

**Lead Agency**

Lake Mead National Recreation Area, National Park Service

**Featured Project**

Wildlife Inventory Monitoring and Management (project no. 2003-NPS-229-P-2004-07)

Final Report on Bald Eagle Monitoring (2004-2005) within Lake Mead National Recreation Area

**Project Description**

This project was conducted to monitor the status of bald eagles (*Haliaeetus leucocephalus*) within Lake Mead National Recreation Area (LMNRA) as part of a national effort to monitor this species across the lower 48 states. Information from this project will be used to analyze the status of bald eagles prior to its possible delisting under the Endangered Species Act.

**Project Status**

Park service employees, contractors, and volunteers have participated in annual winter eagle surveys of LMNRA since 1991. The following document represents the final report for work performed during the 2004 and 2005 seasons by the National Park Service, LMNRA with funding received from the Clark County Multiple Species Habitat Conservation Plan.

**Partners**

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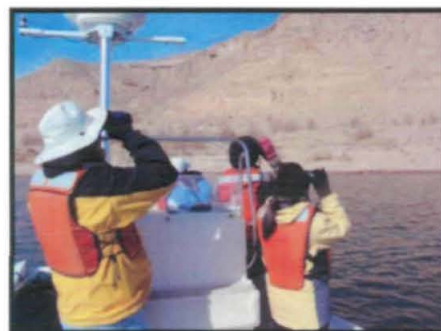
**Funding Awarded**

\$103,485\*

**Funding Spent**

\$103,485\*

\* This amount represents total funding received and spent on work stipulated for bird monitoring and management under the project number (2003-NPS-229-P-2004-07). Specifically, \$10,399 of these funds were stipulated for personnel costs associated with the bald eagle surveys, but travel and equipment costs for these surveys were incorporated into the general budget lines for all bird projects. In addition to the work described herein on bald eagles, project funding was used for monitoring and management actions for peregrine falcons and song birds including MSHCP covered,



Surveyors scanning the sky for eagles at Lake Mead.



Bald eagle on Lake Mojave.

evaluation and watch list species. Reports for other species are provided in separate documents relating to project no. 2003-NPS-229-P-2004-07.

**Completion Date or Status**

This project was completed on 31 January 2006.

**Products Produced from Project**

This project consisted of monitoring for bald eagles, which is a watch list species under the Clark County Multiple Species Habitat Conservation Plan. The survey efforts have been used to document the presence and relative abundance of bald eagles wintering within LMNRA. Data from surveys were shared with the Nevada Department of Wildlife, the Arizona Game and Fish Department and the U.S. Fish and Wildlife Service to be analyzed as part of a national effort to determine the regional, national and global status of bald eagle populations.

January 2006

## **Final Report on Bald Eagle Monitoring (2004-2005) within Lake Mead National Recreation Area**

Final Report for work performed by the National Park Service, Lake Mead National Recreation Area during 2004 and 2005 with funding from the Clark County Multiple Species Habitat Conservation Plan (project no. 2003-NPS-229-P-2004-07)

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### INTRODUCTION

Historically the bald eagle (*Haliaeetus leucocephalus*) ranged throughout much of North America except central and southern Mexico and the extreme northern regions of Alaska and Canada. Over this range, bald eagles were quite common and occurred in the hundreds of thousands (Glick 2005). With the expansion of Europeans in North America, bald eagles began to decline because of direct killing, habitat loss, and predator poisoning programs. By the 1930s, it was obvious the species was in trouble (Glick 2005). The Bald Eagle Protection Act of 1940 (USFWS 1940) provided for the direct protection of bald and golden eagles, however, the decline of bald eagles accelerated in 1945 with the introduction of dichloro-diphenyl-trichloroethane (DDT); a pesticide used to control mosquitoes, black flies, and other insects carrying malaria, typhus, and yellow fever. This persistent pesticide (as well as other persistent contaminants and heavy metals) moves into aquatic ecosystems where it bioaccumulates up the food chain to the fish and waterfowl that are the primary food sources for bald eagles. DDT is now known to have severe effects on wildlife reproduction and has been linked with thinning eggshells and the decline of bald eagles and other bird species (Colborn 1995).

By 1963, only 417 bald eagle nesting pairs were found in the lower 48 states (Glick 2005). Bald eagles were officially declared an endangered species in 1967 in all areas of the United States south of the 40th parallel, under a law that preceded the Endangered Species Act of 1973. DDT, however, was not banned from the United States until December 31, 1972 (EPA 1972). It is still used in some areas of South America. In 1978, the bald eagle was listed as an endangered species in 43 of the 48 lower states, and listed as threatened in Wisconsin, Minnesota, Michigan, Washington and Oregon (USFWS 1978).

The bald eagle is making a gradual comeback, and in 1995 the U.S. Fish and Wildlife Service (USFWS) upgraded the status of bald eagles in all the lower 48 states to threatened (USFWS 1995). Plans to 'delist' this species by 2000 were announced by the Clinton administration, but the USFWS has temporarily delayed their original plan while

government officials study other existing federal laws that safeguard eagles and their habitat. The species remains listed as threatened.

The USFWS (1986) established five geographically defined recovery regions for bald eagles. The lower Colorado River comprises Zone 33 of the Pacific Recovery Area which is recognized mainly as wintering habitat for bald eagles. Lakes Mead and Mohave, within the Lake Mead National Recreation Area (LMNRA), comprise a major portion of this management zone. Winter surveys on these lakes regularly return over 60 bald eagles making this region one of the largest concentrations of this species in Nevada and Arizona. Bald eagles nest in Arizona at approximately the same time that eagle numbers peak at LMNRA. Arizona bald eagles tend to breed earlier in the year in comparison to northern populations with eggs laid in December through March (Grubb 1995). Consequently, it seems possible that bald eagles could begin using Lakes Mead and Mohave as a breeding area as well as winter range.

The bald eagle is a watch list species under the Clark County Multiple Species Habitat Conservation Plan (MSHCP). By definition, a watch list species should be evaluated to acquire additional knowledge about its status within Clark County. One of the main threats listed to bald eagles within Zone 33 by the USFWS (1986) was human disturbance. Lakes Mead and Mohave are popular recreation areas, and many of the activities that occur there can be hazardous and/or disruptive to bald eagles. Lake Mead, however, is also the end point for waste waters from the Las Vegas Valley and runoff from agricultural lands along the Muddy and Virgin Rivers. As indicated above, the bald eagle's habit of preying on fish and waterfowl make this bird extremely sensitive to the effects of bioaccumulation of heavy metals and other contaminants. For these reasons, bald eagles may be an indicator of ecosystem health for Lakes Mead and Mohave.

Winter counts of bald eagles in LMNRA have been conducted by the National Park Service (NPS) since the early 1980s, although methodologies and effort have varied. The objective has been to document trends in the number of wintering birds using Lakes Mead and Mohave. These surveys have also been part of a national effort to determine the overall status of the bald eagle. Bald eagles are gregarious in the winter, and the mid-winter surveys conducted across North America have been an important tool in determining the overall numbers of this species (Stalmaster 1987).

#### GOALS AND DELIVERABLES

Although, the USFWS has proposed delisting of the bald eagle, the national winter bald eagle count is still important for monitoring the status of this species (USFWS 1999) and to provide information necessary to understand and interpret the importance of population fluctuations and trends in the post-delisting era. Under the Clark County MSHCP, the NPS has committed to monitoring of winter bald eagle population trends at LMNRA. The annual bald eagle surveys within LMNRA during 2004 and 2005 were conducted during the first two weeks of January each year, on 1 of 2 target dates associated with the national monitoring effort. Results from these surveys have been submitted to Arizona Game and Fish Department (AGFD) and Nevada Department of Wildlife (NDOW) and then analyzed to produce regional status reports. The following document represents the final report for work performed on bald eagles

during the 2004 and 2005 seasons by the NPS at LMNRA with funding received from the Clark County MSHCP.

## METHODS AND MATERIALS

Recent surveys were conducted by boat with an average of four observers within each boat, including at least one trained eagle observer. Survey routes were planned to incorporate all shorelines of Lake Mead and Lake Mohave without overlap, and followed routes standardized in 2000 (3 routes on Lake Mohave and 5 routes on Lake Mead). These routes were: Overton Arm (Echo Bay clockwise around perimeter of Overton Arm, south to Middle Point and Walker Bay), Temple Bar East (Temple Bar east to park boundary), Temple Bar West (Temple Bar west to the Narrows, Walker Bay to the Temple), Boulder Canyon (Callville Bay through the Narrows to Middle Point), Boulder Basin (Lake Mead Marina to Callville Bay, across the basin to Burro Point and back to the Marina), Willow Beach (Hoover Dam to Owl Point), Cottonwood (Owl Point to Mile 12), and Katherine (Davis Dam to Mile 12) (Fig. 1). The objective was to minimize double-counts by surveying both lakes on the same day, and within the same general time period starting at dawn and ending before dark.

The 2004 and 2005 surveys were conducted on January 8th and January 4th, respectively. Start time and stop times for each survey route were recorded, as well as general weather conditions. Both bald eagles and golden eagles (*Aquila chrysaetos*) were recorded and classified by age class (i.e., adult or immature) or identified into one of three unknown categories (i.e., bald eagle of unknown age, golden eagle of unknown age, or unidentified eagle). The category of "unidentified eagle" pertains to animals seen in silhouette or low light conditions that allow observers to positively identify them as eagles from the size, shape and/or flight pattern, while not being able to adequately observe colors or field marks to differentiate between species.

The surveys were performed by employees of state or federal conservation/resource agencies, as well as private volunteers. All observers were provided with eagle identification guides. Data were recorded on standard data sheets and mapped in reference to shorelines. Resulting data were entered into a geospatially referenced database. Coordination of these surveys was provided by this author (D.F.) and an associate employee.

## RESULTS

Survey results for each route are provided in Table 1. In 2004, the survey effort within the LMNRA totaled approximately 47 hours of search time. The total survey count was 60 bald eagles (36 adults and 24 immature), 2 adult golden eagles, and 3 unidentified eagles. Bald eagles were observed on all survey routes (Table 1, Fig. 2). The highest count was along the Overton Arm of Lake Mead where 19 bald eagles (11 adult and 8 immature) and 2 unidentified eagles were observed.

In 2005, the survey effort totaled about 53 hours. The total number of eagles observed was 67 bald eagles (42 adult, 25 immature), 5 golden eagles, and 15 unidentified eagles. Bald eagles were seen on all routes except at Cottonwood where no

eagles were observed (Table 1, Fig. 3). The 2004 count of 18 bald eagles at Cottonwood was quite high since generally few eagles have been historically observed along this route. Again in 2005, the Overton Arm area had the most eagles with 35 bald eagles (23 adult and 12 immature), 3 adult golden eagles, and 2 unidentified eagles. More than half of all bald eagles observed during 2005 were observed along the Overton Arm of Lake Mead.

## DISCUSSION

The numbers of bald eagles observed during the 2004 and 2005 surveys were consistent with bald eagle survey data collected in the park since methodology was standardized in 2000. Five year averages were recommended by USFWS (1986) for providing estimates for regional winter populations because of variation in seasonal distributions. Since 2000, the 5 year estimates for bald eagles wintering within the park were 63 (2000-2004) and 67 (2001-2005). The number counted in 2000 (48 bald eagles) was low in comparison with later years; although there was a high number of golden eagles counted (see below). The highest number of bald eagles counted occurred in 2002, with a total number of 79 birds.

In this report we provide count numbers for bald eagles going back to 1991 (Table 2); data which have been through a strict NPS quality assurance assessment. These data imply an upward trend in the number of wintering bald eagles observed at LMNRA. The interpretation of this trend, however, is confounded by variations in methodology before 2000. In the past, NPS has faced several challenges monitoring bald eagle populations in LMNRA. For example, prior to 2000 eagle survey routes were not standardized and all shorelines of lakes Mead and Mohave were not necessarily surveyed on the same day or even surveyed at all. There is also some question as to the qualification of observers on all boats. There appears to be little doubt that these problems resulted in some areas not being adequately surveyed each year, double counts, and misidentifications. For example, the number of golden eagles sighted during surveys drops after 2000. This may have been caused by earlier surveyors mistakenly recording immature bald eagles as adult golden eagles; by 2000 or 2001 (the record is unclear) all surveyors were provided with eagle identification guides. In general, data from before 2000 (the year survey routes and effort were standardized) should not be readily relied upon for comparisons or modeling without further evaluation.

High eagle counts within the Overton Arm survey route have remained fairly consistent for the last several years, and this area has had the highest survey count within the LMNRA since 1999. The confluence of the Virgin and Muddy Rivers within this area may provide for a relatively high level of productivity, and this area also supports the largest concentration and highest diversity of shorebirds and waterfowl within the park. These smaller birds may also attract bald eagles to this area since bald eagles have been documented to feed on waterfowl and seabirds (Ehrlich 1988).

## CONCLUSION AND RECOMMENDATION

The NPS has developed an eagle identification guide, which was given to all surveyors in recent years. Additional efforts were made to include trained observers in each boat; however, this has remained a challenge annually in that the surveyors change from year to year. Although, the survey coordinator has tried to make certain that there is at least one experienced surveyor on each boat, this may not always be possible. Even if each boat has an experienced eagle identifier, the other volunteers assisting on that survey may have little or no previous experience with these birds. To improve observer training, we recommend that new or inexperienced volunteers be provided an opportunity in eagle identification prior to the actual survey effort. Training surveys could be conducted along the Overton route shortly before the actual survey. The large number of eagles within this area should provide for plenty of training opportunities.

Since the Overton Arm of Lake Mead consistently has the largest number of eagle sightings, conducting multiple 'training' surveys along this route with trained observers (i.e., the teachers) following the standard protocol, may also double as a method to assess variation in the daily numbers of eagles observed during the peak winter season and allow for some accounting of variation in counts caused by weather and dispersal patterns.

We recommend continuing annual winter surveys for eagles within the LMNRA using the standardized eight survey routes. Furthermore, the geospatial database of observations collected since the early 1980s should be analyzed to identifying key areas along Lakes Mead and Mohave which are important to wintering bald eagles. This information could assist NPS in management decisions, and allow biologists to focus additional surveys in key areas in order to assess how eagles are using the habitat.

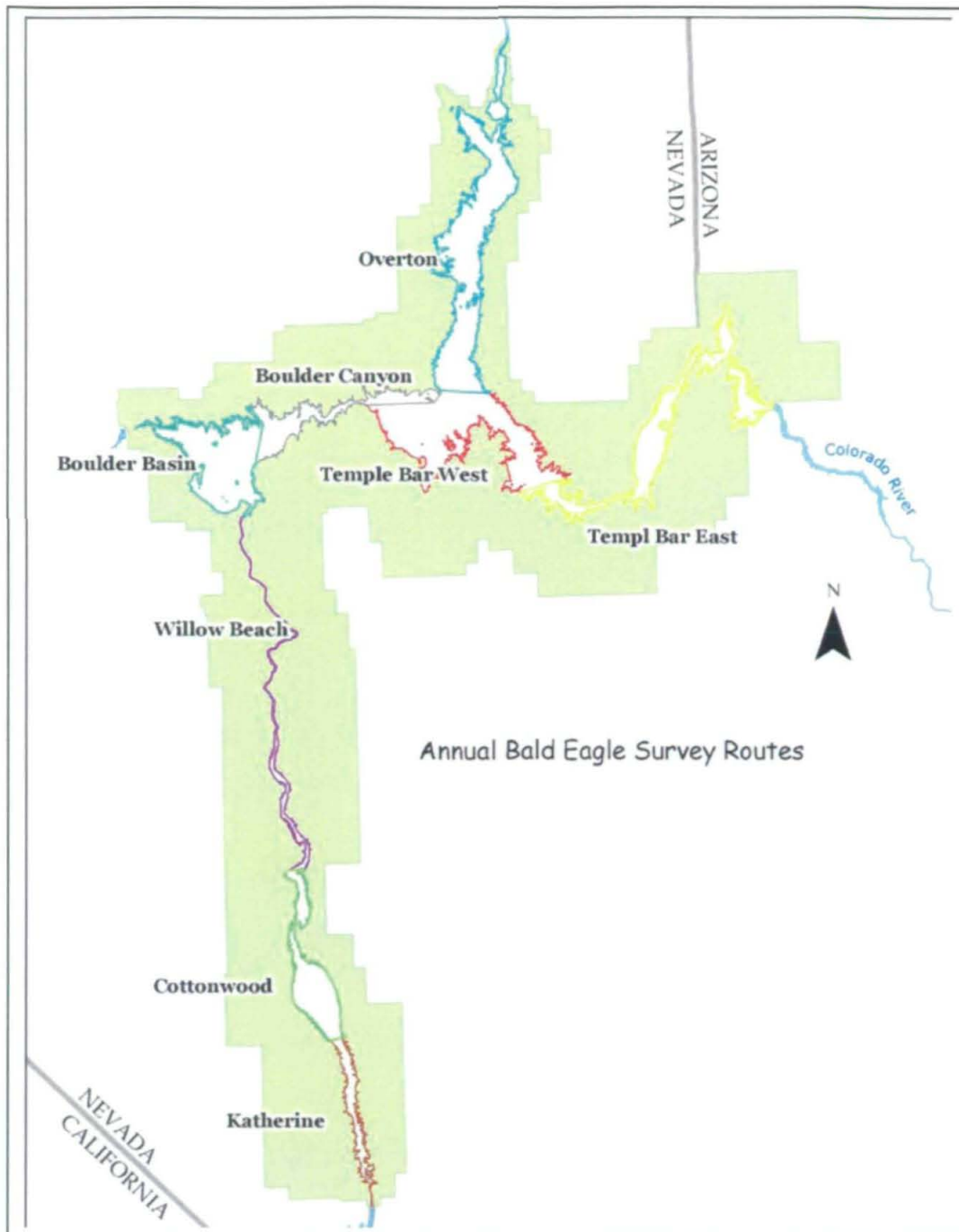


Figure 1. Map of the eight established bald eagle survey routes within Lake Mead National Recreation Area. Routes are color coded (light blue = Overton, yellow = Temple Bar East, red = Temple Bar West, grey = Boulder Canyon, aqua = Boulder Basin, purple = Willow Beach; green = Cottonwood; brown = Katherine).





Figure 2. A map of eagle locations documented during the 2004 winter eagle survey within Lake Mead National Recreation Area.

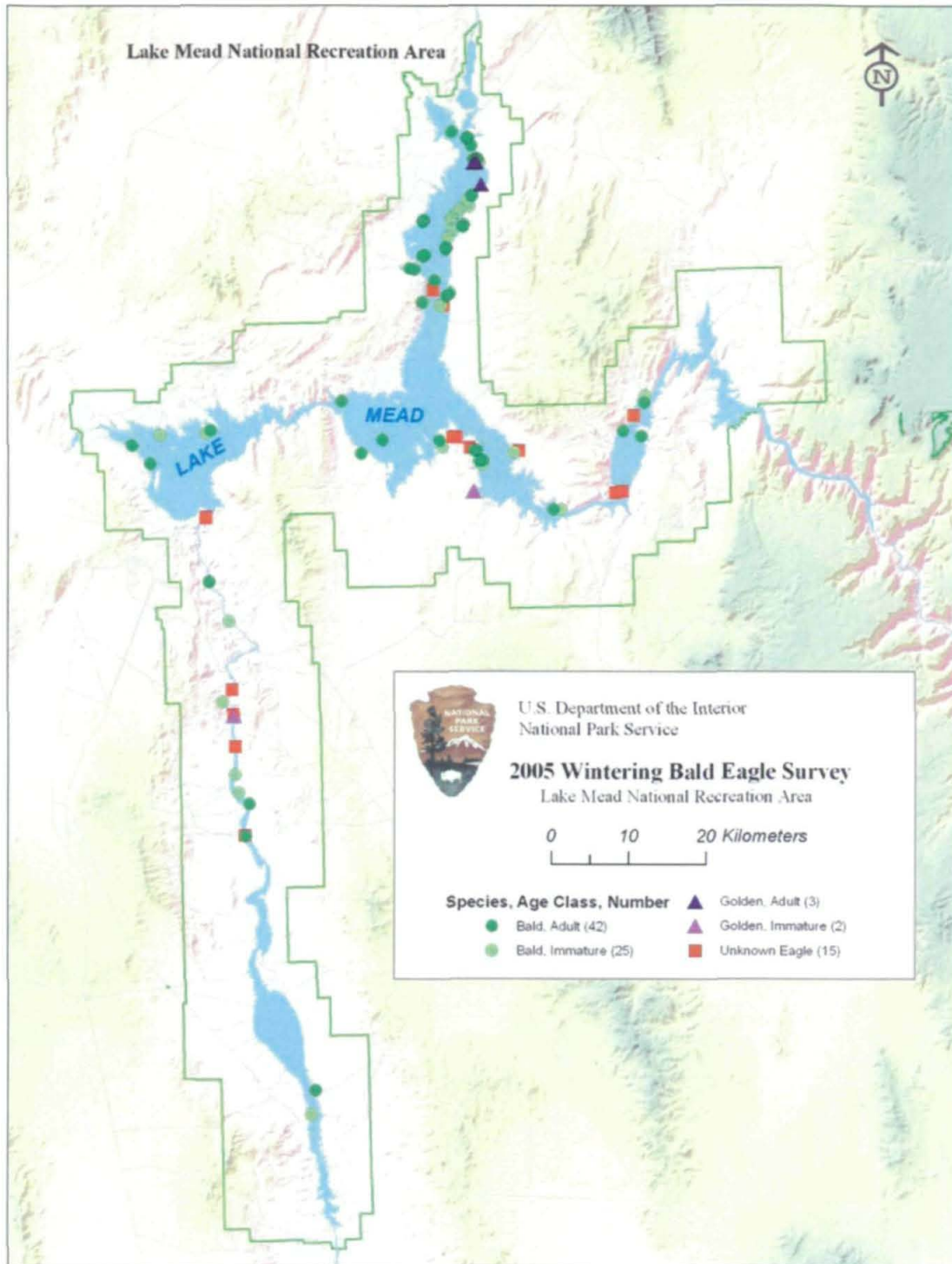


Figure 3. Map of eagle locations documented during the 2005 winter eagle survey within Lake Mead National Recreation Area.

Table 1. Number of eagles recorded in on Lakes Mead and Mojave during the winter surveys of 2004 and 2005.

Route	Date	Total Bald	Adult Bald	Immature Bald	Unknown Bald	Adult Golden	Immature Golden	Unknown Golden	Unidentified Eagle
Overton	2004	19	11	8	0	0	0	0	2
	2005	35	23	12	0	3	0	0	2
Temple Bar East	2004	2	2	0	0	0	0	0	0
	2005	6	4	2	0	0	0	0	3
Temple Bar West	2004	4	4	0	0	0	0	0	0
	2005	10	7	3	0	0	1	0	4
Boulder Canyon	2004	2	1	1	0	0	0	0	0
	2005	1	1	0	0	0	0	0	0
Boulder Basin	2004	8	4	4	0	1	0	0	1
	2005	5	3	2	0	0	0	2	0
Willow Beach	2004	6	2	4	0	1	0	0	0
	2005	8	3	5	0	0	1	0	4
Cottonwood	2004	11	7	4	0	0	0	0	0
	2005	0	0	0	0	0	0	0	0
Katherine Landing	2004	8	5	3	0	0	0	0	0
	2005	2	1	1	0	0	0	0	0

Table 2. Number of eagles recorded from 1991 through 2005 during the winter survey of Lakes Mead and Mojave.

Year	Total Bald	Adult Bald	Immature Bald	Unknown Bald	Adult Golden	Immature Golden	Unknown Golden	Unidentified Eagle
1991	20	4	15	1	0	0	0	0
1992	23	13	10	0	0	0	0	0
1993	32	19	13	0	6	5	1	0
1994	65	35	30	0	10	2	0	6
1995	36	27	9	0	22	5	1	3
1996	19	11	8	0	1	0	0	0
1997	14	11	3	0	3	0	0	3
1998	29	26	3	0	4	0	1	0
1999	48	22	26	0	3	1	4	5
2000	47	32	15	0	7	1	0	4
2001	60	29	31	0	1	1	0	7
2002	79	41	38	0	2	1	0	3
2003	68	37	31	0	2	7	0	8
2004	60	36	24	0	2	0	0	3
2005	67	42	25	0	3	2	0	15

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