# IDENTITY OF BREEDING BALD EAGLES IN ARIZONA 1991-1995

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# IDENTITY OF BREEDING BALD EAGLES IN ARIZONA 1991-1995

Gregory L. Beatty and James T. Driscoll

## INTRODUCTION

The bald eagle (*Haliaeetus leucocephalus*) 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. In August 1995, it was downlisted to threatened in all recovery regions of the lower 48 states (USFWS 1995). It is not federally listed in Alaska and does not occur in Hawaii, but is protected range-wide 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.

From 1977-1985, various biologists attempted to determine the identity and demography of breeding Arizona bald eagles by identifying differences in plumage and later, presence/absence of USFWS bands. These issues were and are important for management and recovery purposes. Nestling eagles were banded with USFWS bands from 1977-1982 (Haywood and Ohmart 1980, 1981, 1982, 1983; Hildebrandt 1981; Hildebrandt and Ohmart 1978; Ohmart and Sell 1980) and from 1983-1985 (Grubb 1986). However, only 51 percent of the known eaglets between 1977-1985 were banded. Early identification efforts were also hampered by an absence of marked breeding birds in the population. Attempts were made to mark nestlings by painting USFWS bands and adding colored wing markers and plastic leg bands, but these marks failed to remain on the eagles until adulthood.

From 1987-1990, Hunt et al. (1992) conducted a more comprehensive examination of the identity and demography of Arizona breeding bald eagles. Beginning in 1987, eagle nestlings were banded with riveted colored (blue, green, purple) anodized aluminum visual identification bands (VID) and USFWS bands. In contrast to earlier studies, more breeding areas were known and a larger proportion (87%) of nestlings was banded. Breeding adults that were trapped for telemetering were banded with black VID and USFWS bands.

To generate the most information on dynamics of this small population of desert nesting bald eagles, Hunt et al. (1992) recommended that agencies continue to identify breeding eagles and band nestlings. Beginning in 1991, AGFD and USFWS coordinated efforts to continue banding nestlings (Mesta et al. 1992., Driscoll et al. in prep.). AGFD also began to identify as many bald eagles occupying territories as possible. The joint commitment to continue this demography project was outlined in a 1994 Section 6 job description between the two agencies.

This interim report describes the identity of adult bald eagles occupying territories observed from 1991-1995 and the process by which this task was accomplished. This

information will be used to complete a detailed demography report on Arizona bald eagles after the 2000 breeding season.

## STUDY AREA

Breeding bald eagles were identified at nests located along rivers and reservoirs throughout Arizona. With the exception of the Luna Breeding Area (BA), in eastern Arizona's Montane-Conifer Forest, all BAs were in the central part of the state, along riparian areas of the Upper and Lower Sonoran Life-Zones and in the transition areas of both zones (Life Zones from Merriam 1898). The most northern site was the Tower BA, above Clarkdale along the Verde River. The most southern site was the Coolidge BA below Coolidge Dam and San Carlos Lake. The most western sites were at Alamo Lake, northwest of Wickenburg, and the most eastern site was at Luna Lake, near Alpine, Arizona. Breeding area elevations ranged from approximately 1080 feet at Alamo Lake to 8000 feet at Luna Lake.

The bald eagle's breeding habitat in central Arizona occurs from 1080 to 5640 feet in elevation in riparian areas of the Upper and Lower Sonoran Life Zones and in the transition area of both zones. Brown (1982) described representative vegetation in these zones as including blue paloverde (*Cercidium floridium*), mesquite (*Prosopis* spp.), ironwood (*Olyneya tesota*), saguaro (*Carnegia gigantea*), teddy bear cholla (*Opuntia bigelovii*), Fremont cottonwood (*Populus fremontii*), Goodding willow (*Salix gooddingii*), Arizona sycamore (*Platanus wrightii*), introduced tamarisk or salt cedar (*Tamarix pentandra*), juniper (*Juniperus* spp.), and pinyon (*Pinus* spp.).

Luna Lake is the only Arizona bald eagle BA known in Montane-Conifer Forest. Representative vegetation (Brown 1982) of the Montane-Conifer Forest is 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 vegetation in this BA is narrowleaf cottonwood (*Populus angustifolia*), thinleaf alder (*Alnus tenuifolia*), Bebb's willow (*Salix bebbiana*) and coyote willow (*Salix exigua*).

## METHODS

We entered BAs just prior to egg-laying or during early incubation to determine the presence or absence of bands and plumage characteristics of resident eagles. We were most likely able to observe both eagles during this time in the event that eagles did not lay eggs or failed during incubation. Some sites in remote locations were not visited due to logistics and/or time constraints. Identities of other eagles were not determined because of nest failures and the subsequent unpredictable location of the bird.

We first determined presence or absence of VID and/or USFWS bands with a Questar,

Bushnell, or Celestron (45x-90x) spotting scope. We made observations in the nest area at distances ranging from 1 km to 150 m. Observation points were determined by the landscape and the eagles' tolerance of observers. Eagles with nests in more remote locations (i.e. East Verde, Blue Point) were often disturbed if we approached closely. Other eagles with nests in more heavily recreated locations (i.e. Fort McDowell, Bartlett) generally allowed us to approach more closely.

While banding eaglets, some eagles would fly close enough for an observer with binoculars to get a positive look at the legs. However, the unreliable behavior of the adult eagles during banding, and the inaccuracy of determining the presence/absence of a band on the correct leg, caused this to not be a preferred method.

Observations by nestwatchers from the Arizona Bald Eagle Nestwatch Program (Beatty 1992, Beatty and Driscoll 1993, Beatty et al. 1995a, 1995b) assisted in identifying breeding bald eagles. Nestwatchers were able to confirm our observations or give us information on a bird's identity that we were later able to verify. Because many of these observers were inexperienced, we did not rely solely on their observations.

While looking for bands, an eagle's behavior or choice of perches provided a superior or inferior observation of its tarsi. Preening, especially stretching the leg or scratching the head extended the bird's tarsus showing the entire leg. Immediately after landing on a perch, an eagle would often expose its leg by adjusting its footing and/or extending the leg. However, once a bird settled on a perch, feathers would often cover the legs causing us to "wait until just the right moment." Many times only a brief glimpse of the birds' legs was available while waiting for hours in front of the scope. Eagles perched on snags with the sun behind us increased the chances of a positive identification. Conversely, an eagle perched on a foliated branch with the sun positioned behind the bird hindered identification. Additionally, a bright sun causing distorting "heat waves" or being positioned well below a bird's perch (>45$^{o}$ angle) made observations difficult.

Plumage of bald eagles occupying territories was determined from Clark and Wheeler (1987), National Geographic Society (1987), and Stalmaster (1987). Eagles in adult plumage were characterized by complete white heads and tails with brown bodies. Eagles in near-adult plumage had brown bodies with white heads and tails mottled with brown. The heads would often have a brown eyestripe with additional mottling giving the appearance of spots on the back and/or top of the head. On the tail, the middle two tail feathers along with a terminal band exhibited the most brown and would stand out as a bird flew overhead.

After observing the presence of an eagle's VID band, we read the symbol engraved in the anodized aluminum. We tried to avoid the immediate area of an active nest when attempting to read a symbol during incubation or early nestling stage in case we

caused an eagle to leave the eggs or young. However, as more banded eagles returned as members of breeding pairs, the time it took to read all the banded birds became more of a concern. Beginning in 1994, it became necessary to read symbols on the bands of eagles while they were incubating eggs or with small nestlings. We then had to be more careful to not disturb the eagles.

If positioning and lighting conditions were favorable, a positive read of a symbol could be easily determined at less than 150 m from a perched eagle with a Questar spotting scope. The use of a blind near an eagle's nest was necessary in some cases. We approached the Lake Pleasant male while it was perched at the nest within this distance prior to egg-laying. Two observers were able to confirm the same symbol. After determining that the Tonto eagles had incubated past the hatch date, at first light we covered ourselves with a camouflaged tarp 100 m from a commonly used snag perch. We then read the symbol easily.

## RESULTS

### Plumage

From 1991 through 1995, we identified 222 plumages of breeding eagles at 29 territories (Tables 1-5). We observed 14 instances of breeding eagles in subadult plumage. The remaining 208 identified plumages were adult. These totals do not represent the actual number of individual eagles breeding throughout this time span, but the year-to-year tally of plumages seen.

In two cases banded eagles of known age retained their "near-adult" plumage into their sixth year. The 1992 Sheep female entered the site at four years old and kept an eyestripe until it was six. Also, the six year old San Carlos female was first identified breeding in 1995 with an eyestripe and brown in its tail feathers.

### Number of individual breeding birds identified

Seventy-two individual breeding eagles were positively identified from 1991-1995 (Table 14). Eleven (15%) of them occupied a site at three (n=1) or four years old (n=10). When identified, 33 breeding eagles were unbanded, 13 wore only USFWS bands, 8 wore black VID and USFWS bands placed on as breeding adults, and 18 wore colored VID and USFWS bands placed on them as nestlings. After the Luna breeding eagles were trapped in 1994, their identifying features changed to black VID and USFWS bands.

### Presence or absence of bands

The lowest percentage of banded birds identified in the breeding population was in 1992 (42%) and the highest was in 1995 (59%) (Tables 2, 5, 11). Seventeen unbanded birds entered the breeding population from 1991 to 1995 (Tables 1-10, 12). Three new unbanded birds were identified in 1991, 7 in 1992, 2 in 1993, 4 in 1994, and 1 in 1995.

From 1991 to 1995, 13 eagles wore only USFWS bands (Tables 1-10). Eight wore only USFWS bands in 1991, 1992, and 1995. In 1994, 11 eagles were identified wearing only USFWS bands. No newly USFWS-banded eagles entered the breeding population in 1995.

When an eagle was trapped as a breeding adult (Hunt et al. 1992, Beatty et al. 1995), black VID and USFWS bands were placed on its legs. Eight eagles were identified wearing black VID bands in 1991. The number of black VID banded birds in the population dwindled to four in 1994, but climbed back to five in 1995 after we trapped and banded the Luna Lake adults (Tables 1-5, 11).

A total of 18 color VID-banded Arizona nestlings entered the breeding population between 1991 and 1995 (Tables 1-13). Recruitment of these eagles increased from 1991 to 1995. In 1991, only one eagle returned to breed. Over the next four years there were 2, 3, 2, and 10 new Arizona VID banded birds that entered the breeding population. Seventeen VID banded recruits existed in the breeding population at the end of the 1995 season.

Replacements and new birds identified

From 1991 to 1995, we identified 42 "new" bald eagles (Tables 6-10, 12). These were known replacements in existing territories, and pioneers in establishing new BAs or reoccupying historical BAs. Twenty-one birds were confirmed replacements from eagles identified the previous year. Another eagle was a mid-season replacement (Talkalai BA). Six new eagles were confirmed replacements where there was no information from the previous year. Fourteen eagles were identified at seven newly discovered BAs.

## DISCUSSION

If an eagle's plumage is not carefully examined, near-adults can be mistaken for adults. Stalmaster (1987) noted that fourth-year plumage is so similar to the adult "that sometimes only close observation can distinguish the two." We have observed near-adult eagles with heavy eyestripes and banded tails that were easy to distinguish (1992 Sheep female). We have also seen near-adult eagles that, from a distance, first appeared to be in adult plumage, but which proved to be near-adults when we collected a tail feather and observed the bird flying <30 m overhead (1992 Tonto male).

Conversely, we have observed adult bald eagles with near-adult plumage "characteristics" and adult birds retaining remnants of their near-adult plumage. The 1987-1992 Ladders female appeared to have a mild eyestripe at a minimum of nine years old. Upon closer examination, the eyestripe was the separation of feathers at the ridge above the eagle's eye and the associated shadow. The Sheep female (1992-1995)

entered the breeding area at four years old in 1992, but retained an eye-stripe into its sixth year. The 1995 San Carlos female also retained its near-adult plumage at six years old. Adult eagles may appear to have near-adult plumage characteristics if their head is dirty from eating at a large mammal carcass or while submerged in the water from foraging. Because of the unprecedented occurrence of near-adult eagles as members of breeding pairs (Hunt et al. 1992), birds must be examined with care and often on more than one visit to correctly determine their plumage and subsequent age.

Similarly, while checking an eagle's leg, birds wearing bands can appear not to have bands, and vice versa. Eagles in less than optimum viewing conditions that were known to possess color VID and USFWS bands have appeared bandless. Even under good viewing conditions biologists have initially been fooled. One bird's band was hidden at the top of its tarsus under feathers, yet the tarsus appeared completely exposed and bandless. Biologists have gone from "thinking" that an eagle had a green color band to determine after three visits that the bird wore no bands. Even trickier than determining plumage, identifying bands requires patience, return visits, and a keen eye.

From 1991 to 1995, 18 Arizona bald eagle VID banded nestlings (Hunt et al. 1992, Mesta et al. 1992, Driscoll and Beatty in prep.) returned to become members of an Arizona breeding pair. The number of banded recruits has increased almost annually with 1 new bird in 1991, 2 in 1992, 3 in 1993, 2 new birds in 1994, and 10 in 1995. No Arizona hatched eagles have been recorded breeding outside the state.

New single USFWS banded birds have also occurred as replacements in breeding pairs (n=7). Two new single USFWS banded eagles entered the breeding population in 1991, 0 in 1992, 2 in 1993, 3 in 1994, and 0 in 1995. Throughout this study period, 13 eagles wore only a USFWS band.

In the future, we expect that single-banded USFWS birds from Arizona will disappear as new members of breeding pairs. Arizona eagles were last banded in this manner between 1977 and 1985. In 1995, Arizona USFWS single-banded eagles were between 10 and 18 years old. The oldest known breeding eagles (there were 2) in Arizona were 16 years old in 1995. So, while eagles from the 1977-1985 cohorts still might enter the breeding population, the chances are diminishing.

If the Arizona breeding population is open to out-of-state immigrants, a variety of color-marked, single USFWS banded, or unbanded eagles could enter the breeding population. As in Arizona, biologists working on eagles in other western states are marking eagles with identifying features other than the standard USFWS band. Because of this, we expect the number of single USFWS-banded birds will also soon disappear from the nationwide pool. If non-Arizona color-marked eagles enter the breeding population, we will be able to determine their origin.

Unbanded birds (n=17) are also still entering the breeding population. Although we believe we know every breeding area in the state, there may still be unknown territories that are the source of these birds. Additionally, not all eaglets can be banded every single year. And, of course, if the population is open to immigrants, eagles can be entering Arizona from other states.

The passive way to determine the identity of breeding eagles is to visually identify the presence or absence of bands or other distinguishing markers. However, there are presently breeding single USFWS banded eagles whose identity will go unknown if we do not discover the bird's carcass. We very rarely discover dead eagles, so the alternative is to trap these single USFWS banded eagles.

We trapped the Luna male and female eagles in 1994 after we noticed a blue patagial marker on the breeding male. The Luna male was the first out-of-state bird (southeast Texas below Houston) documented breeding in Arizona, and part of the first bald eagle pair recorded breeding in the White Mountains of Arizona at nearly 8000 feet. According to our search of the literature, this bald eagle also traveled the longest distance (858 mi = 1380 km) from its natal area to breed. Central Arizona is the origin of all (n=29) other breeding eagles identified in the desert nesting population (Hunt et al. 1992).

The origin of Arizona's breeding bald eagles is a central issue to establishing de-listing criteria. Is there immigration into the desert nesting population from other states? If there is immigration into Arizona, at what rate does it occur? Was the eagle that came from Texas a fluke? Is there immigration of Luna Lake produced eagles into the desert population and vice versa? Does Arizona provide breeding eagles for other southwestern states, or is Arizona a sink for immigrants? These answers will only be addressed by a continued efforts to band, trap, and identify Arizona bald eagle nestlings and breeding adults.

## RECOMMENDATIONS

1. Continue banding all Arizona eaglets through at least 1996 with color VID and USFWS bands. This would represent 10 consecutive years of banding with color VID bands.

2. Continue identifying presence or absence of bands of bald eagles holding territories through 2000. This would represent 10 consecutive years of monitoring Arizona bald eagle demographics in the breeding segment of the population.

3. Attempt to capture breeding bald eagles wearing only USFWS bands. This will help add information on the known origin of breeding Arizona eagles. This

information may be critical when evaluating the level of isolation (or lack of immigration) in the Arizona breeding population to set recovery goals.

4. Mark captured adults with color bands and USFWS bands for future identification should they not already possess these identification markers.

5. Purchase a Questar spotting scope to make band reading efforts quicker. Presently, a Questar has been borrowed from the U.S. Bureau of Reclamation to make band reading efforts more accurate. With our two to three person team, we could split our personnel resources to maximize effort and reduce expended time. Work will annually increase as more banded eagles return to breed in the population.

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## APPENDIX

Table 1. Identity of Arizona bald eagles at occupied breeding areas visited, 1991.

| | Male | | | Female | | |
|---|---|---|---|---|---|---|
| Breeding area | Age[1] | Left leg | Right leg | Age | Left leg | Right leg |
| Alamo | Adult | None[2] | USFWS | Adult | None | USFWS |
| Bartlett | 7yr | Black R | USFWS | Adult | None | None |
| Blue Point | 12yr | Black B | USFWS | **Adult*** | None | USFWS |
| Cibecue | **Adult*** | USFWS | None | Adult | None | None |
| Cliff | 12 yr | Black G | USFWS | 12yr+ | USFWS | None |
| Coolidge | Adult | None | None | Adult | None | None |
| Devil's Post | Adult | ?[3] | ? | Adult | ? | ? |
| East Verde | Adult | ? | ? | Adult | ? | ? |
| Ft. McDowell | Adult | None | None | 7yr+ | USFWS | None |
| Horse Mesa | Adult | None | None | Adult | None | None |
| Horseshoe | **Adult*** | None | None | 9yr+ | USFWS | Black D |
| Ive's Wash | Adult | None | None | Adult | None | None |
| Ladders | **4yr*** | None | None | 8yr+ | USFWS | Black E |
| Lone Pine | Adult | None | None | Adult | None | None |
| Orme | Adult | ? | ? | Adult | ? | ? |
| Pinal | 9yr+ | None | USFWS | 10yr+ | USFWS | Black A |
| Pinto | No male in territory | | | 10yr | Black G | USFWS |
| Pleasant | **4yr*** | Blue W | USFWS | **Adult*** | None | None |
| Redmond | 8yr+ | USFWS | Black P | Adult | None | None |
| 76 | 8yr+ | USFWS | None | Adult | None | None |
| Sheep | Territory unoccupied | | | | | |

[1]Age: Age of adults represents minimum age due to plumage observed from first observation of a marked eagle in a territory, trapping of a banded bird (Hunt et al. 1992), or visual identification band. ***BOLD** = Known new bird in a territory; [2]None = No band on leg; [3]? = Unknown.

Table 2. Identity of Arizona bald eagles at occupied breeding areas visited, 1992.

| | Male | | | Female | | |
|---|---|---|---|---|---|---|
| Breeding area | Age[1] | Left leg | Right leg | Age | Left leg | Right leg |
| Alamo | Adult | None[2] | USFWS | Adult | None | USFWS |
| Bartlett | **4yrs*** | None | None | Adult | None | None |
| Blue Point | 13yr | Black B | USFWS | Adult | None | USFWS |
| Camp Verde | **Adult*** | None | None | **Adult*** | None | None |
| Cibecue | Adult | USFWS | None | Adult | None | None |
| Cliff | 13yr | Black G | USFWS | 13yr+ | USFWS | None |
| Coolidge | Adult | None | None | Adult | None | None |
| East Verde | **Adult*** | None | None | Adult | None | None |
| Ft McDowell | Adult | None | None | 8yr+ | USFWS | None |
| Horse Mesa | Adult | None | None | Adult | None | None |
| Horseshoe | Adult | None | None | ?[3] | ? | ? |
| Ive's Wash | Adult | None | None | Adult | None | None |
| Ladders | Adult | None | None | 9yr+ | USFWS | Black E |
| Orme | Adult | None | None | Adult | None | None |
| Pinal | 10yr+ | None | USFWS | 11yr+ | USFWS | Black A |
| Pinto | No male in territory | | | 11yr | Black G | USFWS |
| Pleasant | 5yr | Blue W | USFWS | **4yr*** | None | None |
| Redmond | Adult | ? | ? | Adult | ? | ? |
| 76 | 9yr+ | USFWS | None | Adult | None | None |
| Sheep | **Adult*** | None | None | **4yr*** | Green C | USFWS |
| Tonto | **4yr*** | None | None | **5yr*** | Blue G | USFWS |

[1]Age: Age of adults represents minimum age due to plumage observed from first observation of a marked eagle in a territory, trapping of a banded bird (Hunt et al. 1992), or visual identification band. ***BOLD** = Known new bird in a territory; [2]None = No band on leg; [3]? = Unknown.

Table 3. Identity of Arizona bald eagles at occupied breeding areas visited, 1993.

| | Male | | | Female | | |
|---|---|---|---|---|---|---|
| Breeding area | Age[1] | Left leg | Right leg | Age | Left leg | Right leg |
| Alamo | Adult | None[2] | USFWS | Adult | None | USFWS |
| Bartlett | Adult | None | None | Adult | None | None |
| Blue Point | 14yr | Black B | USFWS | Adult | None | USFWS |
| Cibecue | Adult | USFWS | None | Adult | None | None |
| Cliff | 14 yr | Black G | USFWS | 14yr+ | USFWS | None |
| Coolidge | Adult | None | None | Adult | None | None |
| East Verde | Adult | None | None | Adult | None | None |
| Ft McDowell | Adult | None | None | **Adult*** | None | None |
| Horse Mesa | Adult | None | None | Adult | None | None |
| Horseshoe | **5yr*** | USFWS | Green 3 | **Adult*** | None | USFWS |
| Ive's Wash | Adult | None | None | Adult | None | None |
| Ladders | Adult | None | None | 10yr+ | USFWS | Black E |
| Orme | Adult | None | None | Adult | None | None |
| Pinal | 11yr+ | None | USFWS | 12yr+ | USFWS | Black A |
| Pinto | **Adult*** | None | USFWS | 12yr | Black G | USFWS |
| Pleasant | 6yr | Blue W | USFWS | Adult | None | None |
| Redmond | Adult | ?[3] | ? | Adult | ? | ? |
| 76 | 10yr+ | USFWS | None | Adult | None | None |
| Sheep | Adult | None | None | 5yr | Green C | USFWS |
| Table Mt. | Adult | None | None | Adult | None | None |
| Tonto | **6yr*** | Blue 3 | USFWS | 6yr | Blue G | USFWS |
| Tower | **4yr*** | Purple 8 | USFWS | **Adult*** | None | None |

[1]Age: Age of adults represents minimum age due to plumage observed from first observation of a marked eagle in a territory, trapping of a banded bird (Hunt et al. 1992), or visual identification band. ***BOLD** = Known new bird in a territory; [2]None = No band on leg; [3]? = Unknown.

Table 4. Identity of Arizona bald eagles at occupied breeding areas visited, 1994.

| | Male | | | Female | | |
|---|---|---|---|---|---|---|
| Breeding area | Age[1] | Left leg | Right leg | Age | Left leg | Right leg |
| Alamo | Adult | None[2] | USFWS | Adult | None | USFWS |
| Bartlett | Adult | None | None | Adult | None | None |
| Blue Point | 15yr | Black B | USFWS | Adult | None | USFWS |
| Cibecue | Adult | USFWS | None | Adult | None | None |
| Cliff | 15yr | Black G | USFWS | 15yr+ | USFWS | None |
| Coolidge | Adult | None | None | Adult | None | None |
| East Verde | Adult | None | None | Adult | None | None |
| Ft McDowell | Adult | None | None | Adult | None | None |
| Horse Mesa | Adult | None | None | Adult | None | None |
| Horseshoe | Adult | ?[3] | ? | Adult | None | USFWS |
| Ive's Wash | Adult | None | None | Adult | None | None |
| Ladders | Adult | None | None | **Adult*** | None | None |
| Luna | **6yr*** | USFWS | None | **Adult*** | None | None |
| Orme | Adult | None | None | Adult | None | None |
| Pinal | 12yr+ | None | USFWS | 13yr+ | USFWS | Black A |
| Pinto | Adult | None | USFWS | 13yr | Black G | USFWS |
| Pleasant | 7yr | Blue W | USFWS | Adult | None | None |
| Redmond | **7yr*** | Blue V | USFWS | **Adult*** | None | USFWS |
| 76 | 11yr+ | USFWS | None | Adult | None | None |
| Sheep | **3yr*** | None | USFWS | 6yr | Green C | USFWS |
| Table Mt. | Adult | None | None | Adult | None | None |
| Talkalai | **Adult*** | None | None | **Adult*** | None | None |
| Tonto | 7yr | Blue 3 | USFWS | 7yr | Blue G | USFWS |
| Tower | 5yr | Purple 8 | USFWS | Adult | None | None |

[1]Age: Age of adults represents minimum age due to plumage observed from first observation of a marked eagle in a territory, trapping of a banded bird (Hunt et al. 1992), or visual identification band. ***BOLD** = Known new bird in a territory; [2]None = No band on leg; [3]? = Unknown.

Table 5. Identity of Arizona bald eagles at occupied breeding areas visited, 1995.

| | Male | | | Female | | |
|---|---|---|---|---|---|---|
| Breeding area | Age[1] | Left leg | Right leg | Age | Left leg | Right leg |
| Alamo | Adult | None[2] | USFWS | Adult | None | USFWS |
| Bartlett | Adult | None | None | Adult | None | None |
| Blue Point | 16yr | Black B | USFWS | Adult | None | USFWS |
| Box Bar | **5yr*** | Blue 1/C | USFWS | **4yr*** | Blue 2/E | USFWS |
| Cibecue | Adult | USFWS | None | Adult | None | None |
| Cliff | 16yr | Black G | USFWS | ?[3] | ? | ? |
| Coolidge | Adult | None | None | Adult | None | None |
| East Verde | Adult | None | None | Adult | None | None |
| Ft McDowell | Adult | None | None | Adult | None | None |
| Horse Mesa | **6yr*** | Purple ? | USFWS | Adult | None | None |
| Horseshoe | **Adult*** | None | None | Adult | None | USFWS |
| Ive's Wash | **7yr*** | Green 5 | USFWS | **4yr*** | Blue 2/P | USFWS |
| Ladders | Adult | None | None | Adult | None | None |
| Luna | 7yr | USFWS | Black **0**/B | Adult | USFWS | Black **0**/A |
| Orme | Adult | None | None | Adult | None | None |
| Pinal | 13yr+ | None | USFWS | **5yr*** | Blue 1/? | USFWS |
| Pinto | **7yr*** | Green 4 | USFWS | 14yr | Black G | USFWS |
| Pleasant | 8yr | Blue W | USFWS | Adult | None | None |
| Redmond | 8yr | Blue V | USFWS | Adult | None | USFWS |
| San Carlos | **5yr*** | Blue 1/E | USFWS | **6yr*** | Purple D | USFWS |
| 76 | 12yr+ | USFWS | None | Adult | None | None |
| Sheep | **4yr*** | Blue 2/S | USFWS | 7yr | Green C | USFWS |
| Table Mt. | Adult | None | None | Adult | None | None |
| Talkalai | Adult | None | None | **7yr*** | Green B | USFWS |
| Tonto | 8yr | Blue 3 | USFWS | 8yr | Blue G | USFWS |
| Tower | 6yr | Purple 8 | USFWS | Adult | None | None |

[1]Age: Age of adults represents minimum age due to plumage observed from first observation of a marked eagle in a territory, trapping of a banded bird, or visual identification band (Hunt et al. 1992). ***BOLD** = Known new bird in a territory; [2]None = No band on leg; [3]? = Unknown.

Table 6. Replacement or new birds at Arizona bald eagle breeding areas, 1991.

| | Previous bird | | | | Replacement bird | | |
|---|---|---|---|---|---|---|---|
| Breeding area | Sex[1] | Known tenure[1] | Age[1] | Identifying feature[1] | Year arrived and identified | Age | Identifying feature |
| Blue Point | F | 1990 | #3 | Subadult plumage | 1991 | A[2] | USFWS band on right tarsus |
| Cibecue | M | 1989-? 1990? | A | Replaced injured 1989 male | #1991 | A | USFWS band on left tarsus |
| Horseshoe | M | 88-90 | 7+ | Black VID & USFWS band, telemetry unit | 1991 | A | No leg bands |
| Ladders | M | 1990 | 6 | USFWS band on right tarsus; from Horseshoe 1985; found dead 12/90 at West Clear Creek | 1991 | 4 | Unbanded; in near-adult plumage |
| Pleasant | M | 1990 | 4 | Near-adult male | 1991 | 4 | Blue VID & USFWS band |
| Pleasant | F | 1990 | A | USFWS band on left tarsus | 1991 | A | Unbanded adult |

[1]Sex, known tenure, and identifying features for eagles identified from 1987-1990 are from Hunt et al. (1992).
[2]A = eagle of unknown age in adult plumage.

Table 7. Replacement or new birds at Arizona bald eagle breeding areas, 1992.

| | Previous bird | | | | Replacement bird | | |
|---|---|---|---|---|---|---|---|
| Breeding area | Sex[1] | Known tenure[1] | Age[1] | Identifying feature[1] | Year arrived and identified | Age | Identifying feature |
| Bartlett | M | 1987-91 | 8 | Black VID & USFWS band, telemetry unit | 1992 | 4 | Unbanded; near-adult plumage |
| Camp Verde | M | Historical territory not previously occupied | | | 1992 | A | No leg bands |
| Camp Verde | F | Historical territory not previously occupied | | | 1992 | A | No leg bands |
| East Verde | M | 1987-89 1990-91? | 7+ | Black VID & USFWS band, telemetry unit | #1992 | A | No leg bands |
| Pleasant | F | 1991 | A | Unbanded adult | 1992 | 4 | Unbanded; near-adult plumage |
| Sheep | F | 1988-? 1889-91? | A | Adult banded right tarsus observed 11/87 | 1992 | 4 | Green VID & USFWS band, telemetry unit |
| Sheep | M | 1988-? 1989-91? | 4 | Banded (leg unknown) near-adult replaced male during incubation | 1992 | A | Unbanded adult |
| Tonto | F | Territory did not exist | | | 1992 | 5 | Blue VID & USFWS band |
| Tonto | M | Territory did not exist | | | 1992 | 4 | Unbanded; near-adult plumage |

[1]Sex, known tenure, and identifying features for eagles identified from 1987-1990 are from Hunt et al. (1992).
[2]A = eagle of unknown age in adult plumage.

Table 8. Replacement or new birds at Arizona bald eagle breeding areas, 1993.

| | Previous bird | | | | Replacement bird | | |
|---|---|---|---|---|---|---|---|
| Breeding area | Sex[1] | Known tenure[1] | Age[1] | Identifying feature[1] | Year arrived and identified | Age | Identifying feature |
| Fort McDowell | F | 1989-92 | 8+ | USFWS band on left tarsus | 1993 | A | No leg bands |
| Horseshoe | M | 1991-92 | 6+ | No bands; found dead 10/92 | 1993 | 5yr | Green VID & USFWS band |
| Horseshoe | F | 1988-91 1992? | 8+ | Black VID & USFWS band, telemetry unit | #1993 | A | USFWS band on right tarsus |
| Pinto | M | Involved in polygynous relationship w/ Pinal male 1987-1992 | | | 1993 | A | USFWS band on left tarsus |
| Tonto | M | 1992 | 4 | Unbanded; near-adult plumage | 1993 | 6yr | Blue VID & USFWS band |
| Tower | F | Historical territory not previously occupied | | | 1993 | A | Unbanded adult |
| Tower | M | Historical territory not previously occupied | | | 1993 | 4yr | Purple VID & USFWS band |

[1]Sex, known tenure, and identifying features for eagles identified from 1987-1990 are from Hunt et al. (1992).
[2]A = eagle of unknown age in adult plumage.

Table 9. Replacement or new birds at Arizona bald eagle breeding areas, 1994.

| | Previous bird | | | | Replacement bird | | |
|---|---|---|---|---|---|---|---|
| Breeding Area | Sex[1] | Known Tenure[1] | Age[1] | Identifying Feature[1] | Year arrived and identified | Age | Identifying Feature |
| Ladders | F | 1988-93 | 10+ | Black VID & USFWS band, telemetry unit | 1994 | A | No leg bands |
| Luna | F | Territory did not exist | | | 1994 | A | No bands; trapped and banded black "0/A" right tarsus and USFWS band (629-36097) left tarsus |
| Luna | M | Territory did not exist | | | 1994 | 6yr | Trapped, USFWS band left tarsus (629-19689), black band "0/B" right tarsus, blue patagial marker |
| Redmond | F | 1987-91 1992-93? | A | Unbanded adult | #1994 | A | USFWS band on right tarsus |
| Redmond | M | 1989-91 1992-93? | A | Black VID & USFWS band, telemetry unit | #1994 | 7yr | Blue VID & USFWS band |
| Sheep | M | 1992-93 | A | Unbanded adult | 1994 | 3yr | USFWS band on right tarsus |
| Talkalai | M | Territory not yet discovered | | | 1994 | A | Unbanded adult |
| Talkalai | F | Territory not yet discovered | | | 1994 | A | Unbanded adult |

[1]Sex, known tenure, and identifying features for eagles identified from 1987-1990 are from Hunt et al. (1992).
[2]A = eagle of unknown age in adult plumage.

Table 10. Replacement or new birds at Arizona bald eagle breeding areas, 1995.

| | Previous bird | | | | Replacement bird | | |
|---|---|---|---|---|---|---|---|
| Breeding Area | Sex[1] | Known Tenure[1] | Age[1] | Identifying Feature[1] | Year arrived and identified | Age | Identifying Feature |
| Box Bar | F | Historical territory not previously occupied | | | 1995 | 4yr | Blue VID & USFWS band |
| Box Bar | M | Historical territory not previously occupied | | | 1995 | 5yr | Blue VID & USFWS band |
| Horse Mesa | M | 1991-94 | A | Unbanded adult | 1995 | 6yr | Purple VID & USFWS band |
| Horseshoe | M | 1993 1994? | 5yr (6?) | Green VID & USFWS band telemetry unit | 1995 | A | Unbanded adult |
| Ive's Wash | M | 1988-94 | A | Unbanded adult | 1995 | 7yr | Green VID & USFWS band |
| Ive's Wash | F | 1988-94 | A | Unbanded adult | 1995 | 4yr | Blue VID & USFWS band |
| Pinal | F | 1987-94 | 12+ | Black VID & USFWS band | 1995 | 5yr | Blue VID & USFWS band |
| Pinto | M | 1993-94 | 6+ | USFWS band on right tarsus | 1995 | 7yr | Green VID & USFWS band, telemetry unit |
| Sheep | M | 1994 | 3yr | USFWS band on right tarsus | 1995 | 4yr | Blue VID & USFWS band |
| San Carlos | M | Territory did not exist | | | 1995 | 5yr | Blue VID & USFWS band |
| San Carlos | F | Territory did not exist | | | 1995 | 6yr | Purple VID & USFWS band |
| Talkalai | F | 1994 | A | Unbanded adult | 1995 (1994[3]) | A | 1994 mid-season replacement; green VID & USFWS band, telemetry unit |

[1]Sex, known tenure, and identifying features for eagles identified from 1987-1990 are from Hunt et al. (1992).
[2]A = eagle of unknown age in adult plumage.
[3]Talkalai 1995: Female was a 1994 replacement after prior female hatched eaglets; 1995 was its first year breeding.

Table 11. Summary of breeding bald eagles identified in Arizona 1991-1995.

| Year | Age class[1] | | Identified VID banded recruitments in population[2] | All identified VID banded eagles[3] | Identified USFWS banded eagles[4] | Identified banded eagles[5] | Identified unbanded eagles[6] | Identified eagles[7] |
|---|---|---|---|---|---|---|---|---|
| | Adult | Sub-adult | | | | | | |
| 1991 | 37 | 2 | 1 | 9 | 8 | 17 | 16 | 33 |
| 1992 | 36 | 4 | 3 | 8 | 8 | 16 | 22 | 38 |
| 1993 | 43 | 1 | 6 | 11 | 9 | 20 | 22 | 42 |
| 1994 | 47 | 1 | 7 | 11 | 11 | 22 | 25 | 47 |
| 1995 | 48 | 3 | 17 | 22 | 8 | 30 | 21 | 51 |

[1]Age class of breeding eagles identified by plumage and / or known age of banded eagles.
[2]Identified breeding eagles with VID bands placed on as nestlings.
[3]Identified breeding eagles with VID & USFWS bands placed on as nestlings and breeding adults.
[4]Identified eagles wearing only a USFWS band.
[5]Identified eagles wearing a band (USFWS or VID and USFWS).
[6]Identified eagles not wearing a band.
[7]Identified eagles for which plumage and presence or absence of bands were determined.

Table 12. Summary of replacement or new breeding bald eagles identified in Arizona 1991-1995.

| | Replacement eagles with prior year bird known | | | Replacement eagles with prior year bird not known | | | Eagles at pioneer or reoccupied breeding areas | | |
|---|---|---|---|---|---|---|---|---|---|
| Year | VID[1] | USFWS[2] | No band[3] | VID | USFWS | No band | VID | USFWS | No band |
| 1991 | 1 | 1 | 3 | - | 1 | - | - | - | - |
| 1992 | 1 | - | 3 | - | - | 1 | 1 | - | 3 |
| 1993 | 2 | 1 | 1 | - | 1 | - | 1 | - | 1 |
| 1994 | - | 1 | 1 | 1 | 1 | - | - | 1 | 3 |
| 1995 | 7 | - | - | - | - | 1 | 4 | - | - |

[1]VID = number of replacement or new birds wearing a visual identification band from Arizona.
[2]USFWS = number of replacement or new birds wearing only a USFWS band.
[3]No band = number of replacement or new birds wearing no bands.

Table 13. Identity of breeding eagles banded as nestlings 1991-1995, Arizona.

| Hatch year | Sex | Natal BA | VID band | USFWS band 629- | Breeding area | Year entered | Age of 1st breeding |
|---|---|---|---|---|---|---|---|
| 1987 | M | Horse Mesa | Blue W | 15187 | Pleasant | 1991 | 4 yrs |
| 1987 | F | Horseshoe | Blue G | 15198 | Tonto | 1992 | 5 yrs |
| 1988 | F | 76 | Green C | 26472 | Sheep | 1992 | 4 yrs |
| 1988 | M | Ladders | Green 3 | 26468 | Horseshoe | 1993 | 5 yrs |
| 1989 | M | Ladders | Purple 8 | 32627 | Tower | 1993 | 4 yrs |
| 1987 | M | Pinal | Blue reverse 3 | 26451 | Tonto | 1993 | 6 yrs |
| 1987 | M | Horse Mesa | Blue V | 15188 | Redmond | 1992-1994 | 5-7 yrs |
| 1988 | F | 76 | Green B | 26471 | Talkalai | 1995 (1994[1]) | 6 yrs |
| 1988 | M | Ive's Wash | Green 5 | 26464 | Ive's Wash | 1995 | 7 yrs |
| 1991 | F | Blue Point | Blue 2/P | 36009 | Ive's Wash | 1995 | 4 yrs |
| 1988 | M | Orme | Green 4 | 26469 | Pinto | 1995 | 7 yrs |
| 1990 | M | Horse Mesa | Blue 1/E | 32656 | San Carlos | 1995 | 5 yrs |
| 1989 | F | Bartlett | Purple D | 32631 | San Carlos | 1995 | 6 yrs |
| 1989 | F | ? | Purple ? | ? | Horse Mesa | 1995 | 6 yrs |
| 1990 | M | Horse Mesa | Blue 1/C | 32655 | Box Bar | 1995 | 5 yrs |
| 1991 | F | Ft. McDowell | Blue 2/E | 32756 | Box Bar | 1995 | 4 yrs |
| 1991 | M | Ladders | Blue 2/S | 36011 | Sheep | 1995 | 4 yrs |
| 1990 | F | ? | Blue 1/? | ? | Pinal | 1995 | 5 yrs |

[1]Talkalai female 1995: eagle was a 1994 mid-season replacement after prior female hatched eaglets; 1995 was its first year breeding.

Table 14. Summary of the minimum number of identified Arizona breeding eagles, 1991-1995.

| | 1991 | | 1992 | | 1993 | | 1994 | | 1995 | | Minimum number of breeders |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Breeding area | % | & | % | & | % | & | % | & | % | & | |
| Alamo | Ad[1] | Ad | S[2] | S | S | S | S | S | S | S | 2 |
| Bartlett | 7[3] | Ad | 4 | S | S | S | S | S | S | S | 3 |
| Blue Point | 12 | Ad | S | S | S | S | S | S | S | S | 2 |
| Box Bar | Reoccupied territory | | | | | | | | 5 | 4 | 2 |
| Camp Verde | Reoccupied site | | Ad | Ad | Unoccupied territory | | | | | | 2 |
| Cibecue | Ad | Ad | S | S | S | S | S | S | S | S | 2 |
| Cliff | 12 | Ad | S | S | S | S | S | S | S | ?[4] | 2 |
| Coolidge | Ad | Ad | S | S | S | S | S | S | S | S | 2 |
| East Verde | ? | ? | Ad | Ad | S | S | S | S | S | S | 2 |
| Fort McDowell | Ad | Ad | S | S | S | Ad | S | S | S | S | 3 |
| Horse Mesa | Ad | Ad | S | S | S | S | S | S | 6 | S | 3 |
| Horseshoe | Ad | Ad | S | ? | 5 | Ad | ? | S | Ad | S | 5 |
| Ive's Wash | Ad | Ad | S | S | S | S | S | S | 7 | 4 | 4 |
| Ladders | 4 | Ad | S | S | S | S | S | Ad | S | S | 3 |
| Lone Pine | Ad | Ad | Not checked | | | | | | | | 2 |
| Luna | New pioneer territory | | | | | | 6 | Ad | S | S | 2 |
| Orme | ? | ? | Ad | Ad | S | S | S | S | S | S | 2 |
| Pinal | Ad | Ad | S | S | S | S | S | S | S | 5 | 3 |
| Pinto | Pnl[5] | 10 | Pnl | S | Ad | S | S | S | 7 | S | 3 |
| Pleasant | 4 | Ad | S | 4 | S | S | S | S | S | S | 3 |
| Redmond | Ad | Ad | ? | ? | ? | ? | 7 | Ad | S | S | 4 |
| San Carlos | New pioneer territory | | | | | | | | 5 | 6 | 2 |
| 76 | Ad | Ad | S | S | S | S | S | S | S | S | 2 |
| Sheep | Unoccupied | | Ad | 4 | S | S | 3 | S | 4 | S | 4 |
| Table Mountain | Not checked | | | | Ad | Ad | S | S | S | S | 2 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Talkalai | Newly discovered territory | | | | | | Ad | Ad | S | 7 | 3 |
| Tonto | Pioneer territory | | 4 | 5 | 6 | S | S | S | S | S | 3 |
| Tower | Reoccupied territory | | | | 4 | Ad | S | S | S | S | 2 |
| 28 breeding areas | 16 | 17 | 19 | 19 | 21 | 21 | 23 | 24 | 26 | 25 | 72 |

[1]Ad = adult plumaged bird $5 years old; [2]S = based upon plumage or bands, bird identified is the same as previous year; [3]Number = known age of eagle; [4]? = identification uncertain; [5]Pnl = Pinal male.