, three additional nests were found (#2-4). An adult bald eagle was seen perched within a third of a mile of nests #1 and #4 on January 10.

Gila Box (Gila River). – During the winter count survey on January 9, a new large nest (#1) was found on a cliff upstream of Bonita Creek.

Gila River. – During the winter count survey on January 9, a new large nest (#1) was found on a cliff upstream of the San Francisco River.

Reservation Lake. – On April 19, one immature bald eagle was seen at the lake.

Sunrise Lake. – On January 10, a new large nest (#1) was found in a snag. The nest appeared to be the type of construction associated with ospreys.

West Clear Creek. – During the winter count survey on January 2, a new large nest was found on a cliff. The nest was within a historic golden eagle breeding area (West Clear Creek, 2GE070) and assigned to that site as nest #4. One golden eagle was observed in flight less than a mile from the nest.

Whipple Mountains, CA (new breeding area). – On April 11, a new nest (#1) was found on a cliff in the Whipple Mountains of San Bernardino County in California. An adult bald eagle was brooding at least one nestling, approximately two to three weeks old (Figure 4). The band status of the adult was not determined.

Table 5. Arizona bald eagle nest survey summary, 2019 new locations.

Location	Date(s)	Survey Method	Results
Big Sandy River	1/28	Helicopter	No nests or eagles.
Big Lake	4/19	Helicopter	No nests or eagles.
Blue River	1/9	Helicopter	New large nest (#1).
Burro Narrows	1/28	Helicopter	New large nest (#1).
Cibecue Crossing	1/10, 4/19	Helicopter	1/10: On adult perched. 1/10 & 4/19: Three new large nests found (#2-4).
Gila Box (Gila River)	1/9	Helicopter	New large nest (#1).
Gila River	1/9	Helicopter	New large nest (#1).
Goldwater Lake	3/22	Helicopter	No nests or eagles.
upper Little Colorado River	4/19	Helicopter	No nests or eagles.

Table 6 continued.

Location	Date(s)	Survey Method	Results
Reservation Lake	4/19	Helicopter	No nests. One immature bald eagle seen.
Sunrise Lake	1/10	Helicopter	New large nest (#1).
West Clear Creek	1/2	Helicopter	New large nest on cliff. One golden eagle.
Whipple Mountains, CA	4/11	--	4/11: Adult in new cliff nest (#1) with at least one nestling, 2-3 weeks old.

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.

Bear Canyon Lake. – On May 3, an osprey was incubating in nest #3, and another osprey was standing in nest #5. One adult bald eagle was observed flying to a perch.

Bluebell. – On April 11, a new large nest (#2) was found on a cliff.

Blue Ridge Reservoir. – On May 3, two adult bald eagles were seen at opposite ends of the lake. An osprey was incubating in a new snag nest (#9).

Buckskin 3. – On April 11, a red-tailed hawk was incubating in a new large nest (#3) on a cliff.

Buckskin Mesa. – On April 11, red-tailed hawk nestlings were seen in nest #1. A new nest (#6) was found on a cliff.

Cross Current. – On April 11, a red-tailed hawk was incubating in a new nest (#2) on a cliff.

George's Basin (new BA). – In 2012, a pair of adults was perched by a new large nest (#1) in a snag. A pair of adults was seen again during the breeding seasons of 2016 and 2018, but no nesting occurred. This year, on March 15, an adult was incubating in nest #1 (Figure 4) however the nesting attempt failed by April 19.

Figure 4. George's Basin (left) and Two Bar (right), new breeding areas.

Granite. – On March 22, a golden eagle was incubating in nest #5, and a hatchling was observed on April 22.

Hidden Valley. – On March 22, a red-tailed hawk was incubating in nest #1.

Horseshoe Cienega. – On March 15, a new large nest (#6) was found in a snag.

Knoll Lake. – On May 3, ospreys were incubating in nests #6 and #7.

Mile 320. – On April 11, a red-tailed hawk was incubating in nest #4.

Pineasco Creek. – On January 10, one adult bald eagle was seen downstream of nest #1.

Rawhide 1. – On April 11, a new large nest (#4) was found on a cliff.

Two Bar (new BA). – On February 12, an adult was incubating in nest #2 (Figure 4), and two nestlings successfully fledged in June. Although eagles have been observed at this site in recent years, this year is the first time they laid eggs.

Willow Springs Lake. – On May 3, ospreys were seen incubating in nests #2, 4, and 5, and in two new snag nests (#10-11).

Table 7. Arizona bald eagle nest survey summary, 2019 potential nest sites (continued on next page).

Location*	Date(s)	Survey Method	Results
Aubrey Hills (4NE002)	4/11	Helicopter	Nest #2 empty. Nest #1 not found. No eagles.
Bear Canyon Lake	5/3	Helicopter	Osprey active in nest #3, and standing in #5. One adult bald eagle seen.
Black Canyon Lake	5/3	Helicopter	No new nests or eagles.
Bluebell (4NE090)	4/11	Helicopter	Nest #1 empty. New large nest (#2) on cliff. No eagles.
Blue Ridge Reservoir	5/3	Helicopter	Nest #7-8 empty. Nest #2 not found. Osprey incubating in new nest (#9) in snag. Two adult bald eagles seen.
Big Sand Bar (3NE123)	4/11	Helicopter	All known nests empty. No eagles.
Buckskin 1 (4NE083)	4/11	Helicopter	Nest #1 empty. No eagles.
Buckskin 2 (4NE084)	4/11	Helicopter	Nest #1, 3 empty. Nest #2 not found. No eagles. One peregrine falcon flying.
Buckskin 3 (4NE085)	4/11	Helicopter	All known nests empty. New nest (#3) with red-tailed hawk incubating. No eagles.
Buckskin 4 (4NE087)	4/11	Helicopter	Nest #1 not found. No eagles.
Buckskin 5 (4NE088)	4/11	Helicopter	Nests #1, 3-6 empty. Nest #2 not found.
Buckskin Mesa (4NE086)	4/11	Helicopter	Red-tailed hawk nestlings in nest #1. New nest (#6) on cliff. All other known nests empty.
Castle Cove	4/11	Helicopter	All known nests empty. No eagles.

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

Table 6 continued.

Location*	Date(s)	Survey Method	Results
Cross Current (3NE122)	4/11	Helicopter	Red-tailed hawk incubating in new nest (#2).
Havasu Wilderness 1 (4NE055)	4/11	Helicopter	Nest #1 empty.
George's Basin	1/10, 3/15, 4/19	Helicopter	3/15: Adult bald eagle incubating in nest #1.
Granite (2GE049)	1/2, 1/28, 3/22, 4/22	Ground, Helicopter	3/22: Adult golden eagle incubating in nest #5. 4/22: One golden eagle hatchling.
Hidden Valley	3/22	Helicopter	Red-tailed hawk active in nest #1. Nest #2 empty.
Horseshoe Cienega	3/15, 4/19	Helicopter	3/15: Nests #1, 5 empty. Nests #2, 3 not found. New large nest (#6) found. 4/19: Nests #5, 6 empty. Nests #1-4 not found.
Indian Rapids (3NE124)	4/11	Helicopter	All known nests empty. No eagles.
Knoll Lake	5/3	Helicopter	Ospreys active in nests #6-7. Nest #5 not found. No eagles.
Lost Mule (1GE056)	1/10	Helicopter	Nests #1-2 empty. No eagles.
Malpais (3NE126)	4/11	Helicopter	Three nests at #2. Nest #1 not found. No eagles.
Mile 320 (3NE127)	4/11	Helicopter	Nests #1-3, 5 empty. Red-tailed hawk incubating in nest #4.
Mormon Pocket (2GE031)	1/28, 4/22	Helicopter	All known nests empty. No eagles.
Needles Eye (6NE107)	4/19	Helicopter	All known nests empty. No eagles.
Pineasco Creek	1/10, 3/15, 4/19	Helicopter	1/10: One adult downstream.
Porphyry Gulch (6NE129)	4/19	Helicopter	All known nests empty. No eagles.
Rankin Ranch (3NE118)	4/11	Helicopter	Nest #1 empty. No eagles.
Rawhide 1 (3NE054)	4/11	Helicopter	Nest #3 not found. New large nest (#4) found. No eagles.
Roaring Rapids (3NE125)	4/11	Helicopter	Nest #2 empty. Nest #1 not found. No eagles.
Ringbolt Rapids (3NE115)	4/11	Helicopter	All known nests empty. No eagles.
Two Bar	1/3, 1/29, 2/12, 3/14, 4/19, 5/3, 5/24, 6/4	Helicopter, Ground	2/12: Adult incubating in nest #2.
Watson Lake (3GE010)	3/20	Helicopter	All known nests empty. One golden eagle perched.
Willow Springs Lake	5/3	Helicopter	Ospreys active in nests #2, 4, 5 and new nests #10 and #11. Nests #6-8 empty. Nest #9 not found. No eagles.

*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 March 15, an adult bald eagle was incubating in nest #9, making this a re-occupied historic breeding area. The site was last occupied by a pair of eagles in 2007 and the last active breeding attempt was 1998. This year is only the second time that young have successfully fledged since monitoring of the area began in 1978.

Mule Hoof. – On March 15, a new nest (#3) was found on a cliff near the historic nest sites. The new nest was considered large enough to potentially be used by eagles and will be monitored in the future.

Rock Creek. – On March 14, nest #2 was fallen. Currently, there are no known existing nests and the breeding area was last occupied in 2008.

Table 7. Arizona bald eagle nest survey summary, 2019 historic breeding areas.

Location	Date(s)	Survey Method	Results
Canyon	1/3	Helicopter	No new nests or eagles.
Cedar Basin	1/10, 3/15, 4/19, 5/24, 6/6	Helicopter, Fixed-wing	3/15: Adult incubating in nest #9. 4/19: Adult with one nestling, 3 weeks old. 6/6: One nestling, 9 weeks old.
Hell Point	1/2, 1/28, 3/22, 4/22	Helicopter	All known nests empty. No eagles.
Mule Hoof	1/10, 3/15	Helicopter	Nest #1 empty. New large-looking nest (#3) on cliff. No eagles.
Rock Creek	3/14	Helicopter	Nest #2 fallen. No eagles.

Breeding Areas (Table 8)
Below are findings at known breeding areas, limited to observations of new nests, fallen nests, bald eagles without active nests, and breeding activity of other species.

Ashurst BA. – On February 26, nest #2 was fallen and an adult was found incubating in a new nest (#3) in a live pine tree (Figure 5).

Figure 5. Ashurst (left) and Cataract (right) breeding areas.

Bartlett BA. – In January, the Department was alerted to a new nest location at the Bartlett BA. On January 28, we observed an adult incubating in the new cliff nest (#5).

Box Bar BA. – On January 2, nest #6 was noted as fallen.

Buckeye BA. – A pair of adults was observed at nest #1 during the winter count survey on January 2. In mid-January, the Department received a report from the public that nest #1 had fallen, and on January 22 we confirmed that the entire nest tree had toppled.

Bulldog BA. – On January 3, an adult was incubating in a new cliff nest (#3). Nests #1-3 are all on the same cliff, with nest #1 low, #2 high, and #3 in the middle.

Burro Creek BA. – On January 28, one new large nest was found on a cliff (#5).

Cataract BA. –. On April 22, a blue-banded adult was standing in a new snag nest (#3) with one nestling, 1-2 weeks old (Figure 5).

Coldwater BA. – On March 22, one adult was seen upstream of the nest area.

Coolidge BA. – On March 15, a large, partially-constructed nest (#5) was observed in a live tree in the traditional nest area and one adult was seen flying nearby. On April 19, the nest had been built up and one adult was perched upstream on a cliff near a medium nest that was not considered to be of eagle construction.

Doka BA. – On January 2, two adults were in the area, one of them perched by nest #3. On January 28, the pair was perched at nest #3. Nestwatchers observed eagles throughout February and March, but no nesting activity was observed.

Fort McDowell. – In November 2018, Karen Shaw of FMYN found a new snag nest (#19) under construction by a pair of adults. On January 2, an adult was incubating in the new nest.

Granite Basin BA. – On March 15, a blue-banded adult was perched by nest #2 (Figure 6).

Figure 6. Granite Basin (left) and Kerr (right) breeding areas.

Ive's Wash BA. – On January 8, a pair of adults was seen at Alamo Lake above the dam. On March 20, the pair was perched at nest #3.

Kerr BA. – On January 3, nest #1 was fallen (the entire nest branch broke off). In early April, Nestwatchers found a new nest (#2) in a partially-live tree with at least one nestling. On April 19, an adult was observed with two nestlings (Figure 6).

Lynx BA. – On January 28, an adult was incubating in a new snag nest (#7), and nest #6 was mostly fallen.

Needle Rock BA. – On January 2, nest #3 was fallen and no new nests were found.

Orme BA. – On January 3, a pair of adults was perched near a new nest under construction in the same tree as Granite Reef nest #2. Due to the presence of an adult at the same time at Granite Reef nest #7, and subsequent observations by Nestwatchers of the male at Granite Reef perching with the Orme female, we designated the new nest as Orme nest #11 (higher and smaller than Granite Reef #2).

Pleasant BA. – On January 2, a pair of adults was perched together. Although nesting activity was not observed at either of the known nests, an adult and two fledged young were photographed by a member of the public in the area on June 21. The young were described as begging for food and very vocal. During a boat visit on June 27, an adult was seen perched in nest #3 but neither of the fledglings was located. Several medium-sized nests were found, however all of them seemed to be hawk or raven constructions. Additional surveys are needed to find the new nest location in this territory.

Redmond BA. – On January 3, a pair of adults was perched near nest #5. On March 14, one adult was standing in nest #5.

Riverside Ruin BA. – In November, SRPMIC reported eagles building a new nest (#3) in a snag south of the traditional nest site. On January 3, a pair of adults was perched by a new nest (#2) in the same tree used in previous years.

Rodeo BA. – In late December 2018, FMYN reported a new nest (#6) in a live cottonwood tree. On January 2, nest #5 was fallen. On January 28, an adult was incubating in the new nest.

Silver Creek BA. – In December 2018, a member of the public reported that nest #2 had blown down. A new nest (#3) was found in an nearby snag in mid-January, and an adult bald eagle was reported incubating in the new nest by April 12.

Tonto BA. – On December 7, 2018, a new large nest (#9) was found in a snag, and #8 was fallen. On January 29, a pair of adults was perched in the new nest. Nestwatchers documented the pair copulating and perching during the season, but no nesting activity was observed (Figure 7).

Whiskey Spring BA. – In October 2018, the Department installed a high-definition internet camera 200 ft (61 m) from nest #1. In December, a pair of adults was observed at the nest (Figure 7), occasionally chasing off a third adult eagle (a blue-banded male assumed to be last year's breeder). A clutch of two eggs was laid on January 21, which were both destroyed by

ravens within days due to lack of nest attendance by the new male eagle. A second clutch of two eggs was laid on February 21 (one of which was taken by ravens a few days later) but the last egg failed to hatch after 37 days of incubation and was destroyed by ravens in early April.

White Horse BA. – On March 22, nests #1 and #5 were mostly fallen and nest #7 was fallen.

Woods Canyon BA. – On March 14, an adult was incubating in a new nest (#13) in a snag.

Figure 7. Tonto (left) and Whiskey Spring (right) breeding areas.

Table 8. Arizona bald eagle nest survey summary, 2019 breeding areas (continued next page).

Location	Date(s)	Survey Method	Results
Ashurst	2/26, 4/22, 5/14, 5/15, 5/29, 6/11	Ground, Helicopter	2/26: Adult incubating in new nest (#3).
Bartlett	1/2, 1/28, 3/6, 3/22, 4/3, 4/22, 5/10	Helicopter, Ground	1/28: Adult incubating in new cliff nest (#5).
Box Bar	12/5, 1/2, 1/28, 2/1, 3/22, 4/17, 4/22	Helicopter, Ground	1/2: Nest #6 fallen.
Buckeye	1/2, 1/22, 2/6	Helicopter, Ground	1/2: Pair of adults at nest #1. 1/22: Nest #1 confirmed fallen.
Bulldog	1/3, 1/29, 3/14, 4/19	Helicopter	1/3: Adult incubating in new cliff nest (#3).
Burro Creek	1/28	Helicopter	1/28: One new large nest found (#5).
Cataract Lake	2/19, 3/28, 4/22, 5/29, 6/12	Helicopter, Ground	4/22: Adult in new nest (#3) with one nestling.
Coldwater	1/2, 1/28, 3/22	Helicopter	3/22: One adult upstream.
Coolidge	1/3, 3/15, 4/19	Helicopter	3/15 & 4/10: Partial nest construction and one adult seen.
Doka	1/2, 1/28, 2/7, 3/22, 4/22	Helicopter	1/2: Two adults in area. 1/28: Two adults perched at nest #3.
Fort McDowell	1/2, 1/28, 3/22	Helicopter	1/2: Adult incubating in new nest (#19).
Granite Basin	1/3, 3/15, 4/19	Helicopter	3/15: One adult perched.

Table 8 continued.

Location	Date(s)	Survey Method	Results
Ive's Wash	1/8, 1/28, 3/20, 4/11	Helicopter, Ground	1/8 and 3/20: Pair of adults.
Kerr	1/3, 3/14, 4/19, 4/29, 5/3, 5/24	Helicopter, Ground	1/3: Nest #1 fallen. 4/19: Adult with two nestlings in new nest (#2).
Lynx	1/28, 3/22, 4/22	Helicopter	1/28: Adult incubating in new nest (#7). Nest #6 mostly fallen.
Orme	1/2, 1/3, 1/28, 3/22, 4/19	Helicopter	1/3: Pair of adults by new nest (#11). 3/22 & 4/19: One adult perched.
Needle Rock	1/2, 1/28, 3/22, 4/22	Helicopter	1/2: Nest #3 fallen.
Pleasant	1/2, 1/23, 1/28, 6/27	Helicopter	6/21: Adults and two fledged young reported by the public.
Redmond	1/3, 3/14, 4/19	Helicopter	1/3: Pair of adults perched. 3/14: One adult perched.
Riverside Ruin	1/3, 1/28, 3/8, 3/22, 4/22, 4/24	Helicopter, Ground	1/3: Pair of adults at new nest (#2). New nest (#3) empty.
Rodeo	1/2, 1/28, 2/7, 3/8, 3/22, 4/1, 4/18, 4/22	Helicopter, Ground	1/2: Nest #5 fallen. 1/28: Adult incubating in new nest (#6).
Silver Creek	1/25, 3/4, 3/15, 4/19, 5/24	Helicopter, Ground	3/15: Adult incubating in new nest (#3).
Tonto	12/7, 1/3, 1/29, 2/1, 3/14, 4/19	Helicopter, Ground	12/7: New large nest (#9) found. Nest #8 fallen.
Whiskey Spring	10/23, 10/25, 10/27, 1/2, 1/23, 1/28	Helicopter, Ground	10/25-10/27: Nest camera installation.
White Horse	2/26, 3/22	Helicopter	3/22: Nest #6 empty. Nests #1, 5 mostly fallen and nest #7 fallen. Nest #8 not found. All other known nests empty. No eagles.
Woods Canyon	3/14, 5/3	Helicopter	3/14: Adult incubating in new nest (#13) in snag.

Breeding Areas in Surrounding States (Table 9)

Black Canyon BA (Nevada). – On April 11, an unbanded adult was perched in nest #1 with two nestlings (Figure 8).

Copper Basin BA (*California*). – Personnel from the Metropolitan Water District of Southern California reported one nestling on March 23 in a cottonwood tree nest. An adult with a blue band on the left leg and silver band on the right leg was photographed at the nest (Figure 8). Although the band number was not confirmed, the blue band is consistent with it being an Arizona-hatched eagle.

Figure 8. Black Canyon, NV (left) and Copper Basin, CA (right) breeding areas. Photos by J. Presler and M. Stalvey.

Table 9. Bald eagle breeding area observations in surrounding states, 2019.

Location	Date(s)	Survey Method	Results
Black Canyon, NV	4/11	Helicopter	Two nestlings, 5.5-6 weeks old. Pair of adults perched.
Copper Basin, CA	--	--	3/23: One nestling reported.

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, Two Bar, 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.

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 2019. 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 (Bachelor Cove, Box Bar, Concho, Crescent, Fool Hollow, Goldfield, Luna, Pinto, Tonto, Whiskey Spring, Woods Canyon), those without (Granite Reef, Orme, Saguaro, Sycamore, Tapco), and those monitored opportunistically for information (Doka, Fort McDowell, Kerr, Rodeo). In the fall of 2018, 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 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 1 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, Concho, 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 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 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 21 breeding areas (either full or part-time) in 2019 including Bachelor Cove, Box Bar, Concho, Crescent, Doka, Fool Hollow, Fort McDowell, Goldfield, Granite Reef, Kerr, Luna, Needle Rock, Orme, Pinto, Rodeo, Saguaro, Sycamore, Tapco, Tonto, Whiskey Spring, and Woods Canyon (Appendix C). The Doka, Fool Hollow, Fort McDowell, Kerr, Needle Rock, Rodeo, and Whiskey Spring 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.

Bachelor Cove Breeding Area (Appendix E, Figure 9)

Observation Period. – March 29 to April 21. Total monitoring 224 hours over 30 days.

Bald Eagle Identification. – The male and female were reported by nestwatchers as unbanded and in adult plumage (unknown origin).

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

Human Activity. – Nestwatchers recorded 163 human activities. Terrestrial activity of 8 types represented 98.8% and aircraft activity (helicopters) 1.2%. One type of activity elicited one significant response from the breeding pair. The bald eagles left the area in response to a helicopter.

Food Habits. – The breeding pair was observed delivering 52 prey items to the nest, of which the male delivered 57.7%, the female 30.8%, and an unidentified adult 11.5%. Fish comprised 76.9%, mammals 5.8%, and unknown prey 17.3% of the deliveries. None of the prey was identified to species.

Habitat Use. – The Bachelor Cove nestwatchers identified eleven separate perch locations within 500 m of the nest. The bald eagle pair spent 61.9% of the observed time within 100 m of the nest and 38.1% at the remaining locations.

Figure 9. Bachelor Cove (left) and Box Bar (right)breeding areas. Gila and Maricopa Counties, Arizona.

Box Bar Breeding Area (Appendix F, Figure 9)
Observation Period. – February 1 to June 2. Total monitoring 766 hours over 89 days.

Bald Eagle Identification. – Both adults were in adult plumage. Nestwatchers reported the male was not banded (unknown origin). The female had a blue band on the left leg and silver band on the right leg (unknown, but blue band consistent with Arizona origin).

Management Activities. – 1) The USFS placed "No Entry" signs around the nest area. 2) On April 17, two nestlings were blue VID banded "88/A" and "89/A" at 4.5-5 weeks of age. 3) On May 16, a backpack transmitter was attached to one nestling (88/A) at 9 weeks of age.

Human Activity. – Nestwatchers recorded 582 human activities. Terrestrial activity of 11 types represented 81.7%, water pursuits (canoe/kayak, tuber, swimmer) 15.1%, and aircraft activity (small planes, helicopters, drones, and jets) 3.1%. Four types of activities elicited 12 significant responses from the breeding pair. The bald eagles were restless in response to four military jets,

one helicopter, one hiker, and one Department personnel (during banding activities). The eagles flushed in response to three photographers and two helicopters.

Food Habits. – The nestwatchers observed 7 forage events, with fish accounting for 57.1%, mammals 28.6%, and birds 14.3%. The male was successful in 100% (n=2) and the female in 80.0% (n=5) of forage events. The breeding pair was observed delivering 62 prey items to the nest, of which the male delivered 41.9% and the female 58.1%. Fish comprised 77.4%, mammals 8.1%, birds 4.8%, and unknown prey 9.7% of the deliveries. Of the 22 prey items further identified, 22.7% each were tilapia (*Oreochromis sp.*), common carp (*Cyprinus carpio*), and unknown sucker species, 13.6% were unknown waterfowl species, 9.1% were unknown gopher species, and 9.1% were unknown ground squirrel species.

Habitat Use. – The Box Bar nestwatchers identified eleven separate perch locations spanning 7.3 km of the Verde River ranging from river kilometer (rk) 22.0 to 29.3 (including two locations at the Tonto Verde Golf Course). The bald eagle pair spent 87.6% of the observed time at rk 25.8, 11.5% at rk 25.5, and 0.8% at the remaining locations.

Concho Breeding Area (Appendix G, Figure 10)
Observation Period. – March 4 to June 2. Total monitoring 718 hours over 77 days.

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

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 "87/A" at 5.5 weeks of age. 3) On March 30, Nestwatchers observed the adult male eagle dead in the breeding area. The carcass was recovered by the Department and shipped to the USGS National Wildlife Health Center for a necropsy, however all tests were negative and there was no determination of cause of death.

Human Activity. – Nestwatchers recorded 46 human activities. Terrestrial activity of seven types represented 91.3%, aircraft activity (ultralight, drone) 6.5%, and water pursuits (canoe) 2.2%. Three types of activities elicited five significant responses from the breeding pair. The bald eagles flushed in response to two anglers, two cattle, and one nestwatcher.

Food Habits. – The nestwatchers observed 45 forage events, with fish accounting for 84.4%, mammals 8.9%, and birds 6.7%. The male was successful in 100% (n=1) and the female in 90.9% (n=44) of forage events. The breeding pair was observed delivering 59 prey items to the nest, of which the male delivered 10.2% and the female 89.8%. Fish comprised 55.9%, mammals 11.9%, birds 1.7%, and unknown prey 30.5% of the deliveries. Of the 33 prey items further identified, 48.5% were common carp, 33.3% were rainbow trout (*Oncorhynchus mykiss*), 15.2% were Gunnison's prairie dogs (*Cynomys gunnisoni*), and 3.0% were double-crested cormorants (*Phalacrocorax auritus*).

Habitat Use. – The Concho nestwatchers identified 46 separate perch locations at the lake. The bald eagle pair spent 27.7% of the observed time at perch 1 (adjacent to the nest tree), 15.3% at

perch 7 (~75m from the nest), 7.5% at perch 19 (~250m from the nest), 6.0% at perch 27, 6.0% at perch 2, and 37.6% at the remaining locations (none more than 4.8%).

Figure 10.Concho (left) and Crescent (right) breeding areas. Apache County, Arizona.

Crescent Breeding Area (Appendix H, Figure 10)
Observation Period. – June 7 to August 11. Total monitoring 847 hours over 86 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 517 human activities during the monitoring period. Terrestrial activity of 12 different types represented 87.2%, water pursuits (boater, float tuber, kayak/canoe, paddle board) 12.4%, and aircraft (small plane, helicopter) 0.4%. One type of activity elicited one significant response from the breeding pair. The bald eagles were restless in response to one helicopter.

Food Habits. – The nestwatchers observed 37 forage events, with fish accounting for 78.4%, birds 18.9%, and mammals 2.7%. The male was successful in 100% (n=26) and the female in 100% (n=11) of forage events. The breeding pair was observed delivering 62 prey items to the nest, of which the male delivered 61.3% and the female 38.7%. Fish comprised 80.6%, birds 11.3%, carrion 6.5%, and mammals 1.6% of these deliveries. Of the 57 prey items further identified, 45.6% were unknown trout species, 29.8% were rainbow trout, 12.3% were American coots (*Fulica americana*), 8.8% were cutthroat trout (*Oncorhynchus clarkii*), and 3.5% were brook trout (*Salvelinus fontinalis*).

Habitat Use. – The Crescent nestwatchers identified 23 perch locations around Crescent Lake, the majority occurring in the stand of trees within 300m of the nest. The bald eagle pair spent 44.3% of the observed time at perch 1 (close to the nest), 14.0% at perch 9, 8.7% at perch 5, 8.2% at perch 8, and 24.8% at the remaining locations (none more than 6.4%).

Goldfield Breeding Area (Appendix I, Figure 11)
Observation Period. – February 1 to April 30. Total monitoring 594 hours over 68 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 1,684 human activities during the observation period. Terrestrial activities of 21 different types represented 90.3%, aircraft (helicopters, small planes, drones, motorized parachutes) 8.3%, and water activities (swimmer, canoe/kayak) 1.5%. Eight types of activities elicited 11 significant responses from the breeding pair. The bald eagles were restless in response to two helicopters, one driver, and one angler. The birds flushed in response to two helicopters, and once each to hiker, photographer, dog-walker, and gunshot. The eagles left the area in response to one drone.

Food Habits. – The nestwatchers observed seven forage events, with fish accounting for 71.4% and unknown prey types for 28.6%. The male was successful in 50% (n=4), the female in 100% (n=1), and an unknown adult in 0% (n=2) of forage events. The breeding pair was observed delivering 78 prey items to the nest, of which the male delivered 50.0%, the female 32.1%, and an unidentified adult 17.9%. Fish comprised 55.1% of these deliveries, reptiles 3.8%, mammals 2.6%, birds 2.6%, carrion 1.3%, and unknown prey types 34.6%. Of the seven prey items further identified, 57.1% were unknown sucker species and 14.3% each were smallmouth bass (*Micropterus dolomieu*), channel catfish (*Ictalurus punctatus*), and Sonora mud turtle (*Kinosternon sonoriense*).

Habitat Use. – The Goldfield nestwatchers identified 35 perch locations, spanning a 5.3 km stretch of the Salt River ranging from rk 8.3 to 13.6. The bald eagle pair spent 39.5% of the observed time at rk 9.3, 36.0% at rk 9.2, 5.0% at rk 8.4, 4.7% at rk 9.1, 4.7% at rk 8.5, and 10.2% at the remaining locations.

Granite Reef Breeding Area (Appendix J, Figure 11)
Observation Period. – February 1 to May 19. Total monitoring 650 hours over 75 days.

Bald Eagle Identification – Nestwatchers reported that the male and female were unbanded and in adult plumage.

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 6 and set up an informational display on bald eagles.

Human Activity. – The nestwatchers recorded 1,504 human activities. Aircraft (helicopters, small planes, jets, drones, motorized parachutes) represented 45.4%, water pursuits 32.3% (canoes/kayaks, paddleboards, rafters, boats, swimmers), and terrestrial activity of 18 types 22.3%. Five types of activity elicited seven significant responses from the breeding pair. The bald eagles flushed in response to two drones, two nestwatchers, one helicopter, one standup paddle boarder, and one agency worker.

Food Habits. – The nestwatchers observed 15 forage events with fish accounting for 86.7% and birds 13.3%. The male was successful in 60.0% (n=10), the female in 75.0% (n=4), and an unidentified adult in 0% (n=1) of forage events. The breeding pair was observed delivering 46 prey items to the nest, of which the male delivered 60.9%, the female 34.8%, and an unidentified adult 4.4%. Fish comprised 78.3% of the deliveries, birds 4.4%, mammals 4.4%, carrion 2.2%, and unknown prey types 10.9%. Of the 16 prey items further identified, 56.3% were rainbow trout, 18.8% were bluegill (*Lepomis macrochirus*), and 12.5% each were black crappie (*Pomoxis nigromaculatus*) and unknown sucker species.

Habitat Use. – The Granite Reef nestwatchers identified 22 perch locations spanning 3.2 km along the Salt River ranging from rk 0.0 to 3.2. The bald eagle pair spent 51.4% of the observed time at rk 0.0, 34.7% at rk 0.3, 13.2% at rk 0.4, and 0.8% at the remaining locations.

Figure 11. Goldfield (left) and Granite Reef (right) breeding areas. Maricopa County, Arizona..

Luna Breeding Area (Appendix K, Figure 12)
Observation Period. – February 1 to April 15. Total monitoring 514 hours over 55 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). Nestwatchers reported 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) Nestwatchers were stationed at the boat ramp to talk to visitors.

Human Activity. – The nestwatchers recorded 495 human activities. Terrestrial activity of ten different types accounted for 90.9%, water pursuits (fishing boats, float tubers, kayaks/canoes)

for 6.7%, and aircraft (helicopters, military jets, small planes) 2.4%. Two types of activity elicited seven significant responses from the breeding pair. The bald eagles were restless in response six military jets, and flushed in response to one hiker.

Food Habits. – The nestwatchers observed 39 forage events, with birds accounting for 84.6%, fish 10.3%, and unknown prey types 5.1%. The male was successful in 95.5% (n=22), the female in 85.7% (n=16), and an unidentified adult in 100% (n=1) of forage events. The breeding pair was observed delivering 24 prey items to the nest, of which the male delivered 75.0% and the female 25.0%. Birds comprised 87.5%, fish 4.2%, and unknown prey 8.3% of the deliveries. Of the 22 prey items further identified, 90.9% were American coots, and 4.5% each were rainbow trout and bufflehead (*Bucephala albeola*).

Habitat Use. – The Luna nestwatchers identified 23 separate habitat use areas around Luna Lake. The bald eagle pair spent 60.1% of the observed time at lk 4.8, 21.2% at lk 4.9, 10.1% at lk 5.0, and 8.3% at the remaining locations.

Figure 12. Luna (left) and Pinto (right) breeding areas. Apache and Gila Counties, Arizona.

Pinto Breeding Area (Appendix L, Figure 12)
Observation Period. – February 1 to May 5. Total monitoring 406 hours over 50 days.

Bald Eagle Identification – Nestwatchers reported that the male was unbanded and in adult plumage (unknown origin), and the female had a blue VID band on the left leg, USFWS band on the 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) On March 26, two nestlings were blue VID banded "74/A" and "75/A" at 5 weeks of age. Monofilament fishing line and a flip-flop were removed from the nest during banding.

Human Activity. – The nestwatchers recorded 14 human activities. Watercraft (boats) represented 42.9%, aircraft (helicopters, small planes) 42.9%, and terrestrial activity (gunshots, OHV) 14.3%. One type of activity elicited one significant responses from the breeding pair. The bald eagles flushed in response to one helicopter.

Food Habits. – The nestwatchers observed two forage events with fish and birds accounting for 50.0% each. An unidentified adult was successful in 50.0% (n=2) of forage events. The breeding pair was observed delivering 52 prey items to the nest, of which the male delivered 61.5%, the female 28.8%, and an unidentified adult 9.6%. Fish comprised 73.1% of the deliveries and unknown prey types 26.9%. None of the prey items was further identified.

Habitat Use. – The Pinto nestwatchers identified 19 perch locations spanning 7.8 km along the Salt River ranging from rk 98.0 to 105.8. The bald eagle pair spent 66.6% of the observed time at rk 105.3, 22.1% at rk 105.4, and 11.3% at the remaining locations.

Saguaro Breeding Area (Appendix M, Figure 13)
Observation Period. – February 15 to May 5 (no monitoring March 10-April 4). Total monitoring 294 hours over 37 days.

Bald Eagle Identification – Nestwatchers reported the male was unbanded and in adult plumage (unknown origin), and the female had a blue band on the left leg, silver band on the right leg, and was in adult plumage (unknown, but blue band consistent with Arizona origin).

Management Activities. – 1) Nestwatchers were supplied a boat by the Department and educated recreationists about the bald eagles. 2) On March 25, two male nestlings were blue VID banded "72/A" and "73/A" at 5 weeks old.

Human Activity. – The nestwatchers recorded 3,104 human activities. Water pursuits (fishing boats, float tubers) represented 93.9%, terrestrial activity (anglers, nestwatchers, gunshots) 4.9%, and aircraft (helicopters, military jets, small planes) 1.2%. Five types of activity elicited six significant responses from the breeding pair. The bald eagles were restless in response to one boater, one small plane, one nestwatcher, and one helicopter. The eagles flushed in response to one nestwatcher and one gunshot.

Food Habits. – The nestwatchers observed three forage events, with birds accounting for 100%. The male was successful in 0% (n=1), the female in 100% (n=1), and an unidentified adult in 100% (n=1) of forage events. The breeding pair was observed delivering 42 prey items to the nest, of which the male delivered 26.2%, the female 54.8%, and an unidentified adult 19.0%. Fish comprised 66.7% and unknown prey 33.3% of the deliveries. None of the prey items were further identified.

Habitat Use. – The Saguaro nestwatchers identified 24 separate habitat use areas around Saguaro Lake. The bald eagle pair spent 36.0% of the observed time at lk 31.4, 29.1% at lk 31.2, 9.0% at lk 31.0, 5.1% at lk 32.0, 5.0% at lk 31.1, and 15.8% at the remaining locations.

Figure 13. Saguaro (left) and Sycamore (right) breeding areas. Maricopa County, Arizona.

Sycamore Breeding Area (Appendix N, Figure 13)
Observation Period. – February 1 to May 20. Total monitoring 540 hours over 67 days.

Bald Eagle Identification. – The male had a blue VID band "27/W" on his left leg, USFWS band on the right leg, and was in adult plumage (2012 Alamo Lake 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. 3) On April 1, one female nestling was blue VID banded "78/A" at 5.5 weeks old. 4) SRP retro-fitted power poles in the area of electrocution and at pole perch locations identified by nestwatchers.

Interventions. – On April 29, the Department removed the nestling from the nest after confirmation from nestwatchers that both adult eagles had been missing for several days. The nestling eagle was temporarily held at Liberty Wildlife Rehabilitation, then on May 2 we attached a transmitter to the juvenile and fostered it to the nest at the Beaver breeding area which contained two nestlings of approximately the same age. Coincidentally, the adult male at Sycamore was discovered dead on the morning of April 29, having been electrocuted on a power line.

Human Activity. – Nestwatchers recorded 127 human activities. Aircraft (helicopters, small planes, and motorized parachutes) accounted for 70.9%, terrestrial activities of nine types 28.3%, and water pursuits (swimming) 0.8%. Three types of activities elicited nine significant responses from the breeding pair. The bald eagles flushed in response to three helicopters, two drivers, and two AGFD biologists. The birds left the area in response to two helicopters.

Food Habits. – The nestwatchers observed six forage events, with fish, mammals, and carrion each accounting for 33.3%. The male (n=5) and female (n=1) were each successful in 100% of forage events. The breeding pair was observed delivering 35 prey items to the nest, of which the male delivered 77.1% and the female 22.9%. Fish comprised 25.7%, birds and mammals 5.7%

each, and unknown prey types 62.9% 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, and 0.1 km along Sycamore Creek. The bald eagle pair spent 31.8% of the observed time at rk 9.9, 28.8% at rk 10.1, 13.7% at rk 7.8, 8.4% at rk 10.7, 6.0% at rk 10.2, 5.1% at the Sycamore Creek perch, and 6.2% at the remaining locations.

Tapco Breeding Area (Appendix O, Figure 14)
Observation Period. – February 1 to March 10. Total monitoring 222 hours over 30 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 consistent with an Arizona origin), 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 consistent with an Arizona origin).

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 7 human activities. Terrestrial activities (hikers, photographers, anglers) accounted for 85.7% and water pursuits (kayaks) for 14.3%. None of the activities elicited a significant response from the breeding pair.

Food Habits. – The nestwatchers observed four forage events, with birds accounting for 75.0% and fish 25.0%. The male was successful in 25.0% (n=4) of forage events. The breeding pair was observed delivering two prey items to the nest, of which an unidentified adult delivered both. Mammals and unknown prey types each represented 50.0% of the deliveries. None of the prey items were further identified.

Habitat use. – The Tapco nestwatchers identified 17 separate perch locations, spanning 4.4 km along the Verde River and ranging from rk 237.0 to 241.4. The bald eagle pair spent 28.9% of the observed time at rk 240.8, 19.5% at rk 238.8, 18.8% at rk 237.3, 17.0% at rk 237.1, 6.7% at rk 237.4, and 9.1% at the remaining locations.

Tonto Breeding Area (Appendix P, Figure 14)
Observation Period. – February 1 to March 24. Total monitoring 307 hours over 38 days.

Bald Eagle Identification. – Both adults were in adult plumage. One adult had no band on the left leg and unknown band status of the right leg (unknown origin). The second adult had a blue band on the left leg and unknown band status of the right leg (unknown, but blue band consistent with Arizona origin).

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

Human Activity. – No nesting activity occurred, and nestwatchers did not record human activities.

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

Habitat use. – The Tonto nestwatchers identified 17 separate perch locations, spanning 1.5 km along Tonto Creek and ranging approximately from rk 16.5 to 18.0. The bald eagle pair spent 36.6% of the observed time at rk 17.1, 28.2% at rk 16.6, 17.4% at rk 17.4, and 17.8% at the remaining locations.

Figure 14. Tapco(left) and Tonto (right) breeding areas. Yavapai and Gila Counties, Arizona.

Woods Canyon Lake Breeding Area (Appendix Q, Figure 15)
Observation Period. – April 26 to July 24. Total monitoring 615 hours over 72 days.

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

Management Activities. – 1) The USFS enacted a closure around the nest area. 2) Nestwatchers educated recreationists about the closure and bald eagles.

Human Activity. – Nestwatchers recorded 1,793 human activities. Terrestrial activities of nine types accounted for 92.1%, water pursuits (canoes/kayaks, boats, swimmers, stand-up paddleboards) 7.3%, and aircraft (recreational drones, helicopters) for 0.6%. Four types of activity elicited four significant responses from the breeding pair. The bald eagles flushed in response once each to a canoe/kayak, a hiker, a photographer, and a boater.

Figure 15. Whiskey Spring breeding area. Coconino County, Arizona.

Food Habits. – The nestwatchers observed 48 forage events, with fish accounting for 97.9% and birds 2.1%. The male was successful in 35.4% (n=17) and the female in 64.6% (n=31) of forage events. The breeding pair was observed delivering 79 prey items to the nest, of which the male delivered 50.6%, the female 46.8%, and an unidentified adult 2.5%. Fish comprised 96.2% and unknown prey 3.8% of the delivered items. Of the 70 prey items that were further identified, 100% were unknown trout species.

Habitat Use. – The Woods Canyon nestwatchers identified 30 perch locations around the lake. The bald eagle pair spent 40.4% of the observed time at lk 4.7, 25.0% at lk 4.9, 16.3% at lk 0.8, 8.9% at lk 1.1, 4.3% at lk 0.1, and 5.1% 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.

Bachelor Cove and Tonto

1) The current management strategy seems to be effective for both breeding areas. Our only recommendation is to remove the Bachelor Cove closure map from the Tonto Basin USFS website. With the strategy being to avoid drawing attention to the nest, a map showing almost the exact nest location is counterproductive.

Box Bar

1) 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. We would suggest further increasing the number of signs around the closure but those who break the closure seem to ignore them anyway, so we will leave that to the discretion of managers.
2) A translation of the current educational brochures into Spanish is highly recommended. A large percentage of the recreating public that nestwatchers engaged at Box Bar were Spanish speaking families.

3) The Box Bar breeding area closure should be extended to include the west bank of the Verde River to the mud bluffs from river kilometer 23.0 to 29.0 as the 2019 resident pair were observed perching or flying frequently over these areas.

Concho
None.

Crescent
None.

Goldfield
1) Communicate with Maricopa County Sheriff's Department and local military units to inform them regarding protections afforded to bald eagles, and their responsibilities for compliance with flights over the breeding areas.
2) Perform greater outreach to local horse riders in the form of educational signage near parking areas and trailheads (as below). Consider enforcement activities on trails that lead into or out of the closure area.
3) Install informational program signage at the Goldfield and Coon Bluff Recreation Site parking areas. This could include a map of the closure area and a program brochure dispenser.
4) Support increased measures to reduce littering and increase removal of litter in and around the river. Looking at the amount of trash accumulated along the shores of and within the river, and the limited change after the single, spring "clean-up" day, the Salt River Tubing company is not doing enough to clean up the Salt River after the summer season, or to effectively reduce littering in the first place. Appropriate measures could include mandates for the concessionaire to do a better job of preserving the area's scenic values and safety for wildlife, inspirational anti-littering signage, and more community pick-up days.
5) Install fishing line recovery bins and empty them regularly to reduce inappropriate disposal of fishing lines.

Granite Reef
1) Due to the increase of drone activity in the Orme and Granite Reef breeding areas, especially directly surrounding the Granite Reef nest, we recommend a collaborative discussion be initiated and a plan be developed to address such situations in the future. From the OP, Nestwatchers are helpless to track down drone operators, who are suspected to be operating their unmanned aerial systems (UAS) from the USFS side of the river. USFS Biologist Kelly Kessler was extremely helpful and responsive to the issue of drones in the breeding area during the 2019 Nestwatch season, and for that Nestwatchers are most grateful. By the time a drone is in the air and actively harassing eagles, the window of available time in which to contact the operator simply is infeasible to achieve a desired outcome. Additional signage placed at Recreation Areas along Bush Highway that specifically addresses UAS use in BAs might yield a favorable result.
2) While not directly impacting the nesting attempt of the Orme and Granite Reef resident adult bald eagles, Nestwatchers feel it noteworthy to mention the many bicyclists were

observed trespassing through Red Mountain Preserve via the South Gate. Perhaps a deterrent would be to replace the faded signage (full of graffiti) at the gate with a sign specific to bicyclists.

3) Nestwatchers thoroughly appreciated the efforts of SRPMIC law enforcement rangers to ensure safety within Red Mountain Preserve. Further, we very much appreciated the signage and road blockades placed around the Nestwatch campsite. We recommend the continuation of this practice in the future, perhaps laminating the signs if possible, to protect against the elements. For the 2019 season, Nestwatchers placed Avery Self-Adhesive Laminating Sheets, Style 73601, over the paper signs.

Luna

1) Set up some dates in January to scout for an alternate observation post, perch trees, hazards, encroachment, etc.
2) Repair the downed fence on the south side waterfowl closure at the water's edge.
3) All USFS projects impacting the Luna Lake Breeding Area should be discussed in advance with AZGFD Bald Eagle management team and Nest Watchers prior to implementation.
4) Luna Lake is a unique breeding area 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.

Pinto

1) Given the limited amount of human activity in the Pinto area, consider not monitoring this breeding area if there are others that would benefit more from having nestwatchers present. There was very limited human activity in 2019, similar to other years this nest has been monitored. Furthermore, the OP being behind a locked gate essentially eliminates the opportunity for public education. Accordingly, it is a sound strategy to relocate nestwatchers from a failed site to Pinto for the later part of the season. The crucial stage before nestlings fledge can be monitored for intervention in the event of a fall. Given Pinto's close proximity to Armer Gulch, that area can be monitored pre-fledging, as well.

Saguaro

1) Informational signage posted at Falcon Field could educate private pilots, providing visual information on areas to avoid flying below the FAA recommended 2000 ft ceiling.
2) While boaters accounted for the majority of human activity in the breeding area, they were not a significant source of disturbance for the eagles. However, we believe that more enforcement presence at the no-wake line could help keep the number of disturbances low. While no-wake violation data was not consistently collected throughout the season, nestwatchers observed a high number of daily violations correlated with high use periods. An alternative method could be to enact some form of sound ordinance or

restriction. This would prevent access restrictions but would contribute to reducing or eliminating boater-caused disturbances.

3) The cliffs at river km. 31.2, which the fledglings would fly to, was occasionally used by cliff divers. It is possible that, by late April, cliff diving could interfere with fledgling's habits and deprive them of a safe, practical spot to land. Furthermore, there's the chance that a cliff diver could stumble upon and disturb a fledgling. Some form of signage or information could be helpful, although additional data is needed to determine the frequency of cliff divers and their level of disturbance to the nesting pair. Future nestwatchers in the Saguaro Lake breeding area should be aware of cliff divers and record activity accordingly.

Sycamore

1) Enlist interested community members to watch the Sycamore breeding area for signs of new breeding adults. Advise best ways to watch and not disturb.
2) Continue closure of any horse trail proximate to the Sycamore nest from December-June if the nest is active. Advise Fort McDowell Adventures Stables of this and notify them of any changes.
3) If Sycamore breeding area has no bald eagles occupying it in 2020, consider limiting travel (Green Zebra) along road from camp to the OP, to reduce impact on the vegetation and wildlife and allow the area to recover from years of heavy traffic.
4) Work with FMYN police to enhance patrolling of areas prone to trespass or shooting violations, especially on the weekends.
5) 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.
6) Meet with Green Zebra to establish professional standards for tours, including what should and should not be shared about the FMYN and the eagles. Establish training standards for Green Zebra, Segway and other guides at Adventures to include basics of bald eagle breeding areas and cultural respect issues.
7) Continue inter-disciplinary meetings and on-going communication between nestwatch, environmental, materials, law enforcement, FMD Adventures etc. to share information and advice.
8) 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.
9) Research options and funds for durable optics (e.g. binoculars, scopes) especially suited to young viewers and those with special needs.
10) Initiate discussion with council and cultural department regarding interpretive themes and goals for bald eagle educational exhibits.
11) Research funding and other resources, e.g. Pattea Foundation, toward educational and entertaining materials for the young and all ages that would tell the particular story of the FMYN eagles.

12) 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.
13) Include bald eagle updates at Council meetings, as suggested by several community members.
14) Consider including a bald eagle component in Camp Yavapai and explore ways to strengthen youth connections to nestwatch.
15) Continue community awareness of bald eagle viewing opportunities at Rodeo RV observation point. Possibly set specific dates and times and publicize via Facebook, The Yavapai News, through the RV Park or other sources.

Tapco

1) If future nestwatchers will be using the same camping location, place signs on the road leading to the campsite stating that it is not open to vehicle traffic. There was regular traffic on the road and people were often camped in the first pull-off. Freeport-McMoRan's private land could also be better signed. The few trespassers we were able to talk to believed they were on Forest Service land.

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.
2) Add more or bigger fishing line and tackle disposal tubes. The ones already installed get filled quickly and are usually overflowing with that and other trash. One at the Spillway parking lot is especially needed.

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APPENDIX A: 2019 ARIZONA BALD EAGLE WINTER COUNT RESULTS

Table 10. 2019 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	30	1	--	--	--
2	Little Colorado River (LCR)	45	--	--	--	--
3	S. Fork LCR – Campground	75	2	3	--	--
4	Casa Malpais – LCR	30	--	--	--	--
5	Greer Lakes (River, Bunch, and Tunnel Reservoirs)	120	--	--	--	--
6	Sponseller Lake	Not surveyed.				
7	Mexican Hay Lake	60	--	--	--	--
8	White Mountain Hereford Ranch (Trinity, Glen Livet, McKay reservoirs)	Not surveyed.				
9	The Ranch Lake	30	--	--	--	--
10	Ortega Lake	30	--	--	--	--
11	Concho Lake	45	2	--	--	--
12	Luna Lake	180	2	1	--	--
13	Nelson Reservoir	70	--	--	--	--
14	Nutrioso Reservoir	110	1	1	--	--
16	San Francisco River (Luna Lake to New Mexico line)	Not surveyed.				
Total		**825**	**8**	**5**	**0**	**0**
Cochise County						
18	Parker Canyon Lake	90	--	--	--	--
19	Willcox Playa	240	2	1	--	--
Total		**330**	**2**	**1**	**0**	**0**
Coconino County						
21	Long Lake Complex	Not surveyed.				
22	Stoneman Lake	124	1	1	0	0
23	FH-3	35	0	0	0	0
24	I-17, Section to Flagstaff	203	3	1	0	0
25	Bellemont	325	1	0	0	0
26	Townsend/Winona A/B	392	2	1	--	--
27	HWY 89 North /Sunset Crater – Wupatki	390	2	4	0	0
28	FH-3 Lakes (Mary, Mormon, Marshall, Prime, etc.)	290	3	7	0	0
29	Continental Country Club Lakes	190	3	1	0	0
30	Chevelon Canyon Lake	Not surveyed.				
32	Spring Valley Wash	195	--	--	--	--
33	Red Lake Valley	44	--	--	--	--
34	Kaibab Lake	50	1	1	--	--
35	Pittman Valley	40	--	--	--	--
36	Davenport Lake	30	--	--	--	--
37	Scholz Lake	Not surveyed.				
38	Cataract Lake	20	2	--	--	--
39	Willow Springs Lake	Not surveyed.				

Table 10 continued.

Route Number	Route Name	Minutes Surveyed	Adults	Subadults	Unknown Bald Eagles	Unknown Eagles
40	West Chevelon Canyon	Not surveyed.				
41	Willow Creek	Not surveyed.				
42	White Horse Lake – Pomeroy Tanks	Not surveyed.				
43	JD Dam Lake	Not surveyed.				
45	Steel/Stone Road	32	--	--	--	--
48	Blue Stem Wash-Babbit property	Not surveyed.				
49	Glen Canyon Nat'l Rec. Area (Lake Powell to Lee's Ferry)	Not surveyed.				
118	Bill Williams Loop Road	Not surveyed.				
119	Johnson Canyon	93	1	--	--	--
120	Highway 64 east	Not surveyed.				
121	Highway 64	Not surveyed.				
122	Camp Navajo	177	--	--	--	--
123	Partridge Creek	37	1	1	--	--
124	Odell Lake	60	--	--	--	--
125	Highway 87 north	32	--	--	--	--
126	Highway 180	180	--	--	--	--
Total		**2,939**	**20**	**17**	**0**	**0**
Graham County						
51	Point of Pines Lake area (ground)	Not surveyed.				
Mohave County						
57	Alamo Lake	95	4	--	--	--
Total		**95**	**4**	**0**	**0**	**0**
Navajo County						
58	Lake of the Woods	25	--	--	--	--
59	Rainbow Lake	25	1	3	--	--
61	Whipple Lake	30	--	--	--	--
62	Long Lake	30	--	--	--	--
63	Lone Pine Dam	25	--	--	--	--
64	Schoens Reservoir	27	--	--	--	--
65	White Mountain Lake	35	2	2	--	--
67	Jacques Marsh	30	--	--	--	--
68	Scott's Reservoir	25	2	2	--	--
69	Show Low Lake	20	--	--	--	--
70	Pintail Lake	19	2	1	--	--
71	Telephone Lake	27	1	1	--	--
72	Fool Hollow Lake	60	2	1	--	--
75	Cottonwood Wash/ Clay Springs	20	--	--	--	--
76	White Lake	8	--	--	--	--
127	Mortenson Wash	Not surveyed.				
Total		**406**	**10**	**10**	**0**	**0**
Santa Cruz County						
82	Pena Blanca Lake	Not surveyed.				
Total		**0**	**0**	**0**	**0**	**0**
Yavapai County						
83	Wet Beaver Creek	225	--	--	--	--
84	Oak Creek	Not surveyed.				

Table 10 continued.

Route Number	Route Name	Minutes Surveyed	Adults	Subadults	Unknown Bald Eagles	Unknown Eagles
85	Willow Lake	240	2	4	1	--
86	Lynx Lake	240	2	1	--	--
87	Watson Lake	240	2	2	--	--
88	Goldwater Lake	240	2	7	--	--
Total		**1,185**	**8**	**14**	**1**	**0**
Yuma and La Paz Counties						
89	Imperial N.W.R. Cibola/Martinez Lake – Colorado River	Not surveyed.				
Total		**0**	**0**	**0**	**0**	**0**

Table 11. 2019 Arizona bald eagle winter count helicopter survey results.

Route Number	Route Name	Minutes Surveyed	Adults	Subadults	Unknown Bald Eagles	Unknown Eagles
90	Verde River	197	20	4	--	--
91	Lower East Verde River	12	2	--	--	--
92	Lower West Clear Creek	19	2	--	--	--
93	Lower Salt River	123	24	10	--	--
94	Upper Salt River	68	4	--	--	--
95	Lower Tonto Creek	22	2	3	--	--
97	Lower Canyon Creek	11	--	--	--	--
98	Lower Cibecue Creek	18	1	--	--	--
100	White River	16	2	1	--	--
101	North Fork White River	44	1	--	--	--
102	Lower Black River	61	6	3	--	--
103	Big and Little Bonito Creeks	26	1	1	--	--
104	San Carlos River–Talkalai Lake	18	6	--	--	--
105	San Carlos Reservoir	15	1	1	--	--
106	Upper and Lower Gila River	53	1	1	--	--
107	Eagle Creek	39	2	--	--	--
108	Bonita Creek	14	--	--	--	--
109	Lower San Francisco River	36	1	--	--	--
110	Blue River	12	--	--	--	--
111	Sunrise Lake	2	--	--	--	--
112	Big Lake	Not surveyed.				
114	Crescent Lake	Not surveyed.				
115	Lake Pleasant	30	4	3	--	--
116	Del Rio Ponds	1	2	--	--	--
117	Tres Rios	28	3	--	--	--
Total		**865**	**85**	**27**	**0**	**0**

Table 12. 2019 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	12	1	--	--	--
129	Buckhead Mesa Landfill	Gila	40	10	15	--	--
973	Elwood Tank	Graham	2	7	4	--	--
974	Glendale Recharge Ponds	Maricopa	210	1	--	--	--
976	West Clear Creek	Yavapai	150	--	1	--	1
986	Kachina Wetlands	Coconino	65	--	--	--	--
991	Clint's Well	Coconino, Yavapai	59	--	--	--	--
Total			**538**	**19**	**20**	**0**	**1**

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: 2019 ARIZONA BALD EAGLE PRODUCTIVITY

Table 13. Arizona bald eagle breeding area productivity, 2019 (continued on next page).

Breeding Area	Status[1]	Nest[2]	Incubation Date	Eggs	Hatch Date	Young	Fledged	Fledge Date
Alamo	F	4	<1/8	2	Failed 2/11-3/20.			
Armer Gulch	F	1	12/7-1/3	1	Failed 1/29-3/14.			
Ashurst	S	3	<2/26	1	2/26-4/22	1	1	>6/11
Bachelor Cove*	S	1	12/7-1/3	2	1/3-2/3	2	2	4/17-4/18
Bagley	U							
Bartlett	S	5	<1/28	3	1/28-2/26	3	3	>5/10
Beaver	S	1	1/2-1/28	2	1/28-3/22	2	3[Δ]	5/15, 5/3-5/23
						[Δ]Includes 1 young fostered from Sycamore		
Becker	S	2	<2/12	1	2/12-3/15	1	1	>5/10
Bill Williams	U							
Black Cross	S	1	<1/3	2	1/29-3/14	2	1	>5/3
Blue Point	S	10	<1/3	3	1/29-3/14	3	3	>4/19
Box Bar*	S	5	1/28-2/2	2	3/9	2	1	5/30
Buckeye	O	Pair of adults observed at nest.						
Bulldog	S	3	<1/3	1	1/29-2/26	1	1	>4/19
Burro Creek	U							
Campaign Bay	U							
Canyon de Chelly	Unknown occupancy and reproductive status.							
Cataract Lake	S	3	<4/22	1	<4/22	1	1	>7/1
Cedar Basin	S	9	1/10-3/15	1	3/15-4/19	1	1	>6/6
Chevelon	F	5	<3/7	1	Failed 3/14-4/18.			
Cibecue	S	9	1/10-3/15	1	3/15-4/19	1	1	>6/6
Cliff	U							
Coldwater	U							
Concho*	S	2	<1/25	1	3/7	1	1	6/7
Coolidge	U	One adult seen 3/15. New nest (#5) found March-April.						
Crescent*	S	1	3/15-4/19	2	4/19-4/28	2	2	8/3
Dogtown	S	3	2/26-3/22	2	4/22-5/29	2	2	>6/26
Doka*	O	Pair of adults seen throughout the season.						
East Verde	F	6	1/2-1/28	1	Failed 1/28-3/22.			
Elaine	F	1	<2/26	1	Failed 2/26-3/28.			
Fish Creek	F	1	1/3-1/29	1	Failed 1/29-3/14.			
Fool Hollow*	F	3	<12/29	1	Failed 2/20-3/2.			
Fort McDowell*	F	19	<1/2	1	Failed 1/17-1/23.			
Gainey Ranch	S	2	<1/22	2	1/22-4/13	2	2	5/7
Garden Lakes	S	2	<12/29	3	1/31-2/16	3	3	4/22-5/4
George's Basin	F	1	1/10-3/15	1	Failed 3/15-4/19.			
Gilbert	No nests or activity reported in this area.							
Goldfield*	S	4	<1/3	2	2/2	2	2	4/25-4/26
Granite Basin	U	One adult seen 3/15.						
Granite Reef*	S	7	1/3-1/28	1	2/24-3/1	1	1	5/15

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

[2]Nest numbers are from Hunt and others 1992; Driscoll and Beatty 1994; Driscoll and others 1992, 1995a, 1995b, 1997-1999; 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. 2013-2018.

[3]Represents minimum number of eggs laid.

*Nests monitored by the Arizona Bald Eagle Nestwatch Program.

Table 13 continued.

Breeding Area	Status[1]	Nest[2]	Incubation Date	Eggs	Hatch Date	Young	Fledged	Fledge Date
Green River	S	1	<1/28	3	1/28-3/22	3	3	>5/3
Greer Lakes	F	4	<3/15	1	Failed 3/15-4/19.			
Horse Mesa	F	4	1/3-1/29	1	Failed 1/29-3/14.			
Horseshoe	F	13	<1/28	1	Failed 3/22-4/22.			
Ive's Wash	O	Two adults seen in area.						
Kachina Village	F	1	2/26-3/28	1	Failed 4/22-5/6.			
Kerr*	S	2	<4/2	2	<4/2	2	2	>5/24
Ladders	S	4	1/28-3/22	1	3/22-4/8	1	1	>5/23
Lone Pine	F	2	<1/10	1	Failed 1/10-3/15.			
Lower Lake Mary	S	3	<2/26	1	2/26-4/22	1	1	>6/11
Luna*	F	2	2/13	1	3/24	1	Failed 3/24-3/29.	
Lynx	F	7	<1/28	1	Failed 1/28-3/22.			
Mohave	U							
Needle Rock	U							
Nevada Bay	U							
Oak Creek	S	4	1/28-2/13	2	2/13-3/22	1	1	>6/5
Orme*	O	Pair of adults and nest-building observed.						
O W	F	1	<3/14	1	Failed 5/3-5/24			
Pee Posh Wetlands	S	7	<12/21	1	1/2-2/11	1	1	4/15
Perkinsville	F	4	1/28-3/22	1	Failed 3/22-4/22.			
Pinal	S	9	1/3-1/29	1	1/29-3/14	1	1	>5/3
Pinto*	S	10	1/3-1/29	2	1/29-3/14	2	2	>5/3
Pleasant	O	Pair of adults seen early in season. Report of two juveniles and an adult in late June.						
Redmond	O	Pair of adults in area on 1/3.						
Riverside	S	2	1/3-1/28	1	1/28-3/8	1	1	5/5
Rock Creek	U							
Rodeo*	S	6	<1/15	2	2/15-2/19	2	2	5/12-5/13
Saguaro*	S	2	1/3-1/29	2	1/29-2/19	2	2	4/28-4/29
San Carlos	F	7	<1/3	1	Failed 1/3-3/15.			
Scholz Lake	S	1	2/26-3/22	2	3/22-5/29	2	2	>7/1
76	S	6	1/3-3/14	2	1/3-3/14	2	1	>5/24
Sheep	S	7	1/29-3/14	1	3/14-4/19	1	1	>6/4
Sheep Creek	S	1	1/2-1/28	2	1/28-3/22	2	2	4/22-5/10
Show Low Lake	F	2	1/26-3/4	1	Failed 3/15-4/19.			
Silver Creek	S	3	1/25-2/10	1	3/4-3/24	1	1	>6/5
Suicide	S	2	<1/3	2	1/3-3/6	2	2	>4/19
Sullivan Lake	S	2	1/2-1/28	2	1/28-3/22	2	2	5/8-5/29
Sycamore*	F	7	1/2-1/15	1	2/15-2/20	1	Nestling fostered to Beaver.	
Table Mountain	S	4	1/28-3/22	1	1/28-3/22	1	1	>5/23
Talkalai	F	9	<1/3	1	Failed 1/3-3/15.			
Tapco*	F	6	1/2-1/28	1	Failed 3/7-3/10.			
Tonto*	O	Pair of adults observed at new nest throughout the season.						
Tortilla Creek	F	1	1/3-1/29	1	Failed 1/29-3/14.			
Tower	U							

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

[2]Nest numbers are from Hunt and others 1992; Driscoll and Beatty 1994; Driscoll and others 1992, 1995a, 1995b, 1997-1999; 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. 2013-2018.

[3]Represents minimum number of eggs laid.

*Nests monitored by the Arizona Bald Eagle Nestwatch Program.

Table 13 continued.

Breeding Area	Status[1]	Nest[2]	Incubation Date	Eggs	Hatch Date	Young	Fledged	Fledge Date
Tremaine	S	2	<3/14	2	3/14-4/29	2	2	>6/6
Two Bar	S	2	1/3-2/12	2	2/12-4/19	2	2	>6/4
Whiskey Spring*	F	1	Clutch 1: 1/21	2	First clutch failed 1/30.			
			Clutch 2: 2/21	2	Second clutch failed 4/2.			
White Horse Lake	U							
Woods Canyon*	S	13	<3/14	1	3/14-4/27	1	1	7/8
Yellow Cliffs	F	1	1/2-1/28	1+	1/28-3/22	1	Failed 4/22-5/24.	

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

[2]Nest numbers are from Hunt and others 1992; Driscoll and Beatty 1994; Driscoll and others 1992, 1995a, 1995b, 1997-1999; 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. 2013-2018.

[3]Represents minimum number of eggs laid.

*Nests monitored by the Arizona Bald Eagle Nestwatch Program.

APPENDIX D: NEST SURVEY RESULTS

Table 14. Results of the 2019 bald eagle winter count, ORA, and nest survey flights (continued next page).

Location	Time	Comments
January 2, 2019		
Orme BA	0739	All known nests empty. One immature bald eagle flying.
Rodeo BA	0745	Nest #5 fallen. Two adults by river between Rodeo and Sycamore BAs.
Sycamore BA	0752	All known nests empty. Two adults downstream at gravel ponds.
Doka BA	0755	One adult perched by nest #3, empty. Second adult upstream. Nest #7 empty.
Fort McDowell BA	0759	Adult incubating in new nest (#19).
Box Bar BA	0805	All known nests empty. Nest #6 fallen. No eagles.
Needle Rock BA	0808	No new nests or eagles. Nest #3 fallen.
Bartlett BA	0810	All known nests empty. No eagles.
Yellow Cliffs BA	0830	All known nests empty. Two immatures and two adults at Bartlett Lake.
Sheep Creek BA	0835	Pair of adults standing in nest #1.
Cliff BA	0839	All known nests empty. No eagles.
Horseshoe BA	0852	Nests #17 empty, #18 not seen. Three adults at Horseshoe Lake.
Table Mountain BA	0902	One adult at nest #4, empty. Second adult downstream.
East Verde River	0912	No new nests. Two adults along river.
East Verde BA	0926	All known nests empty. No eagles.
Coldwater BA	0933	All known nests empty. No eagles.
Ladders BA	0937	Nests #3, 4 empty. Nests #5, 9 not seen.
West Clear Creek	1053	One adult bald eagle and one golden eagle. New large nest found.
Beaver BA	1118	All known nests empty. No eagles.
Oak Creek BA	1129	All known nests empty. One adult flying near nest #4. Second adult downstream.
Green River BA	1135	All known nests empty. Two adults upstream.
Tapco BA	1141	All known nests empty. One adult flying.
Tower BA	1148	All known nests empty. No eagles.
Perkinsville BA	1154	All known nests empty. One adult upstream of nest #4.
Hell Point historic BA	1205	All known nests empty. No eagles.
Granite (golden eagle BA)	1215	Nest #2 empty. No eagles.
Sullivan Lake BA	1221	Pair of adults perched in tree adjacent to nest #2.
Pleasant BA	14111	All known nests empty. Pair of adults perched between nests #3 and #4.
Whiskey Spring BA	1416	Pair of adults flew over nest #1.
Buckeye BA	1510	One adult perched in nest #1. Second adult perched by nest.
Pee Posh Wetlands BA	1524	Adult incubating in nest #7.
Garden Lakes BA	1529	Adult incubating in nest #2.
January 3, 2019		
Riverside BA	0730	Pair of adults by new nest #2.
Granite Reef BA	0738	One adult perched by nest #7. Pair of adults perched near nest #2 and a new nest (Orme #11) in the same tree.
Goldfield BA	0744	Adult incubating in nest #4.

Table 14 continued.

Location	Time	Comments
Kerr BA	0745	Nest #1 fallen.
Bulldog BA	0755	Adult incubating in new nest #3.
Blue Point BA	0804	Adult incubating in nest #10.
Bagley BA	0805	All known nests empty. No eagles.
Saguaro BA	0810	Adult standing in nest #1.
Tortilla Creek BA	0818	Pair of adults perched near nest #1.
Black Cross BA	0823	Adult incubating in nest #1.
Fish Creek BA	0830	All known nests empty. No eagles.
Horse Mesa BA	0837	One adult standing in nest #5.
Two Bar nest site	0850	All known nests empty. No eagles.
Bachelor Cove BA	0858	Adult incubating in nest #1.
Tonto BA	0901	New large nest (#9) in snag, empty. No eagles.
Sheep BA	0906	All known nests empty. Two adults perched in area.
76 BA	0915	All known nests empty. No eagles.
Armer Gulch BA	1029	Adult incubating in nest #1. Second adult perched in nest.
Pinto BA	1034	All known nests empty. One adult perched.
Pinal BA	1039	One adult standing in nest #9.
Redmond BA	1044	Pair of adults perched near nest #5.
Canyon historic BA	1103	No new nests or eagles.
Talkalai BA	1312	Adult incubating in nest #9. Second adult flying.
San Carlos BA	1323	Adult incubating in nest #7. Second adult perched.
Suicide BA	1335	Adult incubating in nest #2.
Coolidge BA	1341	No new nests or eagles.
Granite Basin BA	1423	All known nests empty. No eagles.
January 9, 2019		
Gila Box	1250	New large nest (#1) on cliff.
Blue River	1325	New large nest (#1) on cliff.
Gila River	1410	New large nest (#1) on cliff.
Show Low BA	1539	All known nests empty. No eagles.
Fool Hollow BA	1544	Adult incubating in nest #3.
January 10, 2019		
Cibecue Crossing nest site	0935	All known nests empty. New large nest (#2) on cliff. One adult perched.
Cibecue BA	0945	Nests #1, 2, 9, 10 empty. No eagles.
Mule Hoof historic BA	1003	All known nests empty. No eagles.
Cedar Basin historic BA	1022	All known nests empty. No eagles.
Lone Pine BA	1033	Adult incubating in nest #2.
Sunrise Lake	1136	New large nest (#1) in snag.
Pineasco Creek nest site	1321	All known nests empty. One adult downstream.
George's Basin nest site	1328	All known nests empty. No eagles.
Lost Mule (golden eagle BA)	1339	All known nests empty. No eagles.
January 28, 2019		
Riverside BA	0715	Adult incubating in nest #2.
Granite Reef BA	0755	Adult incubating in nest #7. Second adult in nest tree.
Orme BA	0758	Nests #3, 7, 10 empty. Nest #1 not found. No eagles.
Rodeo BA	0805	Adult incubating in new nest #6.
Sycamore BA	0809	Adult incubating in nest #7.
Doka BA	0810	Pair of adults perched above nest #3.
Fort McDowell BA	0814	Nest #19 empty, failed. No eagles.

Table 14 continued.

Location	Time	Comments
Box Bar BA	0817	One adult standing in nest #5. Second adult perched.
Bartlett BA	0824	Adult incubating in new nest (#5) on rock pinnacle.
Yellow Cliffs BA	0827	Adult incubating in nest #1.
Sheep Creek BA	0830	Adult incubating in nest #1.
Cliff BA	0833	All known nests empty. No eagles.
Horseshoe BA	0845	Adult incubating in nest #13.
Table Mountain BA	0857	All known nests empty. One adult perched above nest #4.
East Verde BA	0908	Adult incubating in nest #6. Second adult flew to nest.
Coldwater BA	0915	All known nests empty. No eagles.
Ladders BA	0921	Pair of adults perched in nest #3.
Beaver BA	0933	Adult incubating in nest #1.
Oak Creek BA	0940	All known nests empty. One adult perched near nest #4.
Green River BA	1043	Adult incubating in nest #1.
Tapco BA	1047	Adult incubating in nest #6.
Tower BA	1050	All known nests empty. No eagles.
Mormon Pocket (golden eagle BA)	1055	All known nests empty. No eagles.
Perkinsville BA	1057	All known nests empty. One adult upstream.
Hell Point historic BA	1110	All known nests empty. No eagles.
Granite golden eagle BA	1117	All known nests empty. Pair of adult golden eagles soaring over nest area.
Sullivan Lake BA	1125	Adult incubating in nest #2. Second adult perched.
Lynx BA	1135	Adult incubating in new nest (#7) in snag. Nest #6 mostly fallen.
Burro Creek BA	1326	All known nests empty. One new large nest (#5) on cliff. No eagles.
Burro Creek	1335	New large nest (#1) on cliff at beginning of narrows.
Big Sandy River	1349	No new nests or eagles.
Alamo BA	1352	Adult incubating in nest #4.
Ive's Wash BA	1400	All known nests empty. No eagles.
Pleasant BA	1434	All known nests empty. One adult and one immature in area.
Whiskey Spring BA	1442	Adult incubating in nest #1.
Garden Lakes BA	1458	Adult incubating.
Pee Posh Wetlands BA	1503	Adult incubating or brooding.
January 29, 2019		
Goldfield BA	1542	Adult incubating or brooding.
Bulldog BA	1548	Adult incubating.
Blue Point BA	1552	Adult incubating.
Saguaro BA	1555	Adult incubating in nest #2.
Tortilla Creek BA	1557	Adult incubating in nest #1.
Black Cross BA	1600	Adult incubating.
Fish Creek BA	1604	Adult incubating in nest #1. Second adult perched.
Horse Mesa BA	1608	Adult incubating in nest #4.
Two Bar nest site	1613	Adult standing in nest #3.
Pinto BA	1623	Adult incubating in nest #10. Second adult perched.
Pinal BA	1626	Adult incubating in nest #9.
Armer Gulch BA	1630	Adult incubating.
Tonto BA	1637	Pair of adults in nest #9, one standing and one sitting. Incubation not confirmed.
Sheep BA	1645	One adult perched near nest #7. Second adult perched.

Table 14 continued.

Location	Time	Comments
February 11, 2019		
Alamo BA	0937	Adult incubating.
February 12, 2019		
Two Bar nest site	0850	Adult incubating in nest #2.
Becker BA	1438	Adult incubating in nest #2.
February 19, 2019		
Cataract Lake BA	1551	All known nests empty. No eagles.
February 26, 2019		
Elaine BA	0956	Adult incubating in nest #1.
Lower Lake Mary BA	1004	Adult incubating in nest #3.
Ashurst BA	1010	Nest #2 fallen. Adult incubating in new nest (#3) in tree.
Kachina Village BA	1051	One adult perched on nest platform #1. Second adult perched nearby.
White Horse Lake BA	1155	Nests #1, 5-7 empty. No eagles.
Scholz Lake BA	1200	All known nests empty. No eagles.
Dogtown Lake BA	1207	All known nests empty. No eagles.
February 27, 2019		
Nevada Bay BA	0855	All known nests empty. No eagles.
March 14, 2019		
Granite Reef BA	0745	Adult brooding at least one hatchling. Prey observed in nest.
Goldfield BA	0753	Two nestlings, 5-5.5 weeks old.
Kerr BA	0754	No new nests or eagles.
Bulldog BA	0757	One nestling, 5.5-6 weeks old.
Blue Point BA	0801	Three nestlings, 5.5-6 weeks old.
Saguaro BA	0805	Two nestlings, 4.5 weeks old.
Tortilla Creek BA	0813	Pair of adults standing in nest. Nest empty, failed.
Black Cross BA	0817	Adult with two nestlings, 4-5 weeks old.
Fish Creek BA	0821	Nest empty, failed.
Horse Mesa BA	0828	Nest empty, failed.
Rock Creek historic BA	0833	Nest #2 fallen.
Two Bar BA	0840	Adult incubating.
Campaign Bay BA	0850	No new nests or eagles.
Pinto BA	0852	Two nestlings, 4 weeks old. Adult perched.
Pinal BA	0854	One nestling, 3 weeks old. Two adults perched.
Redmond BA	0858	Adult standing in nest #5.
Armer Gulch BA	0921	Nest empty, failed.
Bachelor Cove BA	0937	Two nestlings, 6 weeks old. One adult perched.
Tonto BA	0940	Adult perched above nest #9. Red-tailed hawk incubating in nest #6.
Sheep BA	0947	Adult incubating in nest #7. Second adult perched.
76 BA	0954	Adult standing with one hatchling in nest #6. Second adult flushed.
OW BA	1053	Adult incubating in nest #1. Second adult perched in nest.
Woods Canyon BA	1100	Adult incubating in new nest (#13) in snag.
Tremaine BA	1403	Adult incubating in nest #2. Second adult perched.
March 15, 2019		
Cibecue BA	0849	Adult incubating in nest #9.
Mule Hoof historic BA	0853	All known nests empty. No eagles. New large-looking nest (#3) on cliff nearby.

Table 14 continued.

Location	Time	Comments
Cedar Basin BA	0912	Adult incubating in nest #9. Second adult flew to nest tree.
Lone Pine BA	0920	Nest empty, failed.
Pineasco Creek nest site	0926	All known nests empty. No eagles.
George's Basin nest site	0938	Adult incubating in nest #1. Second adult perched.
Horseshoe Cienega nest site	0957	Nests #1, 5 empty. Nests #2,3 not found. New large nest (#6) in snag.
Fool Hollow BA	1107	Adult incubating.
Silver Creek BA	1120	Adult incubating in new nest #3.
Concho BA	1141	Adult incubating or brooding in nest #2.
Becker BA	1214	Adult brooding at least one nestling, 2 weeks old.
Greer Lakes BA	1240	Adult incubating in nest #4.
Crescent BA	1248	All known nests empty. One adult flew in and perched above nest #1.
Show Low BA	1309	Adult incubating in nest #2. Second adult perched.
Talkalai BA	1450	Nest empty, failed. Pair of adults in area.
San Carlos BA	1500	Nest empty, failed. Pair of adults perched, flew to nest.
Suicide BA	1510	Two nestlings, 4.5-5 weeks old.
Coolidge BA	1514	Partial construction of a large nest found in tree. One adult flying in area.
Granite Basin BA	1521	One adult perched above nest #2.
		March 22, 2019
Riverside BA	0725	One nestling, 5 weeks old. Two adults in flight, perched.
Orme BA	0742	All known nests empty. One adult near nest #10.
Rodeo BA	0749	Two adults with two nestlings, 4.5-5 weeks old.
Sycamore BA	0753	Adult with one nestling, 4.5 weeks old.
Doka BA	0756	All known nests empty. One adult perched next to nest #7.
Fort McDowell BA	0758	All known nests empty. One adult in area.
Box Bar BA	0801	Adult brooding at least one nestling, 2 weeks old, in nest #5.
Bartlett BA	0806	Adult with at least two nestlings, 4 weeks old.
Yellow Cliffs BA	0810	Adult appeared to be brooding at least one nestling.
Sheep Creek BA	0816	Adult in nest with two nestlings, 5 weeks old.
Cliff BA	0820	All known nests empty. No eagles.
Horseshoe BA	0825	Adult incubating.
Table Mountain BA	0840	Adult with one nestling, 3 weeks old, in nest #4. Second adult flying.
East Verde BA	0849	Nest empty, failed.
Coldwater BA	0851	All known nests empty. One adult upstream.
Ladders BA	0905	Adult incubating in nest #4.
Beaver BA	0915	Adult with two nestlings, 3 weeks old.
Oak Creek BA	0923	Adult flew to nest #4. One hatchling and one egg in nest #4.
Hidden Valley nest site	0932	Red-tailed hawk incubating in nest #1. Nest #2 empty. No eagles.
Green River BA	1035	Adult with three nestlings, 4-5 weeks old.
Tapco BA	1040	Adult incubating.
Tower BA	1043	All known nests empty. No eagles.
White Horse Lake BA	1058	Nest #6 empty. Nests #1, 5 mostly fallen and nest #7 fallen. Nest #8 not found.
Scholz Lake BA	1107	Adult incubating in nest #1.
Dogtown Lake BA	1110	Adult incubating in nest #3.
Perkinsville BA	1125	Adult incubating in nest #4.

Table 14 continued.

Location	Time	Comments
Hell Point historic BA	1135	All known nests empty. No eagles.
Granite (golden eagle BA)	1138	Adult golden eagle incubating in nest #5.
Sullivan Lake BA	1144	Adult with two nestlings, 4 weeks old.
Lynx BA	1336	Unattended egg in nest. Pair of adults perched together at lake.
Goldwater Lake	1340	No new nests or eagles.
Garden Lakes BA	1419	Adult with three nestlings, 6 weeks old.
Pee Posh Wetlands BA	1424	One nestling, 7+ weeks old.
April 11, 2019		
Ive's Wash BA	0810	All known nests empty. No eagles.
Bluebell nest site	0814	All known nests empty. New large nest (#2) on cliff. No eagles.
Rankin Ranch nest site	0823	All known nests empty. No eagles.
Buckskin 1 nest site	0828	All known nests empty. No eagles.
Rawhide 1 nest site	0831	Nest #3 not found. New large nest (#4) found on cliff. No eagles.
Buckskin 2 nest site	0843	Nest #1, 3 empty. Nest #2 not found. No eagles. One peregrine falcon flying.
Bill Williams BA	0850	All known nests empty. No eagles.
Buckskin 3 nest site	0855	All known nests empty. New nest (#3) with red-tailed hawk incubating. No eagles.
Buckskin Mesa nest site	0901	Red-tailed hawk nestlings in nest #1. New nest (#6) on cliff. All other known nests empty.
Buckskin 4 nest site	0908	Nest #1 not found. No eagles.
Buckskin 5 nest site	0912	Nests #1, 3-6 empty. Nest #2 not found.
Whipple Mountains (CA)	0923	Adult in new large nest (#1) on cliff. At least one small nestling present.
Aubrey Hills	0930	Nest #2 empty. Nest #1 not found. No eagles.
Mohave BA	0941	Prairie falcon incubating in nest #8. All other known nests empty. No eagles.
Havasu Wilderness 1 nest site	0950	Nest #1 empty.
Nevada Bay BA	1125	Red-tailed hawk standing in nest #5. All other known nests empty. No eagles.
Black Mtns 8	1128	All known nests empty. No eagles.
Black Mtns 7	1133	Nests #3, 4 empty. Nest #1 not found.
Mile 320 nest site	1137	Nests #1-3, 5 empty. Red-tailed hawk incubating in nest #4.
Malpais	1145	Three nests at #2. Nest #1 not found.
Roaring Rapids nest site	1154	Nest #2 empty. Nest #1 not found. No eagles.
Black Canyon BA	1158	Adult with two nestlings, 5.5 weeks old, in nest #1. Second adult perched.
Indian Rapids nest site	1200	All known nests empty. No eagles.
Big Sand Bar nest site	1204	All known nests empty. No eagles.
Cross Current nest site	1205	Red-tailed hawk incubating in new nest (#2).
Ringbolt Rapids nest site	1208	All known nests empty. No eagles.
Castle Cove nest site	1215	All known nests empty. No eagles.
April 19, 2019		
Granite Reef BA	0742	Adult with one nestling, 7.5 weeks old.
Orme BA	0745	Nests #7, 10 empty. One adult perched.
Kerr BA	0750	Adult with two nestlings, 4-5 weeks old, in new nest (#2) in tree.
Goldfield BA	0752	Two nestlings, 10-10.5 weeks old.
Bulldog BA	0756	One nestling, 10.5-11 weeks old.

Table 14 continued.

Location	Time	Comments
Blue Point BA	0757	Three nestlings, 10.5-11 weeks old.
Saguaro BA	0801	Two nestlings, 9.5 weeks old.
Black Cross BA	0808	One nestling, 9-10 weeks old.
Two Bar BA	0818	Two nestlings, 4 weeks old.
Bachelor Cove BA	0828	Nest empty, presumed fledged. One adult flying low in nest area, perched and vocal.
Tonto BA	0830	All known nests empty. No eagles.
Sheep BA	0836	Two adults with one nestling, 4.5 weeks old.
76 BA	0845	Two nestlings, 4-5.5 weeks old.
Pinto BA	0906	Two nestlings, 9 weeks old.
Pinal BA	0909	One nestling, 8 weeks old.
Pinal Creek black hawk nest	0910	Nest empty. No hawks.
Redmond BA	0915	All known nests empty. No eagles.
Cibecue BA	0930	Adult with one nestling, 3 weeks old.
Cibecue Crossing nest site	0934	All known nests empty. New large nest (#3) on cliff. No eagles.
Cedar Basin BA	0945	Adult with at least one nestling, 3 weeks old.
Pineasco Creek nest site	0952	All known nests empty. No eagles.
George's Basin nest site	0956	All known nests empty. No eagles.
Show Low Lake BA	1020	One unattended egg in nest, failed. No eagles.
Horseshoe Cienega Lake nest site	1126	Nests #5, 6 empty. Two ospreys in area. nests #1-4 not found.
Reservation Lake	1137	No new nests. One immature bald eagle perched.
Big Lake	1147	No new nests or eagles.
Crescent Lake BA	1151	Adult incubating in nest #1. Second adult in area.
Greer Lakes BA	1156	Nest empty, failed. No eagles.
Little Colorado River	1158	No new nests or eagles.
Becker BA	1208	One nestling, 6 weeks old. One adult perched.
Silver Creek BA	1235	Adult shading one nestling, 3.5 weeks old.
Suicide BA	1413	Two nestlings, 9.5-10 weeks old. Two adults soaring.
Coolidge BA	1420	New large nest (#5) in tree. One adult upstream.
Needles Eye nest site	1427	All known nests empty. No eagles.
Porphyry Gulch nest site	1435	All known nests empty. No eagles.
Granite Basin BA	1441	All known nests empty. No eagles.
April 22, 2019		
Riverside BA	0733	One nestling, 9.5 weeks old.
Rodeo BA	0742	Two nestlings, 8+ weeks old.
Sycamore BA	0747	One nestling, 8+ weeks old. One adult flew to nest.
Doka BA	0750	All known nests empty. No new nests or eagles.
Box Bar BA	0755	Two nestlings, 4.5-5 weeks old.
Bartlett BA	0759	Three nestlings, 7-7.5 weeks old.
Yellow Cliffs BA	0804	One nestling, 7 weeks old.
Sheep Creek BA	0807	Two nestlings, 9 weeks old.
Horseshoe BA	0813	One adult flew to nest #13 and sat down. No eggs or young confirmed.
Table Mountain BA	0822	Adult with one nestling, 7.5 weeks old.
East Verde BA	0827	Nest empty, failed.
Ladders BA	0845	One nestling, 4.5 weeks old. Second adult flying.
Beaver BA	0851	Two nestlings, 7+ weeks old. One adult perched downstream.
Oak Creek BA	0856	One nestling, 4 weeks old.
Green River BA	0859	Three nestlings, 8.5-9 weeks old.

Table 14 continued.

Location	Time	Comments
Tapco BA	0903	One unattended egg, failed.
Ashurst BA	0923	Adult brooding at least one nestling, 2-3 weeks old.
Lower Lake Mary BA	0927	Adult with one nestling, 3 weeks old.
Elaine BA	0935	Nest empty, failed. No eagles.
Kachina Village BA	0940	Adult incubating in nest #1.
Scholz Lake BA	1129	Adult incubating in nest #1.
Dogtown BA	1134	Adult incubating in nest #3.
Cataract Lake BA	1138	Adult in new nest (#3) in snag with one nestling, 1-2 weeks old.
Mormon Pocket (golden eagle BA)	1159	All known nests empty. No eagles.
Perkinsville BA	1202	Nest empty, failed.
Hell Point historic BA	1209	All known nests empty. No eagles.
Granite (golden eagle BA)	1217	Adult golden eagle brooding one hatchling in nest #5.
Sullivan Lake BA	1221	Two nestlings, 8.5 weeks old.
Lynx BA	1300	Nest empty, failed.
Garden Lakes BA	1336	Three nestlings, 10.5 weeks old.
		May 3, 2019
Granite Reef BA	0701	One nestling 9.5 weeks old. One adult perched.
Kerr BA	0704	Adult with one nestling, 6 weeks old.
Saguaro Lake BA	0710	One nestling, 11.5 weeks old.
Black Cross BA	0716	One nestling, 11 weeks old.
Two Bar BA	0729	Two nestlings, 5+ weeks old. Two adults flying.
Pinto BA	1201	Two nestlings, 11 weeks old.
Pinal BA	1203	One nestling, 10 weeks old. One adult perched.
76 BA	1223	One nestling, 7.5-8 weeks old. One dead nestling in nest.
OW BA	1355	Adult incubating.
Black Canyon Lake	1400	No new nests or eagles.
Willow Springs Lake nest site	1410	Ospreys active in nests #2, 4, 5 and new nests #10 and #11. Nests #6-8 empty. Nest #9 not found. No eagles.
Woods Canyon BA	1420	Adult with one nestling, 3 weeks old.
Bear Canyon Lake nest site	1425	Osprey active in nest #3, and standing in #5. One adult bald eagle flew to perch.
Knoll Lake nest site	1435	Ospreys active in nests #6-7. nest #5 not found. No eagles.
Blue Ridge nest site	1446	Nest #7-8 empty. Nest #2 not found. Osprey incubating in new nest (#9) in snag. Two adult bald eagles seen at opposite ends of lake.
Green River BA	1534	Three nestlings, 10-10.5 weeks old.
Oak Creek BA	1537	Adult with one nestling, 5.5 weeks old.
Ladders BA	1549	One nestling, 6 weeks old.
Table Mountain BA	1559	One nestling, 9 weeks old.
Horseshoe BA	1606	Nest empty, failed.
		May 23, 2019
Table Mountain BA	1428	One nestling, 11-12 weeks old.
Ladders BA	1445	One nestling, 9+ weeks old.
Beaver BA	1450	Two fledglings seen. One adult in area.
Oak Creek BA	1455	One nestling 8.5+ weeks old.
		May 24, 2019
Kerr BA	0739	One nestling branching by nest, 9 weeks old.
Two Bar BA	0756	Two nestlings, 8.5+ weeks old.
Cibecue BA	0827	One nestling, 8 weeks old.

Table 14 continued.

Location	Time	Comments
Cedar Basin BA	0837	One nestling, 8 weeks old.
Silver Creek BA	1026	One nestling, 8.5 weeks old.
OW BA	1052	Nest empty, failed.
76 BA	1113	One nestling, 10+ weeks old.
Sheep BA	1120	One nestling, 8.5-9 weeks old.
Yellow Cliffs BA	1134	Nest empty. Status not confirmed. Two adults at lake.
May 29, 2019		
Cataract BA	0923	Adult with one nestling, 6 weeks old.
Dogtown Lake BA	0929	Adult with two nestlings, 5 weeks old.
Scholz Lake BA	0933	Two nestlings, 4-4.5 weeks old.
Lower Lake Mary BA	0951	One nestling, 7+ weeks old.
Ashurst BA	0954	One nestling, 7.5 weeks old.
June 6, 2019		
Cibecue BA	0702	One nestling, 10 weeks old.
Cedar Basin BA	0710	One nestling, 9 weeks old.

APPENDIX E: BACHELOR COVE BREEDING AREA SUMMARY

Table 15. Observed human activity and bald eagle behavior, Bachelor Cove BA, Arizona, 2019.

Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Driver	23	33	--	--	--	53	2	111	68.1
OHV	10	7	--	--	--	10	--	27	16.6
Hiker	4	6	--	--	--	2	--	12	7.4
Angler	1	4	--	--	--	1	--	6	3.7
Camper	--	2	--	--	--	--	--	2	1.2
Picnicker	1	--	--	--	--	--	--	1	0.6
Photographer	1	--	--	--	--	--	--	1	0.6
Motorcycle	1	--	--	--	--	--	--	1	0.6
Helicopter	--	--	--	--	1	--	--	1	0.6
Helicopter, Sheriff	--	--	--	--	--	--	1	1	0.6
Total	41	52	--	--	1	66	3	163	

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

Table 16. Observed prey types delivered to the nest, Bachelor Cove BA, Arizona, 2019.

Sex	Fish	Mammals	Unknown	Total	Percent
Male	24	1	5	30	57.7
Female	13	2	1	16	30.8
Unknown	3	--	3	6	11.5
Total	40	3	9	52	
Percent	76.9	5.8	17.3		

Table 17. Bald eagle habitat analysis at the Bachelor Cove BA, Arizona, 2019.

Location[1]	Perch Type[2]	Side	Shade	Distance to H_2O[3]	H_2O Type[4]	Land Type[5]
N	CM	Right	Partial	8	RC	UP
T	HS	Right	Partial	8	RS	CL
U	CM	Right	Partial	8	RS	UP
V	TX	Right	No	5	RS	UP
W	CT	Right	No	8	RS	CL
X	HS	Right	Partial	8	RS	UP
Y	CL	Right	No	8	RS	CT
Z	BO	Right	No	7	RS	UP
AA	HL	Right	Partial	7	RS	UP
AB	HL	Right	No	7	RS	UP
AC	BO	Right	Partial	8	RS	UP

[1]Refer to the Bachelor Cove nestwatch report for activity locations.
[2]BO=boulder, CL=cottonwood large (20-30m), CM=cottonwood medium (10-20m), CT=cliff top, HL=hillside HS=hard snag (main branches only), TX=tamarisk.
[3]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>401m.
[4]BW=backwater, IF=inflow to reservoir, RC=river current.
[5]CW=cottonwood grove, SO=shore, TX=tamarisk thicket.

Table 18. Bald eagle habitat use at the Bachelor Cove BA, Arizona, 2019.

Location[1]	PW[2,3]	CL	GN	PE	PK	PV	CO	Total	Percent
N	3,310	27	--	--	--	--	--	3,337	46.6
T	636	--	--	--	1	--	--	637	8.9
U	82	--	13	--	--	--	--	95	1.3
V	2	--	--	--	--	6	--	8	0.1
W	163	--	--	--	6	--	--	169	2.4
X	11	--	--	--	--	--	--	11	0.2
Y	75	7	--	8	--	--	1	91	1.3
Z	2,649	42	--	--	--	--	--	2,691	37.6
AA	11	--	--	--	--	--	--	11	0.2
AB	15	--	--	--	--	--	--	15	0.2
AC	91	--	--	--	--	--	--	91	1.3
Total	7,045	76	13	8	7	6	1	7,156	
Percent	98.4	1.1	0.2	0.1	0.1	0.1	<0.1		

[1]Refer to the Bachelor Cove nestwatch report for activity locations.
[2]Observation time (minutes).
[3]PW=perched watching, CL=perched close to mate, GN=gathering nest materials, PE=perched eating, PK=perched with prey, PV=perched vocalizing, CO=copulation event.

APPENDIX F: BOX BAR BREEDING AREA SUMMARY

Table 19. Observed human activity and bald eagle behavior, Box Bar BA, Arizona, 2019.									
Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Hiker	317	9	1	--	--	--	--	327	56.2
Canoe/Kayak	47	--	--		--	--	--	47	8.1
Photographer	39	--	--	3	--	--	1	43	7.4
Angler	30	--	--	--	--	--	--	30	5.2
AZGFD staff	22	--	1	--	--	--	--	23	4.0
Tuber	22	--	--	--	--	--	--	22	3.8
Swimmer	19	--	--	--	--	--	--	19	3.3
Horse Back Rider	13	3	--	--	--	--	--	16	2.7
Birder	12	--	--	--	--	--	--	12	2.1
Cycler	7	--	--	--	--	--	--	7	1.2
Camper	6	--	--	--	--	--	--	6	1.0
Hunter	3	3	--	--	--	--	--	6	1.0
Picnicker	5	--	--	--	--	--	--	5	0.9
Helicopter	--	4	1	--	--	--	--	5	0.9
Sheriff helicopter	--	2	--	2	--	--	--	4	0.7
Military jet	--	--	4	--	--	--	--	4	0.7
Small Plane	--	1	--	--	--	--	1	2	0.3
Drone	1	--	--	--	--	--	--	1	0.2
Dog	--	1	--	--	--	--	--	1	0.2
Military helicopter	--	1	--	--	--	--	--	1	0.2
Apache helicopter	1	--	--	--	--	--	--	1	0.2
Total	544	24	7	5	--	--	2	582	

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

Table 20. Observed forage events and success, Box Bar BA, Arizona, 2019.								
Sex	Fish		Mammals		Birds		Total	
	E[1]	S-U[2]	E	S-U	E	S-U	E	S-U
Male	--	--	1	1-0	1	1-0	2	2-0
Female	4	3-1	1	1-0	--	--	5	4-1
Total	4	3-1	2	2-0	1	1-0	7	6-1

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

Table 21. Observed prey types delivered to the nest, Box Bar BA, Arizona, 2019.						
Sex	Fish	Mammals	Birds	Unknown	Total	Percent
Male	20	2	2	2	26	41.9
Female	28	3	1	4	36	58.1
Total	48	5	3	6	62	
Percent	77.4	8.1	4.8	9.7		

Table 22. Observed prey species delivered to the nest, Box Bar BA, Arizona 2019.

Sex	Fish			Bird	Mammal		Total	Percent
	SU[1]	TI	CA	WS	GO	GS		
Male	3	1	--	2	2	--	8	36.4
Female	2	4	5	1	--	2	14	63.6
Total	5	5	5	3	2	2	22	
Percent	22.7	22.7	22.7	13.6	9.1	9.1		

[1]SU=sucker species, TI=tilapia species, CA=common carp, WS=waterfowl species, GO=gopher species, GS=ground squirrel species.

Table 23. Bald eagle habitat analysis at the Box Bar BA, Arizona, 2019.

Perch Location[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O[4]	H_2O Type[5]	Land Type[6]
22.0	HS	Right	No	1	RU	MB
24.0a	SO	--	No	1	PN	GC
24.0b	DM	--	No	1	PN	GC
25.1	MS	Right	No	4	RU	MB
25.4	HS	Right	No	1	RU	CW
25.5a	CL	Right	Partial	2	RU	CW
25.5b	MS	Right	Yes	3	RU	MB
25.6	MS	Right	No	3	RU	MB
25.8	CL	Right	No	3	RU	CW
29.2	HS	Left	No	1	RU	WT
29.3	BO	Right	No	1	RU	WT

[1]River kilometer (Hunt et. al. 1992).
[2]BO=boulder, CL=cottonwood, large/20-30+ m, DM=deciduous, medium, HS=hard snag (main branches only), MS=mesquite snag, SO=shore.
[3]Side of river facing downstream.
[4]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.
[5]PN=pond, RU=River run.
[6]CW=cottonwood grove, GC= golf course, MB=mesquite bosque, WT= willow thicket.

Table 24. Bald eagle habitat use at the Box Bar BA, Arizona, 2019.

River km[1]	PW[2,3]	PP	CL	PH	PI	PV	PE	PD	CO	Total	Percent
22.0	--	--	--	12	--	--	--	--	--	12	0.1
24.0	31	--	--	45	--	--	--	--	--	76	0.5
25.0	1	--	--	--	--	--	--	--	--	1	<0.1
25.4	--	2	--	--	--	--	16	--	--	18	0.1
25.5	1,716	19	--	--	--	16	15	--	--	1,766	11.5
25.8	12,483	496	337	--	49	27	12	19	3	13,426	87.6
29.2	--	--	--	--	6	--	--	--	--	6	<0.1
29.3	1	--	--	--	--	--	--	--	--	1	<0.1
other	--	--	--	--	--	12	--	--	--	12	0.1
Total	14,232	517	337	57	55	55	43	19	3	15,318	
Percent	88.9	3.2	2.1	0.4	0.3	0.3	0.3	0.1	<0.1		

[1]River or lake kilometer (Hunt et al. 1992).
[2]Observation time (minutes).
[3]PW=perched watching, PP=perched preening, CL=perched close to mate, PH=perched hunting, PI=perched interaction, PV=perched vocalizing, PE=perched eating, PD=perched drying, CO=copulation.

APPENDIX G: CONCHO BREEDING AREA SUMMARY

Table 25. Observed human activity and bald eagle behavior, Concho BA, Arizona, 2019.

Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Hikers	17	--	--	--	--	--	--	17	36.9
Dog	9	--	--	--	--	--	--	9	19.6
Fishermen	3	3	--	2	--	1	--	9	19.6
OHV	2	--	--	--	--	1	--	3	6.5
Ultralight	1	--	--	--	--	1	--	2	4.3
Cattle	--	--	--	2	--	--	--	2	4.3
Nestwatcher	--	--	--	1	--	--	--	1	2.2
Canoe	1	--	--	--	--	--	--	1	2.2
Truck	1	--	--	--	--	--	--	1	2.2
Drone	--	--	--	--	--	1	--	1	2.2
Total	34	3	--	5	--	4	--	46	

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

Table 26. Observed forage events and success, Concho BA, Arizona, 2019.

Sex	Fish		Mammals		Birds		Total	
	E[1]	S-U[2]	E	S-U	E	S-U	E	S-U
Male	--	--	--	--	1	1-0	1	1-0
Female	38	34-4	4	4-0	2	2-0	44	40-4
Total	38	34-4	4	4-0	3	3-0	45	41-4

Table 27. Observed prey types delivered to the nest, Concho BA, Arizona, 2019.

Sex	Fish	Mammals	Birds	Unknown	Total	Percent
Male	1	1	--	4	6	10.2
Female	32	6	1	14	53	89.8
Total	33	7	1	18	59	
Percent	55.9	11.9	1.7	30.5		

Table 28. Observed prey species delivered to the nest, Concho BA, Arizona 2019.

Sex	Fish		Mammals	Birds	Total	Percent
	CA[1]	RT	PD	DC		
Male	--	--	1	--	1	3.0
Female	16	11	4	1	32	97.0
Total	16	11	5	1	33	
Percent	48.5	33.3	15.2	3.0		

[1]CA=common carp, RT=rainbow trout, PD=Gunnison's prairie dog, DC=double crested cormorant.

Table 29. Bald eagle habitat analysis at the Concho BA, Arizona, 2019.

Location[1]	Perch Type[2]	Shade	Distance to H_2O[3]	Land Type[4]
1	CM	No	1	CW
2	JS	No	4	CF
3	CM	No	2	CW
4	SO	No	1	SO
5	JS	No	3	CF
6	SO	No	1	SO
7	CM	Partial	1	CW
8	SO	No	1	SO
9	SO	No	1	SO
10	SO	No	1	SO
11	CM	No	2	CW
12	SO	No	1	SO
13	CM	No	2	CW
14	JN	No	3	CF
15	JS	No	2	CF
16	JN	No	3	CF
17	SO	No	3	CF
18	JS	No	2	CF
19	JN	No	4	CF
20	SO	No	1	SO
21	JN	No	6	CF
22	SO	No	1	SO
23	CL	Partial	1	CW
24	SO	No	1	SO
25	SO	No	3	CF
26	SO	No	1	CF
27	CM	No	1	CW
28	JN	No	4	CF
29	SO	No	1	CF
30	CM	No	1	CW
31	JN	No	5	CF
32	JN	No	5	CF
33	JN	No	5	CF
34	SO	No	1	SO
35	JN	No	6	CF
36	SO	No	1	SO
37	JS	No	3	CF
38	SO	No	1	SO
39	SO	No	1	SO
40	SO	No	1	SO
41	JS	No	4	CF
42	JN	No	4	CF
43	JS	No	3	CF
44	CM	No	1	CW
45	JN	No	3	CF
46	JS	No	4	CF

[1]Perch locations are described and mapped in the corresponding Nestwatch report.
[2]CL=cottonwood large/20-20+m, CM=cottonwood medium/10-20m, JN=Juniper, JS=juniper snag, SO=shore
[3]1=0-25m, 2 =26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.
[4]CF=conifer forest, CW=cottonwood grove, SO=shore.

Table 30. Bald eagle habitat use at the Concho BA, Arizona, 2019.

Location[1]	PW[2,3]	SS	SH	PG	PH	PK	ES	PD	PE	OT	Total	Percent
1	8,041	--	--	--	132	7	--	8	--	--	8,188	27.7
2	1,706	--	--	--	--	5	--	36	--	23	1,770	6.0
4	--	651	113	21	--	--	4	25	--	20	834	2.8
7	4,337	--	--	--	88	2	--	37	--	64	4,528	15.3
10	36	79	305	273	--	26	39	--	--	40	798	2.7
13	1,336	--	--	--	68	13	--	10	--	9	1,436	4.8
15	709	--	--	--	--	--	--	13	--	6	728	2.5
19	2,212	--	--	--	--	--	--	--	--	8	2,220	7.5
21	1,242	--	--	--	--	--	--	--	11	10	1,263	4.3
27	1,766	--	--	--	--	--	--	--	--	15	1,781	6.0
31	686	--	--	--	--	10	--	--	--	46	742	2.5
34	--	943	9	4	--	--	7	--	--	--	963	3.3
42	792	--	--	--	--	--	--	--	--	--	792	2.7
other[4]	2,326	270	243	41	14	235	215	42	153	28	3,567	12.0
Total	25,189	1,943	670	339	302	298	265	171	164	269	29,610	
Percent	85.1	6.6	2.3	1.1	1.0	1.0	0.9	0.6	0.6	0.9		

[1]Perch locations are described and mapped in the corresponding Nestwatch report.
[2]Observation time (minutes).
[3]PW=perched watching, SS=standing on shore, SH=standing in water, PG=perched on ground, PH=perched hunting, PK=perched with prey, ES=eating on shore, PD=perched drying, PE=perched eating, OT=other (includes perched preening, drinking water, perched close to mate, and bathing).
[4]Includes combined data from 33 other locations, none of which comprised more than 2.0% of the total time.

APPENDIX H: CRESCENT BREEDING AREA SUMMARY

Table 31. Observed human activity and bald eagle behavior, Crescent BA, Arizona, 2019.									
Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Anglers	309	--	--	--	--	--	--	309	59.8
Drivers	65	--	--	--	--	--	--	65	12.6
Boats-fishing	29	--	--	--	--	--	--	29	5.6
Kayakers	21	--	--	--	--	--	--	21	4.1
Birders	18	--	--	--	--	--	--	18	3.5
Hikers	14	--	--	--	--	--	--	14	2.7
Picnickers	13	--	--	--	--	--	--	13	2.5
Dogs	8	--	--	--	--	--	--	8	1.5
Float tubers fishing	8	--	--	--	--	--	--	8	1.5
Photographer	7	--	--	--	--	--	--	7	1.3
Agency Workers	7	--	--	--	--	--	--	7	1.3
Canoe	5	--	--	--	--	--	--	5	1.0
AZGFD	5	--	--	--	--	--	--	5	1.0
Motorcycles	2	--	--	--	--	--	--	2	0.4
OHV	2	--	--	--	--	--	--	2	0.4
Paddle Board	1	--	--	--	--	--	--	1	0.2
Hunter	--	1	--	--	--	--	--	1	0.2
Small Plane	1	--	--	--	--	--	--	1	0.2
Helicopter	--	--	1	--	--	--	--	1	0.2
Total	515	1	1	--	--	--	--	517	

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

Table 32. Observed forage events and success, Crescent BA, Arizona, 2019.								
Sex	Fish		Birds		Mammal		Total	
	E[1]	S-U[2]	E	S-U	E	S-U	E	S-U
Male	21	21-0	4	4-0	1	1-0	26	26-0
Female	8	8-0	3	3-0	--	--	11	11-0
Total	29	29-0	7	7-0	1	1-0	37	37-0

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

Table 33. Observed prey types delivered to the nest, Crescent BA, Arizona, 2019.						
Sex	Fish	Birds	Carrion	Mammal	Total	Percent
Male	31	4	3	--	38	61.3
Female	19	3	1	1	24	38.7
Total	50	7	4	1	62	
Percent	80.6	11.3	6.5	1.6		

Table 34. Observed prey species delivered to the nest, Crescent BA, Arizona 2019.							
Sex	Fish				Bird	Total	Percent
	RT[1]	CT	BT	TS	AC		
Male	14	3	1	13	4	35	61.4
Female	3	2	1	13	3	22	38.6
Total	17	5	2	26	7	57	
Percent	29.8	8.8	3.5	45.6	12.3		

[1]RT=rainbow trout, CT=cutthroat trout, BT=brook trout, TS=trout species, AC=American coot.

Table 35. Bald eagle habitat analysis at the Crescent BA, Arizona, 2019.						
Location[1]	Perch Type[2]	Side	Shade	Distance to H_2O[3]	H_2O Type	Land Type[4]
1	SC	--	No	5	--	CF
2	SC	--	No	7	--	CF
3	SC	--	No	7	--	CF
4	PS	--	No	7	--	CF
5	PS	--	No	7	--	CF
6	DS	--	No	8	--	CF
7	SO	--	No	1	--	SO
8	SC	--	No	6	--	CF
9	SC	--	No	6	--	CF
10	BO	--	No	3	--	CF
11	SC	--	No	8	--	CF
12	SC	--	No	5	--	CF
13	PS	--	No	7	--	CF
14	SC	--	No	6	--	CF
15	PS	--	No	8	--	CF
16	BO	--	No	1	--	SO
17	SC	--	No	7	--	CF
18	SG	--	No	8	--	CF
19	SP	--	No	7	--	CF
20	PS	--	No	7	--	CF
21	PS	--	Partial	6	--	CF
22	SC	--	No	7	--	CF
23	SC	--	No	7	--	CF

[1]Perch locations are described and mapped in the corresponding Nestwatch report.
[2]BO=boulder, DS=deciduous small (0-5m), PS=pine/conifer 2nd growth, SC= snag conifer, SG=soft snag (dead, but branches still intact), SO=shore, SP=stump.
[3]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.
[4]CF=coniferous forest, SO=shore.

Table 36. Bald eagle habitat use at the Crescent BA, Arizona, 2019.

Perch Location[1]	PW[2,3]	PP	CL	PE	PD	PG	Total	Percent
1	12,512	170	--	--	31	--	12,713	44.3
3	1,739	86	--	--	5	--	1,830	6.4
5	2,435	56	--	--	--	--	2,491	8.7
6	1,517	31	65	--	--	--	1,613	5.6
8	2,247	82	--	10	--	--	2,339	8.2
9	3,832	192	--	--	--	--	4,024	14.0
17	1,736	36	--	--	--	--	1,772	6.2
other[4]	1,805	40	--	30	--	27	1,902	6.6
Total	27,823	693	65	40	36	27	28,684	
Percent	97.0	2.4	0.2	0.1	0.1	0.1		

[1]Perch locations are described and mapped in the corresponding Nestwatch report.
[2]Observation time (minutes).
[3]PW=perched watching, PP=perched preening, CL=perched close to mate, PE=perched eating, PD=perched drying, PG=perched on ground.
[4]Includes combined data from 16 other locations, none of which comprised more than 2.0% of the total time.

APPENDIX I: GOLDFIELD BREEDING AREA SUMMARY

Table 37. Observed human activity and bald eagle behavior, Goldfield BA, Arizona, 2019.

Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Hiker	473	3	--	1	--	49	97	623	37.0
Photographer	317	2	--	1	--	19	60	399	23.7
Horseback Rider	123	4	--	--	--	3	39	169	10.0
Dog Walker	107	4	--	1	--	5	40	157	9.3
Angler	44	--	1	--	--	3	15	63	3.7
Helicopter	20	16	2	--	--	--	22	60	3.6
Birder	30	--	--	--	--	2	1	33	2.0
Military helicopter (non-Apache)	9	2	--	1	--	2	9	23	1.4
Apache Helicopter	9	1	--	1	--	--	10	21	1.2
Small plane	14	4	--	--	--	--	2	20	1.2
Agency worker	16	1	--	--	--	1	2	20	1.2
Swimmer	10	--	--	--	--	--	4	14	0.8
Mining-Metal Detector	10	--	--	--	--	1	1	12	0.7
Drone	5	2	--	--	1	--	3	11	0.7
Canoe/Kayak	7	--	--	--	--	2	2	11	0.7
Picnicker	6	--	--	--	--	--	4	10	0.6
Cyclist	7	--	--	--	--	--	3	10	0.6
Driver	2	--	1	--	--	--	2	5	0.3
Camper	1	--	--	--	--	--	3	4	0.2
Runner	2	--	--	--	--	--	1	3	0.2
Military jet	2	--	--	--	--	--	1	3	0.2
Nestwatcher	1	1	--	--	--	--	--	2	0.1
Ritual / Ceremony	1	1	--	--	--	--	--	2	0.1
Shooter	2	--	--	--	--	--	--	2	0.1
Gunshot	--	1	--	1	--	--	--	2	0.1
Motorcycle	1	--	--	--	--	--	--	1	0.1
Hunter	1	--	--	--	--	--	--	1	0.1
Musician	1	--	--	--	--	--	--	1	0.1
Garbage collector	1	--	--	--	--	--	--	1	0.1
Motorized parachute	--	--	--	--	--	--	1	1	0.1
Total	1,222	42	4	6	1	87	322	1,684	

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

Table 38. Observed forage events and success, Goldfield BA, Arizona, 2019.

Sex	Fish		Unknown		Total	
	E[1]	S-U[2]	E	S-U	E	S-U
Male	2	1-1	2	1-1	4	2-2
Female	1	1-0	--	--	1	1-0
Unknown	2	0-2	--	--	2	0-2
Total	5	2-3	2	1-1	7	3-4

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

Table 39. Observed prey types delivered to the nest, Goldfield BA, Arizona, 2019.								
Sex	Fish	Reptile	Bird	Mammals	Carrion	Unknown	Total	Percent
Male	21	--	1	1	1	15	39	50.0
Female	15	2	1	1	--	6	25	32.1
Unknown	7	1	--	--	--	6	14	17.9
Total	43	3	2	2	1	27	78	
Percent	55.1	3.8	2.6	2.6	1.3	34.6		

Table 40. Observed prey species delivered to the nest, Goldfield BA, Arizona 2019.						
Sex	Fish			Reptile	Total	Percent
	SU[1]	SB	CC	SM		
Male	--	--	--	--	--	--
Female	2	--	1	1	4	57.1
Unknown	2	1	--	--	3	42.9
Total	4	1	1	1	7	
Percent	57.1	14.3	14.3	14.3		

[1]SU=sucker species, SB=smallmouth bass, CC=channel catfish, SM=Sonoran mud turtle.

Table 41. Bald eagle habitat analysis at the Goldfield BA, Arizona, 2019.

Perch Location[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O[4]	H_2O Type[5]	Land Type[6]
8.3a	WO	Left	Partial	1	PO	MB
8.3b	CM	Right	Partial	6	PO	MB
8.4a	HS	Right	No	2	PO	MB
8.4b	SO	Right	Partial	1	PO	GB
8.5a	WO	Right	Partial	1	PO	SO
8.5b	SO	n/a	No	0	PO	SO
8.6	CL	Right	No	5	RU	MB
8.7	SP	Right	No	7	RU	MB
8.8	MS	Right	Partial	5	RU	MB
8.9	DS	Right	No	6	RU	MB
9.0	SG	Right	No	5	RU	MB
9.1	CM	Right	Partial	6	RU	MB
9.2a	HS	Right	No	5	RU	MB
9.2b	CS	Right	Partial	5	RU	MB
9.2c	CM	Right	Partial	7	RU	MB
9.2d	SO	Right	Partial	1	RU	SO
9.2e	WO	Right	Partial	1	RU	SO
9.3a	SD	Right	No	7	RU	MB
9.3b	HS	Right	No	7	RU	MB
9.3c	CM/SD	Right	No	7	RU	MB
9.4a	CM	Left	No	1	RU	MB
9.4b	SO	Right	Partial	1	RI	SO
9.5	CM	Right	Partial	1	RU	SO
9.6a	CL	Right	Partial	6	RU	MB
9.6b	HS	Right	No	5	RU	MB
9.6c	SO	Right	No	0	RU	WT
9.8	RW	--	No	1	RU	SO
10.0a	WO	Right	No	1	RU	WT
10.0b	SO	Right	No	1	RU	SO
10.1	CT	Right	No	6	RU	MB
10.2	CL	Left	Partial	1	RU	WT
10.3	CM	Right	No	1	RU	WT
10.7	CL	Left	Partial	1	RU	CL
13.3	SO	Left	No	1	PO	SO
13.6	CL	Left	Partial	1	RU	MB

[1]River kilometer (Hunt et. al. 1992).
[2]CF=cliff, CL=cottonwood large/20-30+m, CM=cottonwood medium/10-20m, CS=cottonwood small/0-10m, CT=cliff Top, DS=small deciduous tree, HS=hard snag (only main branches remain), RW=rock in water, SO=shore, SG=soft snag (dead but branches still intact), SP=stump, SS=snag shrub, ST=snag top, WO=willow, WT=willow thicket
[3]L=river left, R=river right.
[4]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400.
[5]PO=river pool, RI=riffle, RU=river run.
[6]CL=cliffs, GB=gravel bar, MB=mesquite bosque, SO=shore, WT=willow thicket.

Table 42. Bald eagle habitat use at the Goldfield BA, Arizona, 2019.

Perch Location[1]	PW[2,3]	PP	PH	PU	PI	PV	PX	CL	PD	OT	Total	Percent
8.3	57	9	--	--	--	--	--	12	--	--	78	0.9
8.4	325	14	13	--	34	18	10	14	--	22	450	5.0
8.5	162	20	103	--	92	35	--	--	--	7	419	4.7
8.6	76	15	--	183	47	15	11	--	--	--	347	3.9
8.7	3	--	--	--	14	2	--	--	--	--	19	0.2
8.8	--	--	--	--	--	--	--	--	--	6	6	0.1
8.9	14	--	--	33	3	--	--	--	--	--	50	0.6
9.0	9	--	--	--	--	--	--	--	--	--	9	0.1
9.1	311	76	--	--	--	14	--	14	6	--	421	4.7
9.2	2,292	791	25	14	13	20	23	16	29	7	3,230	36.0
9.3	2,979	323	59	1	7	49	72	56	--	1	3,547	39.5
9.4	166	23	99	2	--	1	5	--	--	--	296	3.3
9.5	2	--	--	--	--	--	--	--	--	--	2	<0.1
9.6	10	--	8	--	--	--	--	--	--	--	18	0.2
9.8	--	--	--	--	--	--	3	--	--	20	23	0.3
10.0	12	--	2	--	--	1	1	--	--	23	39	0.4
10.1	--	--	--	--	7	--	--	--	--	--	7	0.1
13.6	--	--	21	--	--	--	--	--	--	--	21	0.2
Total	6,418	1,271	330	233	217	155	125	112	35	86	8,982	
Percent	71.5	14.2	3.7	2.6	2.4	1.7	1.4	1.2	0.4	1.0		

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

APPENDIX J: GRANITE REEF BREEDING AREA SUMMARY

Table 43. Observed human activity and bald eagle behavior, Granite Reef BA, Arizona, 2019.

Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Small plane	369	7	--	--	--	8	--	384	25.5
Canoe/Kayak	240	1	--	--	--	5	1	247	16.4
Helicopter	164	26	--	1	--	2	1	194	12.9
Standup paddleboard	154	--	--	1	--	--	--	155	10.3
Other recreations	102	--	--	--	--	2	--	104	6.9
Angler/Fishing	79	--	--	--	--	1	--	80	5.3
Apache helicopter	57	19	--	--	--	1	--	77	5.1
Fishing by boat	64	1	--	--	--	1	--	66	4.4
Picnicker	56	--	--	--	--	1	--	57	3.8
Birder	19	--	--	--	--	--	--	19	1.3
Photographer	17	--	--	--	--	--	--	17	1.1
Agency worker	14	2	--	1	--	--	--	17	1.1
Tuber/Rafter	15	--	--	--	--	--	--	15	1.0
Military helicopter	8	7	--	--	--	--	--	15	1.0
Dog	11	--	--	--	--	--	--	11	0.7
Sheriff helicopter	4	3	--	--	--	--	--	7	0.5
Hiker	7	--	--	--	--	--	--	7	0.5
Driver	6	--	--	--	--	--	--	6	0.4
Nestwatcher	3	--	--	2	--	--	--	5	0.3
Cycler/Bicycler	4	--	--	--	--	--	--	4	0.3
Swimmer	3	--	--	--	--	--	--	3	0.2
Jet	3	--	--	--	--	--	--	3	0.2
Drone	--	--	--	2	--	--	--	2	0.1
OHV	2	--	--	--	--	--	--	2	0.1
Motorized parachute	1	--	--	--	--	--	--	1	0.1
Motorcycle	1	--	--	--	--	--	--	1	0.1
Mining	1	--	--	--	--	--	--	1	0.1
Horseback rider	1	--	--	--	--	--	--	1	0.1
Wood cutter	1	--	--	--	--	--	--	1	0.1
Runner	1	--	--	--	--	--	--	1	0.1
Gunshot	1	--	--	--	--	--	--	1	0.1
Total	1,408	66	--	7	--	21	2	1,504	

[1]Bald 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, Granite Reef BA, Arizona, 2019.

Sex	Fish		Bird		Total	
	E[1]	S-U[2]	E	S-U	E	S-U
Male	8	5-3	2	1-1	10	6-4
Female	4	3-1	--	--	4	3-1
Unknown	1	0-1	--	--	1	0-1
Total	13	8-5	2	1-1	15	9-6

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

Table 45. Observed prey types delivered to the nest, Granite Reef BA, Arizona, 2019.							
Sex	Fish	Bird	Mammal	Carrion	Unknown	Total	Percent
Male	25	--	1	1	1	28	60.9
Female	9	2	1	--	4	16	34.8
Unknown	2	--	--	--	--	2	4.4
Total	36	2	2	1	5	46	
Percent	78.3	4.4	4.4	2.2	10.9		

Table 46. Observed prey species delivered to the nest, Granite Reef BA, Arizona 2019.						
Sex	Fish				Total	Percent
	RT[1]	BL	BC	SU		
Male	6	1	1	2	10	62.5
Female	3	2	--	--	5	31.3
Unknown	--	--	1	--	1	6.3
Total	9	3	2	2	16	
Percent	56.3	18.8	12.5	12.5		

[1] RT=rainbow trout, BL=bluegill, BC=black crappie, SU=sucker species.

Table 47. Bald eagle habitat analysis at the Granite Reef BA, Arizona, 2019.						
Perch Location[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O[4]	H_2O Type[5]	Land Type[6]
0.0a	UP	Right	No	1	PO	UP
0.0b	UP	Left	No	1	PO	UP
0.0c	GR	Canal	No	2	PO	DR
0.0d	SG	Right	No	1	CA	UP
0.0e	UP	Right	No	5	PO	UP
0.0f	UP	Right	No	1	PO	UP
0.0g	SG	Right	No	1	CA	UP
0.0h	UP	Right	No	1	CA	UP
0.0i	RD	Right	No	1	CA	UP
0.0j	HL	Left	No	1	PN	UP
0.0k	DA	Right	No	1	PO	UP
0.0l	UP	Left	No	1	CA	UP
0.1	SG	Right	Partial	1	CO	WT
0.2	HL	Left	No	1	PO	MB
0.3a	CL	Right	No	3	CO	MB
0.3b	HS	Right	No	3	CO	MB
0.4	LG	Right	No	1	CO	WT
0.4	ID	Island	No	1	CO	WT
0.4	SO	Right	No	1	CO	WT
0.4	MS	Right	Partial	1	CO	MB
1.3	HS	Right	No	1	RN	MB
3.2	CL	Right	Partial	1	RU	CW

[1]River kilometer (Hunt and others 1992).
[2]CL=cottonwood, large/20-30+ m, DA=dam, GR=ground, HL=hillside, HS=hard snag (main branches only), ID=island, LG=log, MS=mesquite, RD=road, SG=soft snag (dead but branches still intact), SO=shore, UP=utility pole.
[3]Side of river facing downstream.
[4]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400.
[5]CA=canal, CO=cove, PN=pond, RI=river riffle, RU=river run, PO=river pool.
[6]CW=cottonwood grove, DR=dry riverbed, MB=mesquite bosque, UP=desert upland, WT=willow thicket.

Table 48. Bald eagle habitat use at the Granite Reef BA, Arizona, 2019.

Perch Location[1]	PW[2,3]	PH	PP	PD	PE	PU	PR	DW	PG	OT	Total	Percent
0.0	4,560	951	168	145	110	5	--	1	35	22	5,997	51.4
0.1	1	--	--	--	--	--	--	--	--	--	1	<0.1
0.2	--	--	--	--	--	--	--	--	1	--	1	<0.1
0.3	3,402	7	431	--	--	88	102	--	--	20	4,050	34.7
0.4	1,139	164	14	12	17	--	--	93	57	43	1,539	13.2
1.3	13	20	--	--	--	10	--	--	--	--	43	0.4
3.2	25	--	--	--	--	21	--	--	--	--	46	0.4
Total	9,140	1,142	613	157	127	124	102	94	93	85	11, 677	
Percent	78.3	9.8	5.2	1.3	1.1	1.1	0.9	0.8	0.8	0.7		

[1]River kilometer (Hunt and others 1992).
[2]Observation time (minutes).
[3]PW=perched watching, PH=perched hunting, PP=perched preening, PD=perched drying or sunning, PE=perched eating, PU=perched unknown, PR=perched roosting, DW=drinking water, PG=perched on ground, OT=other (includes bathing, perched vocalizing, and perched close to mate.

APPENDIX K: LUNA BREEDING AREA SUMMARY

Table 49. Observed human activity and bald eagle behavior, Luna BA, Arizona, 2019.									
Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Driver	193	--	--	--	--	--	--	193	39.0
Angler	80	--	--	--	--	--	--	80	16.2
Picnicker	47	--	--	--	--	--	--	47	9.5
Birder	47	--	--	--	--	--	--	47	9.5
Hiker	34	--	--	1	--	--	--	35	7.1
Photographer	19	--	--	--	--	--	--	19	3.8
Boaters (fishing)	19	--	--	--	--	--	--	19	3.8
Float tubers (fishing)	13	--	--	--	--	--	--	13	2.6
Nestwatcher	12	--	--	--	--	--	--	12	2.4
Alpine Fire Dept.	8	--	--	--	--	--	--	8	1.6
U.S. Forest Service	8	--	--	--	--	--	--	8	1.6
Military Jet	--	--	6	--	--	--	--	6	1.2
Helicopter	3	--	--	--	--	--	--	3	0.6
Small plane	3	--	--	--	--	--	--	3	0.6
Sheriff Department	1	--	--	--	--	--	--	1	0.2
Kayak/canoe	1	--	--	--	--	--	--	1	0.2
Total	488	--	6	1	--	--	--	495	

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

Table 50. Observed forage events and success, Luna BA, Arizona, 2019.								
Sex	Birds		Fish		Unknown		Total	
	E[1]	S-U[2]	E	S-U	E	S-U	E	S-U
Male	18	17-1	2	2-0	2	2-0	22	21-1
Female	14	10-4	2	2-0	--	--	16	12-4
Both	1	1-0	--	--	--	--	1	1-0
Total	33	28-5	4	4-0	2	2-0	39	34-5

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

Table 51. Observed prey types delivered to the nest, Luna BA, Arizona, 2019.					
Sex	Birds	Fish	Unknown	Total	Percent
Male	15	1	2	18	75.0
Female	6	--	--	6	25.0
Total	21	1	2	24	
Percent	87.5	4.2	8.3		

Table 52. Observed prey species delivered to the nest, Luna BA, Arizona 2019.					
Sex	Birds		Fish	Total	Percent
	AC[1]	BH	RT		
Male	15	--	1	16	72.7
Female	5	1	--	6	27.3
Total	20	1	1	22	
Percent	90.9	4.5	4.5		

[1]AC=American coot, BH=bufflehead, RT=rainbow trout.

Table 53. Bald eagle habitat analysis at the Luna BA, Arizona, 2019.

Perch Location[1]	Perch Type[2]	Shade	Distance to H_2O[3]	H_2O Type[4]	Land Type[5]
0.8	HS	No	2	RC	--
1.9	PO	Yes	2	RS	--
2.4	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
3.3	ST	No	2	--	CF
3.5	PO	No	1	RC	--
4.4	PS	No	2	--	CF
4.5	FP	No	2	RC	--
4.8	HS	No	4	--	CF
4.8a	PO	Yes	5	--	CF
4.8b	HS	No	6	--	CF
4.8c	HS	Yes	8	--	CF
4.9a	HS	No	5	--	CF
4.9b	HS	Yes	8	--	CF
4.9c	PO	Yes	8	--	CF
5.0a	PO	Yes	8	--	CF
5.0b	HS	No	8	--	CF
5.1a	FP	No	1	RC	--
5.1b	PO	Yes	8	--	CF
5.2	BO	Yes	1	RS	--

[1]Lake kilometer (counterclockwise from boat ramp).
[2]BO=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.
[3]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400.
[4]RC=reservoir cove, RS=reservoir main body.
[5]CF=coniferous forest.

Table 54. Bald eagle habitat use at the Luna BA, Arizona, 2019.

Perch Location[1]	PW[2,3]	PR	PH	PP	PD	CL	ET	PV	Total	Percent
0.8	180	--	--	--	--	--	--	--	180	1.2
1.9	12	36	--	--	--	--	--	--	48	0.3
2.4	35	--	--	--	--	--	--	1	36	0.2
2.6	12	--	21	--	--	--	--	--	33	0.2
2.7	--	--	27	--	--	--	--	--	27	0.2
2.8	27	--	25	--	--	--	--	--	52	0.4
3.3	--	103	15	--	29	--	--	--	147	1.0
3.5	18	--	50	--	--	--	--	--	68	0.5
4.4	--	--	68	--	--	--	--	--	68	0.5
4.5	52	25	--	--	166	--	--	--	243	1.7
4.8	6,293	2,126	138	162	--	120	--	1	8,840	60.1
4.9	1,606	1,097	--	94	131	180	13	--	3,121	21.2
5.0	834	595	--	36	--	--	23	--	1,488	10.1
5.1	85	7	171	89	6	--	--	--	358	2.4
5.2	--	--	5	--	--	--	--	--	5	<0.1
Total	9,154	3,989	520	381	332	300	36	2	14,714	
Percent	62.2	27.1	3.5	2.6	2.3	2.0	0.2	<0.1		

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

APPENDIX L: PINTO BREEDING AREA SUMMARY

Table 55. Observed human activity and bald eagle behavior, Pinto BA, Arizona, 2019.

Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Boat	6	--	--	--	--	--	--	6	42.9
Helicopter	4	--	--	1	--	--	--	5	35.7
Gunshot	1	--	--	--	--	--	--	1	7.1
OHV	1	--	--	--	--	--	--	1	7.1
Small plane	1	--	--	--	--	--	--	1	7.1
Total	13	--	--	1	--	--	--	14	

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

Table 56. Observed forage events and success, Pinto BA, Arizona, 2019.

Sex	Fish		Birds		Total	
	E[1]	S-U[2]	E	S-U	E	S-U
Unknown	1	1-0	1	0-1	2	1-1
Total	1	1-0	1	0-1	2	1-1

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

Table 57. Observed prey types delivered to the nest, Pinto BA, Arizona, 2019.

Sex	Fish	Unknown	Total	Percent
Male	26	6	32	61.5
Female	11	4	15	28.8
Unknown	1	4	5	9.6
Total	38	14	52	
Percent	73.1	26.9		

Table 58. Bald eagle habitat analysis at the Pinto BA, Arizona, 2019.

Perch Location[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O[4]	H_2O Type[5]	Land Type[6]
98.0	MS	Left	Partial	1	RS	TX
99.5a	TX	Left	Partial	1	RS	TX
99.5b	SS	Left	No	1	RS	TX
100.8	WO	Left	No	1	IF	--
100.9	HL	Right	Partial	2	RU	UP
101.0	CF	Right	Partial	4	RU	UP
101.1	CT	Right	No	2	RU	UP
101.6	CT	Right	No	1	RU	UP
103.0	CT	Right	Partial	2	RU	UP
104.7	HS	Right	No	5	RB	TX
105.2	MS	Right	No	6	RB	TX
105.3a	HS	Right	No	6	RB	TX
105.3b	HS	Right	No	6	RB	TX
105.4a	SG	Right	No	6	RB	TX
105.4b	HS	Right	No	6	RB	TX
105.4c	SS	Right	No	7	RB	TX
105.5	CT	Left	No	5	RB	UP
105.6	CS	Right	No	1	RB	WT
105.8	MS	Right	No	5	RB	WT

[1]River kilometer (Hunt et. al. 1992).
[2]CF=cliff ledge, CS=cottonwood small (0-10m), CT=cliff top, HL=hillside, HS=hard snag (main branches only), MS=mesquite, SG=soft snag (dead, but branches still intact), SS=snag or shrub, TX=tamarisk thicket, WO=willow.
[3]Side of river facing downstream.
[4]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.
[5]IF=inflow to reservoir, RB=river bend, RS=reservoir, RU=river run.
[6]TX-tamarisk thicket, UP=desert upland, WT=Willow thicket.

Table 59. Bald eagle habitat use at the Pinto BA, Arizona, 2019.

Perch Location[1]	PW[2,3]	PP	ET	CL	PE	PV	PD	CO	Total	Percent
98.0	3	--	--	--	--	--	--	--	3	0.1
99.5	82	--	--	--	--	--	--	--	82	1.4
100.8	4	--	--	--	--	--	--	--	4	0.1
100.9	89	--	--	--	--	--	--	--	89	1.5
101.0	140	--	--	--	16	--	--	--	156	2.6
101.1	13	--	--	--	--	--	--	--	13	0.2
101.6	44	--	--	--	--	--	--	--	44	0.7
103.0	25	--	--	35	--	--	--	--	60	1.0
104.7	3	--	--	--	--	--	--	--	3	0.1
105.2	6	--	--	--	--	--	--	--	6	0.1
105.3	3,470	397	43	--	6	5	3	--	3,924	66.6
105.4	1,204	92	--	--	9	--	--	--	1,305	22.1
105.5	22	--	--	--	--	--	--	1	23	0.4
105.6	27	95	--	--	--	--	--	--	122	2.1
105.8	62	--	--	--	--	--	--	--	62	1.1
Total	5,194	584	43	35	31	5	3	1	5,896	
Percent	88.1	9.9	0.7	0.6	0.5	0.1	0.1	<0.1		

[1]River kilometer (Hunt et al. 1992).
[2]Observation time (minutes).
[3]PW=perched watching, PP=perched preening, ET=eating in tree, CL=perched close to mate, PE=perched eating, PV=perched vocalizing, PD=perched drying, CO=copulation.

APPENDIX M: SAGUARO BREEDING AREA SUMMARY

Table 60. Observed human activity and bald eagle behavior, Saguaro BA, Arizona, 2019.									
Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Boater	2,050	16	1	--	--	--	--	2,067	66.6
Water skier	490	1	--	--	--	--	--	491	15.8
Jet Ski	320	3	--	--	--	--	--	324	10.4
Angler	137	--	--	--	--	--	--	137	4.4
Standup paddleboard	19	--	--	--	--	--	--	19	0.6
Small plane	11	5	1	--	--	--	--	17	0.5
Kayaker	14	--	--	--	--	--	--	14	0.5
Nestwatcher	6	6	1	1	--	--	--	14	0.5
Helicopter	8	1	1	--	--	--	--	10	0.3
Sheriff's helicopter	5	1	--	--	--	--	--	6	0.2
Military helicopter	--	1	--	--	--	--	1	2	<0.1
Military jet	1	1	--	--	--	--	--	2	<0.1
Gunshot	--	--	--	1	--	--	--	1	<0.1
Drone	--	1	--	--	--	--	--	1	<0.1
Total	3,061	36	4	2	--	--	1	3,104	

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

Table 61. Observed forage events and success, Saguaro BA, Arizona, 2019.				
Sex	Fish		Total	
	E[1]	S-U[2]	E	S-U
Male	1	0-1	1	0-1
Female	1	1-0	1	1-0
Unknown	1	1-0	1	1-0
Total	3	2-1	3	2-1

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

Table 62. Observed prey types delivered to the nest, Saguaro BA, Arizona, 2019.				
Sex	Fish	Unknown	Total	Percent
Male	7	4	11	26.2
Female	17	6	23	54.8
Unknown	4	4	8	19.0
Total	28	14	42	
Percent	66.7	33.3		

Table 63. Bald eagle habitat analysis at the Saguaro BA, Arizona, 2019.

Perch Location[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O[4]	H_2O Type[5]	Land Type[6]
27.3	CT	Left	Partial	1	RB	CL
28.7	CT	Right	Partial	1	RS	CL
28.9	SG	Left	Partial	1	RS	SO
30.3	CT	Right	No	2	RB	CL
31.0a	BO	Right	No	1	RS	UP
31.0b	CT	Left	No	8	RB	UP
31.0c	PT	Right	No	1	RB	CL
31.0d	CF	Right	Partial	1	RB	CL
31.1a	CF	Right	Partial	1	RB	CL
31.1b	CT	Left	No	1	RS	CL
31.2a	CT	Right	No	1	RS	CL
31.2b	SM	Left	Partial	1	RS	SO
31.4a	CT	Left	No	1	RB	CL
31.4b	SO	Right	Partial	1	RB	SO
31.6	CT	Left	No	2	RB	CL
31.7	CF	Left	No	1	RB	CL
31.9a	CF	Left	Partial	1	RB	CL
31.9b	CF	Left	Partial	1	RB	CL
32.0a	RI	Left	Partial	3	RB	CL
32.0b	CT	Left	Partial	1	RB	CL
32.1	CF	Left	Partial	1	RB	CL
32.2a	CF	Left	Partial	3	RB	CL
32.2b	CF	Left	Partial	1	RB	CL
32.6	CF	Left	Yes	1	RB	CL

[1]River kilometer (Hunt et. al. 1992).
[2]BO=boulder, CF=cliff face, CT=cliff top, PT=pinnacle top, RI=ridge, SG=hard snag, SM=mesquite snag, SO=shore.
[3]Side of river facing downstream.
[4]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.
[5]RB=river bend, RS=reservoir.
[6]CL=cliffs, SO=shore, UP=desert upland.

Table 64. Bald eagle habitat use at the Saguaro BA, Arizona, 2019.

Perch Location[1]	PW[2,3]	PP	PV	PI	PD	PE	PX	SH	FH	PH	DW	Total	Percent
27.3	48	--	--	--	--	--	--	--	--	--	--	48	0.8
28.7	99	--	--	--	--	--	--	--	--	--	--	99	1.7
28.9	43	1	--	--	--	--	--	--	--	--	--	44	0.8
29.1	--	--	--	--	--	--	--	--	2	--	--	2	<0.1
31.0	516	--	--	--	--	--	--	--	--	--	--	516	9.0
31.1	279	5	2	--	--	--	--	--	--	--	--	286	5.0
31.2	1,595	--	--	--	--	67	1	--	--	7	--	1,670	29.1
31.4	1,934	53	13	4	6	26	18	12	--		1	2,067	36.0
31.6	164	--	--	--	--	--	--	--	--	--	--	164	2.9
31.7	3	--	--	--	--	4	--	--	--	--	--	7	0.1
31.9	78	5	1	--	--	--	--	--	--	--	--	84	1.5
32.0	291	--	--	--	--	--	--	--	3	--	--	294	5.1
32.1	252	1	1	--	--	--	--	--	--	--	--	254	4.4
32.2	116	--	29	--	--	--	--	--	--	--	--	145	2.5
32.6	59	--	--	--	--	--	--	--	--	--	--	59	1.0
Total	5,477	65	46	4	6	97	19	12	5	7	1	5,739	
Percent	95.4	1.1	0.8	0.1	0.1	1.7	0.3	0.2	0.1	0.1	<0.1		

[1]River kilometer (Hunt et al. 1992).
[2]Observation time (minutes).
[3]PW=perched watching, PP=perched preening, PV=perched vocalizing, PI=perched interaction, PD=perched drying or sunning, PE=perched eating, PX=perched various, SH=standing in water, FH=flying hunting, PH=perched hunting, DW=drinking water.

APPENDIX N: SYCAMORE BREEDING AREA SUMMARY

Table 65. Observed human activity and bald eagle behavior, Sycamore BA, Arizona, 2019.

Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Helicopter	26	2	--	3	1	6	1	39	30.7
Small plane	20	2	--	--	--	4	--	26	20.5
Horseback rider	17	1	--	--	--	2	--	20	15.7
Military helicopter	15	--	--	--	1	--	--	16	12.6
Apache helicopter	3	--	--	--	--	2	--	5	3.9
Driver	2	--	--	2	--	1	--	5	3.9
Gunshot	3	--	--	--	--	1	--	4	3.1
MCSO helicopter	2	--	--	--	--	1	--	3	2.4
AGFD biologist	--	--	--	2	--	--	--	2	1.6
Swimmer	--	--	--	--	--	1	--	1	0.8
Motorized parachute	1	--	--	--	--	--	--	1	0.8
Hiker	1	--	--	--	--	--	--	1	0.8
Picnicker	1	--	--	--	--	--	--	1	0.8
Angler/fishing	--	--	--	--	--	1	--	1	0.8
Dirt bike	1	--	--	--	--	--	--	1	0.8
OHV	1	--	--	--	--	--	--	1	0.8
Total	93	5	--	7	2	19	1	127	

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

Table 66. Observed forage events and success, Sycamore BA, Arizona, 2019.

Sex	Fish		Mammals		Unknown/carrion		Total	
	E[1]	S-U[2]	E	S-U	E	S-U	E	S-U
Male	2	2-0	2	2-0	1	1-0	5	5-0
Female	--	--	--	--	1	1-0	1	1-0
Total	2	2-0	2	2-0	2	2-0	6	6-0

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

Table 67. Observed prey types delivered to the nest, Sycamore BA, Arizona, 2019.

Sex	Fish	Birds	Mammals	Unknown	Total	Percent
Male	4	2	2	19	27	77.1
Female	5	--	--	3	8	22.9
Total	9	2	2	22	35	
Percent	25.7	5.7	5.7	62.9		

Table 68. Bald eagle habitat analysis at the Sycamore BA, Arizona, 2019.

Perch Location[1]	Perch Type[2]	Side[3]	Shade	Distance to H_2O[4]	H_2O Type[5]	Land Type[6]
7.8	UP	Left	No	2	RU	SO
9.1	YL	Right	No	7	RU	MB
9.2a	WO	Right	Partial	1	RI	WT
9.2b	UP	Right	No	8	--	FL
9.4	IS	Right	No	8	--	FL
9.5	GR	Right	No	8	--	FL
9.6	WO	Right	Yes	1	RI	WT
9.7	SG	Left	No	6	RU	MB
9.8	IS	Right	No	8	--	FL
9.9	UP	Right	No	2	RI	FL
10.0	WO	Left	No	1	RI	SO
10.1a	CL	Left	Yes	6	RU	CW
10.1b	MS	Right	No	1	RI	MB
10.1c	CM	Left	Yes	6	RU	CW
10.2a	UP	Right	No	2	RU	FL
10.2b	EU	Right	Partial	8	--	FL
10.3	SP	Left	No	6	RU	MB
10.6	SG	Left	No	2	RI/ RU	WT
10.7	CM	Left	Partial	5	RU	MB
0.2S	WO	Left	No	6	RU	GB

[1]River kilometer (Hunt et. al. 1992).
[2]CL=cottonwood, large/20-30+ m, CM=cottonwood, medium/10-20+ m, EU=eucalyptus, G=ground, IS=irrigation structure, MS=mesquite, SG=soft snag, SP=stump, UP=utility pole, WO=willow, YL=sycamore, large/10-20+ m.
[3]Side of river facing downstream.
[4]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>400m.
[5]RI=riffle, RU=run.
[6]CW=cottonwood grove, FL=farmland, GB=gravel bar, MB=mesquite bosque, SO=shore, WT=willow thicket.

Table 69. Bald eagle habitat use at the Sycamore BA, Arizona, 2019.												
Perch Location[1]	PW[2,3]	PH	PP	PD	PK	PG	PE	ES	SS	SH	Total	Percent
7.8	1,753	451	40	--	--	--	6	--	--	--	2,250	13.7
9.1	26	--	--	--	--	--	--	--	--	--	26	0.1
9.2	38	100	22	--	--	--	--	--	--	--	160	1.0
9.4	29	--	--	--	--	--	--	--	--	--	29	0.2
9.5	--	--	--	--	15	40	--	--	--	--	55	0.3
9.6	48	107	--	--	--	--	--	18	6	--	179	1.1
9.7	15	--	7	17	6	--	--	--	--	--	45	0.3
9.8	4	--	--	--	11	--	--	--	--	--	15	0.1
9.9	4,230	--	583	326	59	--	33	--	--	--	5,231	31.8
10.0	41	352	--	--	--	--	--	--	--	4	397	2.4
10.1	4,521	--	203	--	12	--	--	--	--	--	4,736	28.8
10.2	790	119	19	--	58	--	--	--	--	--	986	6.0
10.3	65	--	--	--	--	--	--	--	--	--	65	0.4
10.6	--	55	--	--	--	--	--	--	--	--	55	0.3
10.7	1,146	125	74	34	--	--	--	--	--	--	1,379	8.4
S 0.2	786	--	54	--	--	--	--	--	--	--	840	5.1
Total	13,492	1,309	1,002	377	161	40	39	18	6	4	16,448	
Percent	82.0	8.0	6.1	2.3	1.0	0.3	0.2	0.1	<0.1	<0.1		

[1]River kilometer (Hunt et al. 1992).
[2]Observation time (minutes).
[3]PW=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 O: TAPCO BREEDING AREA SUMMARY

Table 70. Observed human activity and bald eagle behavior, Tapco BA, Arizona, 2019.									
Human Activity	N[1]	W	R	F	L	B	U	Total	Percent
Hiker	3	--	--	--	--	--	--	3	42.9
Kayaker	1	--	--	--	--	1	--	2	28.6
Photographer	1	--	--	--	--	--	--	1	14.3
Angler	1	--	--	--	--	--	--	1	14.3
Total	6	--	--	--	--	1	--	7	

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

Table 71. Observed forage events and success, Tapco BA, Arizona, 2019.						
Sex	Birds		Fish		Total	
	E[1]	S-U[2]	E	S-U	E	S-U
Male	3	0-3	1	1-0	4	1-3
Total	3	0-3	1	1-0	4	1-3

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

Table 72. Observed prey types delivered to the nest, Tapco BA, Arizona, 2019.				
Sex	Mammal	Unknown	Total	Percent
Unknown	1	1	2	100
Total	1	1	2	
Percent	50.0	50.0		

Table 73. Bald eagle habitat analysis at the Tapco BA, Arizona, 2019.

River km[1]	Perch Type[2]	Side	Shade	Distance to H_2O[3]	H_2O Type[4]	Land Type[5]
237.0a	CL	Right	No	5	RB	CW
237.0b	CL	Right	No	5	RB	CW
237.1a	CL	Right	No	5	RU	CW
237.1b	WO	Left	Partial	1	RU	CW
237.3a	CL	Right	No	1	RU	CW
237.3b	SD	Right	No	1	RU	CW
237.4a	HS	Right	No	1	RU	CW
237.4b	SO	Left	Partial	1	RU	SO
237.8	CS	Right	No	1	RU	CW
237.9	SS	Right	No	1	RU	CW
238.2	SD	Left	No	3	RI	CW
238.8	CL	Left	No	2	RU	CW
238.9	DM	Left	No	2	RU	CW
240.2	CL	Right	No	1	UN	CW
240.3	CM	Right	No	1	UN	CW
240.8	HS	Right	No	3	PO	UP
241.4	CT	Right	No	1	UN	CW

[1]River kilometer (Hunt et. al. 1992).
[2]CL=cottonwood large (20-30m), CM=cottonwood medium (10-20m), CS=cottonwood small (0-10m), CT=cliff top, DM=deciduous, medium (5-10m), HS=hard snag (main branches only), SD=snag, SO=shore, SS=snag. shrub, WO=willow.
[3]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>401m.
[4] PO=pool, RB=river bend, RI=riffle, RU=run, UN=unknown.
[5]CW=cottonwood grove, SO=shore, UP=upland desert.

Table 74. Bald eagle habitat use at the Tapco BA, Arizona, 2019.

River km[1]	PW[2,3]	PP	PH	PD	PE	DW	PV	PU	Total	Percent
237.0	87	--	--	--	--	--	--	--	87	4.3
237.1	251	95	--	--	--	--	--	--	346	17.0
237.3	254	71	--	34	18	--	5	--	382	18.8
237.4	99	23	--	--	6	7	--	2	137	6.7
237.8	6	--	--	--	--	--	--	--	6	0.3
237.9	22	--	--	--	--	--	--	--	22	1.1
238.2	1	--	--	--	6	--	--	--	7	0.3
238.8	396	--	--	--	--	--	--	--	396	19.5
238.9	4	--	--	--	--	--	--	--	4	0.2
240.2	--	--	37	--	--	--	--	--	37	1.8
240.3	10	--	--	--	--	--	--	--	10	0.5
240.8	552	35	--	--	--	--	--	--	587	28.9
241.4	12	--	--	--	--	--	--	--	12	0.6
Total	1,694	224	37	34	30	7	5	2	2,033	
Percent	83.3	11.0	1.8	1.7	1.6	0.3	0.2	0.1		

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

APPENDIX P: TONTO BREEDING AREA SUMMARY

Table 75. Bald eagle habitat analysis at the Tonto BA, Arizona, 2019.

Location[1]	Perch Type[2]	Side	Shade	Distance to H_2O[3]	H_2O Type[4]	Land Type[5]
A	SS	Right	No	5	IF	TX
B	TX	Right	Partial	3	IF	TX
C	HS	Right	No	5	IF	TX
D	TX	Right	Partial	7	IF	TX
E	HS	Right	No	7	IF	TX
F	SS	Right	No	7	IF	TX
G	HS	Right	No	7	IF	TX
H	HS	Right	No	7	IF	TX
I	TX	Right	No	7	IF	TX
J	TX	Right	No	6	IF	TX
K	HS	Right	No	8	IF	TX
L	HS	Right	No	6	IF	TX
M	SS	Right	No	3	IF	TX
P	HS	Right	No	6	IF	TX
Q	CL	Right	Partial	1	RC	CW
R	HS	Left	No	1	IF	SO
S	SS	Right	No	1	BW	SO

[1]Refer to the Tonto nestwatch report for activity locations.
[2]CL=cottonwood large (20-30m), HS=hard snag (main branches only), SS=soft snag, TX=tamarisk.
[3]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>401m.
[4]BW=backwater, IF=inflow to reservoir, RC=river current.
[5]CW=cottonwood grove, SO=shore, TX=tamarisk thicket.

Table 76. Bald eagle habitat use at the Tonto BA, Arizona, 2019.

Location[1]	PW[2,3]	GN	CL	DW	PH	CO	Total	Percent
C	1,070	2	192	--	--	7	1,271	36.6
F	687	290	--	--	--	--	977	28.2
A	605	--	--	--	--	--	605	17.4
Q	183	--	--	--	--	--	183	5.3
M	173	--	--	--	--	--	173	5.0
D	89	5	--	--	--	--	94	2.7
S	--	--	--	48	--	--	48	1.4
L	40	--	--	--	--	--	40	1.2
R	--	--	--	--	36	--	36	1.0
J	11	7	--	--	--	--	18	0.5
G	14	--	--	--	--	--	14	0.4
K	3	--	--	--	--	--	3	0.1
H	2	--	--	--	--	--	2	0.1
P	--	2	--	--	--	--	2	0.1
B	1	--	--	--	--	--	1	0.0
E	1	--	--	--	--	--	1	0.0
I	1	--	--	--	--	--	1	0.0
Total	2,880	306	192	48	36	7	3,469	
Percent	83.0	8.8	5.5	1.4	1.0	0.2		

[1]Refer to the Tonto nestwatch report for activity locations.
[2]Observation time (minutes).
[3] PW=perched watching, GN=gathering nest materials, CL=perched close to mate, DW=drinking water, PH=perched hunting, CO=copulation.

APPENDIX Q: WOODS CANYON BREEDING AREA SUMMARY

Table 77. Observed human activity and bald eagle behavior, Woods Canyon BA, Arizona, 2019.

Human Activity[1]	N[2]	W	R	F	L	B	U	Total	Percent
Hiker	1,456	8	--	1	--	--	50	1,515	84.5
Canoe/kayak	110	--	--	1	--	--	2	113	6.3
Angler	68	3	--	--	--	--	4	75	4.2
Runner	34	--	--	--	--	--	--	34	1.9
Birder	10	--	--	--	--	--	--	10	0.6
Photographer	8	--	--	1	--	--	--	9	0.5
Boat	8	--	--	1	--	--	--	9	0.5
Swimmer	7	--	--	--	--	--	--	7	0.4
Helicopter	2	2	--	--	--	--	1	5	0.3
Picnicker	4	--	--	--	--	--	--	4	0.2
Drone	1	2	--	--	--	--	1	4	0.2
Agency worker	3	--	--	--	--	--	--	3	0.2
Stand up paddleboard	2	--	--	--	--	--	--	2	0.1
Cycler	1	--	--	--	--	--	--	1	0.1
OHV	--	--	--	--	--	--	1	1	0.1
Small Plane	1	--	--	--	--	--	--	1	0.1
Total	1,715	15	--	4	--		59	1,793	

[1]Due to constant human activity, the table includes only the number of activities in and around the nest closure, on the trail and closest shore near the nest, and activities that yielded a significant response from the eagles.
[2]Bald eagle response: N=none, W=watched, R=restless, F=flushed, L=left area, B=birds not in area, U=unknown.

Table 78. Observed forage events and success, Woods Canyon BA, Arizona, 2019.

Sex	Fish		Unknown		Total	
	E[1]	S-U[2]	E	S-U	E	S-U
Male	16	10-6	1	0-1	17	10-7
Female	31	22-9	--	--	31	22-9
Total	47	32-15	1	0-1	48	32-16

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

Table 79. Observed prey types delivered to the nest, Woods Canyon BA, Arizona, 2019.

Sex	Fish	Unknown	Total	Percent
Male	38	2	40	50.6
Female	36	1	37	46.8
Unknown	2	--	2	2.5
Total	76	3	79	
Percent	96.2	3.8		

Table 80. Observed prey species delivered to the nest, Woods Canyon BA, Arizona 2019.			
Sex	Fish	Total	Percent
	TS[1]		
Male	37	37	52.9
Female	31	31	44.3
Unknown	2	2	2.9
Total	70	70	
Percent	100.0		

[1]TS=Trout species

Table 81. Bald eagle habitat analysis at the Woods Canyon BA, Arizona, 2019.					
Perch Location[1]	Perch Type[2]	Shade	Distance to H_2O[3]	H_2O Type[4]	Land Type[5]
0.0a	PO	No	2	RS	CF
0.0b	PO	No	1	RS	CF
0.1a	PO	Partial	1	RS	CF
0.1b	SC	No	1	RS	CF
0.2	PO	Yes	2	RS	CF
0.4	SC	No	1	RS	CF
0.7	SC	No	3	RS	CF
0.8a	SC	No	3	RS	CF
0.8b	PO	Partial	1	RS	CF
0.8c	SO	No	1	RS	CF
0.9a	SC	No	1	RS	CF
0.9b	SO	No	1	RS	CF
0.9c	PO	Partial	2	RS	CF
1.1a	PO	No	1	RS	CF
1.1b	PO	Partial	2	RS	CF
1.1c	SO	Yes	1	RS	CF
1.1d	PS	Yes	1	RS	CF
1.2	SC	No	1	RS	CF
1.3	PS	Partial	1	RS	CF
4.2	PO	No	1	RS	CF
4.6a	PO	Partial	1	RS	CF
4.6b	PO	No	2	RS	CF
4.7a	PO	Partial	2	RS	CF
4.7b	PO	Yes	1	RS	CF
4.7c	PO	No	2	RS	CF
4.7d	PO	No	2	RS	CF
4.7e	PO	No	3	RS	CF
4.9a	PO	Partial	1	RS	CF
4.9b	PO	No	1	RS	CF
5.0	PO	No	1	RS	CF

[1]Lake kilometer (counterclockwise from middle of dam).
[2]PO=pine/conifer, old growth/20-30+ m., PS=pine/conifer, 2nd growth/10-20+ m, SC=conifer snag, SO=shore.
[3]1=0-25m, 2=26-50m, 3=51-75m, 4=76-100m, 5=101-200m, 6=201-300m, 7=301-400m, 8=>401m.
[4]RS=reservoir main body.
[5]CF=conifer forest.

Table 82. Bald eagle habitat use at the Woods Canyon BA, Arizona, 2019.

Lake km[1]	PW[2,3]	PV	PP	PH	DW	PE	PK	PG	PD	OT	Total	Percent
0.1	627	--	--	--	--	--	4	--	7	4	642	4.3
0.4	41	--	--	--	--	--	3	5	--	--	49	0.3
0.7	30	--	--	--	1	--	--	--	--	--	31	0.2
0.8	2,418	--	--	--	1	--	--	--	--	9	2,428	16.3
0.9	219	--	71	5	--	--	--	12	6	--	313	2.1
1.1	1,251	--	--	23	17	20	12	--	--	--	1,323	8.9
1.2	29	--	--	17	--	--	--	--	--	--	46	0.3
1.3	--	--	--	3	--	--	--	--	--	--	3	<0.1
4.2	7	--	--	--	--	--	--	--	--	--	7	<0.1
4.6	253	--	--	--	--	--	--	--	--	--	253	1.7
4.7	5,749	265	--	15	3	--	--	--	--	--	6,032	40.4
4.9	3,704	--	--	--	12	22	--	--	--	--	3,738	25.0
5.0	60	--	--	--	--	--	--	--	--	--	60	0.4
999.9*	--	--	--	--	14	--	--	--	--	--	14	0.1
Total	14,388	265	71	63	48	42	19	17	13	13	14,939	
Percent	96.3	1.8	0.5	0.4	0.3	0.3	0.1	0.1	0.1	0.1		

[1]Lake kilometer (counterclockwise from middle of dam).
[2]Observation time (minutes).
[3]PW=perched watching, PV=perched vocalizing, PP=perched preening, PH=perched hunting, DW=drinking water, PE=perched eating, PK=perched with prey, PG=perched on ground, PD=perched drying or sunning, OT=other (includes perched close to mate and bathing).
*999.9=out of view (audible)