1993 ARIZONA BALD EAGLE WINTER COUNT

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INTRODUCTION

Arizona's wintering bald eagle (*Haliaeetus leucocephalus*) population was examined in the 1970s and early 1980s through comprehensive winter counts (Todd 1977, 1981, 1984a, 1984b; Hall 1985). In 1986, the National Wildlife Federation (NWF), coordinators of the nationwide survey, asked that only areas of eagle concentration (sites with more than 15 eagles observed in 2 or more years) be surveyed. Subsequently, due to Arizona's lack of eagle "concentrations," the state only contributed minimal information in 1986 and 1987 (Hastings 1988). From 1989-1991 winter counts in Arizona were localized to specific management areas such as Roosevelt Lake (USFWS 1990) and Nankoweap Creek (Brown and Stevens 1991). The statewide count completed in 1992 (Beatty 1992) tied Todd's (1984b) previous high count of 225 bald eagles.

The national bald eagle winter survey was initiated and organized by the NWF from 1979-1991. It is now coordinated by the Raptor Research Technical Assistance Center (RRTAC - Bureau of Land Management, 3948 Development Avenue, Boise, Idaho 83705). Because the bald eagle can be gregarious in winter, national surveys can determine the species' success throughout its range and distribution (Stalmaster 1987). In addition, determining the bald eagle's winter use in Arizona contributes to agencies management efforts on the bird's wintering grounds.

Our goal for the 1993 count was to duplicate 1992's survey routes and search for eagles in new areas of the state. Unfortunately, heavy rainstorms during the survey period and restrictions placed upon AGFD by the White Mountain Apache Tribe hindered our attempts to accomplish these objectives. Yet, we were still able to count 186 bald eagles: 46 (25%) subadults, 133 (71%) adults, and 7 (4%) unknowns.

METHODS

The 1993 winter count was scheduled for 6-10 January for agency helicopters to be used on weekdays and to provide a weekend for volunteers. Due to the diverse habitat in Arizona and the desire to maximize (but not duplicate) the count of bald eagles in a narrow time frame with minimal effort, a variety of methods are needed to survey the state adequately. The Salt, Verde, East Verde, Bill Williams, Gila, Black, and White rivers and associated lakes are the main water bodies in central Arizona where fish and carrion eating raptors like bald eagles might occur. Because these drainages have rugged terrain, deep canyons, and are relatively inaccessible, they are best surveyed by helicopter. The Bureau of Reclamation (USBR) and the Salt River Project (SRP) contributed two days of helicopter time to survey the Verde River and lower Salt River.

Other areas that bald eagles may frequent in Arizona which are more accessible by boat, vehicle, and foot, were left to volunteer surveyors.

Poor weather and constraints put upon AGFD did not allow us to survey areas visited in 1992 by helicopter. Heavy rainstorms and high river flows caused a day-to-day wait until helicopter time was available because agency helicopters were tending to emergencies. This delay caused our surveys to be conducted outside of the target survey period and at undesirable times of the day. The Verde River flight was conducted on 11 January, 1993 and our Salt River flight was postponed until 21 January. In addition to heavy rains, the White Mountain Apache Tribe placed restrictions upon all endangered species work on the reservation. This caused us to terminate our survey for the upper Salt River and the lower Black and White rivers.

Helicopter surveys were conducted with three biologists and a pilot in low-level flight, directly above the drainage. The observer in front had the best overall view. Observers in back watched for birds out the side windows. Often the observer in front was able to spot the most eagles. Biologists in back were most useful observing eagle concentrations along a short stretch of river or lake when birds were flushed by the helicopter. Location and distance traveled are described by river kilometers after BioSystems Analysis, Incorporated's river map atlas (Hunt et al. 1992). When river kilometers were not known, landmarks and estimated distances were used. Level of flight and speed varied on terrain, height and density of tension wires, and wind speed. A flying height of 100-200 feet above ground level was best for all observers when conditions were favorable.

Volunteer surveyors from agencies and private groups were solicited through the mail, given NWF forms, and instructed on procedures. Most volunteers surveyed from their vehicle. Foot travel, boat, and helicopter followed as the next most preferred methods.

The state was broken down into regions (northeast AZ - White Mountains, northern AZ - Flagstaff / Coconino Co., Glen Canyon Recreation Area, central AZ - Salt / Verde rivers, southwestern AZ - lower Colorado River, southeastern AZ - San Carlos Apache Indian Reservation). A coordinator was appointed for each region to maximize the areas covered and to minimize double counting of birds. Regions were chosen based upon past sightings of wintering bald eagles, available bald eagle habitat, location of agencies involved, and geographic landforms. Areas surveyed by volunteers were determined by the expertise of the coordinators and surveyors in their particular region and from areas visited in 1992. Some counts were made in areas not assigned to a region. NWF forms were then submitted to the Department for compilation and sent to the western regional coordinator of the RRTAC.

Adult plumaged bald eagles are birds at least five-years old, with a distinct all-white head and tail, brown wings and body. Subadult (or immature) plumaged birds are less than five-years old, with brown in the tail and head and white mottling on the body (Clark and Wheeler 1987). Volunteers were sent instructions for identifying adult and subadult bald and golden eagles. They were also asked to be aware of mistaking four-

year old near-adult bald eagles for full adult plumaged birds.

Bald eagles were classified as resident breeding birds by being sighted on commonly used perches, and proximity to a known nest. More obvious determinations were made when eagles were actually incubating eggs or perched in a nest.

Data are broken down by county in two sections, the helicopter survey and the volunteer survey by county (see Appendix: Tables 1-27). The separation between helicopter and volunteer surveys was created due to the difference in method and because of the desire to retain duplication of effort and consistency for comparisons in future seasons.

Many of Arizona's county borders are defined, in part, by a river. In the following cases where a drainage was a county border, the county which the bird was counted in, was chosen arbitrarily: Bill Williams River/Alamo Lake-Mohave County, upper Verde River-Yavapai County, San Carlos Reservoir-Gila County. These border decisions will remain consistent for future counts.

RESULTS

Because of the poor weather, the dates on which bald eagles were counted ranged outside the window of time (6-10 January) designated nationally for counting eagles. This year surveys occurred between 5-28 January.

One hundred eighty-six bald eagles were counted statewide (Appendix: Tables 29 and 31). One-hundred thirty three were adults (71%), 46 were subadults (25%), and 7 were of unknown age (4%). One near-adult bird was counted near Fredonia. More bald eagles may have been near-adults and misidentified as full adults due to the inexperience of volunteers, distance of bird when identified, lack of spotting scope, poor viewing conditions and/or a brief period of observation.

Three golden eagles were spotted during the count, two were adults and one was of unknown age (Appendix: Table 30). All of these birds were observed in Coconino County. One was being chased by a near-adult bald eagle.

The greatest effort was spent in Coconino County where 31+ volunteers spent 3219 minutes (53.65 hours) searching for bald eagles (Appendix: Table 28). Additionally, Coconino County also counted the most eagles (n=81).

The most efficient method of counting eagles was by helicopter. The 26 eagles counted by helicopter in 333 minutes represents 1 eagle/12.8 minutes of searching. The most efficient ground effort was expended in Apache County where 1 eagle was counted for every 34 minutes spent searching (Appendix: Table 28).

DISCUSSION

Methods of searching for bald eagles during the 1992 and 1993 winter count changed from those of earlier statewide surveys. Todd (1981) flew extensively throughout the state in a fixed-wing aircraft emphasizing the northern section of the state near Flagstaff, and the eastern, White Mountains region. In contrast, the helicopter was the only aircraft used in the 1992 and 1993 count, with an emphasis on central Arizona's rivers and lakes surrounding the breeding bald eagle population. Todd flew the lower reaches of the Verde and Salt rivers, but his access to the upper reaches of these drainage was hampered by the fixed-wing aircraft's inability to fly in narrow canyons. In the 1992 and 1993 survey, the northern and northeastern regions of the state were left to terrestrial volunteer surveyors.

The total number of bald eagles counted in Arizona during the 1993 winter count was 186. In 1992 we counted 225 bald eagles, which equaled the previous high of birds counted statewide in 1984. Totals from previous statewide counts (Todd 1984, Hall 1985, Beatty 1992) are presented in the Appendix (Table 32). The low numbers for 1985 (118 bald eagles) were likely due to the lack of air support, an integral part of the survey method from 1981-1984. Also in 1985, a spring bald eagle survey, in which 109 eagles (56 adults, 53 subadults) were counted, occurred from 17-30 March. Thirty-five percent (n=38) of these spring birds were resident breeders and 20 percent (n=22) were young in the nest. Arizona bald eagle winter counts from 1986-1990 were low due to the changes in the NWF survey method and the lack of coordination for a statewide effort.

Roosevelt Reservoir has been consistently surveyed from 1989-1993 for wintering bald eagles (Appendix: Table 33) by USBR in response to a USFWS (1990) recommendation in the Biological Opinion issued 30 March, 1990 on the Central Arizona Water Control Project, Roosevelt Dam Element of Plan 6. Although Roosevelt supports three pairs (Tonto, Pinto, and Pinal) of breeding eagles, no eagles were observed on the winter count. We did see birds very near Roosevelt: 2 eagles at the Tonto Creek inlet to the lake and 1 subadult below Roosevelt Dam. The totals for the surveys conducted from 1989-1993 were 24 sightings consisting of 26 (18 adults, 8 subadults) bald eagles. Sixteen (62%) of these eagles were observed on the north shore, and 10 (38%) on the south shore. With the three breeding areas and winter migrants, Roosevelt Reservoir probably receives the most year-round use by bald eagles in Arizona.

Nankoweap Creek, a tributary of the Colorado River in Marble Canyon has represented the most concentrated area for wintering bald eagles in Arizona since its examination by Brown and Liebfried (1991). In 1990, from 26 February to 4 March, the creek supported more than 20 bald eagles per day, with a peak concentration of 26 birds (Brown and Liebfried 1990). This gathering of eagles has been in response to accessible spawning trout in the lower reaches of the 14 kilometer long creek (Brown et al. 1989b).

Brown did not recommend searching Nankoweap Creek in early January due to the probable lack of eagles and the effort needed to access the site (T. Tibbitts pers. comm.). However, from 16 February to 6 March, surveys coordinated by the USFWS and the National Park Service Co-op unit at Northern Arizona University were performed from the canyon's rim and along the river. No more than 5 eagles were observed at one time and a minimum of 5 individual birds were recognized. Throughout this survey period only one forage attempt was observed (Sogge and Tibbitts pers. comm).

The age distribution of the 186 bald eagles observed during Arizona's 1993 winter count was 71 percent (n=133) adults, 25 percent (n=46) subadults, and 4 percent (n=7) unknown. Stalmaster (1987) discusses the factors which can influence winter age ratios, such as status of the population, stage of migration, and geographic location. Later, Stalmaster summarizes: "roughly a third of all eagles in any concentration are juveniles and sub-adults." The NWF national winter surveys (Hastings 1988) for 1986-1988 averaged 33 percent subadult bald eagles. Arizona's statewide counts from 1981-1985 and 1992-1993 averaged 31 percent subadult bald eagles. Arizona's 1993 count of 25 percent subadult birds was the lowest from all of our statewide counts.

Unless the low percentage (25%) of sub-adult bald eagles observed in 1993 becomes a trend, limitations placed upon our survey locations by the White Mountain Apache Tribe and poor weather likely affected our chances of spotting more young birds. We were unable to survey six breeding areas on the upper Salt River and the nearby lower White and Black rivers. As a result, only 19 breeding areas were surveyed in 1993 compared to 27 in 1992. In 1992, the rivers along these six breeding areas on White Mountain Apache Tribal Land supplied 17 (42.5%) of the 40 bald eagles counted among the breeding population (Beatty 1993). These 40 birds represented 57 percent of the total number of subadult bald eagles (n=70) counted for the entire survey. During the 1993 count, we only counted two subadult bald eagles among the breeding population.

However, had we been able to survey the upper Salt River and the lower Black and White rivers, we still may have not observed many more eagles. Compared to the 1992 count, our 1993 survey of the upper Verde River, San Carlos Reservoir, and Roosevelt Reservoir indicate that heavy rains, turbid rivers and muddy lakes affected the abundance of eagles. Extensive records (Appendix: Tables 34-36) maintained by Kelly Kishpaugh of the Verde Train (20 miles of river between Clarkdale and Perkinsville) indicate that eagles observed per day during the month of January dropped considerably from 1992 (10.3 eagles/day) to 1993 (6.6 eagles/day). On our helicopter surveys in this stretch of river we observed 6 eagles in 1992 and 0 eagles in 1993. On San Carlos Reservoir we spotted 11 eagles (8 subadults, 3 adults) in 1992, only 2 eagles were observed in 1993. Seven birds were observed on Roosevelt Lake in 1992, no birds were observed in 1993 (although 2 eagles were observed at Tonto Creek inlet and 1 bird was below Roosevelt Dam). Comparing densities of eagles observed among the

breeding population for 1992, considerably less eagles were observed in 1993. It would seem that extreme rainfall and the subsequent affects of muddy lakes and turbid rivers caused eagles to travel elsewhere for food.

In 1993, we observed a higher proportion of resident eagles at occupied breeding areas visited compared to the 1992 count. Because Arizona breeding eagles do not migrate and are either incubating or involved in courtship during our winter count, we have an established number of eagles to evaluate the accuracy of our counts. During the 1992 count we observed at least one eagle at 15 of the 27 occupied breeding areas (55.6%) visited on our helicopter surveys. This low percentage raised questions regarding the thoroughness of our counts (Beatty 1993). In 1993, we observed resident eagles in 14 of the 18 occupied territories (77.8%) visited. In 1993, most eagles observed along surveys in the breeding population were resident eagles (25 of 30 birds counted, 83.3%). Assuming a pair of eagles was present at all 18 occupied territories visited during the survey, we had the potential of observing 36 birds. We observed a 25 resident eagles representing 78 percent of the maximum of 36 breeding eagles.

RECOMMENDATIONS

1.Work with the White Mountain Apache Tribe to perform surveys on the Black, White, and Salt rivers.

2.Perform a helicopter survey on the Gila River above San Carlos Reservoir. We could then compare results from the 1992 and 1994 helicopter surveys and decide the best route for future counts.

3.The great response and contribution by volunteers made the 1992 and 1993 counts a success. To retain continuity and duplication of effort, future efforts should target the same locations visited in 1992 and 1993 with the same personnel.

4.Coordinate helicopter flights over the upper Verde River with the Verde River Train to compare accuracy.

4.Weather, ice conditions, and prey availability are important factors in winter eagle distribution. These elements should be emphasized when volunteers fill out their survey forms. An example survey form should be distributed to volunteers.

5.Examine southern places of the state, such as the San Pedro River and Willcox Playa.

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APPENDIX: DATA TABLES FOR 1993 WINTER SURVEYS

Table 1. Arizona bald eagle winter count, Verde River helicopter survey, 11 January 1993. Survey personnel: James Driscoll, Jon Hanna, and Mike Ingraldi (AGFD); Pilot Ken Kloppel (USBR).

Time	Location	Comments	Sub-adults	Adults	Total # eagles
1705-1700	Verde/Salt confluence to Hwy 87 bridge, 0.0-4.2.	No eagles observed	0	0	0
1700-1646	Hwy 87 bridge to Needle Rock, 4.2-29.5.	2 adults observed near Ft. McDowell BA	0	2	2
1646-1636	Needle Rock to north end of Bartlett Reservoir 29.5-60.0.	2 adults in Bartlett BA	0	2	2
1636-1618	North end Bartlett Reservoir to Horseshoe Dam, 60.0-73.5.	2 adults in Cliff BA	0	2	2
1618-1612	Horseshoe Reservoir, 73.5-84.0.	1 adult observed	0	1	1
1612-1606	Inflow Horseshoe Reservoir to Table Mt. nest #4, 84.0-110.0.	1 subadult above Horseshoe Reservoir, 2 adults in Table Mt. BA	1	2	3
1606-1553	Table Mt. nest #4 to Fossil Creek, 110.0-136.5.	No eagles observed	0	0	0

Table 1. Continued.

Time	Location	Comments	Sub-adults	Adults	Total # eagles
1553-1544	Lower East Verde River, 0.0-~10.0	No eagles observed	0	0	0
1544-1516	Fossil Creek to West Clear Creek, 136.5-175.4.	1 adult in nest at East Verde BA	0	1	1
1516-1510	Lower West Clear Creek, 0.0-~10.0	No eagles observed	0	0	0
1510-1505	West Clear Creek to Verde River bridge in Camp Verde, 175.4-185.1.	No eagles observed	0	0	0
1505-1435	Verde River bridge to Peck's Lake, 185.1-234.0.	No eagles observed	0	0	0
1435-1428	Peck's Lake.	1 adult observed	0	1	1
1428-1327	Break and refuel in Sedona.				
1327-1320	Upper Verde River, 234.0-248.0.	No eagles observed	0	0	0
1320-1315	Verde River to Sycamore Creek/Verde River confluence, 248.0-252.0.	No eagles observed	0	0	0

Table 1. Continued.

Time	Location	Comments	Sub-adults	Adults	Total # eagles
1315-1300	Sycamore Creek / Verde River confluence to Perkinsville, 252.0-271.0.	No eagles observed	0	0	0
1300-1253	Perkinsville to Hell's Canyon, 271.0-283.0.	No eagles observed	0	0	0
1253-1245	Verde River above Hell's Canyon to power lines across river, 283.0-310.3.	1 adult perched near km 292.9	0	1	1
1245-1240	Power lines to Sullivan Lake, 310.3-316.0	No eagles observed	0	0	0

Table 2. Arizona bald eagle winter count, summary of Verde River helicopter survey, 11 January, 1993.

Length of Survey	Locations	# Subadult Bald Eagles	# Adult Bald Eagles	Total # Bald Eagles
1240-1705 Total survey time: 204 min. 1 eagle / 16 min.	Verde River 0.0-316.0, Peck's Lake, Lower East Verde River 0.0-~10.0 Lower West Clear Creek 0.0-~10.0	1	12	13

Table 3. Arizona bald eagle winter count, lower Salt River / Roosevelt Reservoir / Tonto Creek / San Carlos Reservoir helicopter survey, 21 January, 1993. Survey personnel: James Driscoll, Greg Beatty (AGFD; Teah Nobel, Pilot Doug Blakely (SRP).

Time	Location	Comments	Sub-adults	Adults	Total
1302-1320	Salt / Verde River confluence to Stewart Mountain Dam, 0.0-21.9.	2 adults at Orme BA.	0	2	2
1321-1349	Stewart Mt. Dam to Roosevelt Reservoir, 21.9-79.1.	1 adult at Blue Point BA, 1 subadult below Roosevelt Dam,only north ends of Canyon and Apache Reservoirs surveyed.	1	1	2
1349-1402	Roosevelt Dam along southern perimeter of reservoir to Tonto Creek inlet.	No eagles observed - Large nests at Alchesay Canyon and Cottonwood Creek examined.	0	0	0
1403-1424	Tonto Creek inlet up the creek to 76 BA 14.5-59.0.	2 adults observed at each of the Tonto, Sheep, and 76 BAs.	0	6	6
1434-1441	Tonto Creek inlet along northern perimeter of Roosevelt Reservoir to Pinto BA	No eagles observed.	0	0	0
1441-1507	Refuel at Roosevelt.	Refuel and break.	-	-	-
1535-1540	Coolidge BA.	1 adult observed flying toward Coolidge nest.	0	1	1
1540-1605	San Carlos Reservoir perimeter.	2 adults observed.	0	2	2

Table 4. Arizona bald eagle winter count, summary of lower Salt River / Roosevelt Reservoir / Tonto Creek / San Carlos Reservoir helicopter survey, 21 January, 1993.

Length of Survey	Locations	# Subadult Bald Eagles	# Adult Bald Eagles	Total # Bald Eagles
1302-1605 Total survey time: 129 min. 1 eagle / 10 min.	Salt River below Stewart Mt. Dam 0-21.9, Saguaro Reservoir (north shore) Canyon Reservoir (north shore) Apache Reservoir (north shore) Roosevelt Reservoir (north shore) 21.9-79.l, Tonto Creek 14.5-59.0, San Carlos Reservoir perimeter	1	12	13

Table 5. Arizona bald eagle winter count, Apache County-volunteer survey, 6 and 9 January 1993. Survey personnel: USFS Springerville and Alpine Ranger Districts; White Mountain Audubon Society; AGFD Region I. Methods: ground vehicle and foot travel.

Date	Time	Location	Comments	Sub-adults	Adults	Unknown	Total
1/6/93	0840-0900	Becker Lake.	Eagles in cottonwoods at southeast side of lake.	2	2	0	4
1/6/93	1230-1245	Nelson Reservoir	Lake 30% iced-over.	0	0	0	0
1/6/93	0900-0905	Casa Malapais, Little Colorado River.	Eagle in cottonwoods.	1	0	0	1
1/6/93	1030-1100	S. Fork, Little Co. River, S. Fork campground.	2 adults, 2 subadults.	2	2	0	4
1/6/93	1130-1200	Greer Lakes, Bunch, River and Tunnel Reservoirs.	Lakes 95% iced-over, 1 adult at River Reservoir.	0	1	0	1
1/6/93	0942-0952	The Ranch Lake.	Lake 95% iced over, 3 adults in Ponderosa Pine south of HWY 60.	0	3	0	3
1/6/93	1005-1035	Ortega Lake.	Lake 100 % iced-over, 1 adult flying in area.	0	1	0	1
1/6/93	1152-1208	Sponseller Lake.	1 adult in snag on west side of lake.	0	1	0	1
1/9/93	0800-0830	Concho Lake	2 adults	0	2	0	2
1/9/93	0710-0740	Zion Lake	1 adult in cottonwood snag	0	1	0	1

Table 5. Continued.

Date	Time	Location	Comments	Sub-adults	Adults	Unknown	Total
1/6/93	1030-1045	San Francisco River to Luna Lake	Subadult flying west toward town of Alpine	1	0	0	1
1/6/93	1048-1109	Luna Lake	Adult perched in pine snag	0	1	0	1
1/6/93	1120-1530	San Francisco River from Luna Lake to New Mexico border	No eagles observed	0	0	0	0
1/6/93	1120-1140	FS road 281 to Turkey Creek	No eagles observed	0	0	0	0
1/6/93	1157-1234	Campbell Blue Creek, FS road 30 from 281 to Brooks Ranch	No eagles observed	0	0	0	0
1/6/93	1009-1010	Nutriosa Reservoir	1 eagle of unknown age	0	0	1	1
1/6/93	1009-1014	Judds Lake	No eagles observed	0	0	0	0
1/6/93	0900-0920	Williams Valley	No eagles observed	0	0	0	0
1/6/93	0945-1030	Sierra Blanca Lake	No eagles observed	0	0	0	0
1/6/93	1430-1530	Black River, east fork	No eagles observed	0	0	0	0
1/6/93	1530-1600	Black River, west fork	No eagles observed	0	0	0	0
1/6/93	1035-1105	Coyote Creek area	1 eagle of unknown age	0	0	1	1

Table 6. Arizona bald eagle winter count, summary of Apache County volunteer survey, 6 January, 1993.

Dates / Time	Locations	# Subadult Bald Eagles	# Adult Bald Eagles	# unknown Bald Eagles	Total # Bald Eagles
1 / 6 / 93 Total survey time: 750 min. 1 eagle / 34 min.	Becker Lake, Nelson Reservoir, Casa Malapais, Little Colorado River, South Fork Little CO River Campground, Greer Lakes-River, Bunch and Tunnel, The Ranch Lake, Ortega Lake, Sponseller Lake, Concho Lake, Zion Lake, San Francisco River to Luna Lake, Luna Lake, San Francisco River- Luna Lake to NM, FS road 281 to Turkey Creek, Campbell Blue Creek, FS road 30 from 281 to Brooks Ranch, Nutriosa Reservoir, Judds Lake, Williams Valley, Sierra Blanca Lake, Black River, east fork Black River, west fork, Coyote Creek area	6	14	2	22

Table 7. Arizona bald eagle winter count, Cochise County volunteer survey, 9 January, 1993.

Date	Time	Location	Comments	Sub-adults	Adults	Unknown	Total
1/9/93	1530-1600	Parker Canyon Lake	No eagles observed	0	0	0	0
1/9/93	1200-1600	Willcox Playa	No eagles observed	0	0	0	0

Table 8. Arizona bald eagle winter count, summary of Cochise County volunteer survey, 9 January, 1993. Survey personnel: USFS Santa Catalina Ranger District; AGFD Region V. Methods: ground vehicle and foot travel.

Dates/Time	Locations	# Subadult Bald Eagles	# Adult Bald Eagles	# Unknown Bald Eagles	Total # Bald Eagles
1/9/93 Total survey time: 270 min. 0 eagle/270 min.	Parker Canyon Lake, Wilcox Playa	0	0	0	0

Table 9. Arizona bald eagle winter count, Coconino County volunteer survey, 5-9,12-13, 28 January, 1993. Survey personnel: USFS Kaibab, Williams, Chalendar, Chevelon, and Mormon Lake Ranger Districts; Flagstaff Birding Club; Glen Canyon National Recreation Area; Northern Arizona Audubon Society; AGFD. Methods: ground vehicle, foot travel, boat, helicopter

Date	Time	Location	Comments	Sub-adults	Adults	Unknown	Total
1/7/93	0900-1400	West Chevelon Canyon, FS Road 34	2 adults observed.	0	2	0	2
1/12/93	300 min.	Chevelon Canyon Lake	5 adults, 4 subadults, 2 unknown age.	4	5	2	11
1/8/93	0800-1000	Willow Creek	1 adult observed.	0	1	0	1
1/8/93	1030-1100	White Horse Lake	2 adults and 2 subadults observed at adjacent meadow	2	2	0	4
1/8/93	1245-1300	Barney Flat Wetland	3 adults observed	0	3	0	3
1/8/93	1315-1330	Kaibab Lake	1 adult observed	0	1	0	1
1/5/93	-	Cedar Knoll, FS Roads 422(a),89a	1 near-adult bald eagle flying with 1 golden eagle. Incidental observation	1	0	0 1 G.E.	1 1 G.E.
1/8/93	1430-1500	Juan Tank Allotment	1 adult observed	0	1	0	1
1/8/93	1630-1640	Pittman Valley	2 adults observed	0	2	0	2
1/13/93	0915-0925	Spring Valley Wash	2 adults, 4 subadults	4	2	0	6
1/8/93	1100-1200	J.D. Dam Lake	No eagles observed	0	0	0	0
1/6/93	1500-1530	Holden Lake	1 adult observed	0	1	0	1
1/6/93	1030-1040	Red Lake Valley	2 adults and 2 immatures	2	2	0	4
1/7/93	0900-1000	Tusayan-HWY 64	1 adult in pine snag	0	1	0	1
1/9/93	0930-1200	Country Club Lakes	2 adults at Lake Elaine	0	2	0	2
1/9/93	1120-1210	Bellemont	1 adult observed	0	1	0	1

Table 9. Continued.

Date	Time	Location	Comments	Sub-adults	Adults	Unknown	Total
1/9/93	1210-1300	Davenport Lake	2 adults observed	0	2	0	2
1/9/93	1300-1350	Catarac Lake	2 adults observed	0	2	0	2
1/9/93	1600-1615	Steel/Stone Reservoir	1 adult observed	0	1	0	1
1/9/93	1000-1400	Townsend-Winona Road A	No eagles observed	0	0	0	0
1/9/93	0900-1200	Townsend-Winona Road B	1 adult observed	0	1	0	1
1/9/93	0945-1330	89 North (Sunset Crater-Wupatki)	2 golden eagles observed	0	2 G.E.	0	2 G.E.
1/9/93	1430-1730	Route 180	No eagles observed	0	0	0	0
1/9/93	1030-1230	Stoneman Lake area	4 adults and 1 subadult	1	4	0	5
1/9/93	0900-1030	FH3	2 adults observed	0	2	0	2
1/8/93	1145-1545	I-17 (Flagstaff to Sedona exit)	3 adults and 2 subadults	2	3	0	5
1/7/93	1015-1208	FH3 Lakes (Mary, Morman, Prime, Ashurst)	14 adults, 4 subadults and 2 unknowns. 14 birds at Lower Lake Mary perched in snag	4	14	2	20
1/8/93	1015-1230	Hwy 87(A-Sitgreaves FS boundary to Clint's Well)	No eagles observed	0	0	0	0
1/8/93	1000-1200	Hwy 87-Hwy 260-Camp Verde RD (Clint's Well to Camp Verde)	2 adult eagles observed	0	2	0	2
1/28/93	0855-1327	Glen Canyon National Recreation Area-Lees Ferry to Stateline, Wahweap- Lake Powell	No eagles observed on Arizona section of survey, 20 eagles spotted on Utah portion	0	0	0	0

Table 10. Arizona bald eagle winter count, summary of Coconino County volunteer survey, 5-9, 12-13, 28 January, 1993.

Dates / Time	Locations	# Subadult Bald Eagles	# Adult Bald Eagles	# Unknown Bald Eagles	Total # Bald Eagles
1 / 5-6, 12-13, and 28 / 93 Total survey time: 3219 minutes 1 eagle / 40 min.	West Chevelon Canyon, Chevelon Canyon Lake, Willow Creek, White Horse Lake, Barney Flat Wetland, Kaibab Lake, Cedar Knoll, FS Roads 422(a),89a, Juan Tank Allotment, Pittman Valley, Spring Valley Wash, J.D. Dam Lake, Holden Lake, Red Lake Valley, Tusayan, HWY 64, Country Club Lakes Bellemont, Davenport Lake, Catarac Lake, Steel / Stone Reservoir, Townsend-Winona Road A&B, Route 180, Stoneman Lake, FH3, I-17 (Flagstaff to Sedona exit), FH3 Lakes (Mary, Morman, Ashurst), Hwy 87 (A-S FS boundary- Clint's Well), Hwy 87-Hwy 260-Verde RD (Clint's Well to Camp Verde), Glen Canyon National Recreation Area-(Lees Ferry to Stateline, Wahweap- Lake Powell),	20	57	4	81

Table 11. Arizona bald eagle winter count - golden eagles, summary of Coconino County volunteer survey, 5 and 9 January, 1993.

Dates / Time	Locations	# Subadult Golden Eagles	# Adult Golden Eagles	Total # Golden Eagles

1/5&9/93	89 North (Sunset Crater-Wupatki), Cedar Knoll, FS Roads 422(a),89a	0	3	3

Table 12. Arizona bald eagle winter count, Greenlee County volunteer survey, 6 January, 1992.

Dates	Time	Location	Comments	Sub-adults	Adults	Unknown	Total
1/6/92	1309-1557	Blue River-Downs Ranch to Turkey Creek	3 adults - 1 adult in pine snag at fish hatchery, 2 adults perched in cottonwoods, 1 unknown age bird	0	3	1	4
1/6/92	1300-1430	Beaver Creek	No eagles observed	0	0	0	0
1/9/92	1140-1154	Turkey Creek, Campbell Blue, Blue River, FS Rd 281	No eagles observed	0	0	0	0

Table 13. Arizona bald eagle winter count, summary of Greenlee County volunteer survey, 6 January, 1992. Survey personnel: USFS Alpine and Clifton Ranger Districts; AGFD Region I. Methods: ground vehicle and foot travel.

Dates/Time	Locations	# Subadult Bald Eagles	# Adult Bald Eagles	# Unknown Bald Eagles	Total # Bald Eagles
1/6/92 Total survey time: 271 min. 1 eagle/68 min.	Blue River-Downs Ranch to Turkey Creek, Beaver Creek, Turkey Creek-Campbell Blue, Blue River (FS Rd 281)	0	3	1	4

Table 14. Arizona bald eagle winter count, Maricopa County volunteer survey, 13 January, 1993.

Dates	Time	Location	Comments	Sub-adults	Adults	Unknown	Total
1/13/93	1030-1200	Painted Rock Reservoir	1 subadult	1	0	0	1

Table 15. Arizona bald eagle winter count, summary of Maricopa County volunteer survey, 13 January, 1992. Personnel: AGFD Nongame Branch. Methods: foot travel.

Dates/Time	Locations	# Subadult Bald Eagles	# Adult Bald Eagles	Total # Bald Eagles
1/13/92 Total survey time: 90 min.	Painted Rock Reservoir	1	0	1

Table 16. Arizona bald eagle winter count, Mohave County volunteer survey, 8-10 January, 1993.

Dates	Time	Location	Comments	Sub-adults	Adults	Unknown	Total
1/8/93	---	Alamo Lake	4 adults from Alamo and Ive's Wash BAs observed by nestwatchers, both pairs incubating eggs.	0	4	0	4
1/9/93	0800-1100	Lake Mead, Temple Bar	4 adults observed in Grand Wash Bay	0	4	0	4

1/10/93	0645-1445	Lake Mead, Boulder Basin, Boulder Canyon, Lower Virgin Beach	1 adult and 1 subadult observed	1	1	0	2
1/9/93	0700-1000	Topock Marsh, Havasu National Wildlife Refuge	No eagles observed	0	0	0	0
1/9/93	0800-1200	Lake Mohave, Colorado River	4 subadults observed	4	0	0	4

Table 17. Arizona bald eagle winter count, summary of Mohave County volunteer survey, 8-10 January, 1993. Survey personnel: National Park Service; AGFD Region III. Methods: ground vehicle and boat.

Dates / Time	Locations	# Subadult Bald Eagles	# Adult Bald Eagles	# Unknown Bald Eagles	Total # Bald Eagles
1 / 8-10 / 93 Total survey time: 1080 min. 1 eagle / 77 min.	Alamo Lake, Lake Mead, Temple Bar, Lake Mead, Boulder Basin, Boulder Canyon, Lower Virgin Beach, Topock Marsh, Havasu National Wildlife Refuge, Lake Mohave, Colorado River	5	9	0	14

Table 18. Arizona bald eagle winter count, Navajo County volunteer survey, 6 January, 1993. Survey personnel: USFS Heber and Lakeside Ranger Districts; White Mountain Audubon Society; AGFD Region I. Methods: ground vehicle and foot travel.

Date	Time	Location	Comments	Sub-adults	Adults	Unknown	Total
1/6/93	1300-1400	Black Canyon	No eagles observed	0	0	0	0
1/6/93	1117-1210	Dry Lake	No eagles observed	0	0	0	0
1/6/93	1022-1040	Cottonwood Wash, Clay Springs	1 adult	0	1	0	1
1/6/93	0835-1315	FS Rds. 50461536956170 699	1 subadult perched	1	0	0	1
1/6/93	0817-1017	Highway 260	2 subadults	2	0	0	2
1/6/93	1116-1128	Scott's Reservoir	1 subadult	1	0	0	1
1/6/93	1137-1209	Rainbow Lake	1 adult, 1 subadult	1	1	0	2
1/6/93	1113-1127	Lake of the Woods	No eagles observed	0	0	0	0
1/6/93	1024-1041	Jacque's Marsh	1 adult perched in snag	0	1	0	1
1/6/93	1011-1126	Little Mormon Lake	No eagles observed	0	0	0	0
1/6/93	0920-0955	Showlow Lake	2 adults observed	0	2	0	2
1/6/93	1011-1126	Whipple Lake	No eagles observed	0	0	0	0
1/6/93	1414-1448	White Mountain Lake	2 adults observed	0	2	0	2
1/6/93	0900-0945	Pintail Lake	1 adult flying	0	1	0	1
1/6/93	1015-1045	Telephone Lake	2 adults	0	2	0	2
1/6/93	1120-1214	Schoen's Reservoir	4 adults, 1 subadult	1	4	0	5
1/6/93	1015-1230	Fools Hollow Lake	5 adults perched along southern arm of lake	0	5	0	5

Table 18. Continued.

Date	Time	Location	Comments	Sub-adults	Adults	Unknown	Total
1/6/93	0900-0920	Woodland Lake	No eagles observed	0	0	0	0
1/6/93	0920-0935	Fred's Lake	No eagles observed	0	0	0	0
1/6/93	0935-0955	Edeler's Lake	1 adult observed	0	1	0	1
1/6/93	1455-1520	Lone Pine Lake	No eagles observed	0	0	0	0
1/6/93	1137-1218	Long Lake	No eagles observed	0	0	0	0

Table 19. Arizona bald eagle winter count, summary of Navajo County volunteer survey, 6 January, 1992.

Dates/Time	Locations	# Subadult Bald Eagles	# Adult Bald Eagles	Total # Bald Eagles
1/6/92 Total survey time: 1210 min. 1 eagle/47 min.	Black Canyon, Dry Lake, Cottonwood Wash/Clay Springs, FS Rds. 504615369561706 99, Highway 260, Scott's Reservoir, Rainbow Lake, Lake of the Woods, Jacque's Marsh, Little Mormon Lake, ShowLow Lake, Whipple Lake, White Mountain Lake, Pintail Lake, Telephone Lake, Redhead Marsh, Schoen's Reservoir, Fool Hollow Lake, Woodland Lake, Fred's Lake, Edeler's Lake, Lone Pine Lake, Long Lake	6	20	26

Table 20. Arizona bald eagle winter count, Pinal County volunteer survey, 9 January, 1993.

Date	Time	Location	Comments	Sub-adults	Adults	Unknown	Total
1/9/93	0915-1300	Picacho Lake	No eagles observed	0	0	0	0

Table 21. Arizona bald eagle winter count, summary of Pinal County volunteer survey, 9 January, 1993. Survey personnel: AGFD Region V. Methods: ground vehicle.

Dates / Time	Locations	# Subadult Bald Eagles	# Adult Bald Eagles	# Unknown Bald Eagles	Total # Bald Eagles
1 / 9 / 93 Total survey time: 225 min. 0 eagle / 225 min.	Picacho Lake	0	0	0	0

Table 22. Arizona bald eagle winter count, Santa Cruz County volunteer survey, 9 January, 1993. Survey personnel: AGFD Region V. Methods: ground vehicle and foot travel.

Date	Time	Location	Comments	Sub-adults	Adults	Unknown	Total
1 / 9 / 93	1230-1300	Bog Hole	No eagles observed	0	0	0	0
1 / 9 / 93	0800-1630	Patagonia Lake	No eagles observed	0	0	0	0
1 / 9 / 93	1330-1500	San Raphael Valley	No eagles observed	0	0	0	0

Table 23. Arizona bald eagle winter count, summary of Santa Cruz County volunteer survey, 9 January, 1993. Survey personnel: AGFD Region V. Methods: ground vehicle and foot travel.

		# Subadult	# Adult	# Unknown	Total #

Dates / Time	Locations	Bald Eagles	Bald Eagles	Bald Eagles	Bald Eagles
1 / 9 / 93 Total survey time: 630 min. 0 eagle / 630 min.	Bog Hole, Patagonia Lake San Raphael Valley	0	0	0	0

Table 24. Arizona bald eagle winter count, Yavapai County volunteer survey, 8-10 January, 1993. Survey personnel: Northern Arizona Audubon Society. Methods: ground vehicle and foot travel.

Dates	Time	Location	Comments	Sub-adults	Adults	Unknown	Total
1 / 9 / 93	0700-1700	Wet Beaver Creek (USFS Station to Verde River)	1 subadult observed	1	0	0	1
1 / 9 / 93	0800-1600	Lower Oak Creek (Red Rocks to Verde River)	1 adult observed	0	1	0	1
1 / 9 / 93	0900-1600	Upper Oak Creek (Red Rocks to Pine Flat)	1 adult observed	0	1	0	1

Table 25. Arizona bald eagle winter count, summary of Yavapai County volunteer survey, 8-10 January, 1993. Survey personnel: Northern Arizona Audubon Society. Methods: ground vehicle and foot travel.

Dates / Time	Locations	# Subadult Bald Eagles	# Adult Bald Eagles	Total # Bald Eagles
1 / 8-10 / 93	Wet Beaver Creek (USFS Station to Verde River), Lower Oak Creek (Red Rocks to Verde River),	1	2	3

Total survey time: 1500 min. 1 eagle / 500 min.	Upper Oak Creek (Red Rocks to Pine Flat)			

Table 26. Arizona bald eagle winter count, Yuma County volunteer survey, 8 January, 1993. Survey personnel: Imperial National Wildlife Refuge. Methods: boat.

Dates	Time	Location	Comments	Sub-adults	Adults	Total
1/8/93	1000-1630	Colorado River, Imperial National Wildlife Refuge-Cibola Lake to Martinez Lake.	3 adults and 6 immatures, all eagles perched on sand bars. Part of survey performed in La Paz County, all eagles observed in Yuma County.	6	3	9

Table 27. Arizona bald eagle winter count, summary of Yuma County volunteer survey, 8 January, 1993. Survey personnel: Imperial National Wildlife Refuge. Methods: boat.

Dates/Time	Locations	# Subadult Bald Eagles	# Adult Bald Eagles	Total # Bald Eagles
1/8/93 Total survey time: 360 min. 1 eagle/40 min.	Colorado River, Imperial National Wildlife Refuge-Cibola Lake to Martinez Lake	6	3	9

Table 28. Survey effort, 1993 - Arizona bald eagle winter count.

Location / County	Time	Number of volunteers
Helicopter Surveys	333 minutes	7
Apache County	750 minutes	11
Cochise County	270 minutes	3
Coconino County	3219 minutes	31+
Greenlee County	271 minutes	3
Maricopa County	90 minutes	1
Mohave County	1080 minutes	8
Navajo County	1210 minutes	11
Pinal County	225 minutes	2
Santa Cruz County	630 minutes	2
Yavapai County	1500 minutes	5
Yuma County	360 minutes	3
Totals	9938 minutes	87

Table 29. Summary of Arizona bald eagle winter count, helicopter and volunteer survey, January 8-12 and 14, 1993.

Location	Length of Survey	# Subadult Bald Eagles	# Adult Bald Eagles	# Unknown Bald Eagles	Total # Bald Eagles
Verde River, helicopter survey	204 minutes	1	12	0	13
Lower Salt River / San Carlos Reservoir / Tonto Creek, helicopter survey	129 minutes	1	12	0	13
Apache County	750 minutes	6	14	2	22
Cochise County	270 minutes	0	0	0	0
Coconino County	3219 minutes	20	57	4	81
Greenlee County	271 minutes	0	3	1	4
Maricopa County	90 minutes	1	0	0	1
Mohave County	1080 minutes	5	9	0	14
Navajo County	1210 minutes	6	20	0	26
Pinal County	225 minutes	0	0	0	0
Santa Cruz County	630 minutes	0	0	0	0
Yavapai County	1500 minutes	1	2	0	3
Yuma County	360 minutes	6	3	0	9
Totals	9938 minutes	46	133	7	186

Table 30. Summary of Arizona winter count, golden eagles, helicopter and volunteer survey, January 8-12 and 14, 1993.

Location	Length of Survey	# Subadult Golden Eagles	# Adult Golden Eagles	# Unknown Golden Eagles	Total # Golden Eagles
Verde River, helicopter survey	204 minutes	0	0	0	0
Lower Salt River / San Carlos Reservoir / Tonto Creek, helicopter survey	129 minutes	0	0	0	0
Apache County	750 minutes	0	0	0	0
Cochise County	270 minutes	0	0	0	0
Coconino County	3219 minutes	0	2	1	3
Greenlee County	271 minutes	0	0	0	0
Maricopa County	90 minutes	0	0	0	0
Mohave County	1080 minutes	0	0	0	0
Navajo County	1210 minutes	0	0	0	0
Pinal County	225 minutes	0	0	0	0
Santa Cruz County	630 minutes	0	0	0	0
Yavapai County	1500 minutes	0	0	0	0
Yuma County	360 minutes	0	0	0	0
Totals	9938 minutes	0	2	1	3

Table 31. Summary of 1993 Arizona bald eagle winter count by county.

Location	# Subadult Bald Eagles	# Adult Bald Eagles	# Unknown Bald Eagles	Total # Bald Eagles
Apache County	6	14	2	22 (11.8%)
Cochise County	0	0	0	0
Coconino County	20	57	4	81 (43.5%)
Gila County	0	9	0	9 (4.8%)
Greenlee County	0	3	1	4 (2.2%)
Maricopa County	1	10	0	11 (5.9%)
Mohave County	5	9	0	14 (7.5%)
Navajo County	6	20	0	26 (14.0%)
Pinal County	0	0	0	0
Santa Cruz County	0	0	0	0
Yavapai County	2	8	0	10 (5.4%)
Yuma County	6	3	0	9 (4.8%)
Totals	46 (25%)	133 (71%)	7 (4%)	186 (100%)

Table 32. Summary of statewide Arizona bald eagle winter counts, 1981-1985, 1992-1993.

Year	# Subadult Bald Eagles	# Adult Bald Eagles	# Unknown Bald Eagles	Total # Bald Eagles
1981	60 (36%)	103 (63%)	2 (1%)	165
1982	72 (34%)	135 (64%)	3 (2%)	210
1983	53 (33%)	104 (66%)	1 (1%)	158
1984	63 (28%)	159 (71%)	3 (1%)	225
1985	40 (34%)	78 (66%)	0	118
1992	70 (31%)	145 (65%)	10 (4%)	225
1993	46 (25%)	133 (71%)	7 (4%)	186
Totals	404 (31%)	857 (67%)	26 (2%)	1287 (100%)

Table 33. Summary of Roosevelt Reservoir bald eagle winter counts, 1989-1993.

Year	# Subadult Bald Eagles	# Adult Bald Eagles	Eagles Observed North Shore	Eagles Observed South Shore
Nov. 21, 1989	1	5	1	5
Jan. 3, 1990	1	5	5	1
Feb. 6, 1990	1	1	1	1
Mar. 21, 1990	0	1	0	1
Jan. 15, 1991	3	1	3	1

Jan. 10, 1992	2	5	6	1
Jan. 21, 1993	0	0	0	0
Totals	8	18	16	10

Table 34. Verde River Train bald eagle counts, Perkinsville-Clarkdale, Arizona, 1992.

Date	# Subadult Bald Eagles	# Adult Bald Eagles	Total # Bald Eagles
Jan. 3, 1992	1	5	5
Jan. 6, 1992	1	6	7
Jan. 8, 1992	0	6	6
Jan. 10, 1992	0	8	8
Jan. 11, 1992	1	3	4
Jan. 12, 1993	1	3	4
Jan. 15, 1993	0	8	8
Jan. 18, 1993	3	13	16
Jan. 19, 1993	0	4	4
Jan. 22, 1993	1	10	11
Jan. 24, 1993	3	4	7
Jan. 25, 1993	3	15	18
Jan. 26, 1993	8	16	24
Jan. 27, 1993	10	12	22
Jan. 31, 1993	0	11	11
Total	33 (21%)	121 (79%)	154 (100%)

Table 35. Verde River Train bald eagle counts, Perkinsville-Clarkdale, Arizona 1993.

Date	# Subadult Bald Eagles	# Adult Bald Eagles	Total # Bald Eagles
Jan. 2, 1993	3	3	6
Jan. 13, 1993	1	9	10
Jan. 14, 1993	0	5	5
Jan. 15, 1993	1	2	3
Jan. 23, 1993	0	5	5
Jan. 24, 1993	1	9	10
Jan. 30, 1993	0	9	9
Jan. 31, 1993	0	5	5
Total	6 (11.3%)	47 (88.7%)	53 (100%)

Table 36. Summary of Verde River Train bald eagle counts, Perkinsville-Clarkdale, Arizona 1992-1993.

Year	Days	# Subadult Bald Eagles	Average # Subadults Per Day	# Adult Bald Eagles	Average # Adults Per Day	Average # Bald Eagles Per Day	Total # Bald Eagles
1992	15	33 (21%)	2.2	121 (79%)	8.1	10.3	154 (74%)
1993	8	6 (11%)	0.75	47 (89%)	5.9	6.6	53 (26%)
Total	23	39 (19%)	1.7	168 (81%)	7.3	9.0	207(100%)