

# ARIZONA BALD EAGLE 1994 NEST SURVEY

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## INTRODUCTION

The bald eagle was classified by the U.S. Fish and Wildlife Service (USFWS) in 1978 as endangered in 43 states (including Arizona) and threatened in 5 others. It is not endangered or threatened in Alaska and does not occur in Hawaii. In addition to protection under the Endangered Species Act, the bald eagle is protected by the Migratory Bird Treaty Act and by the Bald and Golden Eagle Protection Act. A recovery plan (USFWS 1982) guides management of the southwestern population, which includes Arizona, New Mexico, and Texas and Oklahoma west of the 100th meridian.

The first bald eagle nest survey in Arizona was conducted from 1972 through 1975, by Rubink and Podborny (1976). Since 1978, state and federal biologists have surveyed and monitored bald eagle nest sites through various interagency agreements (Grubb 1986; Glinski 1985, 1986; Hildebrandt et al. 1987; Gooch et al. 1988; Tibbitts et al. 1989, 1990; Corman et al. 1991; Driscoll et al. 1992, 1994).

The annual bald eagle nest search is intended to refine our understanding of the distribution of breeding Arizona bald eagles. It focuses on areas where bald eagles have been observed and/or where habitat appears adequate for nesting. In addition, Breeding Areas (BAs) where current occupancy is unknown are searched for new or previously undetected alternate nests. We also inspect historical BAs for occupancy. Discovery of new sites, alternate nests, and the status of known BAs contributes to accurately describing the distribution, status, and annual productivity (Appendix A) of Arizona's breeding population. Timely discovery of BAs also identifies sensitive areas that may require proactive protection from potentially adverse impacts.

Since initiation of this cooperative effort in 1985, 13 BAs have been discovered. Presently there are 33 known bald eagle BAs in Arizona. In 1994, we discovered two more BAs: Luna Lake and Talkalai Lake. We also discovered alternate nests at the Horseshoe and Horse Mesa BAs. Monthly Occupancy and Reproduction Assessment (ORA) helicopter flights provided by the BR and SRP and coordinated by AGFD were a valuable tool in locating known and alternate nests in existing territories and exploring for new territories.

This year's survey effort was administered and performed by AGFD in cooperation with the BR, SRP, U.S. Forest Service (USFS), USFWS, Bureau of Land Management, San Carlos Apache Game and Fish Department, and the White Mountain Apache Game and Fish Department.

## SURVEY AREA

Nest searches were conducted along selected river and stream drainages, and around reservoirs found throughout Arizona. Surveys were conducted as far north as Nankoweap Creek along the Colorado River in Marble Canyon, and as far south as Picacho Reservoir. The western boundary of the survey area was the Colorado River in Lake Havasu. The eastern boundary was Luna Lake, near the New Mexico border near Alpine, Arizona. Elevations of the areas surveyed ranged from approximately 480 feet at Lake Havasu to 8000 feet at Luna Lake.

The bald eagle's breeding habitat in central Arizona occurs from 1080 to 5640 feet in elevation in the riparian areas of the Sonoran Desertscrub biotic community (Brown 1982) and in the transition area of both zones. In addition to the bald eagle BAs visited within these zones, the following survey areas also fell within these zones: Talkalai Lake, Picacho Reservoir, Cold Water Creek, and Lake Havasu. Representative vegetation within this biotic community consists of blue palo verde (*Cercidium floridium*), mesquites and ironwood (*Olneya tesota*), juniper (*Juniperus* spp.) and pinyon (*Pinus* spp.) trees, saguaro (*Carnegiea gigantea*), teddy bear cholla (*Opuntia bigelovii*), Fremont cottonwood (*Populus fremontii*), Goodding willow (*Salix gooddingii*), Arizona sycamore (*Platanus wrightii*), and introduced tamarisk or salt cedar (*Tamarix pentandra*).

Other biotic communities visited in our searches for nesting bald eagles were Montane-Conifer Forest (Luna Lake, Flagstaff lakes), Great Basin Conifer Woodland (Chevelon Canyon, Woods Canyon, and Willow Springs lakes), and Great Basin Desertscrub (Nankoweap Creek) (Brown 1982). Representative plants of the Montane-Conifer Forest are blue spruce (*Picea pungens*), Engelmann spruce (*Picea engelmannii*), white fir (*Abies concolor*), Douglas fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), quaking aspen (*Populus tremuloides*), Gambel oak (*Quercus gambelii*), and common juniper (*Juniperus communis*). Riparian plants in this biotic community are narrowleaf cottonwood (*Populus angustifolia*), thinleaf alder (*Alnus tenuifolia*), Bebb's willow (*Salix bebbiana*) and coyote willow (*Salix exigua*). In the Great Basin Conifer Woodland, common species are: juniper (*Juniperus* spp.) and pinyon (*Pinus* spp.), and shrub live oak (*Quercus turbinella*). Ponderosa pines (*Pinus ponderosa*) characterizes the transition between Great Basin Conifer Woodland and Montane-Conifer Forest. The Great Basin Desertscrub biotic community consists of desert plants evolved for cold-temperate environments, such as sagebrushes (*Artemisia* spp.), rabbitbrushes (*Chrysothamnus* spp.), and saltbushes (*Atriplex* spp.) located on top of canyon plateaus. Riparian Desert Scrubland species consist of catclaws (*Acacia* spp.), mesquites (*Prosopis* spp.) and introduced salt cedar (*Tamarix chinensis*).

## METHODS

The 1994 nest survey was conducted between January and May by a one to three person team. Survey area priorities were based upon previous observations, habitat quality, and proximity to known BAs.

Initial surveys in BAs were performed during ORA (Occupancy and Reproductive Assessment) flights. BAs were foot surveyed for alternate nests if the occupancy at all known nests could not be determined. Nest condition, number of adults, nest status, and areas searched were recorded to minimize survey overlap. Eagle-sized nests discovered in 1992 and 1993 (Driscoll et al. 1992, 1994) were revisited to determine occupancy and species.

Drainages were hiked (or driven), rivers were floated, and all trees and cliffs were inspected for nests. Observations were made with 8x35 and 10x50 binoculars and Bushnell, Celestron (25x-45x), and Questar spotting scopes (60x). We plotted all nests on topographic maps and recorded sightings of bald eagles. Nests were categorized as either empty or active (Postupalsky 1974). A single observation of a bald eagle near a nest structure was not considered active if seen during migration or courtship only. The observation was simply noted and included in our text. Observations of other wildlife species, habitat quality, and human activity were also noted.

Cliff height and tree size were classified as either "tall" or "large." These adjectives described structures that in comparison to known bald eagle nest locations in Arizona appeared suitable for nesting bald eagles. Conversely, "short" or "small" cliffs and trees would not be considered tall or large enough to support a bald eagle nest. Hunt et al.'s (1992) nest and river map atlas assisted in relocating historical and known nest sites and describing river locations.

ORA flights and winter count flights provided by BR and SRP were flown monthly from January to June. The flights were scheduled to correspond with important breeding activities (i.e. incubation, nestlings, fledging). During these flights we inspected habitat between known BAs, historical BAs and locations where we had previously observed eagles. To examine habitat and search for new nests, we flew over drainages at approximately 200 feet above ground level at 45 knots (50 mph). Speed and elevation were modified to accommodate safety concerns associated with wind speed, high tension wires, and drainage topography.

## RESULTS

### SURVEY SITES

#### *Talkalai Breeding Area*

The Talkalai area was confirmed as a bald eagle breeding site in 1994. On the 6 January Winter Count flight, two adult eagles flew off of nest number 4 and quickly returned to perch at the nest. On 2 March we foot surveyed the San Carlos River above Talkalai Lake and discovered new nest number 5 with incubating eagles (Figs. 1, 2) Nest number 2 was observed on 13 May occupied by red-tailed hawks with one nestling.

In the immediate nest area, the San Carlos River is bordered by large 250 foot talus-sloped canyon walls. The river's water level was low and few prey species were observed. Nearby Talkalai Lake and the Blue River provide alternate food sources, locations for nests and roosts for the eagles.

The river above Talkalai Lake is rather remote and inaccessible. No human activity was observed in the immediate nest area, however some painted graffiti was on a cliff face across the river from nest number 5.

### *Luna Breeding Area*

The Luna Lake BA was discovered by Jim Copeland and Terry Myers of the Apache-Sitgreaves National Forest on 11 March (Fig. 3). Bald eagles were observed incubating in ponderosa pine nest tree number 1 and were eventually successful, fledging one eaglet in June. This nest was occupied by ospreys in 1993 and by great blue herons for six years from 1987-1992 (J. Copeland pers. comm.). Toward the end of the nesting cycle, the nest had lost many of its sticks and had been reduced to about one-third of its original size. On subsequent visits we observed the fledgling soaring in the nest area on 26 July and the adult male eagle feeding on an American coot on 22 September.

Luna Lake is a relatively small lake of 154 acres (compared to the central Arizona reservoirs used by nesting bald eagles). The lake is fed by the San Francisco River and flows east into Luna, New Mexico for irrigation purposes. Luna Dam was built in 1893 and was increased by 12 feet (3.7 meters) for recreational purposes by AGFD in 1951 (Novy and Jones 1988). Large ponderosa pine trees border the immediate lake area on the north side and line the San Francisco River below Luna Dam.

Stocked rainbow trout and three campgrounds attract humans into the BA. The lake is within 5 miles of the town of Alpine, along Highway 180. A dirt road continues past the campgrounds on the northeast end of the lake and passes within 300 feet of the nest tree. Locked USFS gates along this road control use of this road and the campgrounds. Fishing boats with an 8 horsepower motor limit were commonly on the lake beginning in April. Boats were also rented to the public at a small marina on the southeast end of the lake.

On 14 July, AGFD pulled more than 500 tons of aquatic weeds from the shallow west end of the lake to decrease the water's pH. Due to the over-abundance of weeds, the water's oxygen had fallen to critical levels, causing trout to die in early July. The weed removing procedure is an annual task performed by AGFD.

Luna Lake is used by a variety of wildlife species. A wildlife closure on the west end of the lake allows waterfowl to nest successfully. Waterfowl observed nesting were: Canada geese, eared-grebes, cinnamon teal, American wigeons, mallards, and American coots. The most recent occupants of nest number 1 (great blue herons and ospreys) were observed nesting south of Luna Lake and Highway 180. Other species observed at Luna Lake were yellow-headed blackbirds, osprey, and peregrine falcons.



*Picacho Reservoir*

On 7-8 March we surveyed Picacho Reservoir due to a report of two eagles perched near a cottonwood tree nest. No eagles or large nests were observed.

The reservoir is fed by agriculture runoff from the Florence Casa Grande Canal forming a shallow water marsh. Cattails offered adequate cover for many species of fish and birds. Cottonwood trees on the perimeter of the lake support numerous rookeries of great blue herons. Easy access from the road that surrounds the reservoir promotes fishing activity.

Species observed at Picacho Reservoir were: peregrine falcon, ferruginous hawk, great-horned owl (incubating), green-backed heron, belted kingfisher, cinnamon teal, northern shoveler, gadwall, eared grebes, and yellow-headed blackbirds.

*Flagstaff lakes*

On 25 March we searched upper and lower Lake Mary, Marshall Lake, Ashurst Lake, Mormon Lake, Kinnikinick Lake, Morton Lake, and Stoneman Lake for nesting eagles. Two adult eagles and one subadult were observed soaring near lower Lake Mary. A subadult was observed flying near Marshall Lake, and another was perched at Morton Lake. No nests occupied by bald eagles were discovered.

All of the Flagstaff lakes had potential nesting habitat. Ashurst, Kinnikinick, and Morton lakes are in pinyon/juniper habitat with some scattered large pines. The other lakes are bordered by larger stands of large ponderosa pines. In addition to trees, Stoneman Lake has cliffs on the west side of the lake that could support an eagle nest.

Fishing from the banks and in boats was common throughout most of the lakes. Roads either traveled alongside or around the lakes leading to the boat ramps and camp sites. There are houses stand at the southern end of Stoneman and Mormon Lakes. Kinnikinick and Morton Lakes have less human activity due to their distance from a paved road.

On upper Lake Mary an osprey and osprey nest were observed on the south side of lake near Newman Spring. An osprey nest was also found on the west side of Mormon Lake. No ospreys were observed at this nest, although the nest contained large amounts of orange rope used for nest material. An unidentified raptor nest was discovered on the southern end of lower Lake Mary, but was too small to be an eagle nest.

Waterfowl were abundant on all lakes except upper Lake Mary and Stoneman Lake. In addition to the lakes, waterfowl were also observed on small ponds created by melting snow. Species observed include: northern pintail, bufflehead, red-head, ring-necked duck, cormorant, American coot, mallard and an unidentified teal.

### *Cold Water Creek*

The Cold Water Creek area was surveyed monthly during ORA flights and ground searched on 25-26 April. An adult bald eagle was observed soaring near nest number 2 on 31 January. A near-adult eagle wearing a radiotelemetry transmitter backpack flew near nest number 5 on 17 March. Nest number 1, 2, and 4 were in good condition. Nest number 3 had new construction with fresh mute, and nest number 5 was gone. A new nest was observed on the same cliff as nests number 1, 3, and 4, but was not eagle size.

We observed a golden eagle perched near nest number 1 on 5 January. Four more golden eagles were observed in the area of nest number 3. One bird flying south of the nest was interacting with two zone-tailed hawks. An osprey was also observed hunting at the Childs powerlines near nest number 2.

### *Chevelon Canyon Lake*

Chevelon Canyon Lake was surveyed by foot from the north end on 25 May and by helicopter on 15 April. No eagles or nests were observed.

The steep drainage is lined with large ponderosa pine and pine snags. Access can only be gained on foot and is limited by a 1200 foot change in elevation. Small cliffs and cottonwoods occur below the dam. Eight small motorless boats beached at the north end of the lake suggest some watercraft recreation occurs. Stock size rainbow trout were observed surfacing during the entire survey.

### *Lake Havasu*

The Havasu historical BA was checked on 24 February. The nest tree and man-made nest still exist. No eagles or new nests were observed in the area (V. McCoy pers. comm.).

### *Willow Springs Lake / Woods Canyon Lake*

Willow Springs Lake and Woods Canyon Lake were surveyed on 24 and 26 May. No eagles were observed. An osprey nest was found on Woods Canyon Lake but appeared empty.

These small lakes are bordered by ponderosa pine trees and pine snags. Both lakes support large populations of rainbow and brook trout. The lakes are the first two lakes encountered by recreationists along Highway 87 on the Mogollon Rim and, therefore, receive high human activity. People were observed fishing, boating, hiking, and camping along the banks. The riverine sections of these lakes received less boat traffic because of the inundated stumps and immersed snag trees.

### *Nankoweap Creek*

While surveying for breeding southwestern willow flycatchers on 5 June 1994, USFWS biologists discovered four large nests on the north facing cliff of Barbencetta Butte which separates Nankoweap and Little Nankoweap creeks along the Colorado River in Marble Canyon. The nests were located near each other and were stacked fairly high with large sticks. Three nests were on cliff ledges and one

was on a pinnacle. Two nests were heavily whitewashed with mute. The nests were rechecked again on 29 and 30 June. No eagles were observed on any of the June visits (T. Tibbitts pers. comm.).

## BREEDING AREAS

### *Alamo Breeding Area*

Alamo nest number 2, which was inundated from the floods in January 1993, was rebuilt in the same snag tree between November and December 1993.

### *Ash Breeding Area*

We examined the Ash Breeding Area throughout the breeding season on monthly ORA flights. Although both nest number 1 and number 2 persist, no new nest construction or eagles were observed during the year.

We also inspected the 11 stock tanks in Tanks Canyon, northeast of the nest area, throughout the season by helicopter and on the ground 24-25 February. Two adult eagles were observed at the stock tanks on the 7 January Winter Count and the 1 February ORA flight. On 24-25 February, we found one unbanded near-adult plumaged eagle and one adult bird perched on snags at separate tanks. The near-adult bird was observed on both days. Near dusk on 25 February, the near-adult flew lazily about 0.5 mile from its perch to roost in a small stand of ponderosa pines. No nests or eagles were observed on any subsequent ORA flights.

We observed discarded monofilament and salmon egg jars, indicating that some human activity occurs at these tanks. We also observed approximately 150 waterfowl, including: ring-necked ducks, wigeons, mallards, green-winged teal, and northern pintails.

### *Cedar Basin Breeding Area*

On the 7 January and 1 February ORA flights no eagles were observed in this BA. We ground surveyed on 26-27 February and found all existing nests (nest number 2, 3, 5, 6) to be in poor shape. One adult was observed on two occasions flying upstream. On later ORA flights, eagles were discovered incubating in nest #3. No new nests were discovered.

### *Chino Breeding Area*

On 9 January, USFWS biologists discovered nest tree #1, but found that the nest had fallen. No adult eagles or new nests were observed in the area (T. Tibbitts pers. comm.).

### *Devil's Post Breeding Area*

On 18-19 January, the Burro Creek/Francis Creek area of the Devil's Post BA was searched for eagles and nests. Cottonwood nest #3 still existed but was falling out on all sides. Nest number 1 and 4 were not relocated. One adult bald eagle was observed flying through the area and attempted to forage on small suckers and waterfowl. One adult golden eagle was also observed soaring in the area.

### *Horseshoe Breeding Area*

On the 17 March ORA flight, an adult eagle was discovered incubating one egg in the new cottonwood snag nest number 10 in Tangle Creek, near Sheep Bridge (Fig. 4). Although this is the first nest discovered in Tangle Creek, the birds and nest are presumed to be a part of the Horseshoe Breeding Area due to the close proximity to the lake and to known alternate nests. Upon a return visit on 30 March, the breeding attempt had failed. The large amount of mite and feathers below this nest indicated the Horseshoe eagles may have used nest number 10 in 1993, when an active nest was not located.

Easy access to the Sheep Bridge area and presence of a hot spring bring many recreationists to this area. The nest is located about 1/2 mile from the FS road leading to Sheep Bridge and is visible to motorists.

### *Horse Mesa Breeding Area*

On the 15 April ORA flight, a new eagle size nest just downstream of the Fish Creek/Salt River confluence (Fig. 5) was discovered. The nest showed no evidence of activity.

## ORA HELICOPTER FLIGHTS

A summary of information collected from ORA flights (BA and/or location visited, time, crew, status of nests, and observations) is listed in Appendix B (Tables 4-14). Sightings of eagles in previously unoccupied areas and new nests are described above under the appropriate sections.

## DISCUSSION

We documented discovery of two new BAs in 1994: Talkalai and Luna. The Talkalai BA was discovered on San Carlos Apache Tribal Land along the San Carlos River above Talkalai Lake. The Luna BA was discovered at Luna Lake east of Alpine in the White Mountains near the New Mexico/Arizona border.

The Talkalai BA was suspected as a potential breeding area in 1993 (Driscoll et al. 1994), but was not confirmed until 1994. Reports of adult eagles on or near the San Carlos River date back to the 1960s, when Thompson reported a nest near Rocky Gulch (L. Forbis, documentation of a telephone interview, July 1984). Stumph and Creighton (1977) also reported a nest 15 miles northeast of the San Carlos agency in the Rocky Gulch area. Elgo Dam, which impounds Talkalai Lake, was constructed in 1979 (A. Heuslein, pers. comm.). This new lake may have increased the food source in the only suitable nesting habitat along the San Carlos River (Driscoll et al. 1993, 1994).

From 1985-1988, the AGFD bald eagle nest search visited this area without locating a nest, although subadult eagles were observed in 1985, 1987, and 1988 (Hildebrandt and Glinski 1987; Glinski 1985, 1986; Gooch et al. 1988). In 1993, inspection of habitat surrounding Talkalai Lake from the air, the

discovery of large nests above Talkalai Lake along the Blue and San Carlos rivers, and sightings of adult and subadult eagles flying and perched along the San Carlos River below Talkalai Lake prompted return visits in 1994.

Similar to discovery of the Canyon BA in 1986 (Glinski 1986), many (n=7) large nests were discovered, suggesting occupancy by eagles in this area for some time. Two of these structures were small and one was an active golden eagle nest with three nestlings in 1993 (Driscoll et al. 1994).

The Luna BA is the first confirmed successful pair of bald eagles breeding and foraging in the coniferous forests of Arizona since reports of breeding eagles near the turn of the century (Mearns 1890). There was however, an unconfirmed report of bald eagles nesting in ponderosa pine habitat near Upper Mary Lake (Stumpf and Creighton 1977). The Upper Lake Mary Nest was reported fledging at least one eaglet in 1971, but no pictures or sources were associated with this account. Possibly, nesting ospreys (common for Lake Mary) were mistaken for bald eagles.

More recently, eagles from the Ash BA nested in a small stand of ponderosa pines at 5600 feet in 1984-85, but were likely foraging in the Salt River at 3400 feet (Hunt et al. 1992). Even Mearns' 1890 report is a bit suspect. He reported that a nest was occupied prior to 1890 at Stoneman Lake, although breeding was never confirmed and no other concrete information or details were provided. Although these unconfirmed reports exist and eagles at the Ash BA built a nest at 5600 feet, we consider the Luna BA to be the first confirmed coniferous forest nesting pair of bald eagles in Arizona.

Similar to Ash BA, dependability of the Luna BA as a consistently occupied and productive breeding area seems tenuous. Luna Lake is a very small (154 acres and a mean of 8 feet deep), compared to the large central Arizona lakes used by eagles nesting on the Salt and Verde rivers. From all observations in 1994, it appeared the eagles spent an overwhelming portion of their time at the lake and used it for almost their entire source of food. Luna Lake is drawn down annually to supply Luna, New Mexico with irrigation water. Annual fluctuations combined with increased camping, fishing, and boating recreation in the spring is not conducive to successful bald eagle nesting and foraging.

Clearly, the differences in habitat, elevation and timing of breeding between the Luna BA and the desert nesting population make this site unique for Arizona and expands the search image for nesting bald eagles in the state (Table 1). Previously, all known breeding areas used primarily riparian areas surrounded by Sonoran Desertscrub in the central part of the state. The Luna BA is at 7950 foot elevation in mixed conifer habitat. Luna Lake is also at the eastern edge of Arizona, 66.5 air miles (107 km) from the nearest known breeding area. The furthest any other two sites are from one another is the Tower and Ladders BAs at 53 air miles (85 km) apart. Reports of bald eagles nesting along mountain lakes and rivers in Arizona must now be given more credence. Also, because eagles took over a nest previously occupied by ospreys, it may be prudent to inspect known osprey nesting habitat for nesting bald eagles.

Table 1. Comparison of the Luna Lake Breeding Area to the desert nesting population.		
Description	Luna Breeding Area	Desert Population
Biotic Community	Montane Conifer Forest	Sonoran Desertscrub
Distance to nearest BA	66.5 air miles (107 km) to Lone Pine BA at Salt/White/Black river confluence	Longest = Tower to Ladders 53 air miles (85 km) Most = 6-12 river miles (10-20 km)
Elevation	7950 feet	Highest = Ash BA 5640 feet Most = below 4400 feet
Foraging Habitat	Small mountain lake (Luna Lake)	Sonoran desert riparian areas and large reservoirs
Breeding Cycle	Late February	January to March
Nesting Habitat	Ponderosa Pine	Highest = Ash BA Pinyon/Juniper Most = Cliffs and Riparian trees

### MANAGEMENT RECOMMENDATIONS

We recommend continuing the bald eagle nest search program. With the addition of the Tonto and Camp Verde BAs in 1992, the Tower BA in 1993, and Talkalai and Luna BAs in 1994, it is imperative that new BAs are located as soon as possible to accurately describe population trends and productivity and implement proactive management techniques.

Continue to monitor "hot" areas on ORA, winter count, and the nest search flights in concert with follow-up ground searches. Large sections of river can be easily inspected for the presence of eagles and nests. Follow-up ground searches provide opportunities to more thoroughly investigate site occupancy.

Trap and telemeter adults in areas that will be impacted by new dam construction (Tonto, Sheep, Pinto, Pinal, Pleasant) and in areas in which current nest locations are not known (Camp Verde, Cold Water, Perkinsville). Time and effort spent trapping may save time searching those BAs for new nests and allow more time to be allocated to other BAs.

Historic and/or locations with nests that should continue to be searched:

- Verde River - Cold Water/Brown's Ranch, Stewart's Ranch
- East Verde River - LF Ranch
- Black and White Rivers - Natanes, Bronco, George's Basin
- Gila River - Downriver from the Coolidge BA
- Burro Creek - Devil's Post
- Colorado River - Havasu
- Ash Creek - Ash BA and Tanks Canyon Area

New areas that should be examined for breeding adults and/or nests:

- Gila River drainage - Lower Blue River, San Francisco to confluence
- Black River drainage- Little Bonito and Big Bonito Creek to the confluence of the Black River, Pacheta Creek, Reservation Creek, osprey nesting areas on East and West Fork and main stem
- White River - Whiteriver to confluence with Black and Salt rivers
- North Fork of White River - Known osprey nesting locations
- Salt River drainage - Gun Creek/Tonto Creek confluence, Carrizo Creek, Cherry Creek Colorado River
- Bill Williams River drainage - Ive's Wash BA to Lake Havasu City
- Big Sandy River drainage - Burro Creek near Six Mile Crossing, Upper Trout Creek
- Agua Fria River drainage - Lake Pleasant and the Agua Fria River for a **second** Lake Pleasant BA
- Mountain Lakes - Dry Lake, Christmas Tree Lake, Point of Pines, Cholla Lake, Tonto Lake, Pacheta Lake, Chevelon Canyon Lake

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APPENDIX A: 1994 BALD EAGLE REPRODUCTION SUMMARIES

Table 1. Arizona bald eagle productivity, 1994.								
Breeding Area	Status <sup>1</sup>	Nest # <sup>2</sup>	Inc. Date	No. Eggs	Hatch Date	# Young	No. Fledged	Fledge Date
Alamo*	S	4	1/24	1+	3/1	1	1	>5/9
Ash	U							
Bartlett*	S	1	1/29	1+	3/8-10	1	1	5/31
Blue Point	S	7	<2/1	3	<3/18	2	2	5/13 & 5/14-27
Camp Verde*	U							
Canyon	F	6	<3/18	1+	<4/15	1+	Failed prior to 5/13	
Cedar Basin	F	3	<4/15	2	Failed prior to 5/13			
Chino	U							
Cibecue*	S	3	<2/25	1+	3/18-4/11	1	1	5/23-28
Cliff*	F	4	2/6	2+	~3/13	1	Nestling died 3/24 or 25	
Coolidge	F	2	<2/1	3	Nest found abandoned, failed prior to 3/18 - Unknown if young hatched			
Devil's Post	U							
East Verde	F	6	1/5-31	2+	<3/17	1+	Nest failed between 3/17-31	
Ft. McDowell*	F	12	2/8	1	Incubated infertile "runt" egg past hatch date, abandoned 4/6			
Horse Mesa	F	2	<2/1	1+	Nest abandoned prior to 2/11, 2 adults flying together on 4/11			
Horseshoe	F	10	<3/17	1	Nest failed between 3/17-3/30			
Ive's Wash*	S	3	<1/10	1+	2/4-10	1	1	4/21-24
Ladders*	S	3	2/18	2+	~3/25	2	2	6/3-6 & 6/10-18
Lone Pine	F	1	<4/15	1+	Failed prior to 5/13			
Luna*	S	1	<3/11	2+	3/28-31	1+	1	6/18-27
Mule Hoof	U							

Table 1. Arizona bald eagle productivity, 1994.								
Breeding Area	Status <sup>1</sup>	Nest # <sup>2</sup>	Inc. Date	No. Eggs	Hatch Date	# Young	No. Fledged	Fledge Date
Orme*	S	1	1/31-2/1	2+	~3/7	2	2	5/20-27
Perkinsville	U							
Pinal 2nd clutch*	S	1	<3/18	2+	<4/15	2	1	1 young died 5/6-12
Pinal	F	3	<2/1	2	Nest abandoned prior to 2/24			
Pinto*	F	3	<2/1	2+	~2/25	1+	Nestling(s) died 3/12-18	
Pleasant*	S	2	<1/31	2+	3/1-4	2	2	5/30
Redmond	F	5	2/14-17	1	~3/26	1	Nestling died 3/28-4/1	
76*	S	2	2/4	2+	3/12	2	2	5/23-6/6
Sheep*	F	1	<3/3	2+	Incubated past hatch date, abandoned 4/14			
Table Mountain	S	4	<3/13	1+	<4/14	1	1	<6/8
Talkalai	F	5	<3/2	2+	~3/2	2	4 wk old nestling dead in nest on 4/11, nestlings killed by new bird in pair	
Tonto*	S	2	<2/1	2+	~2/28	2	1	5/18-20, 1 bird fell 4/16, died 4/23
Tower*	F	1	2/14-17	2	Incubated past hatch date, collected infertile eggs 4/18			

<sup>1</sup>Breeding area status codes (Postupalsky 1974) - U=unoccupied, O=occupied, A=active (eggs or young present), S=successful, F=failed, ?=unknown.

<sup>2</sup>Nest numbers are from Ecology of Bald Eagle in Arizona (Hunt et al. 1992).

\*= Sites monitored by 1994 Arizona Bald Eagle Nestwatch Program.

Table 2. Arizona 1994 bald eagle productivity summary.			
Number of Breeding Areas	33	Number of Active Nests	27
Number of Occupied Breeding Areas	27	Number of Failed Nests	15 <sup>1</sup>
Number of Eggs	47+	Number of Successful Nests	13
Nest Success = $13/27 = 0.48$		Number of Young Hatched	27+
Mean Brood Size = $18/13 = 1.385$		Number of Young Fledged	18
		Productivity = $0.48 \times 1.385 = 0.66$	

<sup>1</sup> Pinal eagles laid two clutches of eggs - second clutch successful.

APPENDIX B: ORA FLIGHT SUMMARIES

Table 3. Results of 5 January 1994 winter count/occupancy and reproduction assessment flight, crew: J. Driscoll, G. Beatty, T. Nobel - SRP and Pilot, Doug Blakely - SRP.			
Breeding Area Location	Time	Status	Comments
Orme	0800	O	Nests #3 and #4 empty, one adult perched by nest #1.
Ft. McDowell	0811	O	Nest #14 empty, one adult near nest #12.
Bartlett	0826	O	Nest #1 empty, one adult perched above nest #2.
Cliff	0844	O	One adult standing on nest #4, nest #2 is newly constructed, nest #4 is in poor shape.
Horseshoe	0855	O	Nests #1 and #8 empty, one adult observed between Chalk Mtn and Sheep bridge.
Table Mt.	0939	O	Nest #4 empty, two adults observed at km 116.6.
East Verde	1019	U	Nest #6 empty, two adults observed 1.5 river kilometers up East Verde River but identity unknown.
Coldwater	1023	-	All nest structures empty, one new pinnacle nest at km 144.9, golden eagle perched near new nest below nest #1. Red-tailed hawk perched near nests near Brown's Ranch.
Ladders	1056	U	All existing nests empty. No adults observed in immediate area.
Camp Verde	1109	U	One adult perched in tree adjacent to location of 1992 nest tree.
Tower	1229	U	All existing nests empty. No adults observed in immediate area.
Perkinsville	1245	U	4 adults, 6 subadults, 2 unidentified eagles and 3 golden eagles in nest area. No new structures observed.
Hell Point	1254	U	All existing nests empty.

Table 4. Results of 6 January 1994 winter count/occupancy and reproduction assessment flight, crew: J. Driscoll, M. Siemens, T. Nobel - SRP, J. Feen - San Carlos Apache Game and Fish Department, Pilot, D. Blakely - SRP.			
Breeding Area Location	Time	Status	Comments
Blue Point	0805	O	All nests empty, one adult perched near nest #5.
Horse Mesa	0825	U	All existing nests empty, no adults or new nests observed in immediate area.
Tonto	0846	U	All existing nests empty, no adults or new nests observed in immediate area.
Sheep	0900	U	All existing nests empty, no adults or new nests observed in immediate area.
76	0913	U	All existing nests empty, no adults or new nests observed in immediate area.
Pinto	1039	O	Nest #3 empty, one adult perched on commonly used snag perch.
Pinal	1046	U	All existing nests empty, no adults or new nests observed in immediate area.
Coolidge	1130	O	One adult standing in nest #2, one adult perched in adjacent tree.
Talkalai	1217	0	Adults near nest #4, both birds flush and return to nest.

Table 5. Results of 7 January 1994 winter count/occupancy and reproduction assessment flight. Crew: J. Driscoll, G. Beatty, H. Messing - BR, Pilot K. Kloppel - BR.			
Breeding Area Location	Time	Status	Comments
Pinal	0842	O	One adult observed on cliffs at confluence of Pinal Creek and Salt River.
Redmond	0854	O	Two adults standing on nest #5.
Canyon	0941	U	All existing nests empty, no adults or new nests observed in immediate area.
Cibecue	1002	O	All existing nests empty, 1 adult flying at confluence of Cibecue Creek and the Salt River.
Mule Hoof	1015	U	All existing nests empty, no eagles or new nests observed in immediate area.
Cedar Basin	1035	U	All existing nests empty, no adults or new nests observed in immediate area.
Lone Pine	1051	O	Three adults observed at km 241.3, nest #1 is newly constructed, all existing nests are empty.
George's Basin	1512	-	No adults or new nests observed in immediate area. adult at Nash Creek Reservoir.
Ash	1556	U	All existing nests empty, 2 adults at Tanks Canyon ponds.
Pleasant	1652	O	All existing nests empty, 1 adult perched by nest #2.

Table 6. Results of 31 January 1994 occupancy and reproduction assessment flight, crew: J. Driscoll, G. Beatty, H. Messing - BR, Pilot, M. Santee - BR.			
Breeding Area Location	Time	Status	Comments
Pleasant	0824	A	One adult incubating in nest #2, one adult near nest #1.
Perkinsville	0937	U	No new nest structures observed.
Tower	0947	O	One adult near nest #7, nest #1 is newly constructed, no nests in trees between km 257.0 - 252.0, one adult at Peck's Lake.
Camp Verde	1003	U	Checked cottonwoods from km 193.0 to Ladders BA.
West Clear Creek	1011	-	Verde River confluence to beginning of canyon, 1 near-adult perched near Hwy 260 bridge.
Ladders	1111	U	Nests #4 and #5 are empty, nest #3 was built upon.
Coldwater	1123	-	Nests #1, #2, and #3 are in good shape, nest #5 is gone and nest #4 is falling out on all sides, one adult soaring near nest #2, nests at Brown's Ranch are empty.
East Verde	1129	A	One adult incubating in nest #6, one near-adult soaring on East Verde River area between km 14.0-22.0 near LF Ranch.
Table Mt.	1149	O	2 adults perched at nest pinnacle, nest at km 124.0 falling out.
Horseshoe	1206	U	Nests #1 and #8 are empty, no nests between km 107.0 - 82.0.
Cliff	1210	O	Nests #2 and #4 in poor shape, no nests downriver of nest area between km 65.0 - 78.0.
Bartlett	1219	A	One adult incubating in nest #1, one adult standing in nest # 2.
Ft. McDowell	1231	O	One adult perched in nest tree #12, nest #14 empty, one adult soaring in area.
Orme	1240	O	One adult standing in nest #1, nests #3 and #4 are empty.



Table 7. Results of 1 February 1994 occupancy and reproduction assessment flight, crew: J. Driscoll, G.Beatty, M. Siemens, Pilot - M. Santee - BR			
Breeding Area Location	Time	Status	Comments
Orme	0817	A	One adult incubating in nest #1.
Blue Point	0827	A	One adult incubating in nest #7, flushes from nest and circles back.
Horse Mesa	0839	A	One adult presumably incubating in nest #2, windy conditions through canyon prevented confirmation.
Tonto	0851	O	One adult incubating in nest #2.
Sheep	0903	O	One subadult perched in nest tree #1, no nests on Tonto Creek between km 18.0 - 33.0.
76	0910	O	Two adults in nest #2, nest #2 has been rebuilt.
Pinto	0932	A	One adult incubating in nest #3.
Pinal	0938	A	One adult incubating in nest #3.
Redmond	0945	O	One adult perched near nest #5.
Canyon	1002	U	All existing nests are empty, no eagles observed.
Lone Pine	1157	O	All existing nests are empty, one adult flying at Salt/Black/White river confluence.
Cedar Basin	1203	U	All existing nests are empty, no eagles in area.
Mule Hoof	1213	U	Both existing nests empty, checked up Sawmill Canyon - no nests or eagles observed.
Cibecue	1217	U	All existing nests empty, no eagles in area, small nest found at Cibecue Creek/Salt River confluence on upstream cliff.
George's Basin	1316	-	Adult at Nash Creek Reservoir.
Ash	1353	U	All existing nests empty. Two adults at Tanks Canyon, no eagles at Seneca Lake.
Talkalai	1414	O	All existing nests empty, one near-adult flying in area.
Coolidge	1433	A	One adult incubating in nest #2.

Table 8. Results of 17 March 1994 occupancy and reproduction assessment flight, crew: J.Driscoll, M. Siemens, M. Collins, Pilot - Ken Kloppel - BR.			
Breeding Area Location	Time	Status	Comments
Horseshoe	0821	A	Nests #1 and #8 are empty, found bald eagles incubating in new cottonwood snag nest #10 in Tangle Creek.
Table Mt.	0847	A	One adult incubating in nest #4.
East Verde	0911	A	One adult brooding in nest #6.
E. Verde R. Fossil Creek	0913	-	No eagles or new nests found.
Cold Water	0919	-	Surveyed entire area, all existing nests are empty, one near-adult eagle with a transmitter flying near nest #5.
Ladders	0948	A	One adult incubating in nest #3.
Camp Verde	0951	U	Surveyed from Beasley Flat to I-17 bridge, Confluence Beaver Creek to Hwy bridge, and West Clear Creek.
Perkinsville	1134	U	One subadult perched near fallen nest tree.
Hell Point	1146	-	All existing nests are empty, one adult and one near-adult observed flying in area.
Stewart's Ranch	1154	-	Two adult and three subadult bald eagles were observed flying between Stewart's Ranch and Verde Ranch.
Granite Creek	1158	-	One adult golden eagle incubating in Granite pinnacle nest.
Willow Creek Reservoir	1211	-	Reservoir is very small, no eagles observed.
Watson Lake	1212	-	No bald eagles or new nests observed. Golden eagle nest to the northeast of Watson Lake is very large.
Lynx Lake	1220	-	No eagles or new nests observed. Two nesting platforms were empty.
Lake Pleasant	1244	-	Surveyed west side of lake and below dam. Three small nests were observed on cliff downstream of dam. All nests were empty. No eagles were observed.

Table 9. Results of 18 March 1994 occupancy and reproduction assessment flight, crew: J.Driscoll, M. Siemens, H. Messing, Pilot - M. Santee, BR			
Breeding Area Location	Time	Status	Comments
Orme	0733	A	Adult brooding 2 eaglets, one adult perched near nest.
Blue Point	0742	A	Adult in nest with 2 two-week old eaglets.
Horse Mesa	0749	O	Adult perched on nest cliff, searched cliffs on north and south side of Apache Lake and near Fish Creek.
Pinto	0816	F	Nest failed, no eagles in area.
Pinal	0819	A	Double clutched in nest #1, adult incubating.
Redmond	0824	A	Adult incubating in nest #5, checked Salt River between Redmond/Canyon BAs - no eagles or nests found.
Canyon	0846	A	One adult incubating in nest #6.
Cibecue	1013	A	One adult incubating in nest #3.
Mule Hoof	1016	U	All existing nests are empty, no adults observed.
Sawmill Canyon	1020	-	One adult at km 197.0, searched Sawmill Canyon; adult at 10:41 seen at km 200.0, may be same bird seen earlier. Old nest found at 209.3 on south side of river.
Cedar Basin	1058	O	Adult 5 km downstream of nests, 1 adult in nest area.
Lone Pine	1114	O	Adult in nest area, 2 adults on snag near White/Black River confluence.
George's Basin	1133	-	Two adults flushed from shore, one flew east, one flew down Turkey Creek. No eagles at Nash Creek Res.
Ash	1326	U	Nests empty, no adults observed at Tanks Canyon.
Talkalai	1349	A	One adult brooding two ~ 10 day old eaglets.
Coolidge	1400	F	Nest failed, 1 adult at km 31.0, subadult at km 28.0.
Gila River	1416	-	Searched Granite Basin from km 25.0 - 8.0, adult and subadult in area. Small nest observed at km 9.3.
Pinto	1452	F	Failed, 1 adult in nest area, 1 subadult on red cliffs.
Horse Mesa	1510	F	Searched area north of Apache Lake, no nests or eagles observed.

Table 10. Results of 11 April 1994 banding flight, crew: J. Driscoll, G. Beatty, Manny Garcia, Videographer Channel 3, Pilot - Jerry Clifton Channel 3.			
Breeding Area Location	Time	Status	Comments
Orme	0813	A	Adult perched near nest #1 with 2 four-week old nestlings.
Blue Point	0827	A	One adult perched near nest #7 with 2 five-week old nestlings.
Horse Mesa	0839	O	All existing nests empty, 2 adults on north side of Apache Lake near Adler Creek inlet. Searched area for 20 minutes.
Pinto	0913	F	Adult perched on red cliffs, nest #3 empty.
Pinal	0952	A	Adult incubating in nest #1.
Talkalai	1106	F	Two adults at nest #5, one adult has a transmitter (new adult, mid-season replacement). Climbed nest. One four-week old eaglet dead in nest, puncture wounds to neck indicate mortality probably due to new adult.
Cibecue	1447	A	Two adults and one three-week old eaglet in nest #3.
Blue Point	1625	A	Landed and banded 2 five-week old nestlings.

Table 11. Results of 15 April 1994 occupancy and reproduction assessment flight, crew: J. Driscoll, M. Siemens, T. Nobel, Pilot -SRP.			
Breeding Area Location	Time	Status	Comments
Horseshoe	0828	F	All nests empty, surveyed river km 88.0 - 100.0.
Table Mt.	0852	A	Adult brooding 1 one-week old young in nest #4.
East Verde	0855	F	All existing nest empty, surveyed river km 139.0 - 127.0, and East Verde River km 0.0 - 22.0.
Cold Water	0920	-	All nests empty, searching river km 139.0 - 155.0.
Ladders	0945	A	Adult brooding 2 two-week old eaglets in nest #3.
Camp Verde	0953	U	Searched river km 179.0 - 182.0.
Tower	1009	A	One adult incubating two eggs in nest #1.
Perkinsville	1012	U	No eagles or new nests observed.
Chevelon Creek Lk	1221	-	No eagles or new nests observed.
George's Basin	1344	-	No eagles or new nests observed. No eagles at Nash Creek Reservoir.
Lone Pine	1355	A	Adult incubating in nest #1.
Cedar Basin	1405	A	Adult standing over two eggs in nest #3.
Mule Hoof	1414	U	No eagles or new nests observed.
Cibecue	1419	A	Adult and 1 four-week old eaglet in nest #3.
Canyon	1427	A	One adult brooding very small eaglet(s) in nest #6.
Ash	1528	U	Surveyed Tanks Canyon and Ash Creek down to the Salt River confluence.
Pinal	1617	A	Adult brooding 2 one-week old eaglets in nest #1.
Horse Mesa	1632	F	Surveyed Alder Creek and Long Canyon inlets to Apache Lake and downstream to km 44.0. One large empty nest found near km 47.7 but was empty.

Table 12. Results of 13 May 1994 occupancy and reproduction assessment flight, crew: J. Driscoll, M. Siemens, Darrel Declay White Mt. Apache Game and Fish Department, Pilot - SRP.			
Breeding Area Location	Time	Status	Comments
Cliff	0822	F	Nests empty, no eagles or new nests observed.
Horseshoe	0826	F	Nests empty, no eagles or new nests observed.
Table Mt.	0834	A	Adult and six-week old eaglet in nest #4.
East Verde	0839	F	Nests empty, no eagles or new nests observed.
Cold Water	0848	-	Nests empty, no eagles or new nests observed.
Ladders	0851	A	Two 7 week old eaglets in nest #3.
Tower	0911	F	Nests empty, one adult perched near nest #1.
Pinto	1032	F	Nests empty, no eagles or new nests observed.
Pinal	1037	A	One 4 week old eaglet in nest #1.
Redmond	1041	F	Nests empty, no eagles or new nests observed.
Canyon	1054	F	Nests empty, one adult perched on nest cliff.
George's Basin	1157	-	No new nests or eagles observed.
Lone Pine	1208	F	Nests empty, no eagles or new nests observed.
Cedar Basin	1217	F	Nests empty, one adult perched on nest #3.
Cibecue	1226	A	Adult and 1 eight-week old eaglet in nest #3.
Ash	1233	U	Nests empty, no eagles or new nests observed.
Coolidge	1404	F	Nests empty, no eagles or new nests observed.
Talkalai	1419	F	Nest #2 is a red-tail hawk nest with one nestling, all other nests empty. Both adults at Talkalai Lake, adult female has the transmitter and is the new member of the pair.
Horse Mesa	1501	F	Nests empty, no eagles or new nests observed.
Blue Point	1508	A	Two eaglets in nest #7, one eaglet flies strongly from nest. Both adults flying in area.
Orme	1515	A	Adult and 2 nine-week old eaglets in nest #1.

Table 13. Results of 10 June 1994 occupancy and reproduction assessment flight, crew: G. Beatty, K. Anderson, T. Nobel, Pilot - B. Culver, SRP.			
Breeding Area Location	Time	Status	Comments
Horseshoe	0809	F	No eagles or new nests observed in area.
Table Mountain	0817	S	One adult in nest, nestling not observed in area.
Coldwater	0829	-	Searched from Childs Power Plant to Browns Ranch. No eagles or new nests observed.
Ladders	0840	S	One adult and one eaglet in nest area. Landed and searched for other eaglet, unable to locate second eaglet.
Pinal	1010	A	One 8-week old eaglet in nest #1. No eagles observed.
Horse Mesa	1040	F	Searched Alder Creek, Long Canyon, and Salt River below nest cliff. No eagles or new nest structures observed.