

ARIZONA BALD EAGLE MANAGEMENT PROGRAM 2020 SUMMARY REPORT

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This report, in part, summarizes the results of monitoring by the Arizona Bald Eagle Nestwatch Program using the breeding area reports submitted in 2020. Those include: Leticia Cruz-Paredes and Eduardo Martinez-Leyva, Box Bar Breeding Area (BA); David Drever and Russell Seeley, Concho and Greer Lakes BAs; Kumara MacLeod and Colton Langell, Tonto and Bachelor Cove BAs; Joe and Marta Peddie, Luna and Crescent BAs; Kristina McOmber and Cody Allen, Goldfield BA; Maia Persche and Angelica Varela, Orme and Granite Reef BAs; Maria Icenogle and Jen Ottinger, Doka, Fort McDowell, Rodeo, and Sycamore BAs; Kaia Hayes and Kurt Anderson, Cole's, Whiskey Spring, and Pleasant BAs; Cody Allen, Leticia Cruz-Paredes, Eduardo Martinez-Leyva, and Kristina McOmber, Woods Canyon BA.

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ARIZONA BALD EAGLE MANAGEMENT PROGRAM 2020 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, 2014, and 2020 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 29 members, with the Arizona Game and Fish Department (Department) as the lead implementation agency for bald eagle management projects. This report covers the 2020 results for the following

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

STUDY AREA

Nest 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=55 BAs) [includes Arizona Upland Subdivision (n=47) 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.

A majority of the 92 bald eagle BAs in 2020 occurred at elevations at or below 3,000 ft (914 m) (59.8%, n=55), 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 3,001 and 6,000 ft (915 to 1,829 m) (18.5%, n=17) or above 6,000 ft (>1,829 m) (21.7%, n=20). 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 upland 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*).

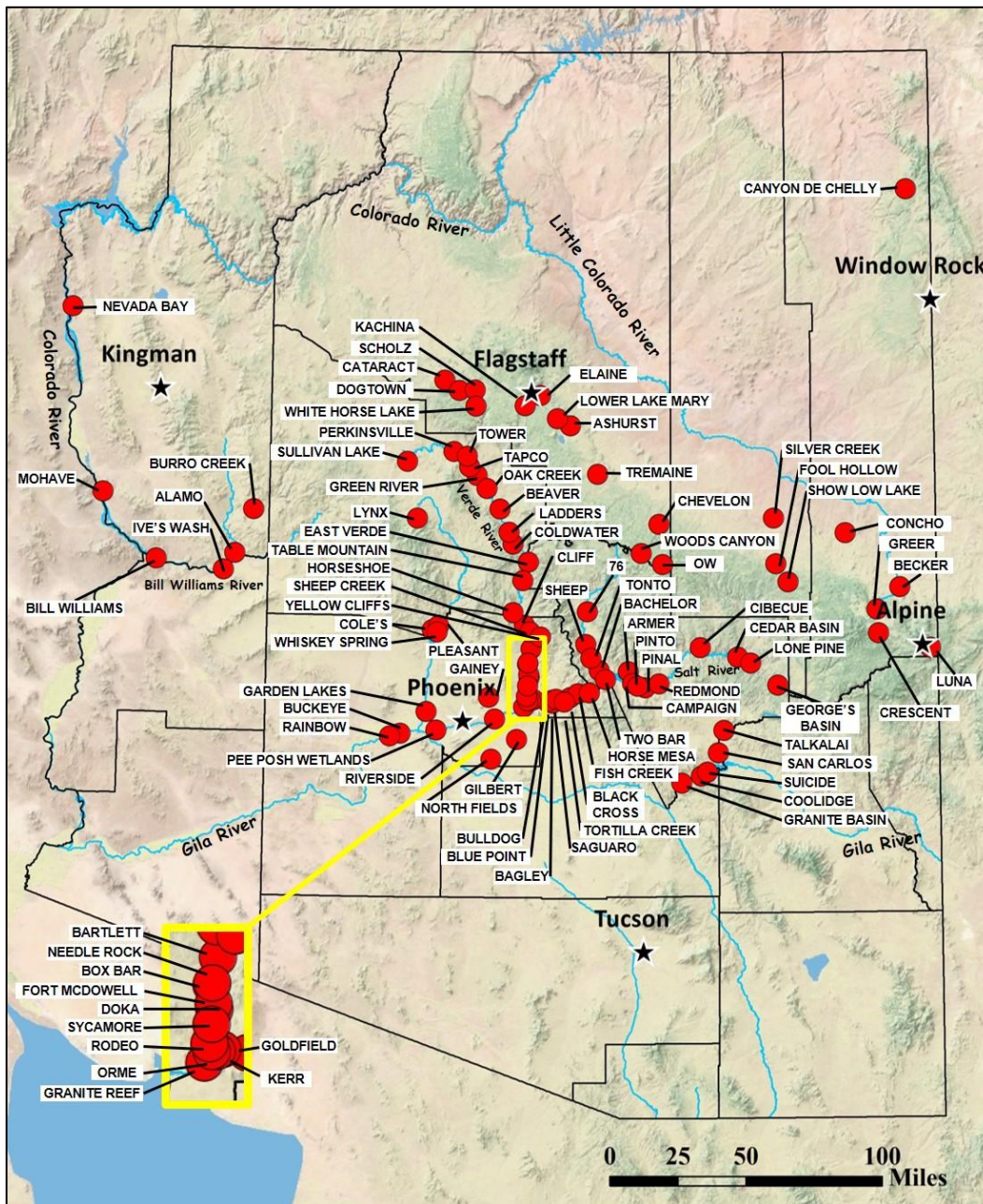


Figure 1. Location of known bald eagle breeding areas in Arizona, 2020.

With some 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 consisting of artificial water formations such as recharge basins, urban ponds and lakes, and canals.

In 2020, 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. 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. Finally, starting in 2020 we added two new winter count sites (Buckhead Mesa Landfill and Point of Pines aerial) that have been surveyed for the past four years and that had at least three bald eagles seen during one or more surveys, bringing the total number of standardized routes back up to 104 (Figure 2).

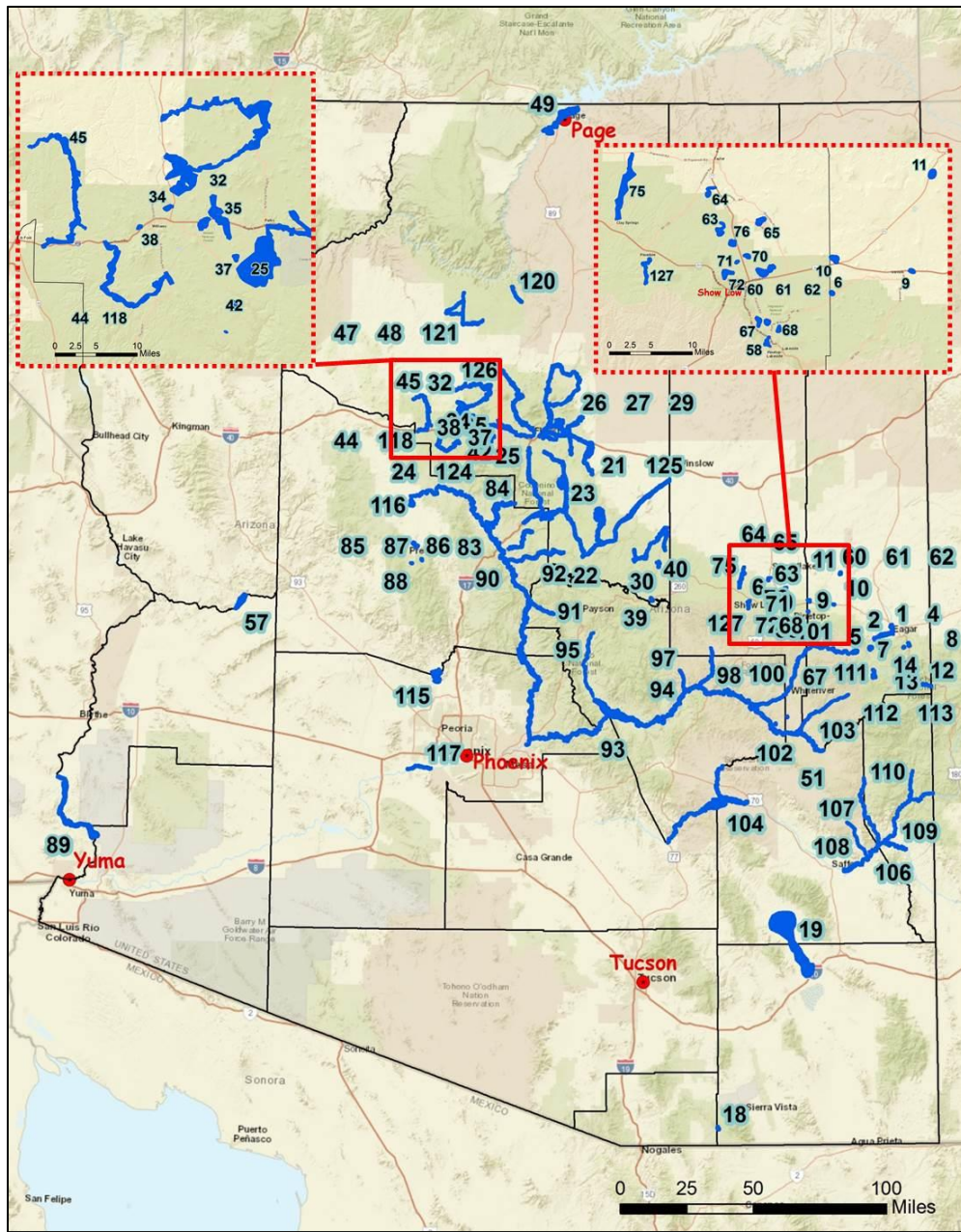


Figure 2. Map of the Arizona Bald Eagle Winter Count survey routes (blue outlines). County lines in black. See Appendix A for the associated route names.

METHODS

We continued to use, and strived to complete, the established 104 standardized survey routes for the 2020 Arizona bald eagle winter count. Additionally, six non-standard routes were completed and integrated into this document for management purposes and were included as non-standard routes in the results submitted to the ACE. We scheduled the winter count for January 6 to 12, 2020, which included weekdays for agency personnel and a weekend for volunteers. The short survey period minimized the chance for any large-scale bald eagle movements between survey routes and related duplicate counts.

We used a variety of survey methods due to the diverse habitats in Arizona and our desire to maximize (but not duplicate) statewide coverage in a narrow period with minimal effort. The most effective method to survey Arizona's remote terrain and the deep canyons of linear drainages was by helicopter. The U.S. Bureau of Reclamation (USBR) and Salt River Project (SRP) contributed a total of five days of helicopter time for 2-3 biologists and a pilot to fly 26 of the winter count routes. The helicopter's altitude and speed were dependent upon terrain, height, density of power lines, and wind speed. In general, a height of 31-61 m (100-200 ft) above ground level and 55-65 knots (63-75 mph) was typical for surveys. Highways, large lakes, and point counts were surveyed by boats, vehicles, and on foot. We solicited surveyors from cooperating agencies and volunteers from private groups, supplied survey forms from ACE, and instructed participants on the National Survey Protocol.

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

Due to our refinement of the statewide winter count routes in 2005, four counties are no longer surveyed by ground methods for wintering bald eagles, including Greenlee, Maricopa, Pima, and Pinal counties. However, portions of Greenlee, Maricopa, and Pinal counties were covered by the helicopter flights. Additionally, the one route representing Graham County was not surveyed in multiple years. This route is now being covered by air to ensure completion.

RESULTS AND DISCUSSION

The 2020 Arizona bald eagle winter count tallied 264 bald eagles, including 174 adults (65.9%), 78 subadults (29.5%), and 12 unknown eagles (4.5%). Participants covered 95 of 104 standardized routes (91%) with a total survey effort of 9,104 minutes (151.7 hours) (Tables 1 and 2). An additional six non-standard routes were surveyed for a total of two bald eagles (Appendix A).

The highest total number of bald eagles observed during ground surveys occurred in Coconino County (n=28 routes, 51 eagles) (Table 1), and the largest concentration on a ground survey

occurred on one route near Flagstaff and one near Payson (13 eagles each) (Appendix A). Also, a large number of bald eagles (n=37) were observed by helicopter along the lower Salt River. The age composition of this year’s count (66% adult, 30% subadult) approximated the average ratio of adults to subadults in Arizona’s winter counts since 2005 (Table 2).

The total of 264 bald eagles in 2020 was higher than the average of 247 birds observed annually during standardized counts in 2005-2019. Although the 2020 winter count was above average, long-term winter count trends in the Southwest changed by -2.2% per year over 25 years (Eakle et al. 2015), a trend which was also detected at a similar rate (-1.9%) in a 30-year analysis (ACE unpublished data). 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. Overall, the long-term trends for all regions are attenuating toward zero, possibly suggesting that bald eagle populations are reaching carrying capacity (ACE unpublished data).

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=88), most responded that this year’s weather was normal (92%), followed by mild (6%), and harsh (2%). There were no responses for very mild or very harsh weather. Similarly, of those that rated ice cover (n=84), most responded that it was normal (74%), followed by more than normal (15%), less than normal (6%), and much more than normal (5%). There were no responses for much less than normal ice cover.

| Survey areas | Routes | Minutes | Adults | Subadults | Unknown ¹ | Total | Total/ Hr. |
|------------------------|-------------------------|---------|--------|-----------|----------------------|-------|------------|
| Apache County | 15 | 1,103 | 16 | 16 | 1 | 33 | 1.8 |
| Cochise County | 2 | 290 | 1 | 2 | 0 | 3 | 0.6 |
| Coconino County | 28 | 4,448 | 30 | 13 | 8 | 51 | 0.7 |
| Gila County | 1 | 35 | 10 | 3 | 0 | 13 | 22.3 |
| Graham County | Not surveyed by ground. | | | | | | |
| Mohave County | 1 | 91 | 2 | 0 | 0 | 2 | 1.3 |
| Navajo County | 16 | 627 | 6 | 5 | 2 | 13 | 1.2 |
| Santa Cruz County | Not surveyed. | | | | | | |
| Yavapai County | 5 | 1,350 | 4 | 4 | 0 | 8 | 0.4 |
| Yuma and La Paz County | 1 | 195 | 3 | 4 | 0 | 7 | 2.2 |
| Verde River drainage | 3 | 220 | 27 | 4 | 0 | 31 | 8.5 |
| Salt River drainage | 9 | 430 | 50 | 20 | 1 | 71 | 9.9 |
| Gila River drainage | 8 | 244 | 11 | 5 | 0 | 16 | 3.9 |
| Various helicopter | 6 | 71 | 14 | 2 | 0 | 16 | 13.5 |
| Totals | 95 | 9,104 | 174 | 78 | 12 | 264 | 1.7 |

¹ Unknown age bald eagles and unidentified eagles.

| Year | Survey time (min) | Surveys completed | Adults | Subadults | Unknown ¹ | Total Birds | Birds/hour |
|-------------------|-------------------|-------------------|-----------|-----------|----------------------|-------------|------------|
| 2005 | 8,910 | 97 (84%) | 153 (68%) | 56 (25%) | 15 (7%) | 224 | 1.5 |
| 2006 ² | 10,074 | 104 (100%) | 239 (74%) | 77 (24%) | 7 (2%) | 323 | 1.9 |
| 2007 | 11,632* | 100 (96%) | 192 (68%) | 81 (29%) | 8 (3%) | 281 | 1.4 |
| 2008 ³ | 9,362 | 96 (94%) | 152 (82%) | 29 (16%) | 4 (2%) | 185 | 1.2 |
| 2009 | 9,357 | 94 (92%) | 139 (68%) | 62 (30%) | 3 (2%) | 204 | 1.3 |
| 2010 | 9,138* | 96 (94%) | 159 (63%) | 81 (32%) | 12 (5%) | 252 | 1.7 |
| 2011 | 8,713* | 93 (91%) | 157 (71%) | 57 (26%) | 8 (4%) | 222 | 1.5 |
| 2012 | 10,320 | 100 (98%) | 189 (63%) | 94 (32%) | 15 (5%) | 298 | 1.7 |
| 2013 | 9,902* | 98 (96%) | 169 (66%) | 76 (30%) | 10 (4%) | 255 | 1.5 |
| 2014 | 9,325 | 98 (96%) | 188 (71%) | 77 (29%) | 1 (0.4%) | 266 | 1.7 |
| 2015 | 8,989 | 93 (91%) | 141 (69%) | 53 (26%) | 10 (5%) | 204 | 1.4 |
| 2016 | 8,814 | 98 (96%) | 161 (65%) | 71 (29%) | 17 (7%) | 249 | 1.7 |
| 2017 | 9,522 | 101 (99%) | 169 (65%) | 84 (32%) | 8 (3%) | 261 | 1.6 |
| 2018 | 9,045 | 101 (99%) | 172 (70%) | 63 (26%) | 9 (4%) | 244 | 1.6 |
| 2019 ⁴ | 6,645 | 79 (77%) | 137 (65%) | 74 (35%) | 1 (0.5%) | 212 | 1.9 |
| 2020 ⁵ | 9,104* | 95 (91%) | 174 (66%) | 78 (30%) | 12 (5%) | 264 | 1.7 |
| Average | 9,303 | 96 (93%) | 168 (68%) | 70 (28%) | 9 (4%) | 247 | 1.6 |

¹Unknown age bald eagles and unidentified eagles.

²Beginning of 104 standardized routes derived from the analysis of 1995-2005 surveys.

³Beginning of 102 standardized routes with Lake Meade and Lake Mohave routes dropped.

⁴Federal government shutdown affected survey effort and number of eagles.

⁵Beginning of 104 standardized routes after addition of two new routes.

*Some survey times not recorded. Times averaged from reported times of previous counts.

MANAGEMENT RECOMMENDATIONS

1. Maintain the current 104 standardized routes.
2. Continue to assess non-standardized routes and add new routes for areas with consistent sightings of more than four bald eagles. The national coordinators require at least four years of data before a route is included in trend analyses, although highly productive routes will be added to Department standardized route analysis immediately.
3. Compile spatial data from winter count survey maps to document the location and abundance of wintering bald eagles, identify important habitat use areas, and develop statewide maps for distribution to cooperating agencies.
4. Continue to collect data on other wintering raptors along survey routes in addition to eagles, and investigate the potential to standardize methods for wintering raptor data collection with other states and organizations.
5. Work with partners and volunteers to improve route coverage, especially in underrepresented areas of the state. Investigate assigning new routes in nontraditional bald eagle wintering locations in urban areas.

OCCUPANCY AND REPRODUCTIVE ASSESSMENT AND NEST SURVEY

INTRODUCTION

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

In 1972, concern about bald eagle population declines nationwide prompted surveys for the species throughout Arizona (Rubink and Podborny 1976). These annual surveys have continued to the present, excluding 1976 and 1977 (e.g. Glinski 1985, Hildebrandt and Glinski 1987, McCarty et al. 2018). The Department administered and performed the 2020 surveys in cooperation with the SWBEMC.

METHODS

We monitored breeding activity at current and historic BAs, nest sites discovered between 1992 and 2019, 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 2020. Winter count flights (January), and ORA flights (February and March), 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). In 2020, the emergence of COVID-19 caused us to cease helicopter surveys after the March flight as a safety precaution because of the inability to maintain the recommended physical distance for reducing disease transmission. From April to June, only ground surveys were conducted at active breeding areas and selected nest sites. As a result of these limitations, and also due to the closure of some tribal lands during the COVID-19 pandemic, we were not able to visit some of the breeding areas later in the season in order to determine their final status (Cedar Basin, Cibecue, and Coolidge) and did not visit the Canyon de Chelly BA. Also, we did not have as much opportunity to search outside of known breeding areas as in a typical year.

Helicopters, provided or funded by 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 and off-road vehicles were also 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 survey and 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. 2019).

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=92) except for Canyon de Chelly and Nevada Bay were examined at least once for breeding activity (Figure 1). Although 73 BAs were occupied, three active BAs (Cedar Basin, Cibecue, and Coolidge) were excluded from productivity calculations since they were only surveyed prior to the pandemic-related restrictions of activities and the final outcomes were unknown. Of the remaining 70 occupied BAs, 63 were active and 36 pairs successfully produced 56 fledglings (Table 3; Appendix C) for a productivity of 0.80 statewide. For 40 BAs where nestlings were aged by feather development, the average egg laying date was estimated as January 29 (ranging from December 31 to March 25), and average hatch date was estimated as March 4 (ranging from February 4 to April 29). Overall, laying and hatch dates were earlier at lower elevations, averaging January 21 and February 25 respectively at BAs below 3,000 ft (914 m) (n=23), January 25 and February 29 at BAs from 3,000 to 6,000 ft (914 to 1,829 m) (n=7), and February 20 and March 26 at BAs above 6,000 ft (n=10).

Noteworthy findings of the 2020 nest survey included three new bald eagle BAs (Cole’s, North Fields, and Rainbow), 14 new alternate nests within BAs (Bachelor Cove #2, Bartlett #6, Buckeye #2, Doka #8, East Verde #8, Fort McDowell #20, Greer Lakes #7-9, Lower Lake Mary #5, OW #2, Pee Posh Wetlands #9, Pleasant #5, and Whiskey Spring #2), 13 fallen nests within BAs (Armer Gulch #1, Bachelor Cove #1-2, Cliff #7, Doka #3, Fort McDowell #19, Kerr #2, Oak Creek #4, Pee Posh Wetlands #7, San Carlos #7, Seventy-six #6, Talkalai #9, Tapco #6), and three new potential nests at three sites (Bear Canyon Lake #6, Muldoon #2, and Willow Springs Lake #12).

| | | | |
|--------------------------------------|------|--|------|
| Number of BAs | 92 | Number of Active BAs | 66 |
| Number of Occupied BAs | 73 | Number of Failed Breeding Attempts | 27 |
| Number of Eggs (minimum) | 92 | Number of Successful Breeding Attempts | 36 |
| Nest Success ¹ = 36/70 | 0.51 | Number of Young Hatched | 71 |
| Mean Brood Size ¹ = 56/36 | 1.56 | Number of Young Fledged ¹ | 56 |
| | | Productivity ¹ = 56/70 | 0.80 |

¹Three active sites are not included where success or failure was not determined (Cedar Basin, Cibecue, Coolidge).

DISCUSSION

Statewide productivity at Arizona bald eagle BAs in 2020 was 0.80 young fledged per occupied BA, with some differences in elevations and river systems. Most of this year’s 70 occupied BAs (those with known final status) were at low elevations (at or below 3,000 ft.) compared to middle (3,001-6,000 ft.) and high elevations (>6,000 ft.). Productivity was below the statewide average at the low elevation sites (0.68, n=40; fledged 27), average at the middle elevations (0.83, n=12; fledged 10), and above average at high elevations (1.1, n=18; fledged 19). One factor impacting productivity, especially at the low elevation BAs, was the record high temperatures starting in late April and early May, reaching or topping 100° F daily. The combined exposure and heat was the confirmed or suspected cause of nestling death at several BAs during this time, including Fort McDowell, Granite Basin, Ive’s Wash, Ladders, North Fields, Rainbow, Table Mountain, and Tortilla Creek (9 nestlings total).

There were also differences in productivity at BAs along two of the state’s central rivers. Productivity was above the statewide average on the Verde River (0.94, n=18; fledged 17) and was much higher at BAs on the regulated portion of the river (1.2, n=9; fledged 11), most of which occurred within the low elevation zone and were successful despite the early onset of 100° F days. Productivity was lower at BAs on the unregulated Verde River (0.67, n=9; fledged 6) which contained a mix of low and middle elevation sites. Overall productivity on the Salt River was low (0.57, n=14; fledged 8), where seven of thirteen active nests failed including six that were below 3,000 ft. A meaningful comparison of the regulated and unregulated portion of the Salt River was not possible this year since the end results of the nesting attempts at Cedar Basin and Cibecue were unknown, and only one other BA was occupied on the upper Salt River (Pinal).

While statewide productivity varies from year to year (Figure 3), it has been relatively high since 2004 and averaged 0.96 over the last ten years (Table 4). This year’s productivity (0.80) was not based on a complete census as the Canyon de Chelly, Cedar Basin, Cibecue, Coolidge, and Nevada Bay BAs were not fully monitored due to restrictions related to COVID-19. As a result, actual statewide productivity may have been slightly higher or lower.

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 2020. Three new BAs (Cole’s, North Fields, and Rainbow) were confirmed this year, two of which are located within the Phoenix metropolitan area and largely include disturbed or urban habitat components. The potential discovery of additional

new BAs was curtailed this year due to the absence of helicopter flights in April and May, a time when we typically schedule surveys to explore new areas and follow up on sightings of bald eagles. 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.

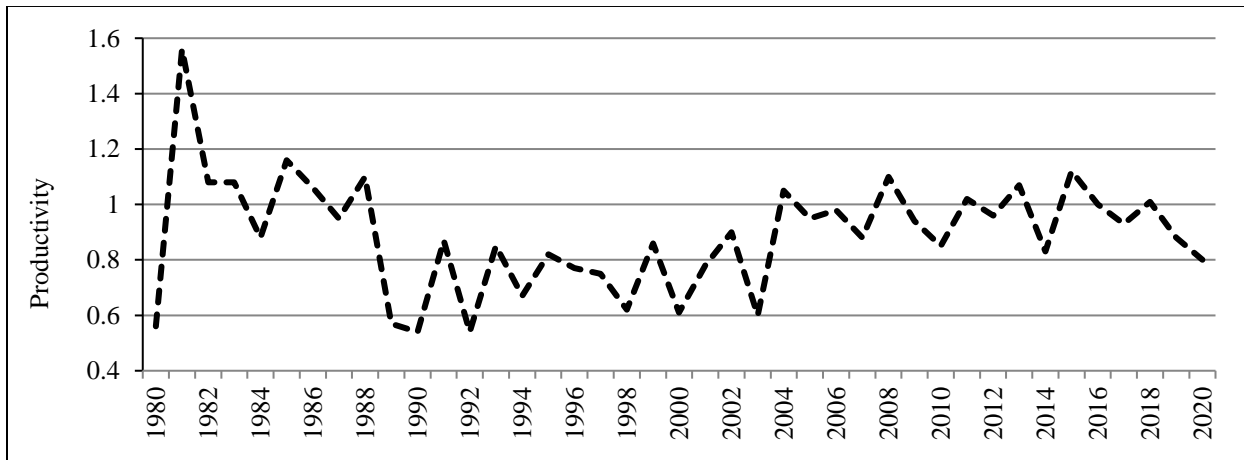


Figure 3. Productivity at bald eagle breeding areas in Arizona, 1980-2020.

| | 2020 | 2019 | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 |
|------------------------------|-------------------|------|------|------|------|------|------|------|------|------|
| Number of BAs | 92 | 89 | 87 | 85 | 81 | 76 | 68 | 68 | 66 | 62 |
| Number of occupied BAs | 73 | 74 | 69 | 68 | 65 | 59 | 52 | 54 | 54 | 55 |
| Occupancy rate (%) | 79.3 | 83.1 | 79.3 | 80.0 | 80.2 | 77.6 | 76.5 | 79.4 | 81.8 | 88.7 |
| Number of eggs (minimum) | 92 | 97 | 102 | 97 | 97 | 90 | 73 | 79 | 80 | 80 |
| Number of active BAs | 66 | 67 | 63 | 60 | 60 | 56 | 47 | 49 | 50 | 51 |
| Failed breeding attempts | 27 | 26 | 19 | 25 | 19 | 17 | 17 | 14 | 19 | 17 |
| Successful breeding attempts | 36 | 41 | 44 | 35 | 41 | 39 | 30 | 35 | 31 | 34 |
| Young hatched | 71 | 72 | 87 | 82 | 79 | 75 | 58 | 71 | 66 | 66 |
| Young fledged | 56 ¹ | 65 | 70 | 63 | 65 | 66 | 43 | 57 | 52 | 56 |
| Nest success | 0.51 ¹ | 0.55 | 0.64 | 0.51 | 0.63 | 0.66 | 0.58 | 0.65 | 0.57 | 0.62 |
| Mean brood size | 1.6 ¹ | 1.6 | 1.6 | 1.8 | 1.6 | 1.7 | 1.4 | 1.6 | 1.7 | 1.6 |
| Productivity | 0.80 ¹ | 0.88 | 1.01 | 0.93 | 1.0 | 1.12 | 0.83 | 1.06 | 0.96 | 1.0 |

¹Three active sites are not included where success or failure was not determined (Cedar Basin, Cibecue, Coolidge).

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.

Agua Fria River. – On January 6, we surveyed the Agua Fria River for two miles upstream of Table Mesa Road. No new nests or eagles were found.

Big Sandy River. – On January 27, we surveyed cottonwood trees along the Big Sandy River for two miles upstream of its confluence with the Santa Maria River. No new nests or eagles were found.

Burro Creek. – On January 27, we surveyed Burro Creek upstream of the Burro Creek BA for five miles, and downstream of the BA for about four miles. No new nests or eagles were found.

Cole's (new BA). – On March 4, a member of the public reported a bald eagle at a nest in a saguaro cactus (*Carnegiea gigantea*), with a similar observation reported by a Department Wildlife Manager on March 7. An adult was seen perched in this new nest (#1) on March 16 but breeding activity was not confirmed until March 20 when Nestwatchers observed a prey delivery and feeding of a nestling. A four-week old nestling was observed on March 23 (Figure 4).

Goldwater Lake. – On March 23, a brief survey was conducted and one adult bald eagle was observed soaring about one mile west of the lake.

North Fields (new BA). – On January 4, a member of the public reported a pair of bald eagles building a new nest in a eucalyptus tree on GRIC land adjacent to the city of Chandler. Biologists with GRIC and SRP observed the adult birds visiting the nest (#1) through January and confirmed incubation by February 13. On June 1, a juvenile was found on the ground and taken to Liberty Wildlife where it was treated for dehydration and exhaustion, and on June 4 its sibling was reported by GRIC as found dead below the nest. On June 9, AGFD and GRIC released the surviving juvenile back to the nest. However on June 11 the juvenile was found on the ground again and recovered by AGFD and GRIC, and taken to Liberty Wildlife. Due to the observed absence of adult eagles at the nest during June 9-11, the juvenile was fostered to the Greer Lakes breeding area on June 16.

Rainbow (new BA). – In January, a pair of adult bald eagles was seen near a new large nest in a snag near the Gila River in Buckeye, and the nest was assigned to the Buckeye BA as nest #2. In February, we received several additional reports of eagles in this area from birdwatchers and other sources. On March 2, a bald eagle was found incubating or brooding in another new nest in a tree about one mile away. Subsequent observations at this latter nest revealed that one of the breeding pair was in near-adult plumage and therefore a distinct pair and a new breeding area (Rainbow BA, nest #1) (Figure 4).



Figure 4. Cole's (left) and Rainbow (right) breeding areas.

Sycamore Creek. – On January 27, we searched two miles upstream on Sycamore Creek on the Verde River just north of Sheep Bridge. Although there are many live cottonwood trees and snags large enough for eagles, no new nests or eagles were found.

Tangle Creek. – On January 27, we searched the first set of cottonwood trees upstream from the Verde River where Horseshoe nest #11 used to exist. No new nests or eagles were found.

| Location | Date(s) | Survey Method | Results |
|------------------|------------------------------|--------------------|---|
| Agua Fria River | 1/6 | Helicopter | No nests or eagles. |
| Big Sandy River | 1/27 | Helicopter | No nests or eagles. |
| Burro Creek | 1/27 | Helicopter | No nests or eagles. |
| Cibecue Crossing | 1/9, 1/28, 3/17 | Helicopter | All known nests empty. No eagles. |
| Cole's | 3/16, 3/23, 4/28, 4/29, 5/19 | Helicopter, Ground | 3/23: Adult with one nestling, 4 weeks old, in new nest (#1) in a saguaro cactus. |
| Goldwater Lake | 3/23 | Helicopter | One adult soaring. |
| North Fields | 6/9, 6/10, 6/11 | Ground | 6/9: Released juvenile to nest #1. 6/11: Rescued fallen juvenile. |
| Rainbow | 3/2, 3/23, 4/20, 4/30 | Helicopter, Ground | 3/2: Bald eagle incubating or brooding in a new nest (#1) in a snag. |
| Sycamore Creek | 1/27 | Helicopter | No new nests or eagles. |

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 raptor species.

Bear Canyon Lake. – On May 6, ospreys were active in nest #5 and a new nest (#6). Nest #3 was not found and no eagles were seen.

Black Canyon Lake. – On April 29, a pair of adult bald eagles was seen perched in a snag along a ridgeline above the lake. One of the adults had no bands (male) while the other adult (female) had a blue band on the left leg which was partially read (2?/H). Our observations suggest it is possible these birds were the same ones seen at the OW BA on April 7 since the band status of each bird and the partial band number of the female are both consistent with the eagles identified at OW. Also, the two areas are only separated by seven miles and no eagles were seen at the OW BA on April 29 just hours prior to visiting Black Canyon Lake.

Blue Ridge Reservoir. – On May 7, a near-adult bald eagle was seen near the dam. Ospreys were standing in nest #8 and attending a nestling in nest #9. Nest #2 was not found this year as well as 2017 and 2019, and is considered as fallen. Nest #7 was empty.

Granite. – On March 23, a golden eagle was incubating in nest #6.

Knoll Lake. – On May 6, ospreys were active in nests #5 and #7, and an osprey was seen flying to nest #6. No eagles were seen.

Muldoon. – On January 6, a new large nest (#2) was found in a hole in a small cliff. A smaller nest, perhaps medium size, was noted close by in a crack to the right.

Willow Springs Lake. – On April 8, an osprey was seen standing or possibly sitting in a new nest (#12) in a snag. On April 30 to May 1, ospreys were found active in nests #2, 5, 11, and 12 and nests # 7-10 were not found. No eagles were seen.

| Location* | Date(s) | Survey Method | Results |
|-------------------------|-----------------|---------------|--|
| Bear Canyon Lake | 5/6 | Ground | Ospreys active in nest #5 and new nest #6. Nest #3 not found. No eagles. |
| Black Canyon Lake | 4/29 | Ground | Pair of adult bald eagles perched. No new nests. |
| Blue Ridge Reservoir | 5/7 | Ground | Pair of ospreys standing in nest #8. Ospreys with one nestling in nest #9. Nest #2 not found. One near-adult bald eagle. |
| Granite (2GE049) | 1/6, 1/27, 3/23 | Helicopter | 3/23: Golden eagle incubating in nest #6. |
| Hell Point (3GE017) | 1/6, 1/27, 3/23 | Helicopter | All known nests empty. No eagles. |
| Hidden Valley | 1/27 | Helicopter | All known nests empty. No eagles. |
| Knoll Lake | 5/6 | Ground | Ospreys active in nests #5 and #7. Osprey flew to nest #6. No eagles. |
| Lost Mule (1GE056) | 1/9 | Helicopter | Nests #1-2 empty. No eagles. |
| Mormon Pocket (2GE031) | 1/27, 3/23 | Helicopter | All known nests empty. 1/27: One golden eagle flying. |
| Muldoon | 1/6, 1/27, 3/23 | Helicopter | |
| Needles Eye (6NE107) | 3/17 | Helicopter | All known nests empty. No eagles. |
| Pineasco Creek | 1/9, 1/28, 3/17 | Helicopter | All known nests empty. No eagles. |
| Porphyry Gulch (6NE129) | 3/17 | 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 |
| Watson Lake (3GE010) | 1/27, 3/23 | Helicopter | All known nests empty. No eagles. |
| Willow Springs Lake | 4/8, 4/30, 5/1 | Ground | 4/8: Osprey incubating in new nest #12. 4/30-5/1: Ospreys active in nests #2, 5, 11-12. Nests #7-10 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.

| Table 7. Arizona bald eagle nest survey summary, 2020 historic breeding areas. | | | |
|--|---------|---------------|-----------------------------------|
| Location | Date(s) | Survey Method | Results |
| Canyon | 1/7 | Helicopter | No new nests or eagles. |
| Mule Hoof | 1/28 | Helicopter | All known nests empty. 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.

Armer Gulch BA. – On January 7, nest #1 was fallen. No eagles were seen and no new nests were found during three surveys this season. Currently there is no extant nest.

Bachelor Cove BA. – On January 7, nest #1 was fallen and an adult was found incubating in a new nest (#2) in a live cottonwood tree. On April 18, Nestwatchers reported that nest #2 had fallen with two 10-week old nestlings in the nest. One of the juveniles was located and later seen successfully fledged. Although no carcass was found near the fallen nest, a second juvenile was never confirmed to have survived.

Bartlett BA. – On January 6, a new large nest (#6) was found on a cliff.

Buckeye BA. – On January 6, one adult was perched in the area of fallen nest #1. On January 16, a new large nest (#2) was found in a tree 2.9 miles from the fallen nest. The next day, a pair of adult bald eagles was perched near the new nest. An adult was observed standing in the nest on March 23, but the nest was empty. Although this new nest is only about one mile from the new Rainbow BA nest, we assigned it to the Buckeye BA due to the presence here of a pair of eagles in adult plumage, whereas the pair of eagles at the Rainbow BA was observed to consist of one bird in adult plumage and one in near-adult plumage.

Canyon de Chelly BA. – Due to the emergence of the COVID-19 virus, no surveys were conducted at this breeding area in 2020.

Cedar Basin BA. – On March 17, an adult was incubating in nest #9. Due to the emergence of the COVID-19 virus, aerial flights were suspended after the March survey and no other surveys were conducted at this breeding area.

Cibecue BA. – On March 17, an adult was incubating in nest #9, and a second adult was perched. Due to the emergence of the COVID-19 virus, aerial flights were suspended after the March survey and no other surveys were conducted at this breeding area.

Cliff BA. – On January 6, nest #7 was fallen. On January 27, we searched two miles upstream Davenport Wash however no nests or eagles were found.

Coolidge BA. – On January 7 and 28, an adult was incubating in nest #5. On March 3 and 17, an adult was seen with one nestling. Due to the emergence of the COVID-19 virus, aerial flights were suspended after the March survey and no other surveys were conducted at this breeding area.

Crescent BA. – On March 17, an adult was seen at nest #1 during a helicopter survey. On April 17, one adult was in nest #1 apparently maintaining the nest and a second adult was perched by the nest. Nestwatchers observed a pair of adults performing courtship behavior and nest-building during April.

Doka BA. – On January 6, nest #3 was fallen. On March 23, a new large nest was found in a live cottonwood tree. One adult was standing in the nest with one nestling 1-2 weeks old.

East Verde BA. – On January 6, a rock fall was seen covering nest #6 appearing to make it unusable, and a new large nest (#8) was found in a large snag. On March 23, an adult was in the new nest with two small nestlings (Figure 6).

Fish Creek BA. – On May 4, an adult was seen perched near Horse Mesa Dam. On May 5, two adults were seen, one of them visiting nest #1 briefly. No breeding behavior or new nests were observed.

Fort McDowell BA. – On January 6, nest #19 was fallen. On March 23, two adults were perched in a new large nest (#20) in a mesquite tree (*Prosopis sp.*) with two nestlings (Figure 6).

Gilbert BA. – No new nests or eagles were reported by the public.

Green River BA. – On January 6, nest #1 was noted as fallen, but the nest had been rebuilt by January 27.

Greer Lakes BA. – On April 16, a 2.5-week old nestling was observed in a new large nest (#7) in a live pine tree. The nest was built in the same tree as nest #5 had been in 2013-2014 (that nest fell in 2014). Two other new nests were found in snags at the lake, with a pair of ospreys nest-building at new nest #8 and one osprey perched near new nest #9.



Figure 5. East Verde (left) and Fort McDowell (right) breeding areas.

Kerr BA. – On January 7, nest #2 was fallen and one adult was perched. No new nests were discovered. This year, adults were seen with young at the Orme BA and another pair of adults was perching at a nest downstream of the Orme BA. It is likely that one of these pairs was the Kerr eagles who had to move due to nest #2 falling.

Lone Pine BA. – On January 9 and 28, one adult was observed in the area and all known nests were empty. No other eagles or nests were found.

Lower Lake Mary BA. – On May 6, two nestlings 4.5 weeks old were found in a new nest (#5) in a live pine tree.

Nevada Bay BA. – Due to the emergence of the COVID-19 virus, aerial flights were suspended in March and no surveys were conducted at this breeding area.

Oak Creek BA. – On April 10, nest #4 was fallen.

Orme/Kerr. – On January 7, an adult was standing in Orme nest #11, and on January 27 one adult was perched by the same nest. On March 17, two adults were standing in Orme nest #11. Since Orme nest #7 and Granite Reef nest #7 were both active this year, it is possible that one or both adults observed at Orme nest #11 were the pair from the Kerr breeding area whose nest was observed fallen. Alternatively, the Kerr pair could have taken over Orme nest #7 and forced the Orme pair downstream to nest #11. Either way, nestwatchers observed this additional pair defending the territory around nest #11.

OW BA. – On April 7, two adults were observed in the area and a new large nest (#2) was confirmed in a live pine tree. The new nest had been reported by the USFS on April 1. The adult male eagle was not banded and the female had a silver band on the right leg and blue band on the left leg (25/H; 2010 nestling from the Oak Creek BA).

Pee Posh Wetlands BA. – On March 18, the GRIC and City of Phoenix reported that the tree for nest #7 had fallen. On October 30, GRIC reported the eagles building a new nest (#9) in a snag.

Perkinsville BA. – On January 6, two adults were seen flying.

Pleasant BA. – On February 11, Nestwatchers reported a new nest (#5) on a cliff with two nestlings.

San Carlos BA. – On January 7, nest #7 was fallen and one adult was perched.

Seventy-six BA. – On March 17, nest #6 was fallen. The entire nest branch had broken off from the main trunk of the snag.

Sullivan Lake BA. – On August 28, nest #2 was confirmed fallen. The nest had been observed in poor condition at the end of the breeding season.

Talkalai BA. – On January 7, nest #9 was fallen. A pair of adults was seen during an aerial survey on January 28. SCAT reported regularly seeing the pair but no nesting occurred.

Tapco BA. – On January 27, nest #5 was fallen.

Tower BA. – During three surveys (January 6, January 27, and March 23) no eagles were seen and no new nests were found. Nest #2 was in fair condition and there were no signs of occupancy, making 2020 the tenth consecutive year that this BA has been unoccupied. Tower will now be designated a historic BA, although it will be monitored during future aerial surveys.

Whiskey Spring BA. – On January 6, an adult was standing in a new nest (#2) on a cliff.

| Location | Date(s) | Survey Method | Results |
|------------------|--|--------------------|--|
| Armer Gulch | 1/7, 1/28, 3/17 | Helicopter | 1/7: Nest #1 fallen. |
| Bachelor Cove | 1/7, 1/28, 3/17, 4/18, 4/21 | Helicopter, Ground | 1/7: Nest #1 fallen. Adult incubating in new tree nest (#2). 4/18: Nest #2 fallen. |
| Bartlett | 1/6, 1/27, 3/20, 3/23, 4/15, 4/21, 5/7, 6/11, 6/24 | Helicopter, Ground | 1/6: New large nest (#6) found on cliff. |
| Buckeye | 1/6, 1/16, 1/17, 1/27, 3/23, 4/20 | Helicopter, Ground | 1/6: One adult perched. 1/16: New large nest (#2) found in tree. 1/17: Pair of adults perched near nest #2. 3/23: One adult standing in nest #2. |
| Canyon de Chelly | -- | -- | Not surveyed due to COVID-19. |
| Cedar Basin | 1/9, 1/28, 3/17 | Helicopter | 3/17: Adult incubating in nest #9. |
| Cibecue | 1/9, 1/28, 3/17 | Helicopter | 3/17: Adult incubating in nest #9. |
| Cliff | 1/6, 1/27, 3/23 | Helicopter | 1/6: Nest #7 fallen. |
| Coolidge | 1/7, 1/28, 3/3, 3/17 | Helicopter, Ground | 1/7 & 1/28: Adult incubating in nest #5. 3/3: Adult with at least one small nestling. 3/17: Adult with one nestling, 2.5-3 weeks old. |

| Table 8 continued. | | | |
|--------------------|------------------------------|--------------------|--|
| Location | Date(s) | Survey Method | Results |
| Crescent | 1/8, 1/28, 3/17, 4/17 | Helicopter, Ground | 3/17: One adult perched at nest #1. 4/17: Pair of adults at nest #1. |
| Doka | 1/6, 1/27, 3/23 | Helicopter | 1/6: Nest #3 fallen. 3/23: Adult in new nest (#8) in tree with one nestling 1.5 weeks old. |
| East Verde | 1/6, 1/27, 3/23, 5/15 | Helicopter, Ground | 1/6: Nest #6 with rock fall. New large nest (#8) found in tree. 3/23: Adult in nest #8 with two nestlings 2 weeks old. |
| Fish Creek | 1/7, 1/28, 3/17, 5/4, 5/5 | Helicopter, Ground | 5/4: One adult perched. 5/5: Two adults in area. |
| Fort McDowell | 1/6, 1/27, 3/23 | Helicopter | 1/6: Nest #19 was fallen. 3/23: Two adults in a new large nest (#20) with two nestlings 3 weeks old. |
| Gilbert | -- | -- | No new nests or eagles reported. |
| Green River | 1/6, 1/27, 3/23, 5/8 | Helicopter, Ground | 1/6: Nest #1 fallen. 1/27: Nest #1 re-built. |
| Greer Lakes | 1/28, 3/17, 4/16, 4/17, 6/16 | Helicopter, Ground | 4/16: One 2.5-week old nestling in new nest (#7) in tree. |
| Kerr | 1/7, 1/28 | Helicopter | 1/7: Nest #2 fallen. One adult perched. |
| Lone Pine | 1/9, 1/28, 3/17 | Helicopter | 1/9: One adult by nest #2. 1/28: One adult flying. |
| Lower Lake Mary | 4/14, 5/6, 5/27, 6/12 | Ground | 5/6: New nest (#5) with two nestlings, 4.5 weeks old. |
| Nevada Bay | -- | -- | Not surveyed due to COVID-19. |
| Oak Creek | 1/6, 1/27, 3/23, 4/10 | Helicopter, Ground | 4/10: Nest #4 fallen. |
| Orme/Kerr | 1/7, 1/27, 3/17 | Helicopter | 1/7: One adult in Orme nest #11. 1/27: One adult at nest #11. 3/17: Two adults standing in nest #11. |
| OW | 4/7, 4/29 | Ground | 4/7: Pair of adults in area. New nest #2. |
| Pee Posh Wetlands | 1/6, 1/27 (3/18, 10/30) | Helicopter | 3/18: Nest #7 reported as fallen. 10/30: Pair of adults reported building new nest #9. |
| Perkinsville | 1/6, 1/27, 3/23 | Helicopter, Ground | 1/6: Two adults flying. |
| Pleasant | 1/6, 1/22, 1/27, 2/19, 3/16 | Helicopter, Ground | 2/19: Adult with at least one nestling in a new nest (#5). |
| San Carlos | 1/7, 1/28, 3/17 | Helicopter | 1/7: Nest #7 fallen. One adult perched. |
| Seventy-six | 1/7, 1/28, 3/17 | Helicopter | 3/17: Nest #6 fallen. |
| Sullivan Lake | 1/6, 1/27, 3/23, 8/28 | Helicopter, Ground | 8/28: Nest #2 fallen. |
| Talkalai | 1/7, 1/28 | Helicopter | 1/7: Nest #9 fallen. 1/28: Pair of adults. |
| Tapco | 1/6, 1/27, 3/23 | Helicopter | 1/27: Nest #5 fallen. |
| Tower | 1/6, 1/27, 3/23 | Helicopter | No new nests or eagles. |
| Whiskey Spring | 1/6, 1/22, 1/27, 2/19 | Helicopter, Ground | 1/6: Adult standing in new nest (#2) on cliff. |

Breeding Areas in Surrounding States

No surveys were completed at breeding areas in southern California or along the Colorado River in Nevada (Black Canyon, Copper Basin, Whipple Mountains). However, the Metropolitan Water District of Southern California reported one young fledged at the Copper Basin BA and that the nest tree was blown over during a severe wind storm in October.

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, Rainbow, 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:
 - 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 – 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; 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), Cibola Havasu National Wildlife Refuge, Havasu National Wildlife Refuge, Imperial 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 and Santa Fe Reservoir.
 - Urban and rural areas – Payson, Stanfield.

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 2020. 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, Cole's, Concho, Crescent, Goldfield, Luna, Pleasant, Whiskey Spring, and Woods Canyon), those without closures (Granite Reef, Orme, and Rodeo), and those monitored opportunistically for information (Doka, Fort McDowell, Sycamore, and Tonto). In the fall of 2019, 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 one question and answer session for the selected ABENWP contractors (nestwatchers). The two orientation 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 session occurred after the first 10-day work period. Subsequent communication was achieved via phone and email due to COVID-

19. 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 7 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 Bachelor Cove, Box Bar, Concho, and Woods Canyon BAs, nestwatchers recorded human activity differently than described above. At the Bachelor Cove BA, nestwatchers had a limited view of the area with observations primarily restricted to the nest canyon and immediate area. Traffic along Highway 188 was not recorded due to its regular presence and no reaction from the resident eagles. 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.

In 2020, the state of Arizona enacted some restrictions in response to the COVID-19 pandemic, including the closure of schools and some businesses. As a result, Nestwatchers reported observing more human activity at eagle BAs as people got outdoors more. Nestwatchers were instructed to maintain physical distance and to not interact with people if they did not feel comfortable doing so. Therefore, close interactions with the public and other education opportunities may have been more limited this season, but overall human activity was higher in many areas.

RESULTS AND DISCUSSION

The ABENWP monitored 21 breeding areas (either full or part-time) in 2020 including Bachelor Cove, Box Bar, Cole's, Concho, Crescent, Doka, Fort McDowell, Goldfield, Granite Reef, Luna, Orme, Pleasant, Rodeo, Sycamore, Tonto, Whiskey Spring, and Woods Canyon (Appendix C). The Doka, Fort McDowell, Granite Reef, and Whiskey Spring BAs were either monitored part-time or opportunistically by nestwatchers at nearby BAs. Therefore, data for some these sites are not included in the following section of this report.

Bachelor Cove Breeding Area (Appendix E, Figure 6)

Observation Period. – February 7 to April 27. Total monitoring 490 hours over 54 days.

Bald Eagle Identification. – Both eagles were in adult plumage. Nestwatchers reported that the female was not banded (unknown origin), and the male 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 maintained “No Entry” signs around the nest area.

Human Activity. – Nestwatchers recorded 1,025 human activities. Terrestrial activity of ten types represented 80.5% of activities, watercraft (boat, canoe, standup paddleboard) 19.1%, and aircraft activity (small plane, jet) 0.4%. Four types of activity elicited 11 significant responses from the breeding pair. The bald eagles were restless in response to three hikers and two drivers, and flushed to two hikers, one driver, one OHV, one canoe, and one Nestwatcher.

Food Habits. – The nestwatchers observed six forage events, with fish accounting for 66.7% and mammals 33.3%. The male was successful in 100% (n=2), the female in 100% (n=1), the adults in tandem in 0% (n=1), and an unknown adult in 100% (n=2) of forage events. The breeding pair was observed delivering 58 prey items to the nest, of which the male delivered 46.6%, the female

32.8%, and an unknown adult 20.7%. Fish comprised 72.4%, birds 6.9%, mammals 1.7%, and unknown prey 19.0% of the deliveries. Of the 7 prey items further identified, 28.6% each were sucker species, and 14.3% each were flathead catfish (*Pylodictis olivaris*), channel catfish (*Ictalurus punctatus*), American coot (*Fulica americana*), waterfowl species, and black-tailed jackrabbit (*Lepus californicus*).

Habitat Use. – The Bachelor Cove nestwatchers identified 32 separate perch locations. The bald eagle pair spent 76.9% of the observed time at lake km (lk) 82.3, 11.9% at lk 82.5, 7.3% at lk 82.4, and 3.9% at lk 82.6.



Figure 6. Bachelor Cove (left) and Box Bar (right) breeding areas. Gila and Maricopa Counties, Arizona.

Box Bar Breeding Area (Appendix F, Figure 6)

Observation Period. – February 7 to May 17. Total monitoring 670 hours over 78 days.

Bald Eagle Identification. – Both adults were in adult plumage. Nestwatchers reported the male was not banded (unknown origin), and 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.

Human Activity. – Nestwatchers recorded 475 human activities. Terrestrial activity of 12 types represented 91.8%, water pursuits (canoe/kayak, tuber) 6.9%, and aircraft activity (small planes, helicopters, motorized parachutes) 1.3%. Six types of activities elicited seven significant responses from the breeding pair. The bald eagles were restless in response to one gunshot and one motorized parachute, and flushed in response to one photographer, one horseback rider, one agency personnel, one gunshot, and one driver.

Food Habits. – The nestwatchers observed five forage events, with mammals accounting for 60.0%, reptiles 20.0%, and unknown prey 20.0%. The male was successful in 50.0% (n=2) and the female in 100% (n=3) of forage events. The breeding pair was observed delivering 54 prey items to the nest, of which the male delivered 70.4% and the female 29.6%. Fish comprised 85.2%,

mammals 7.4%, and unknown prey 7.4% of the deliveries. Of the 36 prey items further identified, 72.2% were sucker species, 16.7% were bass species, 5.6% were ground squirrel species, 2.8% were common carp (*Cyprinus carpio*), and 2.8% were rabbit species.

Habitat Use. – The Box Bar nestwatchers identified 13 separate perch locations spanning 1.3 km of the Verde River ranging from river kilometer (rk) 24.8 to 26.1. The bald eagle pair spent 50.6% of the observed time at rk 25.8, 47.4% at rk 25.5, and 2.0% at the remaining locations.

Cole's Breeding Area (Appendix G, Figure 7)

Observation Period. – March 20 to May 25. Total monitoring 328 hours over 50 days.

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

Management Activities. – 1) Nestwatchers were supplied a boat by AGFD and educated recreationists about the bald eagles. 2) MCPRD closed access to the road above the nest.

Human Activity. – Nestwatchers recorded 4,906 human activities. Water pursuits of nine types represented 99.4%, aircraft activity (small planes, helicopters, jets, and motorized parachutes) 0.5%, and terrestrial activity 0.1%. The bald eagles flushed in response to four OHVs, two motorized parachutes, one boater, and one helicopter.

Food Habits. – The nestwatchers observed 16 forage events, with fish accounting for 81.3%, birds 6.3%, and unknown prey 12.5%. The male was successful in 100% (n=3), the female in 57.1% (n=7), and an unknown adult in 16.7% (n=6) of forage events. The breeding pair was observed delivering 60 prey items to the nest, of which the male delivered 21.7%, the female 43.3%, and an unknown adult 35.0%. Fish comprised 58.3%, birds 3.3%, and unknown prey 38.3% of the deliveries. Of the two prey items further identified, 50% were striped bass (*Morone saxatilis*) and 50% were Western grebes (*Aechmophorus occidentalis*).

Habitat Use. – The Cole's nestwatchers identified 29 separate perch locations (see Nestwatch report for map kilometers). The bald eagle pair spent 27.5% of the observed time at map kilometer 0.6, 24.0% at 0.8, 13.4% at 1.0, 8.6% at 0.7, 8.2% at 0.5, 6.2% at 1.1, and 12.2% at the remaining locations.



Figure 7. Cole's (left) and Concho (right) breeding areas. Maricopa and Apache Counties, Arizona.

Concho Breeding Area (Appendix H, Figure 7)

Observation Period. – March 3 to June 1. Total monitoring 755 hours over 80 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.

Human Activity. – Nestwatchers recorded 341 human activities. Terrestrial activity of 12 types represented 91.2%, water pursuits (canoe) 8.5%, and aircraft activity (drone) 0.3%. Ten types of activities elicited 23 significant responses from the breeding pair. The bald eagles were restless in response to one photographer, and flushed in response to six hikers, five drivers, two anglers, two dog walkers, two OHVs, and one each of kayak, canoe, photographer, gunshot, and children.

Food Habits. – The nestwatchers observed 39 forage events, with fish accounting for 74.4%, mammals 12.8%, birds 10.3%, and 2.6% unknown. The male was successful in 45.5% (n=22) and the female in 41.2% (n=17) of forage events. The breeding pair was observed delivering 50 prey items to the nest, of which the male delivered 50.0% and the female 50.0%. Fish comprised 46.0%, mammals 24.0%, birds 2.0%, and unknown prey 28.0% of the deliveries. Of the 24 prey items further identified, 25.0% were Gunnison's prairie dogs, 20.8% were catfish species, 16.7% each were common carp, rainbow trout (*Oncorhynchus mykiss*), mountain cottontail (*Sylvilagus nuttallii*), and 4.2% were American coots.

Habitat Use. – The Concho nestwatchers identified 38 separate perch locations at the lake. The bald eagle pair spent 48.0% of the observed time at lk 1.3, 11.0% at lk 1.1, 7.7% at lk 1.2, 7.7% at lk 1.5, 7.2% at lk 1.0, 6.9% at lk 1.7, 3.7% at lk 0.8, and 7.7% at the remaining locations.

Crescent Breeding Area (Appendix I, Figure 8)

Observation Period. – April 5 to April 26. Total monitoring 144 hours over 16 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 79 human activities during the monitoring period. Terrestrial activity of six different types represented 91.1%, and water pursuits (boater, float tuber, kayak/canoe) 8.9%. None of the activities elicited any significant responses from the breeding pair.

Food Habits. – No forage events were observed. The male delivered one fish to the nest where the female ate it.

Habitat Use. – The Crescent nestwatchers identified seven perch locations around Crescent Lake. The bald eagle pair spent 92.1% of the observed time 1k 2.3, 3.9 % at 1k 1.1, and 4.1% at the remaining locations.



Figure 8. Crescent (left) and Goldfield (right) breeding areas. Apache and Maricopa Counties, Arizona.

Goldfield Breeding Area (Appendix J, Figure 8)

Observation Period. – February 7 to April 28. Total monitoring 490 hours over 62 days.

Bald Eagle Identification. – The Nestwatchers reported the male had a blue VID band “30/V” on his left leg, USFWS band on the right leg, and was in adult plumage (2015 Sheep Creek nestling), and 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 1,184 human activities during the observation period. Terrestrial activities of 12 different types represented 74.0%, water activities (canoe/kayak, stand-

up paddleboard, tuber, airboat, swimmer, fishing boat) 19.6%, and aircraft (helicopters, small planes, drones) 6.4%. None of the activities elicited any significant responses from the breeding pair.

Food Habits. – The nestwatchers observed the breeding pair delivering 36 prey items to the nest, of which the male delivered 58.3%, the female 38.9%, and an unidentified adult 2.8%. Fish comprised 38.9% of these deliveries, mammals 8.3%, and unknown prey types 52.8%. Of the five prey items further identified, 60% were unknown sucker species and 20% each were desert cottontail (*Sylvilagus audubonii*) and ground squirrel species.

Habitat Use. – The Goldfield nestwatchers identified 23 perch locations, spanning a 4.8 km stretch of the Salt River ranging from rk 8.8 to 13.6. The bald eagle pair spent 51.7% of the observed time at rk 9.3, 21.1% at rk 10.1, 11.7% at rk 9.8, 10.9% at rk 8.8, and 4.5% at the remaining locations.

Granite Reef Breeding Area (Appendix K, Figure 9)

Observation Period. – February 13 to April 9. Total monitoring 44.3 hours over 16 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.

Human Activity. – The nestwatchers recorded 124 human activities. Aircraft (helicopters, small planes, drones) represented 98.4% and terrestrial activity (construction, driver) 1.6%. One type of activity elicited one significant response from the breeding pair. The bald eagles flushed in response to one drone.



Figure 9. Granite Reef (left) and Luna (right) breeding areas. Maricopa and Apache Counties, Arizona.

Food Habits. – The nestwatchers observed one forage event, with the female eagle successful in foraging one fish. The breeding pair was observed delivering six prey items to the nest, of which

the male delivered 66.7% and the female 33.3%. Fish comprised 50.0% of the deliveries and unknown prey types 50.0%. None of the prey items was identified to species.

Habitat Use. – The Granite Reef nestwatchers identified seven perch locations spanning 3.2 km along the Salt River ranging from rk 0.0 to 3.2. The bald eagle pair spent 55.2% of the observed time at rk 0.0, 39.1% at rk 0.3, and 5.7% at the remaining locations.

Luna Breeding Area (Appendix L, Figure 9)

Observation Period. – February 7 to March 29. Total monitoring 352 hours over 40 days.

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

Management Activities. – 1) The USFS enacted a closure around nest #1. 2) Nestwatchers were stationed at the boat ramp to talk to visitors.

Human Activity. – The nestwatchers recorded 390 human activities. Terrestrial activity of eleven different types accounted for 96.4%, water pursuits (fishing boats, float tubers, kayaks/canoes) for 3.3%, and aircraft (helicopters) 0.3%. None of the activities elicited a significant response from the breeding pair.

Food Habits. – The nestwatchers observed 20 forage events, with birds accounting for 95.0% and mammals for 5.0%. The male was successful in 58.3% (n=12), the female in 42.9% (n=7), and an unknown adult in 100% (n=1) of forage events. The breeding pair was observed delivering one prey item to the nest, an American coot which the male delivered.

Habitat Use. – The Luna nestwatchers identified 23 separate habitat use areas around Luna Lake. The bald eagle pair spent 42.3% of the observed time at lk 4.8, 16.2% at lk 2.4, 9.1% at lk 3.4, 7.2% at lk 2.5, 5.3% at lk 4.9, 5.0% at lk 2.6, 4.0% at lk 5.0, 3.6% at lk 5.1, and 7.2% at the remaining locations.

Orme Breeding Area (Appendix M, Figure 10)

Observation Period. – February 7 to May 24. Total monitoring 656 hours over 77 days.

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

Management Activities. – 1) The Salt River Pima-Maricopa Indian Community (SRPMIC) continues to restrict non-tribal member use to the area.

Human Activity. – The nestwatchers recorded 2,116 human activities. Aircraft (helicopter, small plane, jet, parachuter, drone) represented 65.3%, terrestrial activities of 17 types 34.5%, and water pursuits (swimmer, canoe/kayak) 0.2%. Six types of activity elicited 37 significant responses from the breeding pair. The bald eagles were restless in response to seven drivers and one photographer.

They flushed in response to 20 drivers, two hikers, two Nestwatchers, two anglers, two photographers, and one drone.

Food Habits. – The nestwatchers observed eight forage events, with fish accounting for 62.5%, mammals 25.0%, and birds 12.5%. The male was successful in 100% (n=5) and the female in 66.7% (n=3) of forage events. The breeding pair was observed delivering 64 prey items to the nest, of which the male delivered 56.3%, the female 37.5%, and an unknown adult 6.3%. Fish comprised 35.9%, mammals 23.4%, birds 10.9%, and unknown prey 29.7% of the deliveries. None of the prey items were identified to species.

Habitat Use. – The Orme nestwatchers identified 43 perch locations spanning 1.3 km along the Salt River ranging from rk 5.2 to 6.5, and 1.0 km along the Verde River ranging from rk 0.0 to 1.0. The bald eagle pair spent 58.1% of the observed time at rk 0.6 (Verde River), 18.9% at rk 1.0 (Verde River), 12.0% at rk 0.7 (Verde River), 4.1% at rk 0.4 (Verde River), 3.7% at rk 0.5 (Verde River), and 3.2% at the remaining locations.



Figure 10. Orme (left) and Pleasant (right) breeding areas. Maricopa County, Arizona.

Pleasant Breeding Area (Appendix N, Figure 10)

Observation Period. – February 27 to March 15. Total monitoring 119 hours over 25 days.

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

Management Activities. – 1) MCPRD enacted the seasonal closure around the active nest. 2) MCPRD marked closure boundaries with buoys, flags, and signs. 3) Nestwatchers were supplied a boat by AGFD and educated recreationists about the closure and bald eagles. 4) On March 16, one male and one female nestling were blue VID banded “99/A” and “35/B”, respectively, at 5.5 weeks old.

Human Activity. – Nestwatchers recorded 45 human activities. Watercraft (boats) represented 73.3%, aircraft (small planes, helicopters) 20.0%, and terrestrial activity (gunshot) 6.7%. One

activity elicited one significant response by the breeding pair. The bald eagles flushed in response to a Nestwatcher. Due to the location of the nest this year, the nestwatchers were out of view of the buoy line and were unable to gather data on compliance with the southern end of closure (see Whiskey Spring summary). However they did encounter three boats within the territory during nest monitoring.

Food Habits. – Nestwatchers observed four forage events. The male was successful in 100% (n=1), the female in 100% (n=2), and an unknown adult in 0% (n=1) of forage events. Fish accounted for 100% of these events. The breeding pair was observed delivering 27 prey items to the nest, of which the male delivered 22.2%, the female 37.0%, and an unknown adult 40.7%. Fish comprised 66.7% (n=18) of the deliveries, birds 3.7% (n=1), and unknown prey types 29.6% (n=8). Of the four prey items further identified, 25.0% (n=1) each were bluegill (*Lepomis macrochirus*), common carp, channel catfish, and American Coot.

Habitat Use. – The Pleasant nestwatchers identified 14 separate perch locations along the Agua Fria River arm of Lake Pleasant. Perches spanned a total of 1.0 km ranging from rk 72.5 to 73.5. The breeding pair spent 58.5% of the observed time at rk 73.4, 34.0% at rk 73.1, 6.1% at rk 73.5, and 1.4% at the remaining locations.

Rodeo Breeding Area (Appendix O, Figure 11)

Observation Period. – February 7 to May 22 (Full time March 20 to May 22). Total monitoring 318 hours over 65 days.

Bald Eagle Identification. – The male and female were unbanded (unknown origin).

Management Activities. – 1) The FMYN restricts non-tribal member use of the river area. 2) Nestwatchers, Fort McDowell Adventures, Green Zebra Tomcar tours, and community members worked collaboratively to ensure protection of eagles and promote outreach opportunities.

Human Activity. – Nestwatchers recorded 40 human activities. Aircraft accounted for 60.0%, terrestrial activities (OHV, Nestwatcher, gunshot, vehicle) for 37.5%, and water pursuits (swimmer) for 2.5%. One type of activity elicited four significant responses from the breeding pair. The bald eagles flushed in response to four Nestwatchers.

Food Habits. – Nestwatchers were unable to observe any forage events. The breeding pair was observed delivering 35 prey items to the nest, of which the male delivered 51.4% and the female 48.6%. Fish comprised 57.1%, birds 5.7%, reptiles 5.7%, mammals 2.9%, and unknown prey 28.6% of the delivered items. None of the prey items was further identified.

Habitat Use. – The Rodeo nestwatchers identified six separate perch locations, spanning 3.2 km along the Verde River and ranging from rk 3.1 to 6.3. The bald eagle pair spent 53.4% of the observed time at rk 3.6, 41.7% at rk 3.1, 4.6% at rk 6.3, and 0.3% at rk 5.3.



Figure 11. Rodeo (left) and Sycamore (right) breeding areas. Maricopa County, Arizona.

Sycamore Breeding Area (Appendix P, Figure 11)

Observation Period. – February 7 to March 23. Total monitoring 212.5 hours over 36 days.

Bald Eagle Identification. – The male and female were unbanded (unknown origin).

Management Activities. – 1) The FMYN restricts non-tribal member use of the river area. 2) Nestwatchers, Fort McDowell Adventures, Green Zebra Tomcar tours, and community members worked collaboratively to ensure protection of eagles and promote outreach opportunities.

Human Activity. – Nestwatchers recorded 97 human activities. Terrestrial activities (horseback rider, OHV, vehicle) accounted for 72.2%, aircraft (helicopter, small plane) for 26.8%, and water pursuits (swimmer) for 1.0%. None of the activities elicited a significant response from the breeding pair.

Food Habits. – Nestwatchers were unable to observe any forage events or prey deliveries.

Habitat Use. – The Sycamore nestwatchers identified 18 separate perch locations, spanning 3.7 km along the Verde River and ranging from rk 7.8 to 11.5, and 0.1 km along Sycamore Creek. The bald eagle pair spent 31.9% of the observed time at rk 7.8, 20.2% at rk 10.1, 17.6% at rk 10.7, 10.8% at rk 9.7, 6.3% at rk 7.9, and 13.2% at the remaining locations.

Tonto Breeding Area (Appendix Q, Figure 12)

Observation Period. – February 7 to February 21. Total monitoring 128 hours over 15 days.

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

Management Activities. – 1) Southwestern Willow Flycatcher Closure limited recreational activities in the area.

Human Activity. – Because the nesting attempt failed before Nestwatchers arrived, limited observations occurred at the BA. Two human activities (small plane, helicopter) were recorded. None of the activities elicited a significant response from the breeding pair.

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

Habitat Use. – The Tonto nestwatchers identified 13 separate perch locations, spanning 0.9 km along Tonto Creek and ranging from rk 16.8 to 17.7. The bald eagle pair spent 73.4% of the observed time at rk 16.8, 15.4% at rk 17.6, 5.9% at rk 17.0, and 5.2% at the remaining locations.



Figure 12. Tonto (left) and Whiskey Spring (right) breeding areas. Gila and Maricopa Counties, Arizona.

Whiskey Spring Breeding Area (Appendix R, Figure 12)

Observation Period. – February 7 to February 27. Total monitoring 124 hours over 17 days.

Bald Eagle Identification. – Nestwatchers reported both the male and female had no bands and were in adult plumage (unknown origin).

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

Human Activity. – Nestwatchers recorded 49 human activities. Water pursuits (boats, jet skis) accounted for 51.0%, aircraft (jets, small planes, helicopters) for 38.8%, and terrestrial activities (OHV, camper) for 10.2%. One type of activity elicited three significant responses from the breeding pair. The bald eagles were restless in response to three jets. Of the 233 watercraft that were recorded approaching the southern closure buoy line, a total of 35 (15.0%) did not comply and entered the closure.

Food Habits. – The nestwatchers observed six forage events, with fish accounting for 100%. The male was successful in 100% (n=1), the female in 100% (n=4), and an unknown adult in 100% (n=1) of forage events.

Habitat Use. – The Whiskey Spring nestwatchers identified 21 perch locations at the lake and along the Agua Fria River, spanning a total of 2.0 km and ranging from rk 68.0 to 70.0. The bald eagle pair spent 38.8% of the observed time at rk 68.9, 34.8% at rk 68.8, 10.6% at rk 68.3, 5.8% at rk 68.4, 3.9% at rk 68.2, and 6.1% at the remaining locations.

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

Observation Period. – May 1 to June 22. Total monitoring 413 hours over 49 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 1,722 human activities. Terrestrial activities of eight types accounted for 86.1%, water pursuits (canoes/kayaks, boats, swimmers, stand-up paddleboards, tubers) for 13.5%, and aircraft (recreational drones, helicopters, small planes) for 0.4%. None of the activities elicited a significant response from the breeding pair.

Food Habits. – The nestwatchers observed 45 forage events, with fish accounting for 100%. The male was successful in 85.7% (n=7) and the female in 63.2% (n=38) of forage events. The breeding pair was observed delivering 49 prey items to the nest, of which the male delivered 28.6%, the female 69.4%, and an unidentified adult 2.0%. Fish comprised 91.8%, birds 2.0%, and unknown prey 6.1% of the delivered items. Of the 41 prey items that were further identified, 100% were unknown trout species.

Habitat Use. – The Woods Canyon nestwatchers identified 28 perch locations around the lake. The bald eagle pair spent 51.9% of the observed time at lk 0.9, 21.6% at lk 0.7, 8.6% at lk 1.0, 5.5% at lk 4.9, 4.5% at lk 0.2, 3.2% at lk 4.7, and 4.6% at the remaining locations.



Figure 13. Woods Canyon breeding area. Coconino County, Arizona.

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) In response to the events that took place after Covid-19-related USFS closures, we recommend that the USFS place more permanent “no parking” signs that aren’t easily removed in areas where visitor parking isn’t allowed. During the 2020 season nestwatchers had been asked by USFS personnel to enforce their new “no parking” rule to help them regulate people trying to camp long-term in the Bachelor Cove area after Cholla Campground was closed due to Covid-19. Nestwatchers eventually determined that enforcing this new rule on behalf of the USFS created a conflict of interest, limited data reliability due to the amount of time speaking with visitors, and in some cases, posed a safety concern, as many visitors were angry about the government shutdown. Placing heavy-duty signs in these areas that are difficult to remove would help solve this issue for both agencies.

Box Bar

- 1) Many visitors to Box Bar Recreation Area were unaware that a wildlife closure was in effect. Placing large, visible 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.
- 2) During the closure of the Box Bar Recreational Area due to the Covid-19 quarantine, most of our closure violations came from the west side. The trail coming from that direction leads people towards the closure and eventually to the nest tree or its surroundings. We suggest placing a physical barrier where the trail enters the closure, at least during the duration of the breeding season.

Cole’s

- 1) Continue the closure of the OHV road above the nest. The implementation of an OHV closure is needed due to the proximity of the nest to the road and several recorded instances of reactions to human activity there. The number of road-based disturbances shrank to zero after the closure was implemented.
- 2) Currently, a water closure is not recommended. On some occasions, an influx of boats to the Cole’s breeding area was observed after they were re-directed from the Agua Fria closure line.

Concho

- 1) Consideration should be given to the installation of a gate across the access road to the AZGFD property on the southeast shore of the lake. The ability to lock out vehicular access to this area during the Bald eagle breeding season should be of substantial benefit to the

resident eagles. The roads accessed from this gate allow individuals to drive to within approximately 50 meters of the nest. People approaching in this manner are not visible to Nestwatchers, as visibility is blocked by the band of cottonwoods. This situation prevents Nestwatchers from being able to intervene before human activity can disturb the resident adults. It should be noted that Nestwatcher conversations with several locals indicates that AZGFD property is used for small game and waterfowl hunting access in the fall and the winter, so it is recommended that this gate only be locked as necessary during the bald eagle breeding season.

- 2) Foot access to the nest area by people crossing the lake inlet area at the south end of the lake is also a concern. Conversations with people who had seen the signs advising against entering the area indicate that there is a misunderstanding of the signs' meaning. Part of this confusion could stem from the wording of the signs, particularly the phrase: "Entering may violate Federal, State, or Tribal laws." The use of the word "may" indicates to the reader that entering the area might or might not be legal. Some individuals reasoned that simply walking through an area would not significantly disturb any wildlife. As rewording and production of new signs would be a significant undertaking, Nestwatchers should consider posting one individual in the parking lot/boat-ramp area on high use days to explain the signs and educate the public about the importance of staying away from the nest area during the breeding season.

Crescent

- 1) We recommend that the boundary on the east (lake) side be moved lower to just above the trail along the shoreline. This would eliminate visual access to the nest tree and help prevent birds being flushed by human activity. On the north and west sides, there are few standing trees remaining and our recommendation is to re-align this side of the closure boundary directly with the existing fence line until it reaches the remaining stand of timber on the southwest side. At the remaining tree line on the west side, maintain the closure boundary around the timber continuing south until the boundary connects on the south end. Additional yellow signs will need to be purchased.

Goldfield

- 1) Continue posting and maintaining signage around the closure area throughout the breeding season, to aid the enforcement of the closure and to continue to educate the public.
- 2) Continue the education of local pilots, law enforcement, and military agencies about flight ceiling advisories in the vicinity of the breeding area.
- 3) We recommend future education of horse-riding groups about the closure and the need to respect the eagles' need for space, as our conversations with several of the tour operators led us to believe that they ignored the closure while leading horse-riding groups through the breeding area, and chose a course of action based on their own interpretation of eagle behavior.

Granite Reef

- 1) Drones caused disturbances at the Granite Reef and Orme nests twice during the season. If possible, we recommend future nestwatchers allocate time to educate the public at the Forest Service Recreation Areas. We believe this is where the drones were launched from,

and in the past nestwatchers have maintained a presence on Forest Service land as well as on SRPMIC land. Due to area closures related to the Covid-19 outbreak, we were unable to do this in 2020.

Luna

- 1) Repair the downed fence on the south side waterfowl closure at the water's edge.
- 2) 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.
- 3) 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.

Orme

- 1) Place barricades at the beginning of the season to deter visitors from accessing the river through the Pole 3 and 4 entrances. The roads in these areas are located very close to the Orme nest and some of the most frequently used perches. Vehicle and foot traffic during the 2020 nesting season caused the eagles to fly off the perches and away from the nest repeatedly.

Pleasant

- 1) Maintain the closure at the nest area at Table Mesa Road in the beginning of the breeding season until the nest is confirmed inactive. This would benefit the Pleasant resident eagles as well as waterbird rookeries located there.
- 2) The southern closure line serves as a buffer for the Pleasant breeding area and effectively reduces human activity and impact.

Rodeo and Sycamore

- 1) Consider cutting some branches away from the Sycamore nest tree before the breeding season. Currently, Nestwatchers are unable to view the nest once leaf-out occurs which prevents accurate data collection and their ability to confirm nest status.
- 2) Consider disallowing ceremonies and gatherings from occurring at the Nestwatcher camps at observation points.
- 3) While some of the FMYN police dispatchers were very helpful and receptive to Nestwatcher calls, several newer dispatchers were not. Additionally, at times, they did not seem to know basic landmarks or directions when Nestwatchers would call to relay concerns. Perhaps incorporating ride-alongs with officers into new dispatcher training would be helpful in familiarizing them with key landmarks. We often felt a disconnect in our communication with dispatch. FMYN officers were extremely helpful without exception, encouraging us to report trespassers on the Nation. However, when we would do so, some dispatchers conveyed a tone of annoyance with our calls. Consistent messaging in this arena would be very helpful in the future.
- 4) Encourage woodcutters with permits to cut wood from outside of the breeding areas from December through June if there are active nests nearby.

- 5) Coordinate interdisciplinary meetings and on-going communication between Nestwatchers, tribal entities such as the Environmental Department, law enforcement, FMD Adventures etc., to share information and advice.
- 6) Include bald eagle breeding area updates at Council meetings, as suggested by several community members.
- 7) Continue a closure of any horse trails 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.
- 8) Consider providing Nestwatchers with laminated FMYN parking passes to place in their windshields when parked on the Nation. This would save law enforcement the time it takes them to stop and check our vehicles when we are out doing habitat surveys or observing from various places.

Whiskey Spring

- 1) Maintain the current buoy line closure. The new nest this year was much closer to the closure line and keeping a consistent closure will help recreationists' expectations.
- 2) Maintain the presence of AGFD, Maricopa County Sheriff's Office, and Maricopa County Parks & Recreation law enforcement and admin boats at the southern Agua Fria closure line, which was invaluable in managing human impact to eagles. When possible, even 1-2 hours of additional support from law enforcement would significantly improve success.
- 3) Increase signage and distribution of literature within the park to educate recreationists about the seasonal closures and eagle conservation. The importance of consistent messaging and public information was demonstrated by the instances of boaters claiming a marina representative had told them to "go see the eagles up the Agua Fria", the misinformation at the park entrance booths in which people were given the information for the newly opened Table Mesa access and confused it with the lower Agua Fria closure, and the people looking up the first internet search result for the closure dates and seeing the April 5th opening date from the previous season.
- 4) Display park-wide closure maps and literature at all rental offices and especially on reader boards in public access points like the 10-Lane boat ramp, along with Nestwatch-specific pamphlets. The information currently available at the boat ramp is limited to a faded poster of Arizona's raptor species and makes no mention of seasonal closures. The information displayed on the entry-booth signage is not readily apparent or legible unless vehicles are idling in line next to the sign structure.
- 5) Post signage and program literature in English as well as Spanish. There were multiple instances when a language barrier contributed to misunderstanding or lack of awareness of the closure.
- 6) Create press releases or memos to be shared with all park staff, volunteers, and concessionaires at the start of the season, to confirm that all parties are on the same page about closures, prohibited activities, etc. Updates should be circulated as needed when significant changes are implemented.

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: 2020 ARIZONA BALD EAGLE WINTER COUNT RESULTS

| Table 9. 2020 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 | 2 | 0 | 0 | 0 |
| 2 | Little Colorado River (LCR) | 39 | 0 | 0 | 0 | 0 |
| 3 | S. Fork LCR – Campground | 69 | 0 | 0 | 0 | 0 |
| 4 | Casa Malpais – LCR | 17 | 1 | 0 | 0 | 0 |
| 5 | Greer Lakes (River, Bunch, and Tunnel Reservoirs) | 78 | 1 | 0 | 0 | 0 |
| 6 | Sponseller Lake | 30 | 0 | 10 | 0 | 0 |
| 7 | Mexican Hay Lake | 120 | 0 | 0 | 0 | 0 |
| 8 | White Mountain Hereford Ranch (Trinity, Glen Livet, McKay reservoirs) | 60 | 1 | 1 | 0 | 0 |
| 9 | The Ranch Lake | 30 | 0 | 0 | 0 | 0 |
| 10 | Ortega Lake | 30 | 0 | 0 | 0 | 0 |
| 11 | Concho Lake | 40 | 2 | 0 | 0 | 0 |
| 12 | Luna Lake | 198 | 3 | 0 | 0 | 0 |
| 13 | Nelson Reservoir | 122 | 3 | 2 | 0 | 0 |
| 14 | Nutrioso Reservoir | 120 | 3 | 2 | 0 | 0 |
| 16 | San Francisco River (Luna Lake to New Mexico line) | 120 | 0 | 1 | 0 | 1 |
| Total | | 1,103 | 16 | 16 | 0 | 1 |
| Cochise County | | | | | | |
| 18 | Parker Canyon Lake | 50 | 0 | 0 | 0 | 0 |
| 19 | Willcox Playa | 240 | 1 | 2 | 0 | 0 |
| Total | | 290 | 1 | 2 | 0 | 0 |
| Coconino County | | | | | | |
| 21 | Long Lake Complex | 175 | 1 | 0 | 0 | 0 |
| 22 | Stoneman Lake | 150 | 0 | 2 | 0 | 0 |
| 23 | FH-3 | 40 | 0 | 0 | 0 | 0 |
| 24 | I-17, Section to Flagstaff | 195 | 2 | 1 | 0 | 3 |
| 25 | Bellemont | 390 | 2 | 0 | 0 | 0 |
| 26 | Townsend/Winona A/B | 380 | 1 | 0 | 0 | 2 |
| 27 | HWY 89 North /Sunset Crater – Wupatki | 445 | 7 | 6 | 0 | 0 |
| 28 | FH-3 Lakes (Mary, Mormon, Marshall, Prime, etc.) | 302 | 0 | 0 | 0 | 0 |
| 29 | Continental Country Club Lakes | 233 | 3 | 1 | 0 | 0 |
| 30 | Chevelon Canyon Lake | 155 | 0 | 0 | 0 | 0 |
| 32 | Spring Valley Wash | 180 | 1 | 0 | 0 | 0 |
| 33 | Red Lake Valley | 40 | 1 | 0 | 0 | 0 |
| 34 | Kaibab Lake | 60 | 0 | 0 | 1 | 0 |
| 35 | Pittman Valley | 120 | 1 | 0 | 0 | 0 |
| 36 | Davenport Lake | 120 | 0 | 0 | 0 | 0 |
| 37 | Scholz Lake | 90 | 0 | 1 | 0 | 1 |
| 38 | Cataract Lake | 60 | 2 | 0 | 0 | 0 |
| 39 | Willow Springs Lake | 300 | 0 | 0 | 0 | 0 |

| Table 9 continued. | | | | | | |
|--------------------------|--|------------------|-----------|-----------|---------------------|----------------|
| Route Number | Route Name | Minutes Surveyed | Adults | Subadults | Unknown Bald Eagles | Unknown Eagles |
| 40 | West Chevelon Canyon | 122 | 0 | 0 | 0 | 0 |
| 41 | Willow Creek | Not surveyed. | | | | |
| 42 | White Horse Lake – Pomeroy Tanks | 60 | 2 | 0 | 0 | 0 |
| 43 | JD Dam Lake | 30 | 0 | 0 | 0 | 0 |
| 45 | Steel/Stone Road | Not surveyed. | | | | |
| 48 | Blue Stem Wash-Babbit property | Not surveyed. | | | | |
| 49 | Glen Canyon Nat'l Rec. Area (Lake Powell to Lee's Ferry) | 90 | 5 | 2 | 0 | 0 |
| 118 | Bill Williams Loop Road | Not surveyed. | | | | |
| 119 | Johnson Canyon | 120 | 0 | 0 | 0 | 0 |
| 120 | Highway 64 east | Not surveyed. | | | | |
| 121 | Highway 64 | Not surveyed. | | | | |
| 122 | Camp Navajo | 206 | 0 | 0 | 0 | 0 |
| 123 | Partridge Creek | 150 | 0 | 0 | 0 | 0 |
| 124 | Odell Lake | 45 | 1 | 0 | 0 | 0 |
| 125 | Highway 87 north | 25 | 1 | 0 | 0 | 0 |
| 126 | Highway 180 | 165 | 0 | 0 | 0 | 1 |
| Total | | 4,448 | 30 | 13 | 1 | 7 |
| Gila County | | | | | | |
| 129 | Buckhead Mesa landfill | 35 | 10 | 3 | 0 | 0 |
| Total | | 35 | 10 | 3 | 0 | 0 |
| Graham County | | | | | | |
| 51 | Point of Pines Lake area (ground) | Not surveyed. | | | | |
| Mohave County | | | | | | |
| 57 | Alamo Lake | 91 | 2 | 0 | 0 | 0 |
| Total | | 91 | 2 | 0 | 0 | 0 |
| Navajo County | | | | | | |
| 58 | Lake of the Woods | 30 | 0 | 0 | 0 | 0 |
| 59 | Rainbow Lake | 60 | 0 | 1 | 0 | 0 |
| 61 | Whipple Lake | 15 | 0 | 0 | 0 | 0 |
| 62 | Long Lake | 25 | 0 | 0 | 0 | 0 |
| 63 | Lone Pine Dam | 20 | 0 | 0 | 0 | 0 |
| 64 | Schoens Reservoir | 25 | 0 | 0 | 0 | 0 |
| 65 | White Mountain Lake | 45 | 0 | 1 | 0 | 0 |
| 67 | Jacques Marsh | 59 | 0 | 0 | 0 | 0 |
| 68 | Scott's Reservoir | 30 | 0 | 0 | 0 | 0 |
| 69 | Show Low Lake | 32 | 1 | 0 | 0 | 1 |
| 70 | Pintail Lake | 27 | 0 | 0 | 0 | 0 |
| 71 | Telephone Lake | 28 | 3 | 2 | 0 | 1 |
| 72 | Fool Hollow Lake | 100 | 2 | 1 | 0 | 0 |
| 75 | Cottonwood Wash/ Clay Springs | 45 | 0 | 0 | 0 | 0 |
| 76 | White Lake | 6 | 0 | 0 | 0 | 0 |
| 127 | Mortenson Wash | 80 | 0 | 0 | 0 | 0 |
| Total | | 627 | 6 | 5 | 0 | 2 |
| Santa Cruz County | | | | | | |
| 82 | Pena Blanca Lake | Not surveyed. | | | | |
| Total | | 0 | 0 | 0 | 0 | 0 |

| Table 9 continued. | | | | | | |
|---------------------------------|---|------------------|----------|-----------|---------------------|----------------|
| Route Number | Route Name | Minutes Surveyed | Adults | Subadults | Unknown Bald Eagles | Unknown Eagles |
| Yavapai County | | | | | | |
| 83 | Wet Beaver Creek | 390 | 0 | 0 | 0 | 0 |
| 84 | Oak Creek | Not surveyed. | | | | |
| 85 | Willow Lake | 240 | 0 | 0 | 0 | 0 |
| 86 | Lynx Lake | 240 | 2 | 0 | 0 | 0 |
| 87 | Watson Lake | 240 | 0 | 4 | 0 | 0 |
| 88 | Goldwater Lake | 240 | 2 | 0 | 0 | 0 |
| Total | | 1,350 | 4 | 4 | 0 | 0 |
| Yuma and La Paz Counties | | | | | | |
| 89 | Imperial N.W.R. Cibola/Martinez Lake – Colorado River | 195 | 3 | 4 | 0 | 0 |
| Total | | 195 | 3 | 4 | 0 | 0 |

| Table 10. 2020 Arizona bald eagle winter count helicopter survey results. | | | | | | |
|---|--------------------------------|------------------|------------|-----------|---------------------|----------------|
| Route Number | Route Name | Minutes Surveyed | Adults | Subadults | Unknown Bald Eagles | Unknown Eagles |
| 90 | Verde River | 193 | 26 | 4 | 0 | 0 |
| 91 | Lower East Verde River | 10 | 1 | 0 | 0 | 0 |
| 92 | Lower West Clear Creek | 17 | 0 | 0 | 0 | 0 |
| 93 | Lower Salt River | 135 | 24 | 13 | 0 | 0 |
| 94 | Upper Salt River | 81 | 2 | 1 | 0 | 0 |
| 95 | Lower Tonto Creek | 25 | 5 | 0 | 0 | 0 |
| 97 | Lower Canyon Creek | 10 | 0 | 0 | 0 | 0 |
| 98 | Lower Cibecue Creek | 14 | 0 | 0 | 0 | 0 |
| 100 | White River | 17 | 2 | 0 | 0 | 0 |
| 101 | North Fork White River | 45 | 3 | 1 | 0 | 0 |
| 102 | Lower Black River | 75 | 14 | 5 | 0 | 1 |
| 103 | Big and Little Bonito Creeks | 28 | 0 | 0 | 0 | 0 |
| 104 | San Carlos River–Talkalai Lake | 39 | 1 | 1 | 0 | 0 |
| 105 | San Carlos Reservoir | 14 | 4 | 4 | 0 | 0 |
| 106 | Upper and Lower Gila River | 59 | 3 | 0 | 0 | 0 |
| 107 | Eagle Creek | 46 | 1 | 0 | 0 | 0 |
| 108 | Bonita Creek | 15 | 0 | 0 | 0 | 0 |
| 109 | Lower San Francisco River | 38 | 0 | 0 | 0 | 0 |
| 110 | Blue River | 12 | 0 | 0 | 0 | 0 |
| 111 | Sunrise Lake | 1 | 0 | 0 | 0 | 0 |
| 112 | Big Lake | 4 | 0 | 0 | 0 | 0 |
| 114 | Crescent Lake | 2 | 0 | 0 | 0 | 0 |
| 115 | Lake Pleasant | 34 | 3 | 0 | 0 | 0 |
| 116 | Del Rio Ponds | 1 | 2 | 0 | 0 | 0 |
| 117 | Tres Rios | 21 | 2 | 0 | 0 | 0 |
| 128 | Point of Pines aerial | 29 | 9 | 2 | 0 | 0 |
| Total | | 965 | 102 | 31 | 0 | 1 |

| Table 11. 2020 Arizona bald eagle winter count non-standardized survey route results. | | | | | | | |
|---|-------------------------|-------------------|------------------|----------|-----------|---------------------|----------------|
| Route Number | Route Name | County | Minutes Surveyed | Adults | Subadults | Unknown Bald Eagles | Unknown Eagles |
| 130 | Cibola NWR | La Paz, Yuma | 180 | 0 | 0 | 0 | 0 |
| 973 | Elwood Tank | Graham | 2 | 0 | 0 | 0 | 0 |
| 974 | Glendale Recharge Ponds | Maricopa | 250 | 0 | 1 | 0 | 0 |
| 976 | West Clear Creek | Yavapai | 105 | 0 | 0 | 0 | 0 |
| 986 | Kachina Wetlands | Coconino | 45 | 0 | 0 | 0 | 0 |
| 991 | Clint's Well | Coconino, Yavapai | 73 | 1 | 0 | 0 | 0 |
| Total | | | 655 | 1 | 1 | 0 | 0 |

APPENDIX B: TERMINOLOGY AND RAPTOR REPRODUCTIVE STATUS CRITERIA

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

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

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

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

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

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

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

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

Productivity: The number of young fledged per occupied BA.

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

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

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

APPENDIX C: 2020 ARIZONA BALD EAGLE PRODUCTIVITY

| Breeding Area | Status ¹ | Nest ² | Incubation Date | Eggs ³ | Hatch Date | Young | Fledged | Fledge Date |
|------------------|---------------------|--|-----------------|-------------------|---|-------|-----------------------|-------------|
| Alamo | F | 4 | <1/13 | 1 | Failed 1/13-3/23 during incubation. | | | |
| Armer Gulch | U | Nest #1 fallen. No new nests and no eagles. | | | | | | |
| Ashurst | S | 3 | <4/7 | 1 | <4/7 | 1 | 1 | >6/4 |
| Bachelor Cove* | S | 2 | <1/7 | 2 | 1/28-2/27 | 2 | 1 | 4/18 |
| Bagley | U | All known nests empty. No eagles. | | | | | | |
| Bartlett | S | 6 | 1/27-3/23 | 1 | 3/23-4/15 | 1 | 1 | 6/11-6/23 |
| Beaver | S | 1 | 1/6-1/27 | 2 | 1/27-3/23 | 2 | 2 | >4/23 |
| Becker | S | 2 | 1/28-3/17 | 2 | 1/28-3/17 | 2 | 2 | >5/29 |
| Bill Williams | U | No new nests and no eagles. | | | | | | |
| Black Cross | S | 1 | 1/7-1/28 | 2 | 1/28-3/17 | 2 | 2 | >4/30 |
| Blue Point | S | 10 | <1/7 | 1 | 1/28-3/17 | 1 | 1 | >4/9 |
| Box Bar* | S | 5 | 1/6-1/27 | 1 | 2/26 | 1 | 1 | 5/10 |
| Buckeye | O | Pair of adults observed. | | | | | | |
| Bulldog | S | 3 | 1/7-1/28 | 1 | 1/28-3/17 | 1 | 1 | >4/20 |
| Burro Creek | U | No new nests and no eagles. | | | | | | |
| Campaign Bay | U | No new nests and no eagles. | | | | | | |
| Canyon de Chelly | -- | Unable to Survey Due to Covid-19 Complications on Navajo Nation. | | | | | | |
| Cataract Lake | S | 3 | <3/31 | 2 | <3/31 | 2 | 2 | >6/3 |
| Cedar Basin | A | 9 | 1/28-3/17 | 1 | Unable to survey beyond 3/17 due to Covid-19. | | | |
| Chevelon | S | 5 | 2/20-4/2 | 2 | 4/2-4/30 | 2 | 2 | >6/26 |
| Cibecue | A | 9 | 1/28-3/17 | 1 | Unable to survey beyond 3/17 due to Covid-19. | | | |
| Cliff | U | No new nests and no eagles. | | | | | | |
| Coldwater | U | All known nests empty. No eagles. | | | | | | |
| Cole's* | S | 1 | <3/23 | 1 | <3/23 | 1 | 1 | 5/23 |
| Concho* | S | 2 | <1/28 | 1 | 3/2-3/3 | 1 | 1 | 5/26-5/28 |
| Coolidge | A | 5 | <1/7 | 1 | 1/28-3/3 | 1 | Final status unknown. | |
| Crescent* | O | Pair of adults observed. | | | | | | |
| Dogtown | S | 3 | <3/31 | 1 | 3/31-5/13 | 1 | 1 | >6/25 |
| Doka* | S | 8 | <3/23 | 1 | <3/23 | 1 | 1 | 5/29-5/30 |
| East Verde | S | 8 | 1/27-3/23 | 2 | 1/27-3/23 | 2 | 2 | >5/15 |
| Elaine | S | 1 | <3/8 | 2 | 3/8-4/14 | 2 | 2 | >5/26 |
| Fish Creek | O | Pair of adults observed. | | | | | | |
| Fool Hollow | S | 3 | <1/11 | 1 | 1/28-3/17 | 1 | 1 | >4/29 |
| Fort McDowell* | F | 20 | <3/10 | 2 | <3/10 | 2 | Failed on 5/8. | |
| Gainey Ranch | S | 2 | <2/6 | 2 | 2/6-3/22 | 2 | 2 | 4/28-5/2 |
| Garden Lakes | S | 2 | 12/22-12/28 | 2 | 1/6-1/26 | 2 | 2 | 4/10, 4/16 |
| George's Basin | U | All known nests empty. No eagles. | | | | | | |
| Gilbert | -- | No new nests or eagles reported. | | | | | | |
| Goldfield* | S | 4 | <1/7 | 2 | 1/7-2/16 | 2 | 2 | 4/22-4/26 |
| Granite Basin | F | 2 | 1/28-3/17 | 1 | Failed 3/17-4/16. | | | |

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

²Nest numbers are from Hunt and others 1992; Driscoll and Beatty 1994; Driscoll and others 1992, 1995a, 1995b, 1997-1999; Jacobson and others 2004-2007; Koloszar and Driscoll 2001a, 2001b; Koloszar and others 2002; Canaca and others 2004; McCarty and Jacobson 2008-2012; McCarty et al. 2013-2019.

³Represents minimum number of eggs laid.

*Nests monitored by the Arizona Bald Eagle Nestwatch Program.

| Table 12 continued. | | | | | | | | |
|---------------------|---------------------|--|-----------------|-------------------|---|-------|--|------------------|
| Breeding Area | Status ¹ | Nest ² | Incubation Date | Eggs ³ | Hatch Date | Young | Fledged | Fledge Date |
| Granite Reef* | S | 7 | <1/7 | 1 | 1/28-2/13 | 1 | 1 | 4/9 |
| Green River | S | 1 | 1/27-3/23 | 2 | 1/27-3/23 | 2 | 2 | >5/8 |
| Greer Lakes* | F | 7 | <4/15 | 1 | <4/15 | 1 | Greer nestling died in rehabilitation. | |
| Horse Mesa | F | 4 | <1/7 | 1 | Failed 3/17-5/4. | | | |
| Horseshoe | F | 13 | <1/27 | 1 | Failed 1/27-3/23. | | | |
| Ive's Wash | F | 3 | 1/27-3/23 | 1 | 3/23-4/22 | 1 | Failed 4/22-6/2. | |
| Kachina Village | S | 1 | <4/7 | 1 | 4/7-4/25 | 1 | 1 | 6/15-6/26 |
| Kerr | U | Pair possibly moved to Orme BA. | | | | | | |
| Ladders | F | 3 | 1/27-3/23 | 1 | 3/23-4/10 | 1 | Failed 4/10-6/3. | |
| Lone Pine | U | All known nests empty. One adult perched in January. | | | | | | |
| Lower Lake Mary | S | 5* | <5/6 | 2 | <5/6 | 2 | 2 | 6/11-6/19, >6/19 |
| Luna* | O | Pair of adults observed. | | | | | | |
| Lynx | F | 7 | 1/22-1/27 | 1 | Failed 3/9-3/23. Male injured by intruder and treated for lead. | | | |
| Mohave | U | All known nests empty. No eagles. | | | | | | |
| Needle Rock | U | No new nests and no eagles. | | | | | | |
| Nevada Bay | -- | Status unknown, unable to survey due to Covid-19. | | | | | | |
| North Fields | F | 1 | 1/30-2/13 | 2 | 3/10-3/16 | 2 | Failed on 6/11. | |
| Oak Creek | F | 4 | 1/27-2/9 | 1 | 2/9-3/23 | 1 | Failed 3/23-4/10. | |
| Orme* | S | 7 | 1/27-2/7 | 2 | 3/10 | 2 | 2 | 5/25-5/29 |
| O W | O | Pair of adults observed. | | | | | | |
| Pee Posh Wetlands | F | 7 | <12/22 | 1 | Failed by 1/23 during incubation. | | | |
| | | 7 | 2/17-2/18 | 1 | Failed 3/18 during incubation when nest tree fell. | | | |
| Perkinsville | O | Pair of adults observed. | | | | | | |
| Pinal | F | 9 | 1/28-3/17 | 1 | Failed 3/17-4/16. | | | |
| Pinto | F | 10 | <1/7 | 1 | Failed 1/28-3/17 during incubation. | | | |
| Pleasant* | S | 5 | <2/16 | 2 | <2/16 | 2 | 2 | 4/15-4/30 |
| Rainbow | F | 1 | <3/2 | 1 | 3/2-3/23 | 1 | Failed 4/20-4/28. | |
| Redmond | U | No new nests and no eagles. | | | | | | |
| Riverside Ruin | S | 2 | <1/7 | 2 | 1/27-2/14 | 2 | 1 | >4/24 |
| Rodeo* | S | 6 | 1/6-1/27 | 2 | 2/21-2/26 | 2 | 2 | 5/1-5/3, >5/6 |
| Saguaro | F | 2 | 1/7-1/28 | 1 | Failed 1/28-3/17 during incubation. | | | |
| San Carlos | U | No new nests. One adult bald eagle in area. | | | | | | |
| Scholz Lake | S | 1 | <3/31 | 1 | 3/31-5/13 | 1 | 1 | 5/13-6/25 |
| 76 | F | 6 | 1/7-1/28 | 1 | Failed 1/28-3/17 during incubation (nest fell). | | | |
| Sheep | F | 7 | 1/7-1/28 | 1 | Failed 1/28-3/17 during incubation. | | | |
| Sheep Creek | S | 1 | <1/6 | 2 | 1/27-3/20 | 2 | 2 | >4/15 |
| Show Low Lake | S | 1 | 1/28-3/3 | 1 | 3/9-4/8 | 1 | 1 | 7/9-7/13 |
| Silver Creek | S | 3 | 2/7-2/8 | 2 | 3/17-4/4 | 2 | 2 | >5/29 |
| Suicide | F | 1 | 12/30-1/7 | 1 | Failed 1/28-3/3 during incubation. | | | |
| Sullivan Lake | S | 2 | <1/1 | 2 | 2/9-3/23 | 2 | 2 | 5/18, >5/18 |
| Sycamore* | F | 7 | 1/6-1/27 | 1 | Failed 3/15-3/23 during incubation. | | | |
| Table Mountain | F | 4 | 1/27-3/23 | 1 | 1/27-3/23 | 1 | Failed 3/23-5/12. | |

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

²Nest numbers are from Hunt and others 1992; Driscoll and Beatty 1994; Driscoll and others 1992, 1995a, 1995b, 1997-1999; Jacobson and others 2004-2007; Koloszar and Driscoll 2001a, 2001b; Koloszar and others 2002; Canaca and others 2004; McCarty and Jacobson 2008-2012; McCarty et al. 2013-2019.

³Represents minimum number of eggs laid.

*Nests monitored by the Arizona Bald Eagle Nestwatch Program.

Table 12 continued.

| Breeding Area | Status ¹ | Nest ² | Incubation Date | Eggs ³ | Hatch Date | Young | Fledged | Fledge Date |
|-----------------|---------------------|-----------------------------------|-----------------|-------------------|-------------------------------------|-------|------------------|-------------|
| Talkalai | O | Pair of adults observed. | | | | | | |
| Tapco | F | 6 | 1/6-1/27 | 1 | Failed 3/23-4/7. | | | |
| Tonto* | F | 9 | <1/7 | 1 | Failed 1/28-2/7 during incubation. | | | |
| Tortilla Creek | F | 1 | 1/28-3/17 | 1 | 3/17-4/30 | 1 | Failed 5/1-5/29. | |
| Tower | U | All known nests empty. No eagles. | | | | | | |
| Tremaine | S | 2 | <4/8 | 2 | 4/8-5/14 | 2 | 2 | 5/20-6/18 |
| Two Bar | F | 3 | <1/7 | 1 | Failed 1/28-3/17 during incubation. | | | |
| Whiskey Spring* | F | 2 | 1/27-2/10 | 1 | Failed 2/19 during incubation. | | | |
| | | 2 | 3/10 | 1 | Failed during incubation. | | | |
| White Horse | U | All known nests empty. No eagles. | | | | | | |
| Woods Canyon* | F | 13 | <3/25 | 1 | 3/25-5/1 | 1 | Failed 6/19. | |
| Yellow Cliffs | S | 1 | 1/6-1/27 | 2 | 1/27-3/23 | 2 | 2 | >5/7 |

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

²Nest numbers are from Hunt and others 1992; Driscoll and Beatty 1994; Driscoll and others 1992, 1995a, 1995b, 1997-1999; Jacobson and others 2004-2007; Koloszar and Driscoll 2001a, 2001b; Koloszar and others 2002; Canaca and others 2004; McCarty and Jacobson 2008-2012; McCarty et al. 2013-2019.

³Represents minimum number of eggs laid.

*Nests monitored by the Arizona Bald Eagle Nestwatch Program.

APPENDIX D: NEST SURVEY RESULTS

| Table 13. Results of the 2020 bald eagle winter count, ORA, and nest survey flights (continued next page). | | |
|--|------|---|
| Location | Time | Comments |
| January 6, 2020 | | |
| Orme BA | 0720 | Two adults standing in nest #7. |
| Rodeo BA | 0804 | All known nests empty. One adult flying, second adult perched upstream. |
| Sycamore BA | 0815 | All known nests empty. One adult perched downstream. |
| Doka BA | 0821 | All known nests empty. Nest #3 fallen. Pair of adults upstream. |
| Fort McDowell BA | 0823 | Nest #19 fallen. No new nests or eagles. |
| Box Bar BA | 0838 | Pair of adults standing in nest #5. |
| Needle Rock BA | 0838 | No new nests or eagles. |
| Bartlett BA | 0843 | All known nests empty. New large nest (#6) on cliff. One adult perched near dam. |
| Yellow Cliffs BA | 0851 | All known nests empty. Pair of adults perched at lake. |
| Sheep Creek BA | 0904 | Adult incubating in nest #1. Second adult perched by nest. |
| Cliff BA | 0908 | Nest #7 fallen. No new nests or eagles. |
| Horseshoe BA | 0920 | Nests #17 empty, #18 not seen. No eagles. |
| Table Mountain BA | 0931 | All known nests empty. Pair of adults perched. |
| East Verde River | 0943 | No new nests. One adult along river. |
| East Verde BA | 0952 | New nest in tree (#8). Rock fall in nest #6, not useable. |
| Coldwater BA | 1002 | All known nests empty. No eagles. |
| West Clear Creek | 1133 | No new nests or eagles. |
| Ladders BA | 1156 | All known nests empty. One adult perched. |
| Beaver BA | 1209 | All known nests empty. One adult perched. |
| Oak Creek BA | 1217 | All known nests empty. No eagles. |
| Green River BA | 1226 | Nest #1 fallen. No new nests or eagles. |
| Tapco BA | 1233 | One adult flew from nest #6, empty. |
| Tower BA | 1240 | All known nests empty. No eagles. |
| Perkinsville BA | 1246 | All known nests empty. One adult flying near nest #4, second adult flying upstream. |
| Hell Point nest site | 1257 | All known nests empty. No eagles. |
| Muldoon nest site | 1304 | New large nest (#2) on cliff. No eagles. |
| Granite (golden eagle BA) | 1306 | Nest #2 empty. One adult golden eagle perched. |
| Sullivan Lake BA | 1313 | Adult incubating in nest #2. Second adult perched. |
| Agua Fria River (north of Boulder Creek) | 1512 | No new nests or eagles. |
| Pleasant BA | 1519 | All known nests empty. No eagles. |
| Whiskey Spring BA | 1525 | Adult standing in new nest (#2) on cliff. Second adult perched in cove. |
| Buckeye BA | 1624 | No new nests. One adult perched. |
| Pee Posh Wetlands BA | 1637 | Adult incubating in nest #7. |
| Garden Lakes BA | 1643 | Adult incubating in nest #2. |
| January 7, 2020 | | |
| Riverside BA | 0744 | Adult incubating in nest #2. |
| Granite Reef BA | 0752 | Adult incubating in nest #7. |
| Orme BA | 0754 | One adult standing in nest #11. |
| Kerr BA | 0805 | Nest #2 fallen. No new nests. One adult perched. |
| Goldfield BA | 0807 | Adult incubating in nest #4. |

| Table 13 continued. | | |
|-----------------------------|------|--|
| Location | Time | Comments |
| Bulldog BA | 0820 | All known nests empty. No eagles. |
| Blue Point BA | 0829 | Adult incubating in nest #10. |
| Saguaro BA | 0839 | All known nests empty. No eagles. |
| Tortilla Creek BA | 0847 | All known nests empty. Two adults perched at lake. |
| Black Cross BA | 0850 | Pair of adults at nest #1. |
| Fish Creek BA | 0856 | All known nests empty. No eagles. |
| Horse Mesa BA | 0900 | Adult incubating in nest #4. |
| Two Bar BA | 0907 | Adult incubating in nest #3. |
| Bachelor Cove BA | 0916 | Adult incubating in new nest (#2) in tree. Nest #1 fallen. |
| Tonto BA | 0922 | Adult incubating in nest #9. Two other adults in area. |
| Armer Gulch BA | 0947 | Nest #1 fallen. No new nests or eagles. |
| Sheep BA | 1050 | All known nests empty. No eagles. |
| 76 BA | 1102 | All known nests empty. Two adults perched. |
| Canyon historic BA | 1127 | No new nests or eagles. |
| Redmond BA | 1200 | All known nests empty. No eagles. |
| Pinal BA | 1204 | All known nests empty. One immature golden eagle flying. |
| Pinto BA | 1218 | Adult incubating in nest #10. |
| Talkalai BA | 1400 | Nest #9 fallen. No new nests or eagles. |
| San Carlos BA | 1423 | Nest #7 fallen. One adult perched. |
| Suicide BA | 1443 | Adult incubating in nest #1. |
| Coolidge BA | 1457 | Adult incubating in nest #5. |
| Granite Basin BA | 1506 | Pair of adults perched at nest #2. |
| January 8, 2020 | | |
| Crescent BA | 1611 | All known nests empty. No eagles. |
| January 9, 2020 | | |
| Cibecue Crossing nest site | 0935 | All known nests empty. No eagles. |
| Cibecue BA | 0936 | Nests #1, 2, 9 empty. No eagles. |
| Cedar Basin BA | 1013 | All known nests empty. No eagles. |
| Lone Pine BA | 1025 | All known nests empty. Adult perched by nest #2. |
| Pineasco Creek nest site | 1304 | All known nests empty. No eagles. |
| George's Basin nest site | 1313 | All known nests empty. No eagles. |
| Lost Mule (golden eagle BA) | 1323 | All known nests empty. No eagles. |
| January 27, 2020 | | |
| Riverside BA | 0755 | Adult incubating. |
| Orme BA | 0801 | All known nests empty. Adult perched by nest #11. |
| Rodeo BA | 0805 | Adult incubating in nest #6. |
| Sycamore BA | 0810 | Adult incubating in nest #7. |
| Doka BA | 0814 | All known nests empty. One adult perched. |
| Fort McDowell BA | 0819 | No new nests or eagles. |
| Box Bar BA | 0822 | Adult incubating in nest #5. |
| Bartlett BA | 0824 | All known nests empty. No eagles. |
| Yellow Cliffs BA | 0830 | Adult incubating in nest #1. |
| Sheep Creek BA | 0831 | Adult incubating. |
| Cliff BA | 0835 | No new nests or eagles. |
| Horseshoe BA | 0845 | Adult incubating in nest #13. |
| Table Mountain BA | 0858 | All known nests empty. One adult flying. |
| East Verde BA | 0906 | All known nests empty. No eagles. |
| Coldwater BA | 0914 | All known nests empty. No eagles. |
| Ladders BA | 0925 | Adult standing in nest #3. |

| Table 13 continued. | | |
|-------------------------------|------|---|
| Location | Time | Comments |
| Beaver BA | 0934 | Adult incubating in nest #1. |
| Oak Creek BA | 0941 | All known nests empty. Pair of adults perched. |
| Hidden Valley nest site | 0954 | All known nests empty. No eagles. |
| Green River BA | 1055 | Nest #1 re-built. No eagles. |
| Tapco BA | 1103 | Adult incubating in nest #6. Nest #5 fallen. |
| Tower BA | 1109 | All known nests empty. No eagles. |
| Mormon Pocket golden eagle BA | 1115 | All known nests empty. One golden eagle flying. |
| Perkinsville BA | 1117 | All known nests empty. One adult upstream. |
| Hell Point nest site | 1131 | All known nests empty. No eagles. |
| Muldoon nest site | 1141 | All known nests empty. No eagles. |
| Granite golden eagle BA | 1145 | All known nests empty. No eagles. |
| Sullivan Lake BA | 1153 | Adult incubating. |
| Watson Lake golden eagle BA | 1314 | All known nests empty. No eagles. |
| Lynx BA | 1322 | Adult standing in nest #7 with at least one egg. |
| Burro Creek BA | 1350 | All known nests empty. No eagles. |
| Big Sandy River | 1407 | No new nests or eagles. |
| Alamo BA | 1410 | Adult incubating in nest #4. |
| Ive's Wash BA | 1415 | All known nests empty. No eagles. |
| Pleasant BA | 1450 | All known nests empty. No eagles. |
| Whiskey Spring BA | 1455 | All known nests empty. One adult standing in nest #1. |
| Buckeye BA | 1515 | New large nest #2 empty. No eagles. |
| Garden Lakes BA | 1524 | Adult incubating or brooding. |
| Pee Posh Wetlands BA | 1527 | Nest empty, failed. |
| January 28, 2020 | | |
| Granite Reef BA | 0750 | Adult incubating. |
| Kerr BA | 0754 | No new nests or eagles. |
| Goldfield BA | 0757 | Adult incubating. |
| Bulldog BA | 0802 | Adult incubating in nest #3. |
| Blue Point BA | 0805 | Adult incubating. |
| Saguaro BA | 0812 | Adult incubating in nest #2. |
| Tortilla Creek BA | 0814 | All known nests empty. One adult upstream. |
| Black Cross BA | 0821 | Adult incubating in nest #1. |
| Fish Creek BA | 0825 | All known nests empty. No eagles. |
| Horse Mesa BA | 0830 | Adult incubating. |
| Two Bar BA | 0838 | Adult incubating. |
| Bachelor Cove BA | 0841 | Adult incubating. |
| Tonto BA | 0843 | Adult incubating. |
| Sheep BA | 0848 | Adult incubating in nest #7. |
| 76 BA | 0855 | Adult incubating in nest #6. |
| Armer Gulch BA | 0913 | No new nests or eagles. |
| Pinto BA | 0920 | Adult incubating. |
| Pinal BA | 0922 | All known nests empty. Two adults upstream on Salt River. |
| Redmond BA | 0938 | All known nests empty. No eagles. |
| Cibecue Crossing nest site | 1120 | All known nests empty. No eagles. |
| Cibecue BA | 1125 | All known nests empty. No eagles. |
| Mule Hoof historic BA | 1134 | All known nests empty. No eagles. |
| Cedar Basin BA | 1143 | All known nests empty. No eagles. |
| Lone Pine BA | 1149 | All known nests empty. One adult flying ~1 mile downstream. |
| Pineasco Creek nest site | 1202 | All known nests empty. No eagles. |

| Table 13 continued. | | |
|----------------------------|------|--|
| Location | Time | Comments |
| George's Basin BA | 1205 | All known nests empty. No eagles. |
| Crescent BA | 1229 | All known nests empty. No eagles. |
| Greer Lakes BA | 1235 | All known nests empty. No eagles. |
| Becker BA | 1243 | All known nests empty. Pair of adults perched at lake. |
| Concho BA | 1258 | All known nests empty. No eagles. |
| Silver Creek BA | 1310 | Pair of adults standing in nest #3. |
| Fool Hollow BA | 1320 | Adult incubating in nest #3. |
| Show Low BA | 1409 | All known nests empty. No eagles. |
| Talkalai BA | 1505 | No new nests. Pair of adults at lake. |
| San Carlos BA | 1522 | No new nests or eagles. |
| Suicide BA | 1534 | Adult incubating. |
| Coolidge BA | 1539 | Adult incubating. |
| Granite Basin BA | 1543 | All known nests empty. No eagles. |
| March 17, 2020 | | |
| Granite Reef BA | 0738 | Adult with one nestling 6 weeks old. |
| Orme BA | 0743 | Adult brooding at least one nestling in nest #10. Second adult perched. A second pair of adults was perched in nest #11. |
| Goldfield BA | 0745 | Two nestlings, 4.5-5 weeks old. |
| Bulldog BA | 0750 | Adult with one nestling 4 weeks old. Second adult flying. |
| Blue Point BA | 0753 | One nestling 6+ weeks old. |
| Saguaro BA | 0754 | Nest #2 empty, failed. |
| Tortilla Creek BA | 0759 | Adult incubating in nest #1. |
| Black Cross BA | 0803 | Two nestlings 3-3.5 weeks old. |
| Fish Creek BA | 0806 | All known nests empty. No eagles. |
| Horse Mesa BA | 0818 | Adult sitting like still incubating. |
| Two Bar BA | 0823 | Nest empty, failed. |
| Bachelor Cove BA | 0831 | Adult with two nestlings 5.5-6 weeks old. |
| Tonto BA | 0835 | Nest empty, failed. One adult upstream. |
| Sheep BA | 0844 | Nest empty, failed. |
| 76 BA | 0852 | Nest branch broken, nest fallen. Failed. |
| Armer Gulch BA | 0910 | No new nests or eagles. |
| Pinto BA | 0920 | Nest empty, failed. |
| Pinal BA | 0923 | Adult incubating in nest #9. |
| Redmond BA | 0930 | All known nests empty. No eagles. |
| Fool Hollow BA | 1000 | Adult with one nestling 4 weeks old. |
| Cibecue Crossing nest site | 1118 | All known nests empty. No eagles. |
| Cibecue BA | 1123 | Adult incubating in nest #9. Second adult perched. |
| Cedar Basin BA | 1138 | Adult incubating in nest #9. Second adult flying. |
| Lone Pine BA | 1144 | All known nests empty. No eagles. |
| Pineasco Creek nest site | 1157 | All known nests empty. No eagles. |
| George's Basin BA | 1200 | All known nests empty. No eagles. |
| Crescent BA | 1227 | All known nests empty. One adult perched at nest #1. |
| Greer Lakes BA | 1234 | All known nests empty. No eagles. |
| Becker BA | 1245 | Two adults in nest with one hatchling and one egg. |
| Silver Creek BA | 1325 | Two adults with two eggs in nest #3. |
| Show Low BA | 1435 | Adult incubating in nest #1. |
| Talkalai BA | -- | Did not survey (SCAT reported pair of adults but no nesting). |
| San Carlos BA | 1513 | No new nests or eagles. |
| Suicide BA | 1549 | Nest empty, failed. |

| Table 13 continued. | | |
|-------------------------------|------|---|
| Location | Time | Comments |
| Coolidge BA | 1553 | Adult with one nestling 2.5-3 weeks old. |
| Granite Basin BA | 1605 | Adult incubating in nest #2. |
| March 23, 2020 | | |
| Buckeye BA | 0724 | One adult standing in nest #2, empty. |
| Rainbow BA | 0725 | One nestling 2.5-3 weeks old in new large nest (#1) in snag. One adult and one near-adult flying. |
| Cole's BA | 0750 | Adult in new large nest (#1) in saguaro cactus with one nestling 4 weeks old. |
| Ive's Wash BA | 0844 | Adult incubating in nest #3. |
| Alamo BA | 0850 | Nest empty, failed. |
| Goldwater Lake | 0920 | No new nests. One adult soaring ~1 mile west of lake. |
| Lynx BA | 0930 | Nest empty, failed. One adult perched toward lake. |
| Watson Lake golden eagle BA | 0937 | All known nests empty. No eagles. |
| Sullivan Lake BA | 1036 | Two nestlings 5-6 weeks old. One adult perched. |
| Granite golden eagle BA | 1041 | Golden eagle incubating in nest #6. |
| Muldoon nest site | 1045 | All known nests empty. No eagles. |
| Hell Point nest site | 1050 | All known nests empty. No eagles. |
| Perkinsville BA | 1103 | All known nests empty. No eagles. |
| Mormon Pocket golden eagle BA | 1115 | All known nests empty. No eagles. |
| Tower BA | 1121 | All known nests empty. No eagles. |
| Tapco BA | 1127 | Adult incubating. Second adult perched. |
| Green River BA | 1133 | Adult in nest #1 with at least one nestling 3 weeks old. |
| Oak Creek BA | 1140 | Adult with at least one nestling 1 week old. |
| Beaver BA | 1150 | Two nestlings 4.5+ weeks old. |
| Ladders BA | 1200 | Adult incubating in nest #3. |
| Coldwater BA | 1206 | All known nests empty. No eagles. |
| East Verde BA | 1223 | Adult in nest #8 with two nestlings 2 weeks old. |
| Table Mountain BA | 1336 | Adult in nest #4 with one nestling 2 weeks old. |
| Horseshoe BA | 1348 | Nest empty, failed. |
| Cliff BA | 1400 | All known nests empty. No eagles. |
| Sheep Creep BA | 1403 | Two adults with two nestlings 5.5-6 weeks old. |
| Yellow Cliffs BA | 1407 | One adult with two nestlings 2.5 weeks old. |
| Bartlett BA | 1411 | Adult incubating in nest #6. |
| Fort McDowell BA | 1418 | Two adults at new nest (#20) in mesquite tree with two nestlings 3 weeks old. |
| Doka BA | 1422 | Adult in new large nest (#8) in live tree with one nestling 1.5 weeks old. |
| Sycamore BA | 1426 | Nest empty, failed. One adult perched. |
| Rodeo BA | 1431 | Two nestlings 4-4.5 weeks old. One adult flying. |
| Orme BA | 1435 | At least one but probably two nestlings 1-2 weeks old. One adult perched. |

APPENDIX E: BACHELOR COVE BREEDING AREA SUMMARY

Table 14. Observed human activity and bald eagle behavior, Bachelor Cove BA, Arizona, 2020.

| Human Activity | N ¹ | W | R | F | L | B | U | Total | Percent |
|----------------------|----------------|-----|----|----|----|-----|-----|-------|---------|
| Driver | 60 | 260 | 2 | 1 | -- | 158 | 96 | 577 | 56.3 |
| Fishing by boat | 5 | 30 | -- | -- | -- | 22 | 77 | 134 | 13.1 |
| Hiker | 3 | 64 | 3 | 2 | -- | 5 | 15 | 92 | 9.0 |
| OHV | 4 | 35 | -- | 1 | -- | 14 | 11 | 65 | 6.3 |
| Canoe | 1 | 32 | -- | 1 | -- | 3 | 2 | 39 | 3.8 |
| Camper | -- | 24 | -- | -- | -- | 2 | 7 | 33 | 3.2 |
| Picnicker | -- | 14 | -- | -- | -- | 1 | 2 | 17 | 1.7 |
| Angler | 1 | 9 | -- | -- | -- | 1 | 6 | 17 | 1.7 |
| Boater | -- | 5 | -- | -- | -- | 7 | 4 | 16 | 1.6 |
| Motorcycle | 1 | 2 | -- | -- | -- | 5 | 5 | 13 | 1.3 |
| Photographer | -- | 5 | -- | -- | -- | 1 | 2 | 8 | 0.8 |
| Stand up paddleboard | -- | 2 | -- | -- | -- | 2 | 2 | 6 | 0.6 |
| Small plane | -- | -- | -- | -- | -- | 1 | 2 | 3 | 0.3 |
| Nestwatcher | -- | -- | -- | 1 | -- | 1 | -- | 2 | 0.2 |
| Agency Worker | -- | -- | -- | -- | -- | 1 | -- | 1 | 0.1 |
| Exiting boat | -- | 1 | -- | -- | -- | -- | -- | 1 | 0.1 |
| Military Jet | -- | -- | -- | -- | -- | 1 | -- | 1 | 0.1 |
| Total | 75 | 483 | 5 | 6 | -- | 225 | 231 | 1,025 | |

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

Table 15. Observed forage events and success, Bachelor Cove BA, Arizona, 2020.

| Sex | Fish | | Mammals | | Total | |
|---------|----------------|------------------|---------|-----|-------|-----|
| | E ¹ | S-U ² | E | S-U | E | S-U |
| Male | 1 | 1-0 | 1 | 1-0 | 2 | 2-0 |
| Female | 1 | 1-0 | -- | -- | 1 | 1-0 |
| Tandem | -- | -- | 1 | 0-1 | 1 | 0-1 |
| Unknown | 2 | 2-0 | -- | -- | 2 | 2-0 |
| Total | 4 | 4-0 | 2 | 1-1 | 6 | 5-1 |

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

²S-U= Successful – Unsuccessful forage events.

Table 16. Observed prey types delivered to the nest, Bachelor Cove BA, Arizona, 2020.

| Sex | Fish | Birds | Mammals | Unknown | Total | Percent |
|---------|------|-------|---------|---------|-------|---------|
| Male | 20 | 1 | 1 | 5 | 27 | 46.6 |
| Female | 13 | 2 | -- | 4 | 19 | 32.8 |
| Unknown | 9 | 1 | -- | 2 | 12 | 20.7 |
| Total | 42 | 4 | 1 | 11 | 58 | |
| Percent | 72.4 | 6.9 | 1.7 | 19.0 | | |

| Sex | Fish | | | Bird | | Mammal | Total | Percent |
|---------|-----------------|------|------|------|------|--------|-------|---------|
| | SU ¹ | FC | CC | AC | WS | JK | | |
| Male | -- | -- | -- | -- | -- | 1 | 1 | 14.3 |
| Female | 2 | 1 | 1 | 1 | 1 | -- | 6 | 85.7 |
| Total | 2 | 1 | 1 | 1 | 1 | 1 | 7 | |
| Percent | 28.6 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | | |

¹SU=sucker species, FC=flathead catfish, CC=channel catfish, AC=American coot, WS=waterfowl species, JK=Black-tailed jackrabbit.

| Lake km ¹ | Perch Type ² | Side | Shade | Distance to H ₂ O ³ | H ₂ O Type ⁴ | Land Type ⁵ |
|----------------------|-------------------------|-------|---------|---|------------------------------------|------------------------|
| 82.3a | CF | Right | No | 5 | RS | CL |
| 82.3b | SG | Right | No | 7 | RS | UP |
| 82.3c | RI | Right | No | 7 | RS | UP |
| 82.3d | RI | Right | No | 7 | RS | UP |
| 82.3e | RI | Right | No | 7 | RS | UP |
| 82.4a | BO | Right | No | 5 | RS | UP |
| 82.4b | RI | Right | No | 5 | RS | UP |
| 82.4c | CF | Right | No | 4 | RS | CL |
| 82.4d | ST | Right | No | 7 | RS | UP |
| 82.4e | SG | Right | No | 6 | RS | UP |
| 82.5a | SM | Right | No | 5 | RS | UP |
| 82.5b | CF | Right | No | 6 | RS | CL |
| 82.5c | BO | Right | Yes | 8 | RS | UP |
| 82.5d | CS | Right | No | 5 | RS | UP |
| 82.5e | SS | Right | No | 6 | RS | UP |
| 82.5f | HL | Right | No | 6 | RS | UP |
| 82.6a | CF | Right | Partial | 6 | RS | CL |
| 82.6b | CM | Right | Partial | 8 | RS | UP |
| 82.6c | SH | Right | No | 5 | RS | UP |
| 82.6d | BO | Right | No | 8 | RS | UP |
| 83.3a | RI | Right | No | 5 | RS | UP |
| 83.3b | CT | Right | Partial | 7 | RS | CL |
| 83.3c | SM | Right | No | 6 | RS | UP |
| 83.3d | SH | Right | No | 6 | RS | UP |
| 83.3e | SH | Right | No | 6 | RS | UP |
| 83.3f | HT | Right | No | 2 | RS | UP |
| 83.3g | JN | Right | No | 6 | RS | UP |
| 83.3h | RI | Right | No | 6 | RS | UP |
| 83.3i | JN | Right | Partial | 8 | RS | UP |
| 83.3j | BO | Right | No | 8 | RS | UP |
| 83.3k | HL | Right | Partial | 8 | RS | UP |
| 83.7 | SJ | Right | No | 1 | RS | UP |

¹Lake kilometer.

²BO=boulder, CF=cliff ledge, CM=cottonwood medium (10-20m), CS= cottonwood small (<10m), CT=cliff top, HL=hillside, HT=hill top, JN=juniper, RI=ridge, SG=soft snag (dead, but branches still intact), SH=hard snag (dead, main branches only), SJ=snag, juniper, SM=snag, mesquite, SS=snag, shrub, ST=snag top.

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

⁴RS=reservoir.

⁵CL=cliffs, UP=desert upland.

| Table 19. Bald eagle habitat use at the Bachelor Cove BA, Arizona, 2020. | | | | | | | | |
|--|-------------------|-----|-----|-----|-----|-----|-------|---------|
| Lake km ¹ | PW ^{2,3} | PH | PE | PU | PV | PP | Total | Percent |
| 82.3 | 2,218 | -- | -- | -- | -- | -- | 2,218 | 453 |
| 82.4 | 288 | -- | 18 | 52 | -- | -- | 358 | 7.3 |
| 82.5 | 577 | -- | 6 | -- | -- | -- | 583 | 11.9 |
| 82.6 | 161 | -- | 17 | 4 | 4 | 3 | 189 | 3.9 |
| 83.3 | 1,135 | 358 | 50 | 3 | -- | -- | 1,546 | 31.6 |
| Total | 4,379 | 358 | 91 | 59 | 4 | 3 | 4,894 | |
| Percent | 89.5 | 7.3 | 1.9 | 1.2 | 0.1 | 0.1 | | |

¹Lake kilometer.

²Observation time (minutes).

³PW=perched watching, PH=perched hunting, PE= perched eating, PU=perched unknown, PV= perched vocalizing, PP=perched preening.

APPENDIX F: BOX BAR BREEDING AREA SUMMARY

Table 20. Observed human activity and bald eagle behavior, Box Bar BA, Arizona, 2020.

| Human Activity | N ¹ | W | R | F | L | B | U | Total | Percent |
|---------------------|----------------|----|----|----|----|----|----|-------|---------|
| Hiker | 274 | -- | -- | -- | -- | -- | -- | 274 | 47.1 |
| Photographer | 63 | -- | -- | 1 | -- | -- | -- | 64 | 11.0 |
| Horse Back Rider | 45 | -- | -- | 1 | -- | -- | -- | 46 | 7.9 |
| Canoe/Kayak | 29 | -- | -- | -- | -- | -- | -- | 29 | 5.0 |
| Fisherman | 23 | -- | -- | -- | -- | -- | -- | 23 | 4.0 |
| Birder | 8 | -- | -- | -- | -- | -- | -- | 8 | 1.4 |
| AZGFD staff | 6 | -- | -- | -- | -- | -- | -- | 6 | 1.0 |
| Camper | 6 | -- | -- | -- | -- | -- | -- | 6 | 1.0 |
| Tuber | 4 | -- | -- | -- | -- | -- | -- | 4 | 0.7 |
| USFS staff | 2 | -- | -- | 1 | -- | -- | -- | 3 | 0.5 |
| Cycler | 2 | -- | -- | -- | -- | -- | -- | 2 | 0.3 |
| Helicopter | -- | 2 | -- | -- | -- | -- | -- | 2 | 0.3 |
| Gunshot | -- | -- | 1 | 1 | -- | -- | -- | 2 | 0.3 |
| Sheriff helicopter | 2 | -- | -- | -- | -- | -- | -- | 2 | 0.3 |
| Small plane | -- | 1 | -- | -- | -- | -- | -- | 1 | 0.2 |
| Driver | -- | -- | -- | 1 | -- | -- | -- | 1 | 0.2 |
| Mining | 1 | -- | -- | -- | -- | -- | -- | 1 | 0.2 |
| Motorized parachute | -- | -- | 1 | -- | -- | -- | -- | 1 | 0.2 |
| Total | 465 | 3 | 2 | 5 | -- | -- | -- | 475 | |

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

Table 21. Observed forage events and success, Box Bar BA, Arizona, 2020.

| Sex | Mammal | | Reptile | | Unknown | | Total | |
|--------|----------------|------------------|---------|-----|---------|-----|-------|-----|
| | E ¹ | S-U ² | E | S-U | E | S-U | E | S-U |
| Male | 1 | 1-0 | -- | -- | 1 | 0-1 | 2 | 1-1 |
| Female | 2 | 2-0 | 1 | 1-0 | -- | -- | 3 | 3-0 |
| Total | 3 | 3-0 | 1 | 1-0 | 1 | 0-1 | 5 | 4-1 |

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

²S-U= Successful – Unsuccessful forage events.

Table 22. Observed prey types delivered to the nest, Box Bar BA, Arizona, 2020.

| Sex | Fish | Mammals | Unknown | Total | Percent |
|---------|------|---------|---------|-------|---------|
| Male | 32 | 2 | 4 | 38 | 70.4 |
| Female | 14 | 2 | -- | 16 | 29.6 |
| Total | 46 | 4 | 4 | 54 | |
| Percent | 85.2 | 7.4 | 7.4 | | |

Table 23. Observed prey species delivered to the nest, Box Bar BA, Arizona 2020.

| Sex | Fish | | | Mammal | | Total | Percent |
|---------|-----------------|------|-----|--------|-----|-------|---------|
| | SU ¹ | BA | CA | GS | RB | | |
| Male | 16 | 5 | 1 | 1 | 1 | 24 | 66.7 |
| Female | 10 | 1 | -- | 1 | -- | 12 | 33.3 |
| Total | 26 | 6 | 1 | 2 | 1 | 36 | |
| Percent | 72.2 | 16.7 | 2.8 | 5.6 | 2.8 | | |

¹SU=sucker species, BA=bass species, CA=common carp, GS=ground squirrel species, RA=rabbit species.

Table 24. Bald eagle habitat analysis at the Box Bar BA, Arizona, 2020.

| Perch Location ¹ | Perch Type ² | Side ³ | Shade | Distance to H ₂ O ⁴ | H ₂ O Type ⁵ | Land Type ⁶ |
|-----------------------------|-------------------------|-------------------|---------|---|------------------------------------|------------------------|
| 24.8 | UP | Right | No | 4 | RU | MB |
| 25.4a | HS | Right | No | 1 | RU | CW |
| 25.4b | CL | Right | No | 2 | RU | CW |
| 25.5a | CL | Right | No | 2 | RU | CW |
| 25.5b | CM | Right | No | 3 | RU | MB |
| 25.5c | CL | Right | Partial | 2 | RU | CW |
| 25.5d | HS | Right | No | 3 | RU | MB |
| 25.5e | WO | Right | Yes | 3 | RU | MB |
| 25.8a | CL | Right | No | 3 | RU | CW |
| 25.8b | SG | Right | No | 1 | RI | CW |
| 25.9a | SG | Left | No | 1 | RU | MB |
| 25.9b | WO | Left | Yes | 1 | RU | CW |
| 26.1 | CL | Right | No | 3 | RU | CW |

¹River kilometer (Hunt et al. 1992).

²CL=cottonwood, large/20-30+ m, CM=cottonwood, medium/10-20m, HS=hard snag (main branches only), SG=soft snag, UP=utility pole, WO=willow.

³Side of river facing downstream.

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

⁵RI=riffle, RU=River run.

⁶CW=cottonwood grove, MB=mesquite bosque.

Table 25. Bald eagle habitat use at the Box Bar BA, Arizona, 2020.

| River km ¹ | PW ^{2,3} | CL | PD | PH | PP | PV | PE | CO | Total | Percent |
|-----------------------|-------------------|-----|-----|-----|-----|-----|-----|------|--------|---------|
| 24.8 | 4 | -- | 5 | -- | -- | -- | -- | -- | 9 | <0.1 |
| 25.4 | 245 | -- | -- | -- | 26 | -- | 6 | -- | 277 | 1.5 |
| 25.5 | 8,019 | 734 | -- | -- | 50 | 13 | -- | -- | 8,816 | 47.4 |
| 25.8 | 8,462 | 54 | 337 | 292 | 229 | 8 | 24 | 2 | 9,408 | 50.6 |
| 25.9 | -- | -- | -- | 43 | 18 | -- | -- | -- | 61 | 0.3 |
| 26.1 | 15 | -- | -- | -- | -- | -- | -- | -- | 15 | 0.1 |
| 999.9 | -- | -- | -- | -- | -- | 17 | -- | -- | 17 | 0.1 |
| Total | 16,745 | 788 | 342 | 335 | 323 | 38 | 30 | 2 | 18,603 | |
| Percent | 90.0 | 4.2 | 1.8 | 1.8 | 1.7 | 0.2 | 0.2 | <0.1 | | |

¹River kilometer (Hunt et al. 1992).

²Observation time (minutes).

³PW=perched watching, CL=perched close to mate, PD=perched drying, PH=perched hunting, PP=perched preening, PV=perched vocalizing, PE=perched eating, CO=copulation.

APPENDIX G: COLE'S BREEDING AREA SUMMARY

Table 26. Observed human activity and bald eagle behavior, Cole's BA, Arizona, 2020.

| Human Activity | N ¹ | W | R | F | L | B | U | Total | Percent |
|----------------------|----------------|----|----|----|----|----|----|-------|---------|
| Boater | 3,832 | 25 | -- | 1 | -- | -- | -- | 3,858 | 78.6 |
| Angler | 580 | -- | -- | -- | -- | -- | -- | 580 | 11.8 |
| Jet ski | 301 | -- | -- | -- | -- | -- | -- | 301 | 6.1 |
| Nestwatcher | 116 | -- | -- | -- | -- | -- | -- | 116 | 2.4 |
| Small Plane | 7 | 8 | -- | -- | -- | 2 | -- | 17 | 0.3 |
| Kayaker | 10 | -- | -- | -- | -- | -- | -- | 10 | 0.2 |
| Agency boat | 6 | -- | -- | -- | -- | -- | -- | 6 | 0.1 |
| OHV | -- | 2 | -- | 4 | -- | -- | -- | 6 | 0.1 |
| Helicopter | -- | 3 | -- | 1 | -- | -- | -- | 4 | 0.1 |
| Military Jet | -- | 2 | -- | -- | -- | -- | -- | 2 | <0.1 |
| Swimmer | 2 | -- | -- | -- | -- | -- | -- | 2 | <0.1 |
| Motorized parachute | -- | -- | -- | 2 | -- | -- | -- | 2 | <0.1 |
| Water-skier | -- | 1 | -- | -- | -- | -- | -- | 1 | <0.1 |
| Stand-up paddleboard | 1 | -- | -- | -- | -- | -- | -- | 1 | <0.1 |
| Total | 4,855 | 41 | -- | 8 | -- | 2 | -- | 4,906 | |

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

Table 27. Observed forage events and success, Cole's BA, Arizona, 2020.

| Sex | Fish | | Birds | | Unknown | | Total | |
|---------|----------------|------------------|-------|-----|---------|-----|-------|-----|
| | E ¹ | S-U ² | E | S-U | E | S-U | E | S-U |
| Male | 3 | 3-0 | -- | -- | -- | -- | 3 | 3-0 |
| Female | 6 | 3-3 | 1 | 1-0 | -- | -- | 7 | 4-3 |
| Unknown | 4 | 1-3 | -- | -- | 2 | 0-2 | 6 | 1-5 |
| Total | 13 | 7-6 | 1 | 1-0 | 2 | 0-2 | 16 | 8-8 |

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

²S-U= Successful – Unsuccessful forage events.

Table 28. Observed prey types delivered to the nest, Cole's BA, Arizona, 2020.

| Sex | Fish | Birds | Unknown | Total | Percent |
|---------|------|-------|---------|-------|---------|
| Male | 6 | -- | 7 | 13 | 21.7 |
| Female | 18 | 1 | 7 | 26 | 43.3 |
| Unknown | 11 | 1 | 9 | 21 | 35.0 |
| Total | 35 | 2 | 23 | 60 | |
| Percent | 58.3 | 3.3 | 38.3 | | |

Table 29. Observed prey species delivered to the nest, Cole's BA, Arizona 2020.

| Sex | Fish | Birds | Total | Percent |
|---------|-----------------|-------|-------|---------|
| | ST ¹ | WG | | |
| Female | -- | 1 | 1 | 50.0 |
| Unknown | 1 | -- | 1 | 50.0 |
| Total | 1 | 1 | 2 | |
| Percent | 50.0 | 50.0 | | |

¹ST=striped bass, WG=Western grebe.

| Table 30. Bald eagle habitat analysis at the Cole's BA, Arizona, 2020. | | | | | | |
|--|-------------------------|--------|---------|---|------------------------------------|------------------------|
| Lake km ¹ | Perch Type ² | Side | Shade | Distance to H ₂ O ³ | H ₂ O Type ⁴ | Land Type ⁵ |
| 0.2 | SS | Left | Partial | 2 | RC | UP |
| 0.3a | RI | Left | No | 2 | RC | UP |
| 0.3b | BO | Left | Partial | 2 | RC | UP |
| 0.5 | RI | Left | No | 2 | RC | UP |
| 0.6a | RI | Left | Partial | 2 | RC | UP |
| 0.6b | BO | Left | Partial | 1 | RC | UP |
| 0.6c | SS | Left | Partial | 2 | RC | UP |
| 0.7a | BO | Left | Partial | 2 | RC | UP |
| 0.7b | RI | Left | No | 2 | RC | UP |
| 0.7c | HL | Left | Partial | 2 | RC | UP |
| 0.8a | RI | Left | No | 2 | RC | UP |
| 0.8b | BO | Left | Partial | 1 | RC | UP |
| 0.9a | BO | Left | Partial | 2 | RC | UP |
| 0.9b | CC | Left | No | 2 | RC | UP |
| 0.9c | HL | Left | Partial | 2 | RC | UP |
| 1.0 | RI | Left | No | 2 | RC | UP |
| 1.1 | RI | Left | No | 2 | RC | UP |
| 1.4a | BO | Left | No | 2 | RC | UP |
| 1.4b | HL | Left | Partial | 2 | RC | UP |
| 1.6 | BO | Left | No | 2 | RC | UP |
| 1.7a | CC | Right | No | 1 | RS | UP |
| 1.7b | SS | Left | Partial | 1 | RC | UP |
| 1.7c | CF | Left | No | 1 | RC | UP |
| 1.7d | RI | Left | No | 2 | RC | UP |
| 1.8a | CF | Left | Partial | 2 | RC | UP |
| 1.8b | DW | Left | Partial | 1 | RC | UP |
| 1.9a | RI | Left | No | 2 | RC | UP |
| 1.9b | SP | Left | No | 2 | RC | UP |
| 2.8 | ID | Island | No | 1 | RS | UP |

¹Map kilometer (see Cole's BA Nestwatch report).

²BO=boulder, CC=cactus, CF=cliff ledge, DW=driftwood, HL=hillside, ID=island,, RI=ridge, SP=stump, SS=shrub snag.

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

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

⁵UP=desert upland.

| Table 31. Bald eagle habitat use at the Cole's BA, Arizona, 2020. | | | | | | | | | | | | |
|---|-------------------|-----|-----|-----|-----|-----|-----|-----|------|------|-------|---------|
| Map km ¹ | PW ^{2,3} | PP | PH | PV | PK | PE | CL | VX | WB | PX | Total | Percent |
| 0.3 | 216 | 2 | -- | 2 | -- | -- | -- | -- | -- | 1 | 221 | 3.9 |
| 0.5 | 449 | 6 | -- | 5 | -- | -- | -- | -- | -- | -- | 460 | 8.2 |
| 0.6 | 1,523 | 22 | -- | 4 | -- | -- | -- | -- | -- | -- | 1,549 | 27.5 |
| 0.7 | 447 | 3 | -- | 4 | -- | 18 | -- | 11 | -- | -- | 483 | 8.6 |
| 0.8 | 1,297 | 17 | 7 | 11 | 21 | -- | -- | -- | -- | -- | 1,353 | 24.0 |
| 0.9 | 32 | 16 | -- | 1 | -- | -- | -- | -- | -- | -- | 49 | 0.9 |
| 1.0 | 665 | 70 | -- | 9 | -- | -- | 13 | -- | 1 | -- | 758 | 13.4 |
| 1.1 | 345 | 5 | -- | 1 | -- | -- | -- | -- | -- | -- | 351 | 6.2 |
| 1.4 | 138 | 9 | 41 | 1 | -- | -- | -- | -- | -- | -- | 189 | 3.3 |
| 1.6 | 6 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6 | 0.1 |
| 1.7 | 57 | -- | -- | -- | -- | -- | -- | -- | 1 | -- | 58 | 1.0 |
| 1.8 | 131 | -- | 2 | 3 | -- | -- | -- | -- | -- | -- | 136 | 2.4 |
| 1.9 | 27 | -- | -- | 2 | -- | -- | -- | -- | -- | -- | 29 | 0.5 |
| Total | 5,333 | 150 | 50 | 43 | 21 | 18 | 13 | 11 | 2 | 1 | 5,642 | |
| Percent | 94.5 | 2.7 | 0.9 | 0.8 | 0.4 | 0.3 | 0.2 | 0.2 | <0.1 | <0.1 | | |

¹Map kilometer (see Cole's BA Nestwatch report).

²Observation time (minutes).

³PW=perched watching, PP=perched preening, PH=perched hunting, PV= perched vocalizing, PK=perched with prey, PE= perched eating, CL=perched close to mate, VX=various activities, WB=weird behavior, PX=various perched activities.

APPENDIX H: CONCHO BREEDING AREA SUMMARY

Table 32. Observed human activity and bald eagle behavior, Concho BA, Arizona, 2020.

| Human Activity | N ¹ | W | R | F | L | B | U | Total | Percent |
|-------------------------|----------------|----------|----------|-----------|-----------|-----------|-----------|------------|---------|
| Anglers | 98 | -- | -- | 2 | -- | -- | -- | 100 | 29.3 |
| Hikers | 90 | 3 | -- | 6 | -- | -- | -- | 99 | 29.0 |
| Dog Walkers | 71 | 2 | -- | 2 | -- | -- | -- | 75 | 22.0 |
| Kayaks | 15 | -- | -- | 1 | -- | -- | -- | 16 | 4.7 |
| OHV (ATV, Side by Side) | 7 | -- | -- | 2 | -- | -- | -- | 9 | 2.6 |
| Driver | 1 | 2 | -- | 5 | -- | -- | -- | 8 | 2.3 |
| Swimmers | 6 | -- | -- | -- | -- | -- | -- | 6 | 1.8 |
| Dogs | 5 | -- | -- | -- | -- | -- | -- | 5 | 1.5 |
| Fishing Boat | 4 | 1 | -- | -- | -- | -- | -- | 5 | 1.5 |
| People on shore | 5 | -- | -- | -- | -- | -- | -- | 5 | 1.5 |
| Photographer | 2 | -- | 1 | 1 | -- | -- | -- | 4 | 1.2 |
| Picnickers | -- | 1 | -- | -- | -- | -- | -- | 1 | 0.3 |
| Kids | 2 | -- | -- | 1 | -- | -- | -- | 3 | 0.9 |
| Gunshots | -- | -- | -- | 1 | -- | -- | -- | 1 | 0.3 |
| Canoe | -- | -- | -- | 1 | -- | -- | -- | 1 | 0.3 |
| Paddle Boat | 1 | -- | -- | -- | -- | -- | -- | 1 | 0.3 |
| Bicyclist | 1 | -- | -- | -- | -- | -- | -- | 1 | 0.3 |
| Drone | 1 | -- | -- | -- | -- | -- | -- | 1 | 0.3 |
| Total | 309 | 9 | 1 | 22 | -- | -- | -- | 341 | |

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

Table 33. Observed forage events and success, Concho BA, Arizona, 2020.

| Sex | Fish | | Mammals | | Birds | | Unknown | | Total | |
|--------------|----------------|------------------|----------|------------|----------|------------|----------|------------|-----------|--------------|
| | E ¹ | S-U ² | E | S-U | E | S-U | | | E | S-U |
| Male | 19 | 9-10 | 1 | 1-0 | 2 | 0-2 | -- | -- | 22 | 10-12 |
| Female | 10 | 4-6 | 4 | 2-2 | 2 | 0-2 | 1 | 1-0 | 17 | 7-10 |
| Total | 29 | 13-16 | 5 | 3-2 | 4 | 0-4 | 1 | 1-0 | 39 | 17-22 |

Table 34. Observed prey types delivered to the nest, Concho BA, Arizona, 2020.

| Sex | Fish | Mammals | Birds | Unknown | Total | Percent |
|----------------|-------------|-------------|------------|-------------|-------|-----------|
| Male | 13 | 3 | -- | 9 | 25 | 50.0 |
| Female | 10 | 9 | 1 | 5 | 25 | 50.0 |
| Total | 23 | 12 | 1 | 14 | | 50 |
| Percent | 46.0 | 24.0 | 2.0 | 28.0 | | |

Table 35. Observed prey species delivered to the nest, Concho BA, Arizona 2020.

| Sex | Fish | | | Birds | Mammals | | Total | Percent |
|----------------|-----------------|-------------|-------------|------------|-------------|-------------|-------|-----------|
| | CS ¹ | CP | RT | AC | PD | MC | | |
| Male | 4 | 2 | 1 | -- | 1 | 1 | 9 | 37.5 |
| Female | 1 | 2 | 3 | 1 | 5 | 3 | 15 | 62.5 |
| Total | 5 | 4 | 4 | 1 | 6 | 4 | | 24 |
| Percent | 20.8 | 16.7 | 16.7 | 4.2 | 25.0 | 16.7 | | |

¹CS=catfish species, CP=common carp, RT=rainbow trout, AC=American coot, PD=Gunnison's prairie dog, MC=mountain cottontail.

| Table 36. Bald eagle habitat analysis at the Concho BA, Arizona, 2020. | | | | |
|--|-------------------------|---------|---|------------------------|
| Lake km ¹ | Perch Type ² | Shade | Distance to H ₂ O ³ | Land Type ⁴ |
| 0.3 | JN | No | 5 | CF |
| 0.4 | JN | No | 3 | CF |
| 0.5a | SJ | No | 6 | CF |
| 0.5b | SO | No | 1 | SO |
| 0.6 | SO | No | 1 | SO |
| 0.7a | SO | No | 1 | SO |
| 0.7b | UP | No | 7 | CF |
| 0.8a | SO | No | 1 | SO |
| 0.8b | JN | No | 1 | CF |
| 0.8c | JN | No | 2 | CF |
| 0.8d | JN | No | 5 | CF |
| 0.8e | JN | No | 4 | CF |
| 0.8f | SP | No | 2 | CF |
| 0.8g | BO | No | 2 | CF |
| 0.8h | JN | No | 7 | CF |
| 0.9a | SO | No | 1 | SO |
| 0.9b | JN | No | 6 | CF |
| 1.0a | JN | No | 5 | CF |
| 1.0b | SO | No | 1 | SO |
| 1.1a | SO | No | 1 | SO |
| 1.1b | SO | No | 1 | SO |
| 1.1c | JN | No | 6 | CF |
| 1.1d | JN | No | 4 | CF |
| 1.1e | SJ | No | 1 | CF |
| 1.2 | SJ | No | 4 | CF |
| 1.3a | CM | No | 2 | CW |
| 1.3b | CM | No | 2 | CW |
| 1.3c | CM | No | 2 | CW |
| 1.3d | SO | No | 1 | SO |
| 1.5a | CM | No | 2 | CW |
| 1.5b | SO | No | 1 | SO |
| 1.5c | CM | Partial | 1 | CW |
| 1.6a | CM | No | 2 | CW |
| 1.6b | CM | No | 2 | CW |
| 1.7a | CM | No | 2 | CW |
| 1.7b | CM | No | 2 | CW |
| 1.7c | CM | No | 2 | CW |
| 3.0 | SO | No | 1 | SO |

¹River kilometer (Hunt et al. 1992).

²BO=boulder, CM=cottonwood medium/10-20m, JN=Juniper, SJ=snag, juniper, SO=shore, SP=stump, UP=utility pole.

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

⁴CF=conifer forest, CW=cottonwood grove, SO=shore.

| Lake km ¹ | PW ^{2,3} | SH | SS | PP | DW | PH | PD | PG | PK | OT | Total | Percent |
|----------------------|-------------------|-------|-----|-----|-----|-----|-----|-----|-----|-----|--------|---------|
| 0.3 | 216 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 216 | 0.5 |
| 0.4 | 112 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 112 | 0.3 |
| 0.5 | 20 | 91 | 74 | -- | 7 | -- | -- | -- | -- | -- | 192 | 0.4 |
| 0.6 | -- | 56 | 208 | -- | 30 | -- | -- | -- | -- | 63 | 357 | 0.8 |
| 0.7 | 520 | 74 | 24 | -- | 31 | -- | -- | -- | -- | 55 | 704 | 1.6 |
| 0.8 | 993 | 238 | 207 | -- | 41 | -- | -- | 38 | 10 | 70 | 1,597 | 3.7 |
| 0.9 | 547 | 253 | 252 | -- | 43 | -- | -- | 59 | 12 | -- | 1,166 | 2.7 |
| 1.0 | 2,780 | 64 | 39 | 79 | 57 | -- | -- | 7 | 12 | 34 | 3,072 | 7.2 |
| 1.1 | 3,922 | 388 | 85 | -- | 154 | -- | 11 | 39 | 103 | 16 | 4,718 | 11.0 |
| 1.2 | 3,201 | -- | -- | 74 | -- | -- | 41 | -- | -- | -- | 3,316 | 7.7 |
| 1.3 | 20,274 | -- | -- | 243 | -- | 26 | 37 | -- | 10 | 7 | 20,597 | 48.0 |
| 1.5 | 2,799 | 3 | -- | 134 | 17 | 264 | 85 | 8 | -- | -- | 3,310 | 7.7 |
| 1.6 | 516 | -- | -- | 49 | -- | -- | -- | -- | -- | -- | 565 | 1.3 |
| 1.7 | 2,618 | -- | -- | 236 | -- | 88 | -- | 2 | -- | -- | 2,944 | 6.9 |
| 3.0 | -- | -- | 13 | -- | 20 | -- | -- | -- | -- | -- | 33 | 0.1 |
| Total | 38,518 | 1,167 | 902 | 815 | 400 | 378 | 174 | 153 | 147 | 245 | 42,899 | |
| Percent | 89.8 | 2.7 | 2.1 | 1.9 | 0.9 | 0.9 | 0.4 | 0.4 | 0.3 | 0.6 | | |

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

²Observation time (minutes).

³PW=perched watching, SH=standing in water, SS=standing on shore, PP=perched preening, DW=drinking water, PH=perched hunting, PD=perched drying, PG=perched on ground, PK=perched with prey, OT=other (includes perched eating, bathing, ES=eating on shore, PI=perched interaction, weird behavior).

APPENDIX I: CRESCENT BREEDING AREA SUMMARY

Table 38. Observed human activity and bald eagle behavior, Crescent BA, Arizona, 2020.

| Human Activity | N ¹ | W | R | F | L | B | U | Total | Percent |
|----------------------|----------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|---------|
| Anglers | 51 | -- | -- | -- | -- | -- | -- | 51 | 64.6 |
| Picnickers | 9 | -- | -- | -- | -- | -- | -- | 9 | 11.4 |
| Float tubers fishing | 4 | -- | -- | -- | -- | -- | -- | 4 | 5.1 |
| Drivers | 4 | -- | -- | -- | -- | -- | -- | 4 | 5.1 |
| Birders | 4 | -- | -- | -- | -- | -- | -- | 4 | 5.1 |
| AZGFD | 3 | -- | -- | -- | -- | -- | -- | 3 | 3.8 |
| Boater - fishing | 2 | -- | -- | -- | -- | -- | -- | 2 | 2.5 |
| Canoe - kayak | 1 | -- | -- | -- | -- | -- | -- | 1 | 1.3 |
| Hikers | 1 | -- | -- | -- | -- | -- | -- | 1 | 1.3 |
| Total | 79 | -- | -- | -- | -- | -- | -- | 79 | |

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

Table 39. Bald eagle habitat analysis at the Crescent BA, Arizona, 2020.

| Lake km ¹ | Perch Type ² | Side | Shade | Distance to H ₂ O ³ | H ₂ O Type ⁴ | Land Type ⁵ |
|----------------------|-------------------------|-------|---------|---|------------------------------------|------------------------|
| 1.1 | HS | East | No | 5 | RS | CF |
| 2.0 | HS | South | Partial | 6 | RS | CF |
| 2.1 | PO | South | Yes | 8 | RS | CF |
| 2.2 | HS | Nest | No | 8 | RS | CF |
| 2.3a | PO | North | Partial | 8 | RS | CF |
| 2.3b | PO | North | Yes | 8 | RS | CF |
| 2.3c | HS | North | Yes | 7 | RS | CF |

¹Lake kilometer.

²HS=hard snag (main branches only), PO=pine/conifer, 20-30m.

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

⁴RS=reservoir.

⁵CF=coniferous forest, SO=shore.

Table 40. Bald eagle habitat use at the Crescent BA, Arizona, 2020.

| Lake km ¹ | PR ^{2,3} | PW | CL | PP | CO | Total | Percent |
|----------------------|-------------------|--------------|-------------|------------|------------|--------------|---------|
| 1.1 | -- | -- | 258 | -- | 2 | 260 | 3.9 |
| 2.0 | -- | -- | 66 | -- | -- | 66 | 1.0 |
| 2.1 | -- | 25 | -- | -- | -- | 25 | 0.4 |
| 2.2 | -- | 184 | -- | -- | -- | 184 | 2.7 |
| 2.3 | 3,164 | 2,333 | 654 | 47 | 4 | 6,202 | 92.1 |
| Total | 3,164 | 2,542 | 978 | 47 | 6 | 6,737 | |
| Percent | 47.0 | 37.7 | 14.5 | 0.7 | 0.1 | | |

¹Lake kilometer

²Observation time (minutes).

³PR=perched roosting, PW=perched watching, CL=perched close to mate, PP=perched preening, CO=copulation.

APPENDIX J: GOLDFIELD BREEDING AREA SUMMARY

| Human Activity | N ¹ | W | R | F | L | B | U | Total | Percent |
|-----------------------|----------------|-----------|-----------|-----------|-----------|-----------|-----------|--------------|---------|
| Hiker | 356 | -- | -- | -- | -- | -- | -- | 356 | 30.1 |
| Photographer | 293 | -- | -- | -- | -- | -- | -- | 293 | 24.7 |
| Canoe/Kayak | 188 | -- | -- | -- | -- | -- | -- | 188 | 15.9 |
| Dog Walker | 63 | -- | -- | -- | -- | -- | -- | 63 | 5.3 |
| Horseback Rider | 59 | -- | -- | -- | -- | -- | -- | 59 | 5.0 |
| Picnicker | 38 | -- | -- | -- | -- | -- | -- | 38 | 3.2 |
| Angler | 34 | -- | -- | -- | -- | -- | -- | 34 | 2.9 |
| Stand Up Paddler | 26 | -- | -- | -- | -- | -- | -- | 26 | 2.2 |
| Helicopter | 23 | -- | -- | -- | -- | -- | -- | 23 | 1.9 |
| Helicopter (Apache) | 16 | -- | -- | -- | -- | -- | -- | 16 | 1.4 |
| Drone | 14 | -- | -- | -- | -- | -- | -- | 14 | 1.2 |
| Tuber | 11 | -- | -- | -- | -- | -- | -- | 11 | 0.9 |
| Small Plane | 11 | -- | -- | -- | -- | -- | -- | 11 | 0.9 |
| Birder | 10 | -- | -- | -- | -- | -- | -- | 10 | 0.8 |
| Helicopter (Sheriff) | 10 | -- | -- | -- | -- | -- | -- | 10 | 0.8 |
| Metal Detector | 7 | -- | -- | -- | -- | -- | -- | 7 | 0.6 |
| Cycler | 7 | -- | -- | -- | -- | -- | -- | 7 | 0.6 |
| Runner | 4 | -- | -- | -- | -- | -- | -- | 4 | 0.3 |
| Dog | 3 | -- | -- | -- | -- | -- | -- | 3 | 0.3 |
| Airboat | 3 | -- | -- | -- | -- | -- | -- | 3 | 0.3 |
| Swimmer | 3 | -- | -- | -- | -- | -- | -- | 3 | 0.3 |
| OHV | 2 | -- | -- | -- | -- | -- | -- | 2 | 0.2 |
| Helicopter (Military) | 2 | -- | -- | -- | -- | -- | -- | 2 | 0.2 |
| Boat, fishing | 1 | -- | -- | -- | -- | -- | -- | 1 | 0.1 |
| Total | 1,184 | -- | -- | -- | -- | -- | -- | 1,184 | |

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

| Sex | Fish | Mammal | Unknown | Total | Percent |
|----------------|-------------|------------|-------------|-----------|---------|
| Male | 10 | 3 | 8 | 21 | 58.3 |
| Female | 4 | -- | 10 | 14 | 38.9 |
| Unknown | -- | -- | 1 | 1 | 2.8 |
| Total | 14 | 3 | 19 | 36 | |
| Percent | 38.9 | 8.3 | 52.8 | | |

| Sex | Fish | Mammal | | Total | Percent |
|----------------|-----------------|-------------|-------------|----------|---------|
| | SU ¹ | DC | GS | | |
| Male | -- | 1 | 1 | 2 | 40.0 |
| Female | 3 | -- | -- | 3 | 60.0 |
| Total | 3 | 1 | 1 | 5 | |
| Percent | 60.0 | 20.0 | 20.0 | | |

¹SU=sucker species, DC=desert cottontail, GS=ground squirrel species.

| Perch Location ¹ | Perch Type ² | Side ³ | Shade | Distance to H ₂ O ⁴ | H ₂ O Type ⁵ | Land Type ⁶ |
|-----------------------------|-------------------------|-------------------|---------|---|------------------------------------|------------------------|
| 8.8a | HS | R | No | 1 | RU | SO |
| 8.8b | n/a | n/a | No | 0 | RU | GB |
| 8.9a | SG | R | No | 6 | RU | MB |
| 8.9b | HS | R | No | 1 | RB | MB |
| 9.0 | SG | R | Partial | 1 | RB | SO |
| 9.2a | HS | R | No | 7 | RU | MB |
| 9.2b | SG | R | No | 7 | BW | MB |
| 9.3a | HS | R | No | 8 | RU | MB |
| 9.3b | HS | R | No | 6 | RU | MB |
| 9.3c | CL | R | No | 7 | RU | MB |
| 9.4 | SG | R | No | 8 | RU | MB |
| 9.5a | SG | R | No | 1 | RB | SO |
| 9.5b | CL | R | Partial | 8 | RU | MB |
| 9.6 | SG | R | No | 1 | RB | SO |
| 9.8a | CL | R | No | 7 | RU | MB |
| 9.8b | HS | R | No | 1 | RU | MB |
| 9.9 | HS | R | No | 8 | RB | MB |
| 10.0a | HS | L | No | 2 | RU | MB |
| 10.0b | HS | R | No | 1 | RB | SO |
| 10.1 | HS | L | Partial | 1 | RB | SO |
| 10.7 | CT | R | No | 1 | RU | CL |
| 11.6 | SO | R | No | 1 | RF | SO |
| 13.6 | CL | L | Yes | 1 | RU | MB |

¹River kilometer (Hunt et. al. 1992).

²HS= hard snag (only main branches remain), CL=cottonwood large/20-30+m, SG=soft snag (dead but branches still intact), SO=shore.

³L=river left, R=river right.

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

⁵BW=backwater, RB=river bend, RF=riffle, RU=river run.

⁶CL=cliffs, GB=gravel bar, MB=mesquite bosque, SO=shore.

| Table 45. Bald eagle habitat use at the Goldfield BA, Arizona, 2020. | | | | | | | | | |
|--|-------------------|-----|-----|-----|-----|-----|-----|-------|---------|
| Perch Location ¹ | PW ^{2,3} | PP | PV | DW | PX | PK | BA | Total | Percent |
| 8.8 | 881 | 7 | 2 | 14 | -- | -- | -- | 904 | 10.9 |
| 8.9 | 7 | -- | -- | -- | -- | -- | -- | 7 | 0.1 |
| 9.0 | 22 | -- | -- | -- | -- | -- | -- | 22 | 0.3 |
| 9.2 | 2 | 7 | -- | -- | -- | -- | -- | 9 | 0.1 |
| 9.3 | 3,792 | 292 | 4 | -- | 173 | 19 | -- | 4,280 | 51.7 |
| 9.4 | 1 | -- | -- | -- | -- | -- | -- | 1 | <0.1 |
| 9.5 | 49 | -- | -- | -- | -- | -- | -- | 49 | 0.6 |
| 9.6 | 139 | -- | -- | -- | 43 | -- | -- | 182 | 2.2 |
| 9.8 | 811 | 147 | 3 | -- | 6 | -- | -- | 967 | 11.7 |
| 9.9 | -- | -- | -- | -- | 2 | 32 | -- | 34 | 0.4 |
| 10.0 | 53 | -- | -- | -- | -- | -- | 11 | 64 | 0.8 |
| 10.1 | 1,749 | -- | -- | -- | -- | -- | -- | 1,749 | 21.1 |
| 10.7 | -- | -- | -- | -- | -- | 4 | -- | 4 | <0.1 |
| Total | 7,506 | 453 | 9 | 14 | 224 | 55 | 11 | 8,272 | |
| Percent | 90.7 | 5.5 | 0.1 | 0.2 | 2.7 | 0.7 | 0.1 | | |

¹River kilometer (Hunt et al. 1992).

²Observation time (minutes).

³PW=perched watching, PP=perched preening, PV=perched vocalizing, DW=drinking water, PX=perched various/other, PK=perched with prey, BA=bathing.

APPENDIX K: GRANITE REEF BREEDING AREA SUMMARY

Table 46. Observed human activity and bald eagle behavior, Granite Reef BA, Arizona, 2020.

| Human Activity | N ¹ | W | R | F | L | B | U | Total | Percent |
|---------------------|----------------|-----------|-----------|----------|-----------|-----------|-----------|------------|---------|
| Small Plane | 86 | 6 | -- | -- | -- | -- | -- | 92 | 74.2 |
| Helicopter | 20 | 5 | -- | -- | -- | -- | -- | 25 | 20.2 |
| Apache Helicopter | 3 | -- | -- | -- | -- | -- | -- | 3 | 2.4 |
| Military Helicopter | -- | 1 | -- | -- | -- | -- | -- | 1 | 0.8 |
| Construction | 1 | -- | -- | -- | -- | -- | -- | 1 | 0.8 |
| Driver | 1 | -- | -- | -- | -- | -- | -- | 1 | 0.8 |
| Drone | -- | -- | -- | 1 | -- | -- | -- | 1 | 0.8 |
| Total | 111 | 12 | -- | 1 | -- | -- | -- | 124 | |

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

Table 47. Observed forage events and success, Granite Reef BA, Arizona, 2020.

| Sex | Fish | | Total | |
|--------------|----------------|------------------|----------|------------|
| | E ¹ | S-U ² | E | S-U |
| Male | -- | -- | -- | -- |
| Female | 1 | 1-0 | 1 | 1-0 |
| Total | 1 | 1-0 | 1 | 1-0 |

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

²S-U= Successful – Unsuccessful forage events.

Table 48. Observed prey types delivered to the nest, Granite Reef BA, Arizona, 2020.

| Sex | Fish | Unknown | Total | Percent |
|----------------|-------------|-------------|----------|---------|
| Male | 1 | 3 | 4 | 66.7 |
| Female | 2 | -- | 2 | 33.3 |
| Total | 3 | 3 | | |
| Percent | 50.0 | 50.0 | 6 | |

Table 49. Bald eagle habitat analysis at the Granite Reef BA, Arizona, 2020.

| Perch Location ¹ | Perch Type ² | Side ³ | Shade | Distance to H ₂ O ⁴ | H ₂ O Type ⁵ | Land Type ⁶ |
|-----------------------------|-------------------------|-------------------|-------|---|------------------------------------|------------------------|
| 0.0a | UP | Right | No | 1 | RS | MB |
| 0.0b | UP | Left | No | 1 | TR | UP |
| 0.0c | UP | Right | No | 1 | TR | UP |
| 0.0d | UP | Right | No | 8 | RS | UP |
| 0.3a | HS | Right | No | 2 | RS | MB |
| 0.3b | UP | Right | No | 5 | RS | MB |
| 3.2 | MS | Right | No | 3 | RU | MB |

¹River kilometer (Hunt and others 1992).

²HS=hard snag, MS=mesquite, UP=utility pole.

³Side of river facing downstream.

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

⁵RU=run, RS=reservoir main body, TR=tailrace of dam.

⁶MB=mesquite bosque, UP=desert upland.

| Table 50. Bald eagle habitat use at the Granite Reef BA, Arizona, 2020. | | | | | | | |
|---|-------------------|------|-----|-----|-----|-------|---------|
| Perch Location ¹ | PW ^{2,3} | PG | SH | DW | GN | Total | Percent |
| 0.0 | 139 | 2 | 3 | -- | -- | 144 | 55.2 |
| 0.2 | 5 | -- | 6 | -- | -- | 11 | 4.2 |
| 0.3 | 46 | 44 | 8 | 3 | 1 | 102 | 39.1 |
| 3.2 | 4 | -- | -- | -- | -- | 4 | 1.5 |
| Total | 194 | 46 | 17 | 3 | 1 | 261 | |
| Percent | 74.3 | 17.6 | 6.5 | 1.1 | 0.4 | | |

¹River kilometer (Hunt and others 1992).

²Observation time (minutes).

³PW=perched watching, PG=perched on ground, SH=standing in water, DW=drinking water, GN=gathering nest material.

APPENDIX L: LUNA BREEDING AREA SUMMARY

Table 51. Observed human activity and bald eagle behavior, Luna BA, Arizona, 2020.

| Human Activity | N ¹ | W | R | F | L | B | U | Total | Percent |
|------------------------|----------------|-----------|-----------|-----------|-----------|-----------|-----------|------------|---------|
| Drivers | 186 | -- | -- | -- | -- | -- | -- | 186 | 47.7 |
| Fisherman | 75 | -- | -- | -- | -- | -- | -- | 75 | 19.2 |
| Birders | 35 | -- | -- | -- | -- | -- | -- | 35 | 9.0 |
| Hikers | 31 | -- | -- | -- | -- | -- | -- | 31 | 7.9 |
| Picnickers | 30 | -- | -- | -- | -- | -- | -- | 30 | 7.7 |
| Boaters (fishing) | 8 | -- | -- | -- | -- | -- | -- | 8 | 2.1 |
| Agency Workers FS | 5 | -- | -- | -- | -- | -- | -- | 5 | 1.3 |
| Alpine Fire Dept. | 4 | -- | -- | -- | -- | -- | -- | 4 | 1.0 |
| Campers | 3 | -- | -- | -- | -- | -- | -- | 3 | 0.8 |
| Float Tubers (fishing) | 3 | -- | -- | -- | -- | -- | -- | 3 | 0.8 |
| Kayaks/ Canoes | 2 | -- | -- | -- | -- | -- | -- | 2 | 0.5 |
| Photographers | 2 | -- | -- | -- | -- | -- | -- | 2 | 0.5 |
| OHV | 3 | -- | -- | -- | -- | -- | -- | 3 | 0.8 |
| AGFD Biologist | 2 | -- | -- | -- | -- | -- | -- | 2 | 0.5 |
| Helicopter | 1 | -- | -- | -- | -- | -- | -- | 1 | 0.3 |
| Total | 390 | -- | -- | -- | -- | -- | -- | 390 | |

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

Table 52. Observed forage events and success, Luna BA, Arizona, 2020.

| Sex | Birds | | Mammal | | Total | |
|--------------|----------------|------------------|----------|------------|-----------|-------------|
| | E ¹ | S-U ² | E | S-U | E | S-U |
| Male | 12 | 7-5 | -- | -- | 12 | 7-5 |
| Female | 7 | 3-4 | -- | -- | 7 | 3-4 |
| Unknown | -- | -- | 1 | 1-0 | 1 | 1-0 |
| Total | 19 | 10-9 | 1 | 1-0 | 20 | 11-9 |

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

²S-U= Successful – Unsuccessful forage events.

Table 53. Observed prey types delivered to the nest, Luna BA, Arizona, 2020.

| Sex | Birds | Total | Percent |
|----------------|------------|----------|---------|
| Male | 1 | 1 | 100 |
| Female | -- | -- | -- |
| Total | 1 | 1 | |
| Percent | 100 | | |

Table 54. Observed prey species delivered to the nest, Luna BA, Arizona 2020.

| Sex | Birds | Total | Percent |
|----------------|-----------------|----------|---------|
| | AC ¹ | | |
| Male | 1 | 1 | 100 |
| Female | -- | -- | -- |
| Total | 1 | 1 | |
| Percent | 100 | | |

¹AC=American coot.

| Table 55. Bald eagle habitat analysis at the Luna BA, Arizona, 2020. | | | | | |
|--|-------------------------|-------|---|------------------------------------|------------------------|
| Perch Location ¹ | Perch Type ² | Shade | Distance to H ₂ O ³ | H ₂ O Type ⁴ | Land Type ⁵ |
| 0.1 | PO | Yes | 1 | RS | -- |
| 0.3 | PS | Yes | 1 | RS | -- |
| 1.8 | HS | No | 2 | RC | -- |
| 2.3 | PO | Yes | 2 | -- | CF |
| 2.4a | HS | No | 2 | -- | CF |
| 2.4b | PO | Yes | 2 | -- | CF |
| 2.6a | WF | No | 1 | RS | -- |
| 2.6b | SC | No | 6 | -- | CF |
| 2.7 | PS | No | 1 | RS | -- |
| 2.8 | PS | Yes | 1 | RS | -- |
| 3.0 | PS | Yes | 1 | RS | -- |
| 3.4 | ST | No | 2 | -- | CF |
| 3.5 | PO | No | 1 | RC | -- |
| 4.8a | PO | Yes | 5 | -- | CF |
| 4.8b | HS | No | 6 | -- | CF |
| 4.8c | HS | Yes | 8 | -- | CF |
| 4.9a | HS | Yes | 8 | -- | CF |
| 4.9b | PO | Yes | 8 | -- | CF |
| 5.0a | PO | Yes | 8 | -- | CF |
| 5.0b | HS | No | 8 | -- | CF |
| 5.1 | FP | No | 1 | RC | -- |
| 5.2 | BO | No | 1 | RS | -- |
| 5.3 | BO | No | 1 | RS | -- |

¹Lake kilometer (counterclockwise from boat ramp).

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

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

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

⁵CF=coniferous forest.

| Table 56. Bald eagle habitat use at the Luna BA, Arizona, 2020. | | | | | | | | | | |
|---|-------------------|-------|-----|-----|-----|-----|-----|-----|--------|---------|
| Perch Location ¹ | PW ^{2,3} | PR | PH | CL | PP | ET | PV | CO | Total | Percent |
| 0.0 | 63 | -- | 165 | -- | -- | -- | -- | -- | 228 | 2.1 |
| 0.3 | -- | -- | 24 | -- | -- | -- | -- | -- | 24 | 0.2 |
| 1.8 | 50 | -- | -- | -- | -- | -- | -- | -- | 50 | 0.5 |
| 2.3 | 85 | -- | -- | 56 | -- | -- | -- | -- | 141 | 1.3 |
| 2.4 | 1,509 | 260 | -- | -- | 14 | -- | 13 | -- | 1,796 | 16.2 |
| 2.5 | 583 | 90 | 122 | -- | -- | -- | -- | -- | 795 | 7.2 |
| 2.6 | 318 | 90 | 151 | -- | -- | -- | -- | -- | 559 | 5.0 |
| 2.7 | 10 | -- | 88 | -- | -- | -- | -- | -- | 98 | 0.9 |
| 2.8 | -- | -- | 27 | -- | -- | 26 | -- | -- | 53 | 0.5 |
| 3.0 | -- | -- | 43 | -- | -- | -- | -- | -- | 43 | 0.4 |
| 3.4 | 752 | 250 | 9 | -- | -- | -- | -- | -- | 1,011 | 9.1 |
| 3.5 | 35 | -- | 35 | -- | -- | -- | -- | -- | 70 | 0.6 |
| 4.8 | 3,845 | 666 | -- | 156 | 21 | -- | -- | 8 | 4,696 | 42.3 |
| 4.9 | 543 | 14 | -- | 30 | -- | -- | -- | -- | 587 | 5.3 |
| 5.0 | -- | -- | -- | 445 | -- | -- | -- | -- | 445 | 4.0 |
| 5.1 | 295 | -- | 80 | -- | 23 | -- | -- | -- | 398 | 3.6 |
| 5.2 | 25 | -- | 39 | -- | -- | -- | -- | -- | 64 | 0.6 |
| 5.3 | 33 | -- | -- | -- | -- | -- | -- | -- | 33 | 0.3 |
| Total | 8,146 | 1,370 | 783 | 687 | 58 | 26 | 13 | 8 | 11,091 | |
| Percent | 73.4 | 12.4 | 7.1 | 6.2 | 0.5 | 0.2 | 0.1 | 0.1 | | |

¹Lake kilometer (counterclockwise from boat ramp).

²Observation time (minutes).

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

APPENDIX M: ORME BREEDING AREA SUMMARY

Table 57. Observed human activity and bald eagle behavior, Orme BA, Arizona, 2020.

| Human Activity | N ¹ | W | R | F | L | B | U | Total | Percent |
|----------------------|----------------|------------|----------|-----------|-----------|------------|-----------|--------------|---------|
| Small Plane | 820 | 2 | -- | -- | -- | 261 | -- | 1,083 | 51.2 |
| Driver | 334 | 140 | 7 | 20 | -- | 51 | -- | 552 | 26.1 |
| Helicopter | 147 | 15 | -- | -- | -- | 33 | -- | 195 | 9.2 |
| Construction | 29 | 24 | -- | -- | -- | -- | -- | 53 | 2.5 |
| Apache Helicopter | 38 | 1 | -- | -- | -- | 6 | -- | 45 | 2.1 |
| Helicopter, Military | 18 | 8 | -- | -- | -- | 11 | -- | 37 | 1.7 |
| Hiker | 13 | 6 | -- | 2 | -- | 1 | -- | 22 | 1.0 |
| Picnicker | 9 | 2 | -- | -- | -- | 5 | -- | 16 | 0.8 |
| Cycler | 10 | 2 | -- | -- | -- | 3 | -- | 15 | 0.7 |
| Helicopter, Sheriff | 9 | -- | -- | -- | -- | 3 | -- | 12 | 0.6 |
| Horseback Rider | 3 | 7 | -- | -- | -- | 1 | -- | 11 | 0.5 |
| Nestwatcher | 4 | 4 | -- | 2 | -- | -- | -- | 10 | 0.5 |
| Angler | 3 | 4 | -- | 2 | -- | 1 | -- | 10 | 0.5 |
| OHV | 2 | 5 | -- | -- | -- | 2 | -- | 9 | 0.4 |
| Photographer | 5 | 1 | 1 | 2 | -- | -- | -- | 9 | 0.4 |
| Military Jet | 4 | -- | -- | -- | -- | 4 | -- | 8 | 0.4 |
| Motorcycle | 3 | 3 | -- | -- | -- | -- | -- | 6 | 0.3 |
| Rancher | 1 | 4 | -- | -- | -- | -- | -- | 5 | 0.2 |
| Agency | 3 | 1 | -- | -- | -- | 1 | -- | 5 | 0.2 |
| Swimmer | 1 | 1 | -- | -- | -- | 1 | -- | 3 | 0.1 |
| Runner | 2 | -- | -- | -- | -- | -- | -- | 2 | 0.1 |
| Canoe/ Kayak | -- | 2 | -- | -- | -- | -- | -- | 2 | 0.1 |
| Dog | 1 | 1 | -- | -- | -- | -- | -- | 2 | 0.1 |
| Camper | -- | 1 | -- | -- | -- | -- | -- | 1 | <0.1 |
| Parachuter | -- | 1 | -- | -- | -- | -- | -- | 1 | <0.1 |
| AZGFD | -- | 1 | -- | -- | -- | -- | -- | 1 | <0.1 |
| Drone | -- | -- | -- | 1 | -- | -- | -- | 1 | <0.1 |
| Total | 1,459 | 236 | 8 | 29 | -- | 384 | -- | 2,116 | |

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

Table 58. Observed forage events and success, Orme BA, Arizona, 2020.

| Sex | Fish | | Mammals | | Birds | | Total | |
|--------------|----------------|------------------|----------|------------|----------|------------|----------|------------|
| | E ¹ | S-U ² | E | S-U | E | S-U | E | S-U |
| Male | 3 | 3-0 | 2 | 2-0 | -- | -- | 5 | 5-0 |
| Female | 2 | 2-0 | -- | -- | 1 | 0-1 | 3 | 2-1 |
| Total | 5 | 5-0 | 2 | 2-0 | 1 | 0-1 | 8 | 7-1 |

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

²S-U=Successful – Unsuccessful forage events.

Table 59. Observed prey types delivered to the nest, Orme BA, Arizona, 2020.

| Sex | Fish | Mammals | Birds | Unknown | Total | Percent |
|----------------|-------------|-------------|-------------|-------------|-----------|---------|
| Male | 9 | 9 | 4 | 14 | 36 | 56.3 |
| Female | 13 | 6 | 1 | 4 | 24 | 37.5 |
| Unknown | 1 | -- | 2 | 1 | 4 | 6.3 |
| Total | 23 | 15 | 7 | 19 | 64 | |
| Percent | 35.9 | 23.4 | 10.9 | 29.7 | | |

| Perch Location ¹ | Perch Type ² | Side ³ | Shade | Distance to H ₂ O ⁴ | H ₂ O Type ⁵ | Land Type ⁶ |
|-----------------------------|-------------------------|-------------------|---------|---|------------------------------------|------------------------|
| 0.0aV | CL | Right | No | 4 | PW | MB |
| 0.0bV | DM | Left | No | 1 | RU | MB |
| 0.0cV | UP | Right | No | 7 | -- | UP |
| 0.0dV | UP | Right | No | 7 | -- | UP |
| 0.0eV | DS | Right | Partial | 1 | RU | TX |
| 0.4aV | DM | Right | Partial | 1 | RU | CW |
| 0.4bV | UP | Right | No | 8 | -- | UP |
| 0.4cV | UP | Right | No | 8 | -- | UP |
| 0.5aV | CL | Right | No | 5 | -- | CW |
| 0.5bV | DM | Right | No | 1 | -- | MB |
| 0.5cV | SG | Right | No | 2 | RU | WT |
| 0.5dV | UP | Right | No | 8 | -- | UP |
| 0.6aV | CL | Right | No | 5 | -- | MB |
| 0.6bV | CM | Right | No | 5 | -- | MB |
| 0.6cV | DM | Right | No | 1 | RU | WT |
| 0.6dV | DS | Right | No | 1 | RU | CW |
| 0.6eV | HS | Right | No | 5 | RU | MB |
| 0.6fV | MS | Left | No | 1 | RU | MB |
| 0.6gV | MS | Left | No | 1 | RU | MB |
| 0.6hV | MS | Left | Partial | 1 | RU | MB |
| 0.6iV | SG | Right | No | 5 | -- | MB |
| 0.6jV | SG | Right | No | 1 | RU | CW |
| 0.6kV | UP | Right | No | 8 | -- | UP |
| 0.7aV | DL | Right | Partial | 1 | RU | CW |
| 0.7bV | DL | Right | Partial | 2 | RU | MB |
| 0.7cV | DM | Right | Partial | 1 | RU | MB |
| 0.7dV | DM | Right | No | 2 | RU | CW |
| 0.7eV | HS | Right | No | 1 | RU | CW |
| 0.8aV | DL | Left | Partial | 1 | RU | MB |
| 0.8bV | DM | Left | No | 1 | RU | MB |
| 0.8cV | UP | Right | No | 7 | -- | UP |
| 0.9aV | DL | Right | No | 1 | RU | CW |
| 0.9bV | DS | Left | No | 1 | RU | MB |
| 1.0V | SG | Left | No | 1 | RU | MB |
| 4.6aS | DL | Left | No | 1 | RI | MB |
| 4.6bS | DM | Left | No | 1 | RU | MB |
| 4.6cS | DM | Left | No | 1 | RU | MB |
| 5.2S | DM | Left | Partial | 1 | PW | MB |
| 5.3aS | DM | Right | Partial | 7 | -- | TX |
| 5.3bS | UP | Right | No | 5 | -- | MB |
| 5.4S | MS | Left | Partial | 1 | RU | MB |

¹River kilometer (Hunt et. al. 1992). V=Verde River, S=Salt River.

²CL=cottonwood large (20-30+m), CM=cottonwood medium (10-20m), DL=Deciduous, large (10-20m), DM=deciduous, medium (5-10m), DS=Deciduous, small (0-5m), HS=hard snag (main branches only), MS=mesquite, SG=soft snag (dead, but branches still intact), UP=desert upland.

³Side of river facing downstream.

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

⁵PW=pocket water, RI=riffle, RU=run.

⁶CW=cottonwood grove, MB=mesquite bosque, TX=tamarisk thicket, WT=willow thicket.

| Table 60 continued. | | | | | | |
|-----------------------------|-------------------------|-------------------|---------|---|------------------------------------|------------------------|
| Perch Location ¹ | Perch Type ² | Side ³ | Shade | Distance to H ₂ O ⁴ | H ₂ O Type ⁵ | Land Type ⁶ |
| 6.5aS | HS | Right | No | 5 | RU | CW |
| 6.5bS | CL | Right | Partial | 5 | RU | MB |

¹River kilometer (Hunt et al. 1992). V=Verde River, S=Salt River.

²CL=cottonwood large (20-30+m), HS=hard snag (main branches only).

³Side of river facing downstream.

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

⁵RU=run.

⁶CW=cottonwood grove, MB=mesquite bosque.

| Table 61. Bald eagle habitat use at the Orme BA, Arizona, 2020. | | | | | | | | | | | | |
|---|-------------------|-------|-----|-----|-----|-----|-----|-----|-----|-----|--------|---------|
| Perch Location ¹ | PW ^{2,3} | PP | PU | PE | CL | PK | PD | PV | DW | OT | Total | Percent |
| 0.0V | 92 | 3 | 17 | 7 | -- | -- | -- | -- | -- | -- | 119 | 0.7 |
| 0.4V | 600 | 28 | 40 | -- | -- | -- | -- | 4 | -- | -- | 672 | 4.1 |
| 0.5V | 558 | 48 | -- | -- | -- | -- | -- | 1 | -- | 2 | 609 | 3.7 |
| 0.6V | 6,937 | 2,408 | 31 | 20 | -- | 72 | 14 | 17 | -- | 2 | 9,501 | 58.1 |
| 0.7V | 1,361 | 105 | 353 | 37 | 74 | 1 | -- | 3 | 11 | 10 | 1,955 | 12.0 |
| 0.8V | 59 | -- | -- | 9 | -- | -- | -- | -- | 3 | 7 | 78 | 0.5 |
| 0.9V | 49 | -- | -- | 22 | -- | -- | -- | -- | 3 | 1 | 75 | 0.5 |
| 1.0V | 2,871 | 153 | -- | -- | 6 | -- | 54 | 2 | -- | -- | 3,086 | 18.9 |
| 5.2S | 5 | 15 | -- | -- | -- | -- | -- | -- | -- | -- | 20 | 0.1 |
| 5.3S | 178 | 16 | -- | -- | -- | -- | -- | -- | -- | -- | 194 | 1.2 |
| 5.7S | 33 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 33 | 0.2 |
| 6.5S | 2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 2 | <0.1 |
| Total | 12,745 | 2,776 | 441 | 95 | 80 | 73 | 68 | 27 | 17 | 22 | 16,344 | |
| Percent | 78.0 | 17.0 | 2.7 | 0.6 | 0.5 | 0.4 | 0.4 | 0.2 | 0.1 | 0.1 | | |

¹River kilometer (Hunt et al. 1992). V=Verde River, S=Salt River.

²Observation time (minutes).

³PW=perched watching, PP=perched preening, PU=perched unknown, PE=perched eating, CL=perched close to mate, PK=perched with prey, PD=perched drying, PV=perched vocalizing, DW=drinking water, OT=other (includes standing in water, perched on ground, fishing/hunting, gathering nest material, perched hunting, eating on shore).

APPENDIX N: PLEASANT BREEDING AREA SUMMARY

Table 62. Observed human activity and bald eagle behavior, Pleasant BA, Arizona, 2020.

| Human Activity | N ¹ | W | R | F | L | B | U | Total | Percent |
|---------------------|----------------|-----------|-----------|----------|-----------|----------|----------|-----------|---------|
| Nestwatcher | 17 | 7 | -- | 1 | -- | -- | -- | 25 | 55.6 |
| Boater | 3 | 2 | -- | -- | -- | 1 | -- | 6 | 13.3 |
| Small Plane | 3 | -- | -- | -- | -- | 1 | -- | 4 | 8.9 |
| Gunshot | -- | 3 | -- | -- | -- | -- | -- | 3 | 6.7 |
| Helicopter | -- | -- | -- | -- | -- | -- | 3 | 3 | 6.7 |
| Military Helicopter | 2 | -- | -- | -- | -- | -- | -- | 2 | 4.4 |
| Agency Boat | 1 | 1 | -- | -- | -- | -- | -- | 2 | 4.4 |
| Total | 26 | 13 | -- | 1 | -- | 2 | 3 | 45 | |

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

Table 63. Watercraft compliance, Pleasant BA, Arizona, 2020.

| Date | Boats in Closure ¹ | Agency Boats in Closure | Total |
|--------------|-------------------------------|-------------------------|----------|
| 2/29 | 2 | 1 | 3 |
| 3/7 | 1 | -- | 1 |
| 3/14 | -- | 1 | 1 |
| Total | 3 | 2 | 5 |

¹Due to limited observation time at the Pleasant BA, the majority of watercraft compliance information was collected at the Whiskey Spring BA.

Table 64. Observed forage events and success, Pleasant BA, Arizona, 2020.

| Sex | Fish | | Total | |
|--------------|----------------|------------------|----------|------------|
| | E ¹ | S-U ² | E | S-U |
| Male | 1 | 1-0 | 1 | 1-0 |
| Female | 2 | 2-0 | 2 | 2-0 |
| Unknown | 1 | 0-1 | 1 | 0-1 |
| Total | 4 | 3-1 | 4 | 3-1 |

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

²S-U=Successful – Unsuccessful forage events.

Table 65. Observed prey types delivered to the nest, Pleasant BA, Arizona, 2020.

| Sex | Fish | Birds | Unknown | Total | Percent |
|----------------|-------------|------------|-------------|-----------|---------|
| Male | 4 | 1 | 1 | 6 | 22.2 |
| Female | 6 | -- | 4 | 10 | 37.0 |
| Unknown | 8 | -- | 3 | 11 | 40.7 |
| Total | 18 | 1 | 8 | 27 | |
| Percent | 66.7 | 3.7 | 29.6 | | |

Table 66. Observed prey species delivered to the nest, Pleasant BA, Arizona 2020.

| Sex | Fish | | | Birds | Total | Percent |
|----------------|-----------------|-------------|-------------|-------------|----------|---------|
| | BG ¹ | CP | CC | AC | | |
| Female | 1 | -- | -- | -- | 1 | 25.0 |
| Unknown | -- | 1 | 1 | 1 | 3 | 75.5 |
| Total | 1 | 1 | 1 | 1 | 4 | |
| Percent | 25.0 | 25.0 | 25.0 | 25.0 | | |

¹BG=bluegill, CP=common carp, CC=channel catfish, AC=American Coot.

Table 67. Bald eagle habitat analysis at the Pleasant BA, Arizona, 2020.

| Perch Location ¹ | Perch Type ² | Side ³ | Shade | Distance to H ₂ O ⁴ | H ₂ O Type ⁵ | Land Type ⁶ |
|-----------------------------|-------------------------|-------------------|---------|---|------------------------------------|------------------------|
| 72.5 | SO | Left | Partial | 1 | RB | CL |
| 73.1 | RI | Left | No | 1 | RB | CL |
| 73.3 | CT | Left | No | 3 | RB | CL |
| 73.4a | CT | Left | No | 3 | RB | CL |
| 73.4b | CT | Left | No | 3 | RB | CL |
| 73.5a | CF | Left | Partial | 3 | RB | CL |
| 73.5b | CT | Left | No | 3 | RB | CL |
| 73.5c | CT | Left | Partial | 2 | RB | CL |
| 73.5d | HL | Left | Partial | 1 | RC | TA |
| 73.5e | CF | Left | Partial | 3 | RB | CL |
| 73.5f | CT | Left | Partial | 3 | RB | CL |
| 73.5g | CF | Left | Partial | 4 | RC | CL |
| 72.5 | SO | Left | Partial | 1 | RB | CL |

¹River kilometer (Hunt et. al. 1992).

²CF=cliff face, CT=cliff top, HL=hillside, RI=ridge, SO=shore.

³Side of river facing downstream.

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

⁵RB=river bend, RC=reservoir cove.

⁶CL=cliffs, TA=talus.

Table 68. Bald eagle habitat use at the Pleasant BA, Arizona, 2020.

| Perch Location ¹ | PW ^{2,3} | PP | PH | CL | PV | DW | SS | Total | Percent |
|-----------------------------|-------------------|-----|-----|-----|-----|-----|-----|-------|---------|
| 72.5 | -- | -- | -- | -- | -- | -- | 1 | 1 | 0.1 |
| 73.1 | 543 | 2 | -- | -- | 3 | -- | -- | 548 | 34.0 |
| 73.3 | 21 | -- | -- | -- | -- | -- | -- | 21 | 1.3 |
| 73.4 | 910 | 7 | 13 | 5 | 1 | 6 | -- | 942 | 58.5 |
| 73.5 | 90 | 4 | -- | 2 | 2 | -- | -- | 98 | 6.1 |
| Total | 1,564 | 13 | 13 | 7 | 6 | 6 | 1 | 1,610 | |
| Percent | 97.1 | 0.8 | 0.8 | 0.4 | 0.4 | 0.4 | 0.1 | | |

¹River kilometer (Hunt et al. 1992).

²Observation time (minutes).

³PW=perched watching, PP=perched preening, PH=perched hunting, CL=perched close to mate, PV=perched vocalizing, DW=drinking water, SS=standing on shore.

APPENDIX O: RODEO BREEDING AREA SUMMARY

Table 69. Observed human activity and bald eagle behavior, Rodeo BA, Arizona, 2020.

| Human Activity | N ¹ | W | R | F | L | B | U | Total | Percent |
|--------------------|----------------|----------|-----------|----------|-----------|----------|-----------|-----------|---------|
| Helicopter | 6 | 2 | -- | -- | -- | 3 | -- | 11 | 27.5 |
| Apache helicopter | 9 | -- | -- | -- | -- | -- | -- | 9 | 22.5 |
| OHV | 6 | -- | -- | -- | -- | -- | -- | 6 | 15.0 |
| Nestwatcher | -- | -- | -- | 4 | -- | -- | -- | 4 | 10.0 |
| Gunshots | 3 | -- | -- | -- | -- | -- | -- | 3 | 7.5 |
| Small plane | 1 | 1 | -- | -- | -- | -- | -- | 2 | 5.0 |
| Vehicle | -- | 2 | -- | -- | -- | -- | -- | 2 | 5.0 |
| Chinook helicopter | 1 | -- | -- | -- | -- | -- | -- | 1 | 2.5 |
| MCSO helicopter | 1 | -- | -- | -- | -- | -- | -- | 1 | 2.5 |
| Swimmer | -- | 1 | -- | -- | -- | -- | -- | 1 | 2.5 |
| Total | 27 | 6 | -- | 4 | -- | 3 | -- | 40 | |

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

Table 70. Observed prey types delivered to the nest, Rodeo BA, Arizona, 2020.

| Sex | Fish | Birds | Reptiles | Mammals | Unknown | Total | Percent |
|----------------|-------------|------------|------------|------------|-------------|-----------|---------|
| Male | 10 | 2 | 1 | -- | 5 | 18 | 51.4 |
| Female | 10 | -- | 1 | 1 | 5 | 17 | 48.6 |
| Total | 20 | 2 | 2 | 1 | 10 | 35 | |
| Percent | 57.1 | 5.7 | 5.7 | 2.9 | 28.6 | | |

Table 71. Bald eagle habitat analysis at the Rodeo BA, Arizona, 2020.

| Location ¹ | Perch Type ² | Side ³ | Shade | Distance to H ₂ O ⁴ | H ₂ O Type ⁵ | Land Type ⁶ |
|-----------------------|-------------------------|-------------------|-------|---|------------------------------------|------------------------|
| 3.1a | UP | Right | No | 1 | RI | CW |
| 3.1b | UP | Left | No | 1 | RI | CW |
| 3.6 (nest) | CL | Left | Yes | 5 | RU | CW |
| 3.6 | CL | Left | Yes | 5 | RU | CW |
| 5.3 | WO | Left | Yes | 1 | RI | CW |
| 6.3 | SM | Left | No | 1 | PN | MB |

¹River kilometer (Hunt and others 1992).

²CL=cottonwood, large/20-30+ m, SM=Snag, mesquite, UP=utility pole, WO=willow.

³Side of river facing downstream.

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

⁵PN=pond, RI=riffle, RU=run.

⁶CW=cottonwood grove, MB=mesquite bosque.

| Location ¹ | PW ^{2,3} | PP | PH | PD | Total | Percent |
|-----------------------|-------------------|-----|-----|-----|-------|---------|
| 3.1 | 1,319 | 69 | 29 | -- | 1,417 | 41.7 |
| 3.6 | 1,742 | 64 | -- | 5 | 1,811 | 53.4 |
| 5.3 | -- | -- | 10 | -- | 10 | 0.3 |
| 6.3 | 44 | 55 | 56 | -- | 155 | 4.6 |
| Total | 3,105 | 188 | 95 | 5 | 3,393 | |
| Percent | 91.5 | 5.5 | 2.8 | 0.2 | | |

¹River kilometer (Hunt et al. 1992).

²Observation time (minutes).

³PW=perched watching, PP=perched preening, PH=perched hunting, PD=perched drying.

APPENDIX P: SYCAMORE BREEDING AREA SUMMARY

Table 73. Observed human activity and bald eagle behavior, Sycamore BA, Arizona, 2020.

| Human Activity | N ¹ | W | R | F | L | B | U | Total | Percent |
|--------------------|----------------|----------|-----------|-----------|-----------|-----------|-----------|-----------|---------|
| Horseback group | 59 | 1 | -- | -- | -- | -- | -- | 60 | 61.9 |
| Small plane | 11 | -- | -- | -- | -- | -- | -- | 11 | 11.3 |
| Helicopter | 9 | -- | -- | -- | -- | -- | -- | 9 | 9.3 |
| OHV | 7 | -- | -- | -- | -- | -- | -- | 7 | 7.22 |
| Apache helicopter | 3 | -- | -- | -- | -- | -- | -- | 3 | 3.1 |
| Vehicle | 1 | 2 | -- | -- | -- | -- | -- | 3 | 3.1 |
| MCSO helicopter | 1 | -- | -- | -- | -- | -- | -- | 1 | 1.0 |
| Chinook helicopter | 1 | -- | -- | -- | -- | -- | -- | 1 | 1.0 |
| Other helicopter | 1 | -- | -- | -- | -- | -- | -- | 1 | 1.0 |
| Swimmer | -- | 1 | -- | -- | -- | -- | -- | 1 | 1.0 |
| Total | 93 | 4 | -- | -- | -- | -- | -- | 97 | |

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

Table 74. Bald eagle habitat analysis at the Sycamore BA, Arizona, 2020.

| Location ¹ | Perch Type ² | Side ³ | Shade | Distance to H ₂ O ⁴ | H ₂ O Type ⁵ | Land Type ⁶ |
|-----------------------|-------------------------|-------------------|---------|---|------------------------------------|------------------------|
| 7.8 | UP | Left | No | 2 | RU | SO |
| 7.9 | CL | Left | Partial | 1 | RI | SO |
| 9.2 | WO | Right | Partial | 1 | RI | WT |
| 9.5 | GR | Right | No | 8 | -- | FL |
| 9.7 | SG | Left | No | 6 | RU | MB |
| 9.9 | UP | Right | No | 2 | RI | FL |
| 10.0a | WO | Left | No | 1 | RI | SO |
| 10.0b | WO | Right | No | 1 | RI | WT |
| 10.1 (nest) | CL | Left | Yes | 6 | RU | CW |
| 10.1a | UP | Right | No | 1 | RU | FL |
| 10.1b | CM | Left | Yes | 6 | RU | CW |
| 10.1c | MS | Right | No | 1 | RI | MB |
| 10.1d | SP | Island | No | 1 | RU | GB |
| 10.7 | CM | Left | No | 4 | RU | MB |
| 10.8 | ST | Right | No | 1 | RU | MB |
| 10.9 | SM | Right | No | 8 | -- | MB |
| 11.5 | ST | Left | No | 5 | RU | CW |
| S 0.2 | ST | Left | No | 1 | RU | CW |

¹River kilometer (Hunt and others 1992). S=Sycamore Creek (had flowing water most of the season).

²CL=cottonwood, large/20-30+ m. CM=cottonwood, medium/10-20+ m. GR=ground, MS=mesquite, SG=soft snag, SP=stump or fallen tree, ST=snag top, SM=Snag, mesquite, UP=utility pole, WO=willow.

³Side of river facing downstream.

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

⁵RI=riffle, RU=run.

⁶CW=cottonwood grove, FL=farmland, GB=gravel bar, MB=mesquite bosque, SO=shore, WT=willow thicket.

| Location ¹ | PW ^{2,3} | PP | PH | PD | ET | CL | PG | PE | PK | Total | Percent |
|-----------------------|-------------------|------|-----|-----|-----|-----|-----|-----|------|-------|---------|
| 7.8 | 1,703 | 29 | -- | -- | -- | -- | -- | -- | -- | 1,732 | 31.9 |
| 7.9 | 144 | 27 | 126 | 44 | -- | -- | -- | -- | -- | 341 | 6.3 |
| 9.2 | 38 | -- | 35 | -- | -- | -- | -- | -- | -- | 69 | 1.3 |
| 9.5 | -- | -- | -- | -- | -- | -- | 27 | 5 | -- | 32 | 0.6 |
| 9.7 | 328 | 161 | -- | 28 | 69 | -- | -- | -- | -- | 586 | 10.8 |
| 9.9 | 102 | 30 | -- | -- | -- | -- | -- | -- | 4 | 136 | 2.5 |
| 10.0 | -- | -- | 170 | -- | -- | -- | -- | -- | -- | 170 | 3.1 |
| 10.1 | 937 | 115 | 42 | 5 | -- | -- | -- | -- | -- | 1,099 | 20.2 |
| 10.7 | 755 | 168 | -- | -- | -- | 33 | -- | -- | -- | 956 | 17.6 |
| 10.8 | 27 | -- | -- | -- | -- | -- | -- | -- | -- | 27 | 0.5 |
| 10.9 | 63 | 21 | -- | 26 | -- | -- | -- | -- | -- | 110 | 2.0 |
| 11.5 | 30 | -- | -- | -- | -- | -- | -- | -- | -- | 30 | 0.5 |
| S 0.2 | 60 | 41 | -- | 44 | -- | -- | -- | -- | -- | 145 | 2.7 |
| Total | 4,183 | 592 | 373 | 147 | 69 | 33 | 27 | 5 | 4 | 5,433 | |
| Percent | 77.0 | 10.9 | 6.9 | 2.7 | 1.3 | 0.6 | 0.5 | 0.1 | <0.1 | | |

¹River Kilometer (Hunt and others 1992). S=Sycamore Creek perch.

²Observation time (minutes).

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

APPENDIX Q: TONTO BREEDING AREA SUMMARY

Table 76. Observed human activity and bald eagle behavior, Tonto BA, Arizona, 2020.

| Human Activity | N ¹ | W | R | F | L | B | U | Total | Percent |
|----------------|----------------|----|----|----|----|----|----|-------|---------|
| Small Plane | -- | -- | -- | -- | -- | 1 | -- | 1 | 50.0 |
| Helicopter | -- | 1 | -- | -- | -- | -- | -- | 1 | 50.0 |
| Total | -- | 1 | -- | -- | -- | 1 | -- | 2 | |

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

Table 77. Bald eagle habitat analysis at the Tonto BA, Arizona, 2020.

| Location ¹ | Perch Type ² | Side ³ | Shade | Distance to H ₂ O ⁴ | H ₂ O Type ⁵ | Land Type ⁶ |
|-----------------------|-------------------------|-------------------|-------|---|------------------------------------|------------------------|
| 16.8 | HS | Right | No | variable | IF | MB |
| 16.9a | DM | Right | Yes | variable | IF | MB |
| 16.9b | HS | Right | No | variable | IF | MB |
| 16.9c | MS | Right | No | variable | IF | MB |
| 17.0a | HS | Right | No | variable | IF | MB |
| 17.0b | MS | Right | No | variable | IF | MB |
| 17.0c | SS | Right | No | variable | IF | MB |
| 17.0d | HS | Right | No | variable | IF | MB |
| 17.0e | HS | Right | No | variable | IF | MB |
| 17.0f | MS | Right | No | 1 | IF | MB |
| 17.6a | SO | Right | Yes | 1 | IF | SO |
| 17.6b | SS | Right | No | variable | IF | MB |
| 17.7 | HS | Left | No | 1 | IF | MB |

¹River kilometer (Hunt et al. 1992).

²DM=deciduous tree, medium (5-10m), HS=hard snag (main branches only), MS=mesquite, SO=shore, SS=soft snag.

³Side of river facing downstream.

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

⁵IF=inflow to reservoir.

⁶MB=mesquite bosque, SO=shore.

Table 78. Bald eagle habitat use at the Tonto BA, Arizona, 2020.

| Location ¹ | PW ^{2,3} | PE | PH | PP | Total | Percent |
|-----------------------|-------------------|-----|-----|-----|-------|---------|
| 16.8 | 2,595 | 89 | 8 | 3 | 2,695 | 73.4 |
| 16.9 | 84 | -- | -- | -- | 84 | 2.3 |
| 17.0 | 217 | -- | -- | -- | 217 | 5.9 |
| 17.6 | 567 | -- | -- | -- | 567 | 15.4 |
| 17.7 | 108 | -- | -- | -- | 108 | 2.9 |
| Total | 3,571 | 89 | 8 | 3 | | |
| Percent | 97.3 | 2.4 | 0.2 | 0.1 | | 3,671 |

¹River kilometer (Hunt et al. 1992).

²Observation time (minutes).

³PW=perched watching, PE=perched eating, PH=perched hunting, PP=perched preening.

APPENDIX R: WHISKEY SPRING BREEDING AREA SUMMARY

Table 79. Observed human activity and bald eagle behavior, Whiskey Spring BA, Arizona, 2020.

| Human Activity | N ¹ | W | R | F | L | B | U | Total | Percent |
|----------------|----------------|----|----|----|----|----|----|-------|---------|
| Boater | 7 | 5 | -- | -- | -- | 1 | 4 | 17 | 34.7 |
| Military Jet | 1 | -- | 3 | -- | -- | 2 | 2 | 8 | 16.3 |
| Small Plane | 3 | 2 | -- | -- | -- | 1 | -- | 6 | 12.2 |
| Helicopter | 2 | 2 | -- | -- | -- | -- | 1 | 5 | 10.2 |
| Agency Boat | 3 | -- | -- | -- | -- | -- | 1 | 4 | 8.2 |
| OHV | -- | -- | -- | -- | -- | -- | 4 | 4 | 8.2 |
| Jet ski | -- | 3 | -- | -- | -- | -- | -- | 3 | 6.1 |
| Camper | 1 | -- | -- | -- | -- | -- | -- | 1 | 2.0 |
| Nestwatcher | 1 | -- | -- | -- | -- | -- | -- | 1 | 2.0 |
| Total | 18 | 12 | 3 | -- | -- | 4 | 12 | 49 | |

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

Table 80. Watercraft compliance at the southern closure boundary, Whiskey Spring BA, Arizona, 2020.

| Date | Boats at Closure | Boats in Closure | Jet Skis at Closure | Jet Skis in Closure | Total |
|----------|------------------|------------------|---------------------|---------------------|-------|
| 2/7-2/16 | 113 | 15 | 13 | 3 | 144 |
| 2/21-3/1 | 67 | 13 | 5 | 4 | 89 |
| Total | 180 | 28 | 18 | 7 | 233 |

Table 81. Observed forage events and success, Whiskey Spring BA, Arizona, 2020.

| Sex | Fish | | Total | |
|---------|----------------|------------------|-------|-----|
| | E ¹ | S-U ² | E | S-U |
| Male | 1 | 1-0 | 1 | 1-0 |
| Female | 4 | 4-0 | 4 | 4-0 |
| Unknown | 1 | 1-0 | 1 | 1-0 |
| Total | 6 | 6-0 | 6 | 6-0 |

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

²S-U=Successful – Unsuccessful forage events.

| Perch Location ¹ | Perch Type ² | Side ³ | Shade | Distance to H ₂ O ⁴ | H ₂ O Type ⁵ | Land Type ⁶ |
|-----------------------------|-------------------------|-------------------|---------|---|------------------------------------|------------------------|
| 68.0a | CT | Right | Partial | 1 | RB | CL |
| 68.0b | CF | Right | Partial | 1 | RB | CL |
| 68.1 | CF | Right | Partial | 1 | RB | CL |
| 68.2a | NE | Right | Partial | 1 | RB | CL |
| 68.2b | CT | Right | Partial | 1 | RB | CL |
| 68.3a | CT | Left | Partial | 1 | RB | CL |
| 68.3b | CT | Right | No | 1 | RB | CL |
| 68.4a | CT | Right | Partial | 1 | RB | CL |
| 68.4b | CT | Right | No | 1 | RB | CL |
| 68.4c | SO | Left | No | 1 | RB | SO |
| 68.4d | DW | Left | No | 1 | RB | SO |
| 68.7 | BO | Left | Partial | 1 | RB | CL |
| 68.8a | CT | Left | No | 1 | RB | CL |
| 68.8b | HL | Left | Partial | 1 | RB | CL |
| 68.9a | WC | Left | No | 1 | RB | CL |
| 68.9b | AN | Left | Partial | 1 | RB | CL |
| 68.9c | SS | Left | No | 1 | RB | CL |
| 69.0a | CT | Left | No | 1 | RB | CL |
| 69.0b | CF | Left | Partial | 1 | RB | CL |
| 70.0 | CF | Left | Partial | 1 | RB | CL |

¹River kilometer (Hunt et al. 1992).

²AN=alternate nest, BO=boulder, CF=cliff ledge, CT=cliff top, DW=driftwood, HL=hillside, NE=nest, SO=shore, SS=shrub, WC=webcam.

³Side of river looking downstream.

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

⁵RB=river bend.

⁶CL=cliffs, SO=shore.

| River km ¹ | PW ^{2,3} | PE | PV | PP | ES | PI | CO | SS | GN | OT | Total | Percent |
|-----------------------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|---------|
| 68.0 | 8 | 2 | -- | -- | -- | -- | -- | -- | -- | -- | 10 | 0.6 |
| 68.1 | 25 | 14 | -- | -- | -- | -- | -- | -- | -- | -- | 39 | 2.2 |
| 68.2 | 65 | -- | 2 | 1 | -- | -- | -- | -- | -- | -- | 68 | 3.9 |
| 68.3 | 140 | -- | 2 | 37 | -- | 3 | 1 | -- | 1 | 1 | 185 | 10.6 |
| 68.4 | 68 | 14 | 1 | 8 | 9 | -- | -- | -- | -- | 1 | 101 | 5.8 |
| 68.6 | -- | 2 | -- | -- | -- | -- | -- | -- | -- | -- | 2 | 0.1 |
| 68.7 | 6 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 6 | 0.3 |
| 68.8 | 567 | 5 | 11 | 22 | -- | 3 | -- | -- | 1 | -- | 609 | 34.8 |
| 68.9 | 646 | -- | 6 | 20 | -- | 2 | 5 | -- | -- | -- | 679 | 38.8 |
| 69.0 | 18 | -- | -- | -- | -- | -- | -- | -- | 2 | -- | 20 | 1.1 |
| 69.4 | 8 | -- | -- | -- | 11 | -- | -- | 6 | -- | 2 | 27 | 1.5 |
| 70.0 | -- | -- | 2 | -- | -- | -- | -- | -- | -- | -- | 2 | 0.1 |
| Total | 1,551 | 37 | 24 | 20 | 20 | 8 | 6 | 6 | 4 | 4 | 1,748 | |
| Percent | 88.7 | 2.1 | 1.4 | 1.1 | 1.1 | 0.5 | 0.3 | 0.3 | 0.2 | 0.2 | | |

¹River kilometer (Hunt et al. 1992).

²Observation time (minutes).

³PW=perched watching, PE=perched eating, PV=perched vocalizing, PP=perched preening, ES=eating on shore, PI=perched interaction, CO=copulating, SS=standing on shore, GN=gathering nest material, OT=other (includes drinking water and perched close to mate).

APPENDIX S: WOODS CANYON BREEDING AREA SUMMARY

Table 84. Observed human activity and bald eagle behavior, Woods Canyon BA, Arizona, 2020.

| Human Activity | N ¹ | W | R | F | L | B | U | Total | Percent |
|------------------|----------------|----------|-----------|-----------|-----------|-----------|----------|--------------|---------|
| Hiker | 1,333 | -- | -- | -- | -- | -- | -- | 1,333 | 77.4 |
| Canoe/Kayak | 184 | -- | -- | -- | -- | -- | -- | 184 | 10.7 |
| Fisherman | 120 | -- | -- | -- | -- | -- | -- | 120 | 7.0 |
| Boat | 20 | -- | -- | -- | -- | -- | -- | 20 | 1.2 |
| Stand Up Paddler | 14 | -- | -- | -- | -- | -- | -- | 14 | 0.8 |
| Picnicker | 11 | -- | -- | -- | -- | -- | -- | 11 | 0.6 |
| Photographer | 9 | -- | -- | -- | -- | -- | -- | 9 | 0.5 |
| Tuber | 9 | -- | -- | -- | -- | -- | -- | 9 | 0.5 |
| Swimmer | 5 | -- | -- | -- | -- | -- | -- | 5 | 0.3 |
| Drone | 2 | 1 | -- | -- | -- | -- | 1 | 4 | 0.2 |
| Camper | -- | 4 | -- | -- | -- | -- | -- | 4 | 0.2 |
| Birder | 3 | -- | -- | -- | -- | -- | -- | 3 | 0.2 |
| Helicopter | 1 | -- | -- | -- | -- | -- | 1 | 2 | 0.1 |
| Cycler | 2 | -- | -- | -- | -- | -- | -- | 2 | 0.1 |
| Runner | 1 | -- | -- | -- | -- | -- | -- | 1 | 0.1 |
| Small Plane | 1 | -- | -- | -- | -- | -- | -- | 1 | 0.1 |
| Total | 1,715 | 5 | -- | -- | -- | -- | 2 | 1,722 | |

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

Table 85. Observed forage events and success, Woods Canyon BA, Arizona, 2020.

| Sex | Fish | | Total | |
|--------------|----------------|------------------|-----------|---------------|
| | E ¹ | S-U ² | E | S-U |
| Male | 7 | 6-1 | 7 | 6-1 |
| Female | 38 | 24-14 | 38 | 24-14 |
| Total | 45 | 30-15 | 45 | 30-115 |

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

²S-U=Successful – Unsuccessful forage events.

Table 86. Observed prey types delivered to the nest, Woods Canyon BA, Arizona, 2020.

| Sex | Fish | Birds | Unknown | Total | Percent |
|----------------|-------------|------------|------------|-----------|---------|
| Male | 12 | 1 | 1 | 14 | 28.6 |
| Female | 32 | -- | 2 | 34 | 69.4 |
| Unknown | 1 | -- | -- | 1 | 2.0 |
| Total | 45 | 1 | 3 | 49 | |
| Percent | 91.8 | 2.0 | 6.1 | | |

| Sex | Fish | Total | Percent |
|---------|-----------------|-------|---------|
| | TS ¹ | | |
| Male | 11 | 11 | 26.8 |
| Female | 29 | 29 | 70.7 |
| Unknown | 1 | 1 | 2.4 |
| Total | 41 | 41 | |
| Percent | 100 | | |

¹TS=Trout species

| Perch Location ¹ | Perch Type ² | Shade | Distance to H ₂ O ³ | H ₂ O Type ⁴ | Land Type ⁵ |
|-----------------------------|-------------------------|-------|---|------------------------------------|------------------------|
| 0.0 | PS | Yes | 1 | RS | CF |
| 0.2a | PO | No | 1 | RS | CF |
| 0.2b | PS | No | 1 | RS | CF |
| 0.3a | PO | No | 1 | RS | CF |
| 0.3b | PS | No | 1 | RS | CF |
| 0.3c | SS | No | 1 | RS | CF |
| 0.3d | SS | No | 1 | RS | CF |
| 0.4 | PO | Yes | 1 | RS | CF |
| 0.6 | HS | No | 1 | RS | CF |
| 0.7a | SC | No | 3 | RS | CF |
| 0.7b | PO | Yes | 1 | RS | CF |
| 0.9a | SS | No | 2 | RS | CF |
| 0.9b | HS | No | 2 | RS | CF |
| 0.9c | PO | Yes | 1 | RS | CF |
| 1.0a | SS | No | 2 | RS | CF |
| 1.0b | SS | No | 2 | RS | CF |
| 1.0c | PO | No | 1 | RS | CF |
| 1.0d | PO | No | 2 | RS | CF |
| 1.2 | SC | No | 1 | RS | CF |
| 1.3 | HS | No | 1 | RS | CF |
| 1.4a | PO | No | 1 | RS | CF |
| 1.4b | SS | No | 2 | RS | CF |
| 4.1 | PO | Yes | 1 | RS | CF |
| 4.7a | PO | No | 1 | RS | CF |
| 4.7b | PO | No | 2 | RS | CF |
| 4.9 | PO | Yes | 1 | RS | CF |
| 5.0 | PO | No | 1 | RS | CF |
| 5.2 | PO | Yes | 1 | RS | CF |

¹Lake kilometer (counterclockwise from middle of dam).

²HS=hard snag, PO=pine/conifer, old growth/20-30+ m., PS=pine/conifer, 2nd growth/10-20+ m, SC=conifer snag, SS=snag, shrub.

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

⁴RS=reservoir main body.

⁵CF=conifer forest.

| Lake km ¹ | PW ^{2,3} | PH | PK | PD | PE | PX | PV | Total | Percent |
|----------------------|-------------------|-----|-----|-----|-----|-----|-----|-------|---------|
| 0.0 | -- | -- | -- | -- | -- | -- | 1 | 1 | <0.1 |
| 0.2 | 232 | 94 | -- | -- | -- | -- | -- | 326 | 4.5 |
| 0.3 | 45 | 43 | -- | -- | -- | -- | 6 | 94 | 1.3 |
| 0.4 | 10 | -- | -- | -- | -- | -- | -- | 10 | 0.1 |
| 0.6 | 42 | 22 | -- | -- | -- | -- | 1 | 65 | 0.9 |
| 0.7 | 1,532 | -- | -- | 33 | -- | -- | 1 | 1,566 | 21.6 |
| 0.9 | 3,597 | 43 | 61 | 30 | 23 | -- | 4 | 3,758 | 51.9 |
| 1.0 | 610 | -- | 15 | -- | -- | -- | -- | 625 | 8.6 |
| 1.2 | 40 | -- | -- | -- | -- | -- | -- | 40 | 0.6 |
| 1.3 | -- | 4 | -- | -- | -- | -- | -- | 4 | 0.1 |
| 1.4 | 37 | 42 | -- | -- | -- | 15 | -- | 94 | 1.3 |
| 4.1 | 6 | -- | -- | -- | -- | -- | -- | 6 | 0.1 |
| 4.7 | 227 | -- | 3 | -- | -- | -- | -- | 230 | 3.2 |
| 4.9 | 339 | 61 | -- | -- | -- | -- | -- | 400 | 5.5 |
| 5 | 5 | -- | -- | -- | -- | -- | -- | 5 | 0.1 |
| 5.2 | 12 | -- | -- | -- | -- | -- | -- | 12 | 0.2 |
| Total | 6,734 | 309 | 79 | 63 | 23 | 15 | 13 | 7,236 | |
| Percent | 93.1 | 4.3 | 1.1 | 0.9 | 0.3 | 0.2 | 0.2 | | |

¹Lake kilometer (counterclockwise from middle of dam).

²Observation time (minutes).

³PW=perched watching, PH=perched hunting, PK=perched with prey, PD=perched drying or sunning, PE=perched eating, PX=perched various, PV=perched vocalizing.