ARIZONA BALD EAGLE NESTWATCH PROGRAM: 1996 SUMMARY REPORT

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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 five others. In August 1995, the bird was downlisted by the USFWS (1995) to threatened in all recovery regions of the lower 48 states. It is not endangered or threatened in Alaska and does not occur in Hawaii. Yet, the bald eagle still retains protection under the Endangered Species Act, 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's breeding bald eagles.

Many Arizona bald eagle breeding areas (BA) are subjected to human activities that might affect breeding success. Consequently, as the breeding population became better known, the demand for progressive management increased. Strong protective efforts began in 1978, when the U.S. Forest Service (USFS) and two Maricopa Audubon Society volunteers monitored a nest. Soon the monitoring effort expanded into the Arizona Bald Eagle Nestwatch Program (ABENWP).

As more BAs were discovered, interagency coordination became more important. To provide oversight, the Southwestern Bald Eagle Management Committee (SWBEMC) was formed in 1984. The SWBEMC is a cooperative effort among federal and state agencies, private groups, and Native American Tribes committed to bald eagle conservation. In 1986, on behalf of the SWBEMC, the USFWS assumed coordination responsibilities for the ABENWP and expanded its scope. The lead was passed to the Arizona Game and Fish Department (AGFD) in 1991.

The ABENWP has three principal goals: conservation, data collection, and education. Because of the high level of recreation along central Arizona rivers, seasonal closures surround many nest areas. Nestwatchers interact with people who enter these closures, educate them about bald eagle ecology, distribute pamphlets, and tactfully direct them out of the area. To help agencies make better management decisions, nestwatchers also collect information on eagle ecology, productivity, and behavior in response to human activity. The most direct or tangible benefit of the ABENWP is observation of problems at nest sites. Every year, adult eagles and/or nestlings are found in precarious situations. Constant monitoring by nestwatchers makes it possible to rescue birds in life threatening situations.

This report summarizes the most significant discoveries at each BA monitored in 1996. Among the topics discussed are length of observation, timing of breeding events, human activity, food habits, and management activities.

STUDY AREA

In 1996, ABENWP personnel monitored bald eagle breeding areas along selected rivers, creeks, and reservoirs throughout Arizona (Fig. 1). All monitored BAs were in the central part of the state. The most northerly BA was Tower, along the upper Verde River. The most southerly BA was Winkelman, along the Gila River. The most westerly BA was Alamo Lake, near the confluence of the Bill Williams, Big Sandy, and Santa Maria rivers. The most easterly BA was San Carlos, on the San Carlos River. Elevations of the monitored areas ranged from 329 m (1080 ft) at Alamo Lake to 1170 m (3840 ft) at the Tower BA.

Most Arizona bald eagles breed in the central part of the state, at elevations of 1080 ft (329 m) to 1719 m (5640 ft). This portion of the state is within the Upper and Lower Sonoran Life Zones (Merriam 1898), and includes riparian habitats and transition areas of both zones. Brown (1982) describes the representative vegetation of these zones as including Arizona sycamore (*Platanus wrightii*), blue palo verde (*Cercidium floridum*), cholla (*Opuntia* spp.), Fremont cottonwood (*Populus fremontii*), Goodding willow (*Salix gooddingii*), ironwood (*Olneya tesota*), mesquite (*Prosopis* spp.), saguaro (*Carnegiea gigantea*), and tamarisk or salt cedar (*Tamarix pentandra*; an exotic species). Pinyon (*Pinus* spp.) and juniper (*Juniperus* spp.) are common in the transition areas.

METHODS

Beginning in late summer and early fall, AGFD advertised through the American Ornithologists' Union's Newsletter and job placement services at colleges and universities nationwide for potential nestwatchers. Public discussions, word-of-mouth from previous nestwatchers, and the distribution of ABENWP brochures also contributed to the pool of applicants. Nestwatchers were hired as private consultants to AGFD.

After selection of personnel, meetings were held the first week in February to orient and educate nestwatchers. We car-pooled to the Bartlett BA to prepare nestwatchers for the field and to explain data forms. We also addressed protocol for nest failures and bald eagle "emergencies" such as eaglets falling out of the nest, and birds getting tangled in monofilament. The following day, a formal orientation meeting hosted by agency contributors discussed Arizona bald eagle history, ecology, and the role nestwatchers play in management of the species. At the end of the meeting, nestwatch partners were selected. After the first ten days in the field, we reconvened to review problems or questions with data forms and the writing of final reports. Additional problems were discussed on an individual basis in the field or at the office.

BAs selected for monitoring were based upon the level of human activity near BAs. The sites monitored included: all active BAs with legal closures (Bartlett, Box Bar, Ladders, Lake Pleasant, 76, and Tower); BAs with high levels of human activity, but which had no closures (Fort McDowell,

Horseshoe, San Carlos, Sheep, Tonto, Winkelman); and BAs that are fairly accessible and/or have a history of problems such as heat stress, nest parasites, or the persistent presence of monofilament (Alamo, Ive's Wash) (Hunt et al. 1992).

Field work began the first week of February, immediately after orientation, and continued until the eaglets fledged in May and June. Two person teams maintained a ten-day on, four-day off schedule. Each work period included weekends and Fridays, when heavy recreation may impact eagles. Half of each ten-day period (weekends and every other Friday) was devoted to data collection on nests that were monitored from dawn-to-dusk. The other half of each ten-day period was spent collecting supplemental eagle data. The four-day off period occurred every other Monday through Thursday. Breeding areas with constant recreational pressure (Box Bar and Pleasant BAs) were monitored with a three to four person team during the season.

All bald eagle data were recorded opportunistically from distant observation points in the nest areas. Spotting scopes (15-45x) and binoculars were used to view eagles. Each observation point was selected to provide optimal viewing with the least impact to breeding bald eagles. All observations were recorded on field forms. Forms were developed to document forage events, human activity in the breeding area, nesting behavior, prey deliveries, wildlife interactions, and wildlife sightings.

Human activity and the associated eagle behavior were recorded within an arbitrary 1.0 km (3300 ft) radius of an eagle or nest. Bald eagle behavior in response to human activity was classified into seven categories: none, watched, restless, flushed, left area, unknown, and bird not in area. If eagles performed their normal activities without acknowledging a nearby human activity, a "no response" was recorded. If an eagle looked at an activity without displaying any other observable reaction, "watched" was marked. If an eagle vocalized, moved noticeably on its perch, or displayed any overt reaction to an activity without leaving its perch, "restless" was recorded. If an eagle left its perch quickly, in response to a human activity, we recorded a "flush." A "left area" response refers to an eagle that became intolerant of an activity and left the immediate area in less hurried manner than a "flush." We recorded an "unknown" response if we were unable to view an eagle's response and marked "bird not in area" if an eagle was not present when an activity occurred.

In addition, all aircraft below the 600 m (2000 ft) Federal Aviation Administration (FAA) recommended ceiling and within 1.0 km (3300 ft) of an eagle/nest were also documented. Elevation of known landmarks (such as the nest or a nearby cliff top) derived from topographic maps was used to estimate the height of the aircraft. The eagle's response to the aircraft was also recorded.

At the southern end of the Lake Pleasant closure, we described the amount and type of watercraft activity. We recorded all boats or jet-skis that approached the buoy line and whether they entered the closure or not. If the watercraft entered the closure and were able to get past the nestwatchers, they were considered "inside the closure."

We recorded all aspects of the bird's natural history. We documented bald eagle interactions with other wildlife, and tried to identify frequency, type, and species of prey delivered to the nest. In addition, all observed forage events were recorded. Eagle behaviors such as time spent incubating, attending the nest, and feeding the young were recorded. However, in this report, we only discuss the eagle's food habits (forages and prey deliveries). Nest maps with river kilometer designations, nest numbers, and a guide to prey species of fish commonly used by Arizona bald eagles were used (Hunt et al. 1992).

Nestwatchers provided their own transportation, gas, supplies, binoculars, and food. Nestwatchers also provided their own housing on days off. A total of 21 nestwatchers participated in the ABENWP in 1996.

RESULTS AND DISCUSSION

PROGRAM

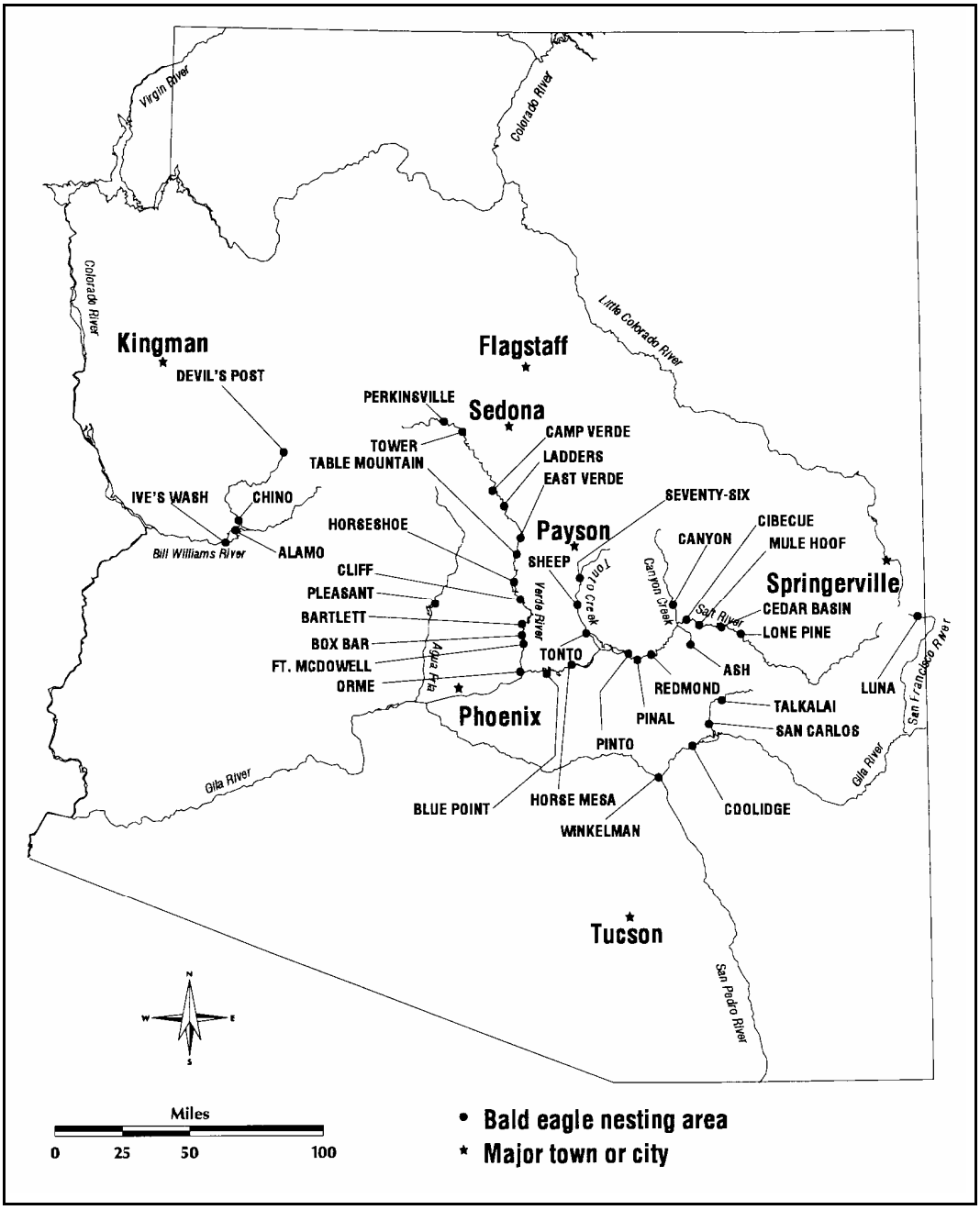
Since monitoring is concentrated in the nest area, this bias must be considered when extrapolating conclusions about foraging locations or habitat use over an entire eagle pair's range. Nevertheless, the information gathered by this focused approach helps inform land and wildlife agencies about the bird's habits, potential conflicts in the nest area, and management activities that may be needed. Further, since eagles are most often found perching and roosting near the nest during the breeding season, it is logical to concentrate management most heavily in this location. Certainly though, important eagle foraging areas, perches, and roosts away from the nest should not be ignored.

We monitored 16 BAs in 1996, including four sites monitored for the first time: Horseshoe in Tangle Creek, Sheep (for a full season), Winkelman, and Box Bar. Five BAs (Alamo, Coolidge, Ive's Wash, Orme, and San Carlos) were only watched for a short time (<10 days) and are not included in the breeding area summaries. The final status of the monitored sites, as defined by Postupalsky (1974), were as follows: 1 did not lay eggs, 6 failed, and 9 were successful. Thirteen young fledged from the nine successful sites.

INTERVENTION

Bartlett Breeding Area

Both Bartlett eaglets were found out of the nest at a young age (10 weeks old - 72 days). We traveled to the site, unsure of whether the eaglets had fallen from the nest, were injured, or capable of flight. We approached both eaglets on the ground and captured them by hand. Both eaglets were healthy. However, cholla spines were removed from one eaglet's body and feet. The birds were released onto a large boulder below the nest. They were being fed by the adults the following day.


Virgin River
Colorado River
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Little Colorado River
Kingman
Flagstaff
DEVIL'S POST
PERKINSVILLE
Sedona
CAMP VERDE
TOWER
TABLE MOUNTAIN
LADDERS
EAST VERDE
IVE'S WASH
CHINO
SEVENTY-SIX
HORSESHOE
Payson
CIBECUE
CANYON
MULE HOOF
Bill Williams River
ALAMO
SHEEP
Springerville
CLIFF
Tonto Creek
Canyon Creek
Salt River
PLEASANT
Verde River
CEDAR BASIN
BARTLETT
LONE PINE
BOX BAR
Agua Fria
TONTO
ASH
FT. MCDOWELL
REDMOND
LUNA
ORME
TALKALAI
Phoenix
PINAL
SAN CARLOS
San Francisco River
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• Bald eagle nesting area
* Major town or city

Figure 1. Locations of known Arizona bald eagle breeding areas as of 1996.

BREEDING AREA SUMMARIES

Breeding Area Productivity Overview

The 1996 Arizona bald eagle breeding season tied 1995's record for young fledged (n=25) and occupied BAs (n=30) (Tables 1, 2). The previous high for young fledged occurred in 1988 (n=24) (Hunt et al. 1992). Prior to 1995, the most occupied BAs (n=27) recorded was in 1994 (Beatty et al. 1995).

Although 1996 was a productive year, a minimum of 10 eaglets died in the nest (n=8) or soon after fledging (n=2). At the Orme, Pinal, Redmond, and Talkalai BAs, at least one eaglet hatched, but died within the first three to four weeks of life. At the 76 BA, an under-developed eaglet died at seven weeks old (52 days); it had the appearance of a bird that was only four weeks old. Two eaglets from the Pleasant BA and one eaglet from the Box Bar BA died at nine weeks old, due an early heat wave. At Pleasant, one eaglet jumped from the nest before it could fly, while the other likely died from dehydration after walking to a nearby ledge. The Box Bar eaglet also died from dehydration (Dr. Kathy Orr, pers. comm.). And finally, two eaglets from the Luna BA fledged successfully, but both were found dead below the nest with their beaks and legs missing. The USFWS's forensic lab in Ashland, Oregon, found that both eaglets had puncture wounds in the body and head from the teeth of a canine. The forensic lab also believed that the wounds where the legs and beaks were severed were made by a gnawing action from teeth.

Table 1. Arizona bald eagle productivity, by breeding area, for the 1996 season.

Breeding area	Status[1]	Nest number[2]	Incubation date	Number of eggs	Hatch date	Number of young	Number fledged	Fledge date
Alamo*	F	4	1/29	2+	Failed March 31-April 2			
Bartlett*	S	2	1/9-2/6	2+	2/28-29	2	2	5/12
Blue Point	S	7	1/10-17	2+	2/13-3/11	2	2	5/6-24
Box Bar*	F	1	1/23-2/5	1+	Abandoned nest 2/9			
Box Bar 2*	F	1	2/9-3/7	1+	4/1-5	1	Died 6/6 - heat stress	
Camp Verde	U							
Canyon	O							
Cedar Basin	F	3	2/2-3/11	2	Failed 4/5-5/6			
Chino	U							
Cibecue	O							
Cliff*	O							
Coolidge*	F	3	2/2-26	1+	Failed 3/11-28			
Devil's Post	U							
East Verde	S	6	1/9-2/6	2	2/6-3/7	1	1	5/6-6/3
Ft. McDowell*	O							

Table 1.(continued) Arizona bald eagle productivity, by breeding area, for the 1996 season.

Breeding area	Status[1]	Nest number[2]	Incubation date	Number of eggs	Hatch date	Number of young	Number fledged	Fledge date
Horse Mesa	S	4	1/17-2/2	2+	2/2-3/11	2	2	~5/24
Horseshoe	S	11	1/9-2/6	3	3/16	1	1	6/3-5
Ive's Wash*	S	3	2/6-21	1+	2/21-3/30	1	1	4/18-6/3
Ladders*	S	4	1/9-2/6	2	3/9	1	1	> 6/3
Lone Pine	F	1	2/2-3/11	1+	Failed 4/5-5/6			
Luna*	S	1	<2/5	2+	2/5-3/20	2	2	5/28-6/4 nestlings died 6/6-6/10
Mule Hoof	U							
Orme*	F	3	1/17-2/2	2	2/19-3/8	1+	Failed 2/19-3/8	
Perkinsville	U							
Pinal	F	5	3/11-22	1+	3/26-4/5?	1+	Failed 4/5-29, adult last seen brooding, no young observed	
Pinto*	S	3	<1/17	3+	1/29-3/4	3	3	5/6-24
Pleasant*	F	3	1/9-24	2+	2/27-3/1	2	Died 4/29-5/3 - heat stress	
Redmond	F	5	2/2-3/11	1	3/14-4/5?	1	Failed 4/5-29, adult last seen brooding, no young observed	
San Carlos*	S	1	<1/17	2	2/2-28	1	1	5/6-24
76*	S	3	1/30-2/10	2+	3/11-13	2	1	>5/31, 1 eaglet died 5/5
Sheep*	S	1	1/17-29	2+	3/9-10	2	2	6/3
Table Mountain	S	4	1/9-2/6	3+	2/6-3/13	2	2	~6/3
Talkalai	F	4	2/2-3/11	1+	3/19-4/5	1+	Failed 4/5-29	
Tonto*	S	2	1/17-30	2+	2/26-3/1	2	2	5/21
Tower*	S	8	1/16-2/9	2+	3/9	2	2	~6/3
Winkelman*	F	1	2/2-14	2	Incubated 45 days - collected infertile eggs			

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

[2] Nest numbers are from Ecology of Bald Eagle in Arizona (Hunt et al. 1992) and SRP's bald eagle nesting areas in Arizona.

* =Sites monitored by 1996 Arizona Bald Eagle Nestwatch Program.

Table 2. Arizona bald eagle productivity summary, for the 1996 season.

Number of Breeding Areas	35	Number of Active Nests	26
Number of Occupied Breeding Areas	30	Number of Failed Nests[1]	12
Number of Eggs	49+	Number of Successful Nests	15
Nest Success = 15/30 = 0.50		Number of Young Hatched	33+
Mean Brood Size = 25/15 = 1.7		Number of Young Fledged	25
		Productivity = 0.5 x 1.7 = 0.85	

[1] Box Bar eagles laid two unsuccessful clutches in 1996.

Bartlett Breeding Area

Observation period
From February 9 to May 13, a total of 71 days (683 hours) was spent watching the birds; 35 days (441 hours) were spent monitoring from dawn-to-dusk.

Eagle activity
The eagles laid eggs in nest #2 prior to January 24, and two eaglets hatched on February 28. Both eaglets fledged successfully on May 12. The Bartlett male was in adult plumage and wore no leg bands. The female was also unbanded, but was in near adult plumage.

Human activity
A total of 268 human activities was recorded (Table 3). Aircraft (small planes, helicopters, ultralights), drivers, and ORVs made up 196 (73%) of all activities recorded. The eagles only reacted with a significant response (restless, flushed, left area) to three non-official activities. Eagles were restless on two occasions due to shooters, and left the area because of an ORV.

Construction on Bartlett Dam restricted access below the dam. The road entering the nest area from the north was gated on weekdays, causing most (81.3%) of the recorded human activities to occur on weekends. Additionally, water releases from Bartlett Dam exceeding 500 cubic feet per second reduced the amount of vehicle traffic traveling along the river and entering the closure from the south (Needle Rock).

Food habits
Nine forage attempts for fish were observed. All observed attempts occurred between river kilometers 34.0 and 36.0 in the nest area. The male was successful in 5 of 6 attempts and the female was successful in 2 of 3 attempts.

Eagles were observed delivering 67 prey items to the nest (Table 4). The male brought 57 prey items to the nest and the female 10. Prey types observed being delivered were fish (n=52), birds (n=4), and unknowns (n=11). Prey items identified in the nest were channel catfish (n=9), suckers (n=8), carp (n=6), largemouth bass (n=2), common mergansers (n=1), American coots (n=1), and eared grebes (n=1) (Table 5).

Management activities
The eaglets were captured after fledging to band and to remove cholla spines imbedded a bird's body and feet. The bird had fledged into a teddy bear cholla.

The USFS closure at Bartlett (and indirectly the restricted access due to dam construction) reduced the amount of human activity in the BA.

Table 3. Observed human activity and bald eagle behavior, Bartlett Breeding Area, Arizona, 1996.

Type	Eagle Behavior Toward Human Activity[1]							
	N	W	R	F	L	?	D-D total[2]	Total
Small plane	90	24	-	-	-	1	94 (43.0%)	115 (42.9%)
Helicopter	37	3	-	-	-	2	24 (11.0%)	42 (15.7%)
Canoe/Kayak	25	10	-	-	-	-	31 (14.2%)	35 (13.1%)
Driver	28	3	-	-	-	1	30 (13.8%)	32 (11.9%)
Hiker	5	2	-	-	-	-	5 (2.3%)	7 (2.6%)
ORV	4	1	-	-	1	-	6 (2.8%)	6 (2.2%)
Birder	5	-	-	-	-	-	5 (2.3%)	5 (1.9%)
Angler	5	-	-	-	-	-	5 (2.3%)	5 (1.9%)
Gunshot	5	-	-	-	-	-	5 (2.3%)	5 (1.9%)
Shooter	2	-	2	-	-	-	4 (1.8%)	4 (1.5%)
Researcher	1	1	1	-	-	-	1 (0.5%)	3 (1.1%)
Agency worker	1	-	-	1	-	-	1 (0.5%)	2 (0.8%)
Picnicker	2	-	-	-	-	-	2 (0.9%)	2 (0.8%)
Horseback rider	2	-	-	-	-	-	2 (0.9%)	2 (0.8%)
Ultralight	1	-	-	-	-	-	1 (0.5%)	1 (0.4%)
Camper	1	-	-	-	-	-	1 (0.5%)	1 (0.4%)
Rafter	1	-	-	-	-	-	1 (0.5%)	1 (0.4%)
Total	215	44	3	1	1	4	218 (100%)	268 (100%)

[1] Eagle behavior, N=none, W=watched, R= restless, F=flushed, L=left area, ?=unknown.
[2] D-D total=Observations on dawn-to-dusk days.

Table 4. Observed prey types delivered to the nest by bald eagles, Bartlett Breeding Area, Arizona, 1996.

Sex	Prey types			
	Fish	Birds	Unknown	Total
Male	43	4	10	57 (85.0%)
Female	9	0	1	10 (15.0%)
Total	52 (77.6%)	4 (6.0%)	11 (16.4%)	67 (100%)

Table 5. Observed prey items delivered to the nest by bald eagles, Bartlett Breeding Area, Arizona, 1996.

Sex	Prey items[1]							
	Fish				Birds			
	CC	S	CA	LB	CM	AC	GB	Total
Male	6	5	6	2	1	1	1	22
Female	3	3	0	0	0	0	0	6
Total	9	8	6	2	1	1	1	28

[1] Prey items, CC=channel catfish, S=suckers, CA=carp, LB=largemouth bass, CM=common merganser, AC=American coot, GB=eared grebe.

Box Bar Breeding Area

Observation period
The Box Bar BA was monitored from February 9 to February 12, and from March 12 to June 6.

Eagle activity
The Box Bar eagles laid two clutches of eggs in 1996. The first clutch was laid between January 23 and February 5, and failed February 9. A second clutch of eggs was laid prior to March 7, and one eaglet hatched between April 1 and 5. The eaglet grew to 9 weeks old and was found dead below the nest on June 6. Necropsy of the eaglet by Dr. Kathy Orr, The Phoenix Zoo, indicated that extreme dehydration due to excessive heat was the probable cause of death. Temperatures at the Box Bar BA had exceeded 100° F for the six days prior to the eaglet's death. No obvious contusions or broken bones were found to indicate that falling from the nest contributed to bird's death.

The Box Bar female was five years old and wears a blue VID (visual identification) and silver USFWS band (hatched from the Fort McDowell BA). The male was six years old and also wears a blue VID and silver USFWS band (hatched from the Horse Mesa BA).

Human activity
A total of 456 human activities was recorded at the Box Bar BA (Table 6). Eighteen different activity types were recorded. Small planes (n=171, 37.5%), drivers (n=85, 18.6%), horseback riders (n=52, 11.4%), helicopters (n=40, 8.8%), hikers (n=35, 7.7%), ORVs (n=27, 5.9%), and construction (n=13, 2.9%) were the most common.

Eagles responded to 26 percent (n=119) of the 456 human activities recorded. Eagles watched 73 times, were restless 8 times, flushed 26 times, and left the area 12 times. Significant responses (restless, flushed, left area) by the eagles were caused by small airplanes (n=10), ORVs (n=7), construction (n=7), drivers (n=6), horseback riders (n=5), hikers (n=4), helicopters (n=3), ultralights, (n=2), and agency workers (n=2).

The eagles varied in their tolerance of human activities. In one particular instance, an eagle only "watched" a horseback rider that traveled directly below its perch. However, the eagles normally responded significantly to any non-motorized activity (hiker, horseback rider, agency worker) that approached within 50 m (160 ft). Motorized activities (planes, helicopters, drivers, and ORVs) elicited a significant response by the eagles from a greater distance. Planes less than 70 m (230 feet) above ground level and within 200 m (660 ft) of a bird caused a significant response. Vehicles and ORVs elicited a significant response when they approached within 75 to 150 m (250 to 450 ft) of the eagle.

Two different construction projects in the breeding area caused the eagles to respond significantly and alter their normal behavior. In early March, the Rio Verde Ranch stabilized the western river bank of their ranch by dumping large rocks over the edge. At the end of the project, a backhoe and frontend-loader leveling a dirt pile greater than 150 m (450 ft) from the nest caused an eagle to vocalize, leave its perch, circle, and leave the area. Later, in early May, about 400 m (1300 ft) downriver of the nest, a diesel powered pile driver was used to help stabilize the Rio Verde Ranch's water well. During the three days and 34 hours of pile-driving, the eagles vocalized at the beginning of each pile-driving session. Additionally, during the three days of construction, no prey was observed delivered to the nest, and the eagles were never seen perched at their most frequently used snag along the river.

Table 6. Observed human activity and bald eagle behavior, Box Bar Breeding Area, Arizona, 1996.

Type	Eagle Behavior Toward Human Activity[1]								
	N	W	R	F	L	B	?	D-D total[2]	Total
Small plane	95	26	1	7	2	3	37	112 (35.7%)	171 (37.5%)
Driver	43	19	-	4	2	3	14	65 (20.7%)	85 (18.6%)
Horseback rider	32	3	-	3	2	-	12	35 (11.1%)	52 (11.4%)
Helicopter	15	10	-	3	-	1	11	21 (6.7%)	40 (8.8%)
Hiker	22	2	-	1	3	2	5	31 (9.8%)	35 (7.7%)
ORV	3	7	1	3	3	2	8	20 (6.4%)	27 (5.9%)
Construction	2	-	4	3	-	4	-	1 (0.3%)	13 (2.9%)
Angler	4	-	-	-	-	3	2	7 (2.2%)	9 (2.0%)
Swimmer	3	4	-	-	-	-	-	7 (2.2%)	7 (1.5%)
Canoe	4	1	-	-	-	-	-	5 (1.6%)	5 (1.1%)
Ultralight	-	-	2	-	-	-	-	2 (0.6%)	2 (0.4%)
Agency worker	-	-	-	2	-	-	-	2 (0.6%)	2 (0.4%)
Car horn	-	-	-	-	-	-	2	2 (0.6%)	2 (0.4%)
Dogs	1	-	-	-	-	-	1	1 (0.3%)	2 (0.4%)
Picnicker	1	-	-	-	-	-	-	1 (0.3%)	1 (0.2%)
Photographer	1	-	-	-	-	-	-	1 (0.3%)	1 (0.2%)
Birder	-	1	-	-	-	-	-	1 (0.3%)	1 (0.2%)
Military jet	1	-	-	-	-	-	-	-	1 (0.2%)
Total	227	73	8	26	12	18	92	314 (100%)	456 (100%)

[1] Eagle behavior, N=none, W=watched, R= restless, F=flushed, L=left area, B=birds not in area, ?=unknown.
[2] D-D total=Observations on dawn-to-dusk days.

Because of the high frequency of shooting in the nest area, gunshots were recorded separately from the 456 human activities. Between March 12 and April 20, we attempted to describe individual shooting events, number of shooters, guns, and number of shots. However, due to the magnitude of shots, these methods proved ineffective. As a result, from April 20 to May 27, only the number of gunshots was recorded along with any outstanding description of the event.

Throughout the entire observation period, nearly 4000 gunshots were recorded. Between April 20 and May 27, 2318 gunshots were recorded. Holidays and weekends were when most gunfire occurred. On the Cinco de Mayo and Memorial Day holidays, 534 shots were recorded. During weekends between April 20 and May 27, 1434 shots were recorded, while 884 shots were recorded on weekdays. The most intense period of gunfire occurred on May 3, when 170 shots were fired between 5:00 pm and 6:00 pm.

Discharge of firearms in the BA resulted in extreme concern for the safety of the nestwatchers, recreationists along the river, and the eagles. Ricocheting bullets over the observation point at the Rio Verde Ranch caused nestwatchers to take cover behind their vehicles on three occasions. Empty and full beer cans were tossed into the river and shot at on a weekly basis. In one instance, a 2 to 3 year old toddler carried his father's loaded rifle by its barrel and stock for 3 to 4 minutes before the weapon was taken away and returned to the ground, still loaded. A group of youths with a shotgun, rifle, and pistol shot a yellow warbler, fired their weapons across the river, into the river, and into the eagle closure. On one occasion, bullets were observed hitting at the base of the tree on which the eagles were perched. Clearly, the magnitude of shots occurring in such a concentrated area poses a very real and dangerous threat to visitors to the lower Verde River, residents of the Rio Verde Ranch, and bald eagles.

Food habits

A total of 22 forage attempts was observed by the Box Bar eagles (Table 7). The male was successful in 7 of 8 forage attempts and the female in 13 of 14 attempts. Fish (n=19) represented the most common prey item.

Nearly all observed forage attempts (n=20) occurred in the nest area between river kilometers 24.0 and 24.7. The eagles would commonly dive from a large cottonwood snag into the river less than 10 m (30 ft) away. On one occasion, a coyote drove an eagle off its kill and carried it into the brush. The coyote unsuccessfully tried on three other occasions to pirate prey from foraging eagles.

Twenty-eight prey deliveries were observed (Table 8). The female delivered 15 prey items and the male 13. Prey items identified in the nest were carp (n=4), channel catfish (n=1), sucker (n=1), unknown fish (n=12), and unknowns (n=10).

Table 7. Observed forage events and success by bald eagles, Box Bar Breeding Area, Arizona, 1996.

	Prey types							
	Fish		Birds		Unknown		Total	
Sex	E[1]	S-U[2]	E	S-U	E	S-U	E	S-U
Female	13	12-1	-	-	1	1-0	14	13-1
Male	6	6-0	1	0-1	1	1-0	8	7-1
Total	19	18-1	1	0-1	2	2-0	22	20-2

[1] E=Forage events observed, each number represents a forage event for a food item, not the strikes to capture it.
[2] S-U=Successful - unsuccessful captures of prey.

Table 8. Observed prey types delivered to the nest by bald eagles, Box Bar Breeding Area, Arizona, 1996.

	Prey types		
Sex	Fish	Unknown	Total
Female	8	7	15 (53.6%)
Male	10	3	13 (46.4%)
Total	18 (64.3%)	10 (35.7%)	28 (100%)

Management activities

The Tonto National Forest, Cave Creek Ranger District established a closure around the immediate nest area on the east side of the Verde River. AGFD developed and purchased signs to mark the closure.

News articles in the local Rio Verde newspaper and a television news segment on Channel 3 informed, educated, and enlisted the public's support and assistance at the Box Bar BA.

Nestwatchers were extremely active in educating and managing people at the Box Bar BA. They contacted people along the river, horseback tours, and educated numerous visitors from the local Rio Verde community. Additionally, they posted closure signs at advantageous places throughout the BA.

We enlisted the support of the Rio Verde Ranch to allow nestwatchers to camp and monitor the eagles from their property.

Fort McDowell Breeding Area

Observation period
From February 9 to March 3, the Fort McDowell BA was monitored for 178 hours over 20 days. A total of 110 hours (10 days) was spent watching from dawn-to-dusk.

Eagle activity
No eggs were laid by Fort McDowell eagles in 1996. We discovered rebuilt nest #6 and new cottonwood tree nest #15 this season. Eagle activity was monitored at nest #6 (nest #15 was not discovered until monitoring was finished). Both nests were climbed at the end of the season, but no eggshell fragments or prey remains were found.

A number of different eagles were seen in the nest area, leaving us unsure about the identity of the resident adults. In early January, an unbanded adult male was perched with an unidentified adult female. On 11 February, a banded subadult (male?) eagle (USFWS band on right tarsus, possible blue band on the left leg) and an adult eagle (female?) were perched near nest #6. Beginning on 15 February, a pair of adult bald eagles (female unbanded, male unknown) were found in the nest area and remained nearby until monitoring ceased.

An unbanded dead (cause unknown) adult male eagle near nest #15 in February suggests that a replacement within the breeding pair took place this year. If this bird was a member of the breeding pair, then its death would explain why eggs were not laid this year.

Human activity
A total of 125 human activities was observed around nest #6 (Table 9). Aircraft (small planes=82, helicopters=29, military jets=1, and ultralights=1) made up 90.4 percent (n=113) of all activities recorded. The remaining activities were gunshots (n=4), drivers (n=3), anglers (n=2), hikers (n=1), hot air balloons (n=1), and ranch dogs (n=1).

With little nesting activity observed, there were only 26 instances where eagles were present when human activity was recorded. As a result, there were few opportunities to record responses to these activities. Eagles did not respond to 23 activities. They watched a helicopter and hot air balloon, and left the nest area in response to a small plane.

Of the 113 low-flying aircraft, 32 flew low enough (<150 m, 500 ft) to record identification numbers, and 12 circled the nest area. One small plane flew along the river at only 15 to 25 m (50 to 75 ft) above the water. Another small plane circled the nest area for 25 minutes, causing the eagles to leave the nest area.

Food habits
Since no nesting activity took place, no prey deliveries occurred and no forage attempts were seen.

Table 9. Observed human activity and bald eagle behavior, Fort McDowell Breeding Area, Arizona, 1996.

Type	Eagle Behavior Toward Human Activity[1]					
	N	W	L	B	D-D total[2]	Total
Small plane	19	-	1	62	53 (75.0%)	82 (65.6%)
Helicopter	4	1	-	24	9 (2.8%)	29 (23.2%)
Gunshot	-	-	-	4	2 (2.8%)	4 (3.2%)
Driver	-	-	-	3	1 (1.4%)	3 (2.4%)
Angler	-	-	-	2	2 (2.8%)	2 (1.6%)
Hiker	-	-	-	1	1 (1.4%)	1 (0.8%)
Ultralight	-	-	-	1	1 (1.4%)	1 (0.8%)
Hot air balloon	-	1	-	-	1 (1.4%)	1 (0.8%)
Military jet	-	-	-	1	1 (1.4%)	1 (0.8%)
Ranch dog	-	-	-	1	1 (1.4%)	1 (0.8%)
Total	23	2	1	99	72 (100%)	125 (100%)

[1] Eagle behavior, N=none, W=watched, L=left area, B=birds not in area.
[2] D-D total=Observations on dawn-to-dusk days.

Management activities

The Fort McDowell Indian Community and AGFD developed a collection agreement to fund the ABENWP.

The Fort McDowell Indian Community supplied nestwatchers with a cellular phone should any eagle or people emergencies arise.

Horseshoe Breeding Area

Observation period
Observations at the Horseshoe BA began on February 10 and continued until May 12. The BA was monitored for 57 days (559 hours). Thirty days (372 hours) were spent watching the site from dawn-to-dusk.

Eagle activity
Three eggs were laid in cottonwood nest tree #11 prior to February 6. One eaglet hatched on March 16 and fledged between June 6 and 8.

The Horseshoe female was in adult plumage and wore a silver USFWS band on its right leg. The Horseshoe male was also in adult plumage, but wore no bands.

Human activity
Due to the nest's proximity to the popular Sheep Bridge, 1792 human activities were recorded (Table 10). The most common activity types were drivers (n=864, 48.2%), small planes (n=517, 28.9%), gunshot events (n=137, 7.7%), and ORVs (n=109, 5.9%).

Vehicles traveling Forest Service Road 269 to or from Sheep Bridge represented the most common activity. Ninety-two percent (n=796) of the 864 vehicles were present on Fridays and weekends. Sheep Bridge attracts many visitors because it is one of the few easily accessible areas of the upper Verde River above Horseshoe Reservoir, and because of the nearby hot springs.

Most human activity remained near the Verde River at the Sheep Bridge campground and did not venture up Tangle Creek. The eagles did not respond significantly (restless, flushed, leaves area) to any human activity in the nest area. Eagles did not respond to 832 activities and watched 536 activities. The birds were not in the area during 40 activities and 379 unknown responses occurred.

Although the eagles did not respond significantly to human activity, instances involving javelina hunters and hikers exemplify the need for the ABENWP at the Horseshoe BA. Hunters were intercepted in Tangle Creek upstream of the nest and asked not to enter the nest area. The three people left willingly, but prior to departing, one fired his weapon several times toward the nest area. Later, one of the people in the hunting party was again contacted trying to enter the nest area. That same day, a group of four hikers (one man, three teenage boys) were found hiking toward the nest. After noticing the nest, they began to whistle and holler to get the attention of the eagles. Then, the three teenagers began to throw rocks at the nest. The incubating male watched the entire time without flushing. Following these events, a nestwatcher was stationed at the mouth of Tangle Creek to contact hikers prior to their approaching the nest area.

Table 10. Observed human activity and bald eagle behavior, Horseshoe Breeding Area, Arizona, 1996.

Type	Eagle Behavior Toward Human Activity[1]					
	N	W	B	?	D-D total[2]	Total
Driver	433	223	21	187	796 (53.5%)	864 (48.2%)
Small plane	245	144	11	117	361 (24.3%)	517 (28.9%)
Gunshot events	40	62	-	35	128 (8.6%)	137 (7.7%)
ORV	33	60	4	8	93 (6.3%)	105 (5.9%)
Military jet	3	19	1	16	13 (0.9%)	39 (2.2%)
Helicopter	5	14	-	12	16 (1.1%)	32 (1.8%)
Camper	19	-	-	-	19 (1.3%)	19 (1.1%)
Hiker	15	4	-	-	19 (1.3%)	19 (1.1%)
Cattle	17	2	-	-	9 (0.6%)	19 (1.1%)
Hunter	7	2	-	3	12 (0.8%)	12 (0.7%)
Canoe/Kayak	7	-	-	1	8 (0.5%)	8 (0.4%)
Hiker on road	3	5	-	-	8 (0.5%)	8 (0.4%)
Angler	3	-	-	-	3 (0.2%)	3 (0.2%)
Ultralight	2	-	-	-	2 (0.1%)	2 (0.1%)
Dog	-	1	-	-	1 (0.1%)	1 (0.1%)
Total	832	536	40	379	1488 (100%)	1792 (100%)

[1] Eagle behavior, N=none, W=watched, B=bird not in area, ?=unknown.
[2] D-D total=Observations on dawn-to-dusk days.

Food habits

Due to the nest's location away from the eagles' foraging grounds, no forage attempts were observed; however, 12 prey deliveries were documented (Table 11). The adult male delivered 8 items, the female 2, and an unidentified Horseshoe adult delivered 2 prey items. Five fish, four birds, and three unknown items were identified in the nest. No prey was identified to species due to the observation point's distance from the nest.

Table 11. Observed prey types delivered to the nest by bald eagles, Horseshoe Breeding Area, Arizona, 1996.

Sex	Prey types			
	Fish	Birds	Unknown	Total
Male	4	1	3	8 (66.6%)
Female	1	1	0	2 (16.7%)
Unknown	0	2	0	2 (16.7%)
Total	5 (41.7%)	4 (33.3.%)	3 (25.0%)	12 (100%)

Management activities

This was the first year the Horseshoe eagles were monitored in Tangle Creek. We found that although few human activities from the nearby Sheep Bridge area disturbed the eagles, the potential for failure remains high due to the extreme nature of some of these activities (i.e. hikers throwing rocks at incubating birds). Regardless of whether a federal closure exists around this nest area, we believe that monitoring and educating the public are important and can be an effective way to manage this site.

Due to the difficulty of getting to the nest area quickly from the observation point, nestwatchers split up and stationed one person at the Tangle Creek/Verde River confluence to contact people traveling up to the nest area. This proved to be an effective way to prevent hikers from approaching the nest closely and disturbing the breeding attempt.

Ladders Breeding Area

Observation period
The Ladders BA was monitored from February 9 to May 26. A total of 75 days (730 hours) was spent watching the eagles. There were 34 dawn-to-dusk day (475 hours) within the observation period. Additionally, the Prescott Audubon Society volunteered four days (22 hours) of observation time on the nestwatcher's days off.

Eagle activity
Two eggs were laid in cliff nest #4 between February 3 and 6. One eaglet hatched on March 9 and fledged after June 3. Both breeding eagles were in adult plumage and were unbanded.

Human activity
A total of 313 human activities was recorded (Table 12). Aircraft (small planes, helicopters, ultralights) comprised 81 percent (n=253) of all activities recorded. The next largest activity type recorded was watercraft (n=48). The remaining 12 activities represented nine different activity types.

The eagles responded significantly (restless, flushed, left area) to four incidents. A small plane and helicopter each caused an eagle to be restless. A rancher along the river (inside the closure) caused an eagle to leave the area, and banding the eaglet resulted in the adult birds flushing from their perches.

Food habits
Seventy-six prey deliveries were recorded (Table 13). The adult male delivered 65.8 percent (n=50) of all observed prey items and the female eagle delivered 34.2 percent (n=26). Fish comprised 59 of the prey deliveries, followed by 5 mammals, 3 birds, and 9 unknowns (Table 14). Prey items identified in the nest were 9 suckers, 3 carp, 5 channel catfish, 1 smallmouth bass, 5 roundtail chubs, 1 largemouth bass, 1 flathead catfish, 34 unknown fish, 1 ringtail cat, 4 unknown mammals, 3 unknown birds, and 9 unknowns (Table 14). Three successful forage attempts for fish were observed in the nest area between river kilometers 164.3 and 162.8.

Management activities
A USFS closure surrounding the nest area on the Prescott and Coconino National Forests reduced human activity.

A French film crew took video of the nestwatch and banding effort for a television program in France.

Table 12. Observed human activity and bald eagle behavior, Ladders Breeding Area, Arizona, 1996.

Type	Eagle Behavior Toward Human Activity[1]							
	N	W	R	F	L	?	D-D total[2]	Total
Small plane	176	42	1	-	-	14	161 (74.2%)	233 (74.4%)
Canoe/Kayak	32	13	-	-	-	3	40 (18.4%)	48 (15.3%)
Helicopter	6	7	1	-	-	4	12 (5.5%)	18 (5.8%)
Hiker	2	1	-	-	-	1	2 (0.9%)	4 (1.2%)
Agency worker	1	-	-	1	-	-	0	2 (0.6%)
Dog	-	1	-	-	-	-	0	1 (0.3%)
Shooter	1	-	-	-	-	-	1 (0.5%)	1 (0.3%)
Ultralight	1	-	-	-	-	-	1 (0.5%)	1 (0.3%)
Film crew	1	-	-	-	-	-	0	1 (0.3%)
Rancher	-	-	-	-	1	-	0	1 (0.3%)
Jets	1	-	-	-	-	-	0	1 (0.3%)
Driver	1	-	-	-	-	-	0	1 (0.3%)
Sonic boom	-	1	-	-	-	-	0	1 (0.3%)
Total	222	65	2	1	1	22	217 (100%)	313 (100%)

[1] Eagle behavior, N=none, W=watched, R=restless, F=flushed, L=left area, ?=unknown.
[2] D-D total=Observations on dawn-to-dusk days.

Table 13. Observed prey types delivered to the nest by bald eagles, Ladders Breeding Area, Arizona, 1996.

Sex	Prey types				
	Fish	Birds	Mammals	Unknown	Total
Male	40	2	4	4	50 (65.8%)
Female	19	1	1	5	26 (34.2%)
Total	59 (77.6%)	3 (3.9%)	5 (6.6%)	9 (9.2%)	76 (100%)

Table 14. Observed prey items delivered to the nest by bald eagles, Ladders Breeding Area, Arizona, 1996.

Sex	Prey items[1]												
	Fish								Mammals		Birds	?	
	S	C	CC	SB	LB	RC	FC	UF	RT	UM	UB	?	Total
Male	6	3	2	1	1	3	-	24	1	3	2	4	50 (65.8%)
Female	3	-	3	-	-	2	1	10	-	1	1	5	26 (34.2%)
Total	9	3	5	1	1	5	1	34	1	4	3	9	76 (100%)

[1] Prey items, S=suckers, C=carp, CC=channel catfish, SB=smallmouth bass, LB=largemouth bass, RC=roundtail chub, FC=flathead catfish, UF=unknown fish, RT=ringtail cat, UM=unknown mammal, UB=unknown bird, ?=unknown.

Pleasant Breeding Area

Observation period
The Pleasant BA was monitored from February 11 to May 4, for 581 hours over 60 days. There were 29 (352 hours) dawn-to-dusk observation days.

Eagle activity
The Pleasant eagles laid eggs in nest #3 on January 24, and two eaglets hatched between February 26 and March 1. This was the first time nest #3 had been used. Both eaglets died between April 30 and May 3. On May 4 one eaglet was found dead below the nest and the other was found dead outside the nest on an adjacent ledge.

Temperatures soared in excess of 100° F beginning April 14. The intense heat, compounded by nest #3's southwest exposure, more than likely led one eaglet to jump from the nest to escape the heat. The nine week old bird was incapable of sustained flight and died from the impact. The second eaglet likely walked away from the nest in search of shade and died from dehydration (Dr. Kathy Orr pers. comm.). Suffering from exposure to intense heat and dying while attempting to escape the nest before they are able to fly has been well documented as a source of bald eagle nestling mortality in Arizona (Hunt et al. 1992).

The Pleasant male was nine years old in 1996 and wore a blue VID and silver USFWS band (hatched from the Horse Mesa BA in 1987). The female was unbanded and in adult plumage.

Human activity
Within about 1.0 kilometer (3300 ft) of Pleasant cliff nest #3, 117 human activities were recorded (Table 15). Watercraft (boats, jet skis, canoes) and aircraft (small planes, helicopters, jets, and ultralights) represented 89 percent (n=104) of all activities.

Eagles behaved with a significant response (restless, flush, left area) to 10 activities. Boats caused eagles to respond significantly on five occasions (restless once, flushed twice, and left the area twice). Eagles responded to boats in the closure at different distances. Birds "left the area" in response to a boat sitting 300 m (980 ft) from the nest, and at other times, boats were tolerated at that distance. However, the eagles flushed in response to all boats that went underneath the nest.

Watercraft (boats, jet-skis) activity and compliance to the closure boundary were recorded throughout the season on weekends and every other Friday (Table 16). A total of 2376 watercraft (boats=2180, jet-skis=196) was observed approaching the closure boundary. Of these, 126 boats and 11 jet-skis entered the closure. Nestwatchers monitored the buoy line and found that although many folks were cooperative and interested in the eagles (especially after a newspaper article and television news segment), they characterized the majority of people's reaction to the closure as "willing but not thrilled."

Table 15. Observed human activity and bald eagle behavior, Pleasant Breeding Area, Arizona, 1996.

Type	Eagle Behavior Toward Human Activity[1]							
	N	W	R	F	L	?	D-D total[2]	Total
Boater	18	15	-	2	2	3	27 (37.0%)	40 (34.2%)
Small plane	19	5	1	-	-	-	18 (24.7%)	25 (21.4%)
Agency boat	6	9	1	-	-	1	10 (13.7%)	17 (14.5%)
Helicopter	4	4	-	-	1	-	4 (5.5%)	9 (7.8%)
Military jet	2	4	-	-	-	-	2 (2.7%)	6 (5.1%)
Ultralight	-	4	-	-	1	1	6 (8.2%)	6 (5.1%)
Jet ski	3	3	-	-	-	-	3 (4.1%)	6 (5.1%)
Anglers	2	-	-	-	-	2	3 (4.1%)	4 (3.4%)
Agency workers	-	-	-	1	1	-	0	2 (1.7%)
Vehicle	1	-	-	-	-	-	0	1 (0.85%)
Canoe	1	-	-	-	-	-	0	1 (0.85%)
Total	56	44	2	3	5	7	73 (100%)	117 (100%)

[1] Eagle behavior, N=none, W=watched, R=restless, F=flushed, L=left area, ?=unknown.
[2] D-D total=Observations on dawn-to-dusk days.

Table 16. Watercraft compliance at southern buoy closure boundary, Pleasant Breeding Area, Arizona, 1996.

Date	BAC[1]	BIC[1]	JAC[1]	JIC[1]	Total
February 24-25	96	1	4	0	101
March 2-3	159	10	2	0	171
March 9-10	81	9	0	1	91
March 15-17	245	11	17	0	273
March 23-24	183	14	8	2	207
March 29-31	386	21	38	0	445
April 6-7	298	24	28	0	350
April 12-14	195	15	21	3	234
April 20-21	227	9	37	3	276
April 27-28	184	12	30	2	228
Total	2054	126	185	11	2376

[1] BAC=boats at closure, BIC=boats inside closure, JAC=jet-skis at closure, JIC=jet-skis inside closure.

Food habits

A total of 62 forage attempts by the eagles was observed (Table 17). All forage attempts were in the nest area between river kilometers 72.1 and 73.6. The male attempted 74.2 percent (n=46), the female 22.6 percent (n=14), and an unidentified Pleasant adult 3.2 percent (n=2) of the foraging attempts. The eagles were successful on 54.8 percent (n=34) of all foraging attempts. Prey types included fish (88.7%, n=56), birds (8%, n=5), and unknown items (1.6%, n=1). Two fish were pirated from great blue herons.

The eagles were observed arriving at the nest 59 times with prey (Table 18). The Pleasant male delivered 69.5 percent (n=41) and the female 30.5 percent (n=18) of the prey. Prey types identified in the nest were fish (n=44), herps (n=1), and unknowns (n=14).

The eagles were found returning to the nest with prey from a variety of locations around Lake Pleasant. In February and early March, the eagles were seen returning with prey from upriver (north) of nest #3. Through the rest of March and April, the eagles were still traveling north, but more frequently were foraging in the nest area and returning with food from downstream of the nest. After the lake's water level increased in late April, the eagles were flying west/southwest directly toward Humbug Bay. Anecdotal reports from anglers indicated that indeed, the eagles were found perching and foraging in Humbug Bay.

Table 17. Observed forage events and success by bald eagles, Pleasant Breeding Area, Arizona, 1996.

	Prey types							
	Fish		Birds		Unknown		Total	
Sex	E[1]	S-U[2]	E	S-U	E	S-U	E	S-U
Male	43	26-17	2	0-2	1	1-0	47	28-19
Female	11	6-5	3	0-3	-	-	14	6-8
Unknown	2	1-1	-	-	-	-	2	1-1
Total	56	33-23	5	0-5	1	1-0	62	34-28

[1] E=Forage events observed, each number represents a forage event for a food item, not the strikes to capture it.
[2] S-U=Successful - unsuccessful captures of prey.

Table 18. Observed prey types delivered to the nest by bald eagles, Pleasant Breeding Area, Arizona, 1996.

	Prey types			
Sex	Fish	Herps	Unknown	Total
Female	30	0	11	41 (69.5%)
Male	14	1	3	18 (30.5%)
Total	44 (74.6%)	1 (1.7%)	14 (23.7%)	59 (100%)

Management activities

Closure signs developed by the Nongame Branch and purchased with Heritage Funds were placed at boat ramps around the lake and at roads entering the nest area.

Buoys were placed by Maricopa County Parks marking the closure at the northern and southern boundaries. Due to the eagles using new nest #3 in 1996, the closure's northern boundary was extended to include the active nest. The closure signs were changed to reflect the new boundaries.

Arizona bald eagle management brochures, developed by AGFD and printed with Heritage Funds, were given to Maricopa Parks and Recreation at Lake Pleasant for distribution.

Nestwatchers were placed at the closure's southern buoy boundary on weekends and every other Friday to educate recreationists about eagles and contact violators entering the closure's boundary.

Logistical support from the Bureau of Reclamation and coordination among Maricopa County Parks and Recreation at Lake Pleasant, Maricopa County Sheriff's Office, AGFD, and the nestwatchers helped improve the closure's effectiveness.

Television news segments and newspaper articles published in the Arizona Republic helped educate the public about the eagles at Lake Pleasant and the closure at the Agua Fria Arm.

76 Breeding Area

Observation period

The 76 BA was monitored from February 10 to March 25. A total of 43 days (400 hours) was spent in the BA; 21 days were spent watching from dawn-to-dusk (260 hours).

Eagle activity

The 76 eagles laid eggs in cottonwood tree nest #3 between February 2 and 10. Two eaglets hatched between March 11 and 13. One eaglet, which was three weeks behind in development, died on May 5. Found dead below the nest, it was likely removed from the nest by the adult birds. The remaining eaglet fledged successfully after May 31. The adult female was unbanded and the adult male wore a USFWS band on its left tarsus.

Human activity

During the short observation time, 30 human activities were recorded (Table 19). Nearly all (n=25, 83%) activities were low-flying aircraft (small planes, helicopters, and jets). The other activities were two javelina hunters and two cattle drives through the area. The eagles watched 12 of the recorded activities, but never reacted with a significant (restless, flushed, left area) response.

Table 19. Observed human activity and bald eagle behavior, 76 Breeding Area, Arizona, 1996.

Type	Eagle Behavior Toward Human Activity[1]				
	N	W	?	D-D total[2]	Total
Small plane	10	6	-	8 (42.1%)	16 (53.3%)
Jet	2	2	1	4 (21.1%)	5 (16.7%)
Helicopter	3	-	1	4 (21.0%)	4 (13.3%)
Hunter	-	1	1	2 (10.5%)	2 (6.7%)
Rancher	-	2	-	1 (5.3%)	2 (6.7%)
Cattle	-	1	-	1 (5.3%)	1 (5.3%)
Total	15	12	3	19 (100%)	30 (100%)

[1] Eagle behavior, N=none, W=watched, ?=unknown.
[2] D-D total=Observations on dawn-to-dusk days.

Food habits

No forage attempts were observed at the 76 BA, but 21 prey deliveries to the nest were recorded (Table 20). The male delivered 80.9 percent (n=17) of all prey. Prey items identified in the nest were catfish (n=1), suckers (n=7), unknown fish (n=7), unknown birds (n=1), and unknowns (n=5) (Table 21).

Table 20. Observed prey types delivered to the nest by bald eagles, 76 Breeding Area, Arizona, 1996.

Sex	Prey types			
	Fish	Birds	Unknown	Total
Male	12	1	4	17 (80.9%)
Female	3	0	1	4 (19.1%)
Total	15 (71.4%)	1 (4.8%)	5 (23.8%)	21 (100%)

Table 21. Observed prey items delivered to the nest by bald eagles, 76 Breeding Area, Arizona, 1996.

Sex	Prey items[1]					
	Fish			Birds	Unknowns	
	C	S	UF	UB	Unknowns	Total
Male	1	6	5	1	4	17
Female	-	1	2	-	1	4
Total	1	7	7	1	5	21

[1] Prey items, C=catfish, S=suckers, UF=unknown fish, UB=unknown birds.

Management activities

A USFS closure around the nest area reduced activity from nearby local communities (Gisela, Jake's Corner, and Punkin Center) and recreationists.

Sheep Breeding Area

Observation period
The Sheep BA was monitored from February 10 to June 9. A total of 86 days (867 hours) was spent at the site. There were 44 dawn-to-dusk days (577 hours).

Eagle activity
The eagles laid eggs in cottonwood tree nest #1 between January 17 and 29. Two eaglets hatched on March 9 and 10 and fledged successfully on June 3. These were the first eaglets to fledge from the Sheep BA since its discovery in 1982.

The Sheep female has occupied the BA since 1992. It is banded with a green VID and a silver USFWS band (hatched at the 76 BA in 1988). The male, banded with a blue VID and silver USFWS band, entered the territory as a four-year old in 1995 (hatched at the Ladders BA).

Human activity
A total of 31 human activities was recorded (Table 22). Twelve different activity types occurred throughout the breeding season with the most common being aircraft (small planes n=8 and helicopters n=8). Ultralights (n=3), ORVs (n=3), and anglers (n=2) were other activity types which happened more than once. Traffic along Highway 188 was within 1.0 kilometer (3300 ft) of the nest, yet vehicles were not included in the tally of human activities.

The Sheep eagles reacted significantly (restless, flushed, left area) to a large percentage (n=9, 29%) of all activities recorded. The eagles responded by vocalizing and flushing to all six activities that approached within 50 m (160 ft) of the nest (ORVs=3, anglers=2, birders=1). One group of anglers stayed in the nest area for 103 minutes, causing the eagles to vocalize and circle the nest tree for 34 minutes. The anglers agreed to leave the nest area only after both nestwatchers contacted them.

Food habits
A total of 81 prey deliveries was observed (Table 23). The male delivered 50.6 percent (n=41) of the prey, while the female brought in 46.9 percent (n=38). Prey types delivered to the nest were fish (n=64), mammals (n=3), birds (n=2), and unknowns (n=13). Prey items identified in the nest were suckers (n=32), carp (n=2), flathead catfish (n=2), largemouth bass (n=1), unknown fish (n=27), American coot (n=1), unknown bird (n=2), rabbit (n=1), wood rat (n=1), unknown mammal (n=1), and unknowns (n=12) (Table 24). One forage attempt was observed at kilometer 34.6.

Management activities
Because no closure exists and ORVs were traveling along the river near the nest tree, "Sensitive Bald Eagle Breeding Area" signs were erected at ORV tracks 300 m (980 ft) upriver and downriver of the nest.

Table 22. Observed human activity and bald eagle behavior, Sheep Breeding Area, Arizona, 1996.

Type	Eagle Behavior Toward Human Activity[1]							
	N	W	R	F	L	?	D-D total[2]	Total
Helicopter	3	4	-	-	-	1	4 (21%)	8 (25.8%)
Small plane	4	2	1	-	-	1	6 (31.6%)	8 (25.8%)
ORV	-	-	-	3	-	-	3 (15.8%)	3 (9.7%)
Ultralight	2	-	-	-	-	1	3 (15.8%)	3 (9.7%)
Angler	-	-	-	2	-	-	1 (5.3%)	2 (6.4%)
Birder	-	-	-	1	-	-	0	1 (3.2%)
Agency worker	-	-	-	-	1	-	0	1 (3.2%)
Gunshot	-	1	-	-	-	-	1 (5.3%)	1 (3.2%)
Military jet	1	-	-	-	-		0	1 (3.2%)
Horseback rider	-	1	-	-	-	-	1 (5.3%)	1 (3.2%)
Surveyor	1	-	-	-	-		1 (5.3%)	1 (3.2%)
Unknown	-	-	-	1	-	-	1 (5.3%)	1 (3.2%)
Total	11	8	1	7	1	3	19 (100%)	31 (100%)

[1] Eagle behavior, N=none, W=watched, R=restless, F=flushed, L=left area, ?=unknown.
[2] D-D total=Observations on dawn-to-dusk days.

Table 23. Observed prey types delivered to the nest by bald eagles, Sheep Breeding Area, Arizona, 1996.

Sex	Prey types				
	Fish	Birds	Mammals	Unknown	Total
Male	34	1	1	5	41 (50.6%)
Female	30	1	2	5	38 (46.9%)
Unknown	-	-	-	2	2 (2.5%)
Total	64 (79.0%)	2 (2.5%)	3 (3.7%)	12 (14.8%)	81 (100%)

Table 24. Observed prey items delivered to the nest by bald eagles, Sheep Breeding Area, Arizona, 1996.

Sex	Prey items[1]											
	Fish					Birds		Mammals			Unknown	
	S	C	FC	LB	UF	AC	UB	RS	WR	UM	Unknown	Total
Male	20	1	2	1	10	0	1	1	0	0	5	41(50.6%)
Female	12	1	0	0	17	1	0	0	1	1	5	38 (46.9%)
Unknown	0	0	0	0	0	0	0	0	0	0	2	2 (2.5%)
Total	32	2	2	1	27	1	1	1	1	1	12	81 (100%)

[1] Prey items, S=suckers, C=carp, FC=flathead catfish, LB=largemouth bass, UF=unknown fish, AC=American coot, UB=unknown bird, RS=rabbit sp., WR=wood rat, UM=unknown mammal.

Tonto Breeding Area

Observation period
The Tonto BA was monitored from February 11 to May 26. A total of 76 days (750 hours) was spent at the site. There were 39 dawn-to-dusk days (482 hours) in the observation period.

Eagle activity
The eagles laid eggs in cottonwood tree nest #2 between January 18 and 30. Two eaglets hatched on March 2, and both birds fledged on May 21. Both adult eagles were banded with blue VID bands and silver USFWS bands (hatched from the Horseshoe and Pinal BAs in 1987).

Human activity
A total of 53 human activities was recorded (Table 25). ORVs (n=13) and aircraft (slurry bomber, small planes, and helicopters) (n=23) comprised 68 percent of all recorded activities. The remaining 17 activities were represented by eight different activity types.

The eagles reacted significantly (restless and flushed) to seven activities. Nestwatchers and AGFD biologists banding the eaglets and checking the status of the newly fledged young caused the birds to flush twice and be restless once. Additionally, the birds flushed when nestwatchers were removed from the site by the Maricopa County Sheriff's Office in order to apprehend a criminal. Also, an ORV, hiker and hunter each caused the eagles to flush by approaching within 200 m (660 ft) of the nest tree.

Food habits
The Tonto eagles were observed delivering 50 prey items (Table 26). The male brought in 40 percent (n=20) of the prey, the female arrived with 44 percent (n=22), and an unidentified Tonto adult delivered 16 percent (n=8). Prey types brought to the nest were fish (n=24, 58%) and unknowns (n=26, 42%). Prey items identified in the nest were largemouth bass (n=5), carp (n=3), channel catfish (n=2), suckers (n=1), unknown fish (n=13), and unknowns (n=26) (Table 27). No forage attempts were observed.

Management activities
On March 16, the eagles delivered a fish to the nest with a hook and monofilament attached. The nestwatchers monitored the piece of monofilament as it hung from the nest, making sure it did not entangle the birds. The monofilament and attached hook were removed when we entered the nest to band the eaglets.

Table 25. Observed human activity and bald eagle behavior, Tonto Breeding Area, Arizona, 1996.

Type	Eagle Behavior Toward Human Activity[1]						
	N	W	R	F	?	D-D total[2]	Total
ORV	5	5	-	1	2	8 (22.8%)	13 (24.5%)
Slurry bomber	10	1	-	-	1	12 (34.2%)	12 (22.6%)
Small plane	4	2	-	-	1	4 (11.4%)	7 (13.2%)
Helicopter	4	1	-	-	1	4 (11.4%)	6 (11.3%)
Agency worker	-	-	1	3	-	0	4 (7.5%)
Gunshot event	3	-	-	-	-	2 (5.7%)	3 (5.7%)
Rancher	1	2	-	-	-	3 (8.6%)	3 (5.7%)
Hunter	-	-	-	1	-	0	1 (1.9%)
Hiker	-	-	-	1	-	0	1 (1.9%)
Picnicker	-	1	-	-	-	1 (2.9%)	1 (1.9%)
Canoe	1	-	-	-	-	1 (2.9%)	1 (1.9%)
Dog	1	-	-	-	-	0	1 (1.9%)
Total	29	12	1	6	5	35 (100%)	53 (100%)

[1] Eagle behavior, N=none, W=watched, R=restless, F=flushed, ?=unknown.
[2] D-D total=Observations on dawn-to-dusk days.

Table 26. Observed prey types delivered to the nest by bald eagles, Tonto Breeding Area, Arizona, 1996.

Sex	Prey types		
	Fish	Unknown	Total
Male	12	8	20 (40%)
Female	12	10	22 (44%)
Unknown	-	8	8 (16%)
Total	24 (48%)	26 (52%)	50 (100%)

Table 27. Observed prey items delivered to the nest by bald eagles, Tonto Breeding Area, Arizona, 1996.

Sex	Prey items[1]						
	Fish					Unknown	
	LB	C	CC	S	UF	Unknown	Total
Male	4	-	1	-	7	8	20
Female	1	3	1	1	6	10	22
Unknown	-	-	-	-	-	8	8
Total	5	3	2	1	13	26	50

[1] Prey items, LB=largemouth bass, C=carp, CC= channel catfish, S=suckers, UF=unknown fish.

Tower Breeding Area

Observation period
The Tower BA was monitored from February 10 to May 21. A total of 67 days (701 hours) was spent at the Tower BA. The nest was watched for 36 days (447 hours) from dawn-to-dusk.

Eagle activity
Eggs were laid in new cliff nest #8 prior to February 9 and two eaglets hatched March 9. One eaglet fledged between May 28 and June 3, and the other fledged after June 3. The Tower female was in adult plumage and unbanded, while the male wore a purple VID and silver USFWS band (hatched from the Ladders BA in 1993).

Human activity
A total of 266 human activities was observed (Table 28). Railroad activities (tourist train, cargo train, rail car) comprised the bulk (68%, n=181) of all types recorded. An additional 17 activity types were responsible for the remaining 85 activities documented.

The eagles reacted significantly (restless, flushed, left area) to 20 human activities. Because a favorite snag perch is located within 10 m (33 ft) of the tracks, train activity caused the eagles to flush or leave the area on 15 occasions. An angler and picnicker both caused the eagles to leave the area. Also, helicopter activity caused the eagles to be restless, flush, and leave the area.

Although the Tower BA is relatively remote, the BA was visited by a variety of people engaged in a diverse number of activities. Other than railroad activity, there were 17 activity types recorded (birders, photographers, carp bowhunters, etc.). The nestwatchers had the opportunity to contact 45 groups of people (including at least 116 individuals). These folks were directed to acceptable areas to recreate outside the eagle closure. The majority of people responded favorably to the closure and breeding eagles.

We were encouraged by the public's support for the eagles soon after the eaglets were banded. Not realizing that we banded the eaglets during the tourist train's trip, we created a panic over "the abduction of the eaglets!" Subsequently, the Verde and Beaver Creek Ranger Districts and AGFD received phone calls from the public and the Verde River Train informing us about the "terrible" incident that occurred. We even had folks showing up at AGFD with pictures of the "culprits." Each person was assured that it was just our normal management activities, the eaglets were fine, and their concern was appreciated.

Table 28. Observed human activity and bald eagle behavior, Tower Breeding Area, Arizona, 1996.

Type	Eagle Behavior Toward Human Activity[1]							
	N	W	R	F	L	?	D-D total[2]	Total
Tourist train	32	58	-	11	1	1	70 (43.8%)	103 (38.7%)
RR maintenance car	35	21	-	2	-	-	20 (12.5%)	58 (21.8%)
Cargo train	10	9	-	1	-	-	9 (5.6%)	20 (7.5%)
Small plane	6	8	-	-	-	-	11 (6.9%)	14 (5.2%)
Driver	13	-	-	-	-	1	11 (6.9%)	14 (5.2%)
Agency worker	8	-	-	-	-	-	3 (1.9%)	8 (3.0%)
Hiker	6	1	-	-	-	-	3 (1.9%)	7 (2.6%)
Picnicker	6	-	-	-	1	-	7 (4.4%)	7 (2.6%)
Cattle	6	1	-	-	-	-	7 (4.4%)	7 (2.6%)
Helicopter	-	2	1	1	1	1	3 (1.9%)	6 (2.2%)
Gunshot	4	-	-	-	-	-	4 (2.5%)	4 (1.5%)
Camper	1	1	-	-	-	1	3 (1.9%)	3 (1.1%)
Angler	-	1	-	-	1	-	2 (1.3%)	2 (0.8%)
Swimmer	2	-	-	-	-	-	2 (1.3%)	2 (0.8%)
Birder	2	-	-	-	-	-	1 (0.6%)	2 (0.8%)
Canoe/Kayak	-	2	-	-	-	-	2 (1.3%)	2 (0.8%)
Photographer	2	-	-	-	-	-	2 (1.3%)	2 (0.8%)
Road grader	2	-	-	-	-	-	0	2 (0.8%)
Explosion	1	1	-	-	-	-	0	2 (0.8%)
Sonic boom	-	-	-	-	-	1	0	1 (0.4%)
Total	136	105	1	15	4	5	160 (100%)	266 (100%)

[1] Eagle behavior, N=none, W=watched, R=restless, F=flushed, L=left area, ?=unknown.
[2] D-D total=Observations on dawn-to-dusk days.

Food habits

A total of 31 forage attempts by the eagles was observed in the nest area between river kilometers 245.6 and 248.6 (Table 29). The male was recorded foraging 25 times (81%), the female 4 times (13%), and unidentified Tower adult once (3%). There was also an unsuccessful team forage by the Tower male and female eagle for a common merganser (3%).

The eagles were observed arriving at the nest with 58 prey items (Table 30). The male delivered 64 percent (n=34) of the prey, while the female came to the nest with 34 percent (n=20). An unidentified Tower adult returned to the nest with one item. Prey types delivered to the nest were fish (n=53), birds (n=2), and unknowns (n=3). Prey items identified in the nest were suckers (n=19), carp (n=3), channel catfish (n=1), unidentified fish (n=28), American coot (n=1), unknown birds (n=1), and unknowns (n=3) (Table 31).

Table 29. Observed forage events and success by bald eagles, Tower Breeding Area, Arizona, 1996.

	Prey types								
	Fish			Birds			Total		
Sex	E[1]	S-U[2]	?[3]	E	S-U	?	E	S-U	?
Male	24	19-3	2	1	-	1	25	19-3	3
Female	4	4-0	-	-	-	-	4	4-0	-
Both	-	-	-	1	0-1	-	1	0-1	-
Unknown	1	-	1	-	-	-	1	-	1
Total	29	33-23	3	2	0-1	1	31	23-4	4

[1] E=Forage events observed, each number represents a forage event for a food item, not the strikes to capture it.
[2] S-U=Successful - unsuccessful captures of prey.
[3] ?=Unknown outcome of a forage event.

Table 30. Observed prey types delivered to the nest by bald eagles, Tower Breeding Area, Arizona, 1996.

	Prey types			
Sex	Fish	Birds	Unknown	Total
Male	34	2	1	37 (63.8%)
Female	18	-	2	20 (34.5%)
Unknown	1	-	-	1 (1.7%)
Total	53 (91.3%)	2 (3.4%)	3 (5.1%)	58 (100%)

Table 31. Observed prey items delivered to the nest by bald eagles, Tower Breeding Area, Arizona, 1996.

Sex	Prey items[1]							
	Fish				Birds		Unknown	
	S	C	CC	UF	AC	UB	Unknown	Total
Male	12	2	1	19	1	1	1	37 (63.8%)
Female	7	1	-	9	-	-	4	20 (34.5%)
Unknown	-	-	-	1	-	-	-	1 (1.7%)
Total	19	3	1	29	1	1	5	76 (100%)

[1] Prey items, S=suckers, C=carp, CC=channel catfish, UF=unknown fish, AC=American coot, UB=unknown bird.

Management activities

The USFS closure surrounding the nest area was altered to include new cliff nest #8. Signs were posted along the river and at access points along the closure's boundary.

Winkelman Breeding Area

Observation period
The Winkelman BA was monitored from February 23 to March 31. The total observation time was 288 hours over 30 days. There were 15 dawn-to-dusk days where the nest was monitored for 184 hours.

Eagle activity
Eggs were laid in cottonwood nest tree #1 between February 2 and 14. This was the first breeding attempt observed at this new BA. Following a minimum of 45 days of incubation, two infertile eggs were removed from the nest.

The Winkelman eagles were both banded with blue visual identification bands on their left legs and silver USFWS bands on their right. The male hatched from the Coolidge BA in 1992 and was four years old. The female hatched from the Alamo BA in 1991 and was five years old.

Human activity
The Winkelman BA is located on private land along the lower San Pedro River and is close to the towns of Winkelman, Hayden, and Dudleyville. As a result, local land use and activity associated with ASARCO's Ray Mine were consistently present.

A total of 181 human activities was recorded (Table 32). Vehicles (n=78, 43%), trains (n=39, 21.5%), horseback riders (n=17, 9.4%), and gunshot events (n=13, 7.2%) were the most common types.

The eagles were never recorded responding significantly (restless, flush, left area) to any human activity recorded in the nest area. They were seemingly very tolerant to the local activities in the nest area. They did not respond to 122 activities, watched 19 activities, and had an unknown response to 40 activities.

Because of the nest's placement on private land and its proximity to town, we were very aware of the attitudes of local landowners. We were fortunate to have employed the help of landowners surrounding the nest area. They allowed us to camp and observe the eagles. Word of the nesting eagles spread throughout town. A total of 23 different people (some made repeat trips) visited the site during the short observation time. Based upon the opinions expressed by those contacted in the field and the calls which the AGFD received, it was clear that there was local interest and support for the eagles.

Table 32. Observed human activity and bald eagle behavior, Winkelman Breeding Area, Arizona, 1996.

Type	Eagle Behavior Toward Human Activity[1]				
	N	W	?	D-D total[2]	Total
Driver	66	2	10	62 (45.6%)	78 (43.0%)
Train	27	1	11	24 (17.7%)	39 (21.5%)
Horseback rider	8	3	6	13 (9.6%)	17 (9.4%)
Gunshot event	3	2	8	13 (9.6%)	13 (7.2%)
Hiker	2	7	-	8 (5.9%)	9 (5.0%)
Helicopter	6	-	-	2 (1.5%)	6 (3.5%)
Small plane	4	-	1	3 (2.2%)	5 (3.0%)
Swimmer	4	-	-	3 (2.2%)	4 (2.2%)
ORV	-	2	2	4 (2.9%)	4 (2.2%)
Shooter	-	2	-	0	2 (1.0%)
Military jet	1	-	-	1 (0.7%)	1 (0.5%)
Picnicker	1	-	-	1 (0.7%)	1 (0.5%)
Stack plume	-	-	1	1 (0.7%)	1 (0.5%)
Trumpeter	-	-	1	1 (0.7%)	1 (0.5%)
Total	122	19	40	136 (100%)	181 (100%)

[1] Eagle behavior, N=none, W=watched, ?=unknown.
[2] D-D total=Observations on dawn-to-dusk days.

Food habits

No forage attempts or prey deliveries were observed. However, anecdotal information from locals indicated that the eagles foraged near the Highway 77 bridge across the Gila River and along the Gila River downstream of the Winkelman Railroad bridge. Also, ranchers mentioned that they had seen eagles foraging in private fishing ponds southeast of the nest along San Pedro Road.

Management activities

We employed the assistance of local land owners, Tommy Dean, Raymond Garcia Sr., Joe Kerlock, Tony and Lupe Monroy, and Manuel Ochoa. Word of mouth from these gentlemen will hopefully inform, educate, and convey positive attitudes about the eagles to local residents.

We discussed with El Paso Natural Gas about closing off a pipeline road that travels within 60 m (200 ft) of the nest tree.

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