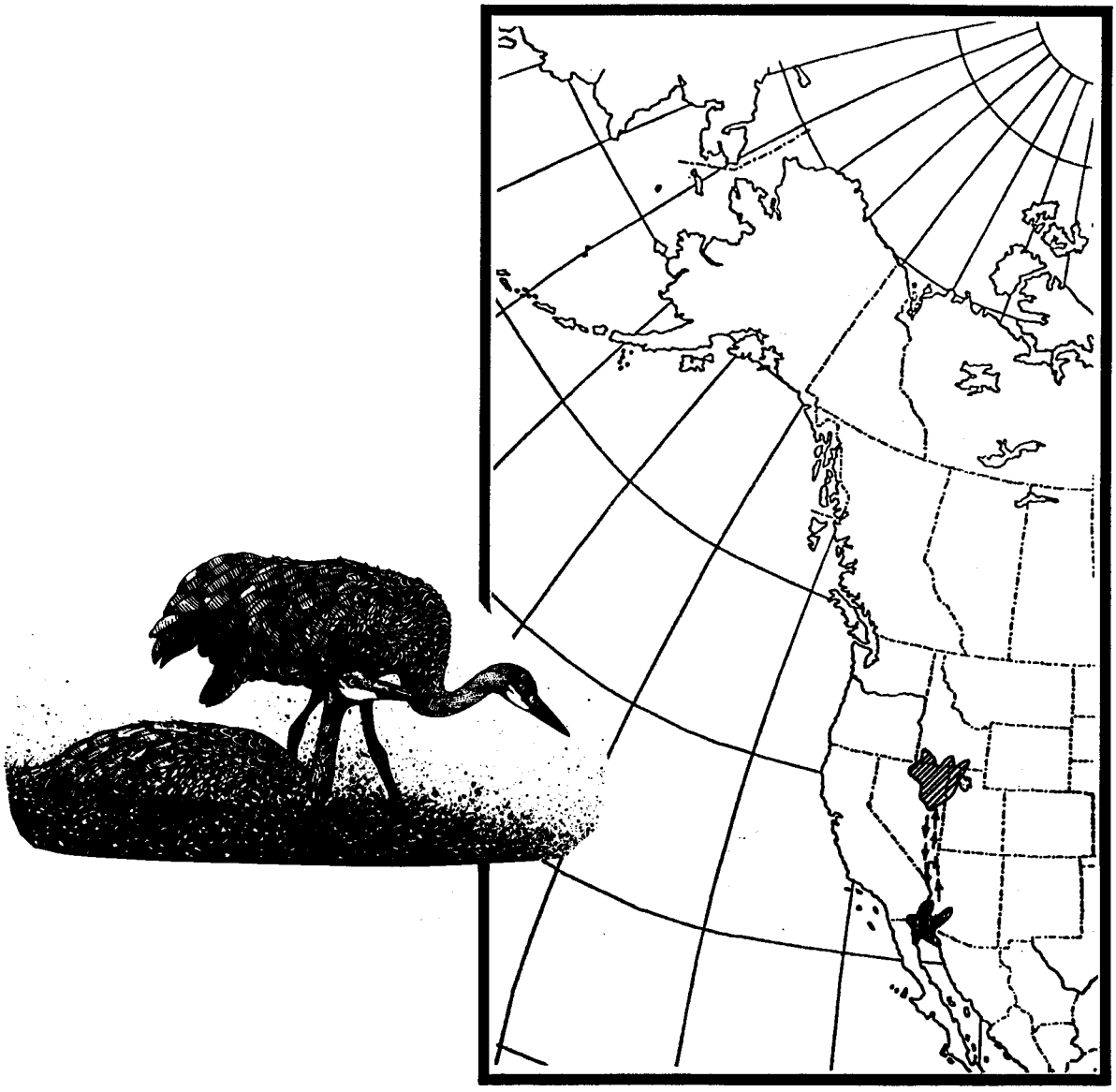
Pacific Flyway Management Plan for the

Greater Sandhill Crane Population Wintering Along The Lower Colorado River Valley



This management plan is one of a series of cooperatively developed plans for managing the various species of migratory birds of the Pacific Flyway. Inquiries about this plan may be directed to member states of the Pacific Flyway Council or to the Pacific Flyway Representative, U.S. Fish and Wildlife Service, 911 N.E. 11th Ave., Portland, OR 97232.

PACIFIC FLYWAY MANAGEMENT PLAN

FOR THE

GREATER SANDHILL CRANE POPULATION

WINTERING ALONG THE LOWER COLORADO RIVER VALLEY

Prepared for the

Pacific Flyway Council

U.S. Fish and Wildlife Service

March 1983

Revised May 1989

Revised March, 1995

PACIFIC FLYWAY MANAGEMENT PLAN

FOR THE

GREATER SANDHILL CRANE POPULATION

WINTERING ALONG THE LOWER COLORADO RIVER VALLEY

Prepared by the Subcommittee on the Lower Colorado River Valley Population of Greater Sandhill Cranes of the Pacific Flyway Study Committee:

David E. Brown, Arizona Game and Fish Department, Phoenix, Subcommittee Chairman
Dwight Bunnell, Utah Division of Wildlife Resources, Salt Lake City
Gary Herron, Nevada Department of Wildlife, Reno
Carroll D. Littlefield, Arizona Cooperative Wildlife Research Unit, Tucson
Dwight L. Perkins, Arizona Game and Fish Department and Arizona Cooperative Wildlife Research Unit, Tucson
Ronald W. Schlorff, California Department of Fish and Game, Sacramento
Robert VanderBerge, U.S. Fish and Wildlife Service, Blythe

Revised by:

Phil Smith, Arizona Game and Fish Department, Phoenix (Subcommittee Chairman)
Tom Aldrich, Utah Division of Wildlife Resources, Salt Lake City
Ronald W. Schlorff, California Department of Fish and Game, Sacramento
Pete Bradley, Division of Wildlife, Elko
Gary Will, Idaho Department of Fish and Game, Boise

With assistance from:

Rod Drewien, University of Idaho, Moscow, Idaho
Carrol D. Littlefield, Malheur Field Station, Princeton, Oregon
Wesley Martin, U.S. Fish and Wildlife Service, Cibola NWR, Arizona
J. R. Thompson, California Department of Fish and Game, Niland
Mike Szymczak, Colorado Division of Wildlife, Ft. Collins
Clark Bloom, U.S. Fish and Wildlife Service, Salton Sea NWR, Calipatria

Approved by:

William A. Molini
Chairman, Pacific Flyway Council

3/26/95
Date

TABLE OF CONTENTS

I. INTRODUCTION

The purpose of this management plan is to facilitate the cooperative management of the population of greater sandhill cranes (Grus canadensis tabida) that winter along the lower Colorado and Gila Rivers in Arizona, in the Imperial Valley, California and in Baja California Norte and Sonora, Mexico (Fig. 1).

The greater sandhill crane is the largest race of the species, nesting from the Great Lakes region westward to the Pacific Northwest and British Columbia. The Lower Colorado River Valley Population (LCRVP) of greater sandhill cranes is probably the least numerous of the five identified populations of the subspecies (Drewien et al. 1976, Drewien and Lewis 1987). The type specimen was collected from this population in 1859 along the Humboldt River in Nevada (Peters 1925). In earlier literature (e.g. Braun 1975, Lewis 1977), this population was called the "Colorado River Valley Population"; however, this subcommittee designated it the "Lower Colorado River Valley Population" which describes their winter distribution. In recent years this population has had one of the lowest recruitment rates of any sandhill population in North America (Drewien et, al. 1995).

Northeast Nevada is the principal nesting region for the 1800 to 2000 cranes believed to comprise the population (Fig. 1). Most LCRVP cranes are thought to nest in Elko and White Pine Counties, Nevada. Cranes that nest in northwest Utah and on the Duck Valley Indian Reservation, Nevada-Idaho, are probably LCRVP cranes as were cranes that formerly nested at Fish Springs National Wildlife Refuge (NWR) in Juab County, Utah. Mullins (1974) estimated that 4 breeding pairs and over 30 cranes of this population reside in south-central Owyhee County, Idaho. Drewien et al. (1976) reported one pair in Washoe Valley in northwest Nevada in 1974. This pair and eight pairs in Malheur County, Oregon may be members of either this population or the Central Valley Population (Littlefield and Thompson 1979). Cranes summering from southwestern Idaho north to Cascade and Bear Valley-Stanley area, Idaho are also suspected to be affiliated with this population (R. Drewien, pers. comm.).

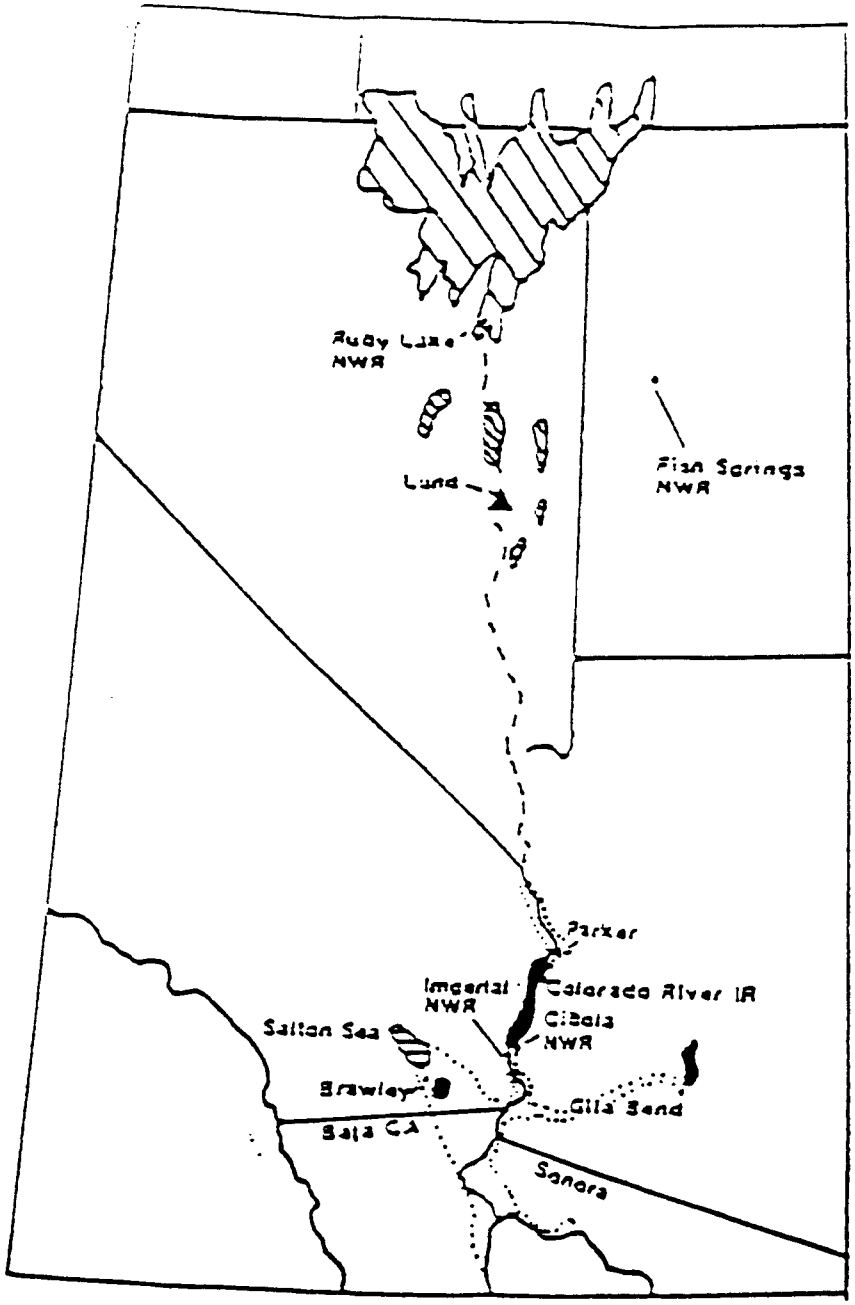


Figure 1. Nesting and wintering distribution of the Lower Colorado River Valley Population of greater sandhill cranes

In fall, 500-700 cranes may congregate in premigratory staging areas in Ruby and Lamoille Valley, Elko County, Nevada. Most migrate from northeastern Nevada by October 30, passing through Lund, White

Pine County, Nevada and probably following the White River south to wintering areas along the Colorado River between Parker, La Paz County, Arizona and the Imperial NWR, La Paz and Yuma Counties, Arizona (Fig. 1). Observations of birds marked in Nevada indicate some LCRVP cranes also winter along the lower Gila River north of Gila Bend, Maricopa County, Arizona, and 11 km southeast of Brawley, Imperial County, California (Appendix A). As recently as 1980, cranes wintered at the Imperial NWR. However, high water in the Colorado River in 1983 through 1986 precluded grain production, causing cranes to abandon Imperial NWR. The Imperial NWR has the potential to become an important wintering area if grain production is resumed and existing roost sites are protected or new roosts created. Moist soil units currently being developed may attract cranes.

LCRVP cranes initiate spring migration as early as the first week of February, flying to Lund, which serves as a spring migration stopover. Cranes spend a few weeks at the stopover; numbers generally peak in late February and early March (Appendix B). By mid-March, most cranes have departed for their summer ranges.

Historically, cranes wintered further south along the Colorado River to near its delta with the Gulf of California (Lumholtz 1912, Leopold 1949, Sheldon 1979, Fig. 1). Populations in this area gradually disappeared coincident with the general decline of the subspecies in the 1915-1945 period; the last recorded sighting in Baja California Norte, Mexico was in 1953 (Appendix C). Presumably crane use was "short-stopped" further north along the Colorado River near Parker (Littlefield 1973); approximately 210 were reported using this area in 1961 (Phillips et al. 1964). A small number of cranes used the Salton Sea area through 1957. Higher recent counts included 283 south of Brawley in 1986 and 329 in February 1994 near Imperial (Appendix C). The Salton Sea NWR, as part of their Wildlife Inventory Plan, conducts three surveys each winter of the refuge and important adjacent habitats. Currently, the major wintering areas are on the Cibola NWR and Colorado River Indian Reservation (CRIR), La Paz County, Arizona where approximately 700 to 1500 birds may be expected between October 15 and February 15. With changing management at Cibola and cropping pattern on CRIR, a greater proportion

of the population is currently utilizing the Cibola Refuge. During 1993-94, 1,100 cranes wintered at Cibola.

This plan is a revision of the May 1989 LCRVP Sandhill Crane Management Plan, and its purpose is to establish guidelines for management of LCRVP sandhill cranes based upon current information.

II. GOALS AND OBJECTIVES

The goals of this management plan are to maintain the Lower Colorado River Valley Population of greater sandhill cranes and to provide opportunities for its increase and expansion within its current range. Objectives are:

A. Increase the population, as measured by winter surveys, from an estimated 1800-2000 cranes to an estimated 2400-2600 cranes by the year 2000.

B. Achieve occupancy by cranes of all suitable nesting habitat by 2000 without major changes in their geographic range, staging areas or migration corridors;

C. Achieve a dispersal of the wintering population by 2000 as follows:

	Percent of Wintering Populations
Colorado River Indian Reservation	25
Cibola NWR	45
Havasu NWR	2
Baja California Norte and Sonora	8
Lower Gila River	7
Imperial NWR	1
Salton Sea NWR	1
Imperial Valley outside of Salton Sea NWR	11
	100

D. Retain, protect and, when possible, develop and/or acquire habitats in sufficient quantity and quality to meet population and distribution objectives;

E. Increase recreational opportunities associated with the LCRVP;

F. Identify survey and research needs.

III. STATUS

Population, Distribution and Habitat

Summer distribution is well documented in Nevada (Fig. 2, Appendix D) and Utah (Appendix E). The LCRVP may also be expanding their range in Idaho (C. Littlefield, R. Drewien; pers. comm.). Though only cursory nesting habitat investigations have been conducted, it appears a considerable amount of available nesting habitat is unoccupied (Fig. 2).

Currently, the only nesting areas in public ownership in Nevada are the Ruby Lake NWR, Elko County lands administered by the Nevada Division of Wildlife (NDOW) on the Bruneau River and Franklin Lake and by the BLM on the Mary's River and Bruneau River, and lands administered by the BLM in North Spring Valley, White Pine County. The Nevada Division of Wildlife in cooperation with the Nature Conservancy, has purchased a portion of Franklin Lake in Ruby Valley, an important nesting area.

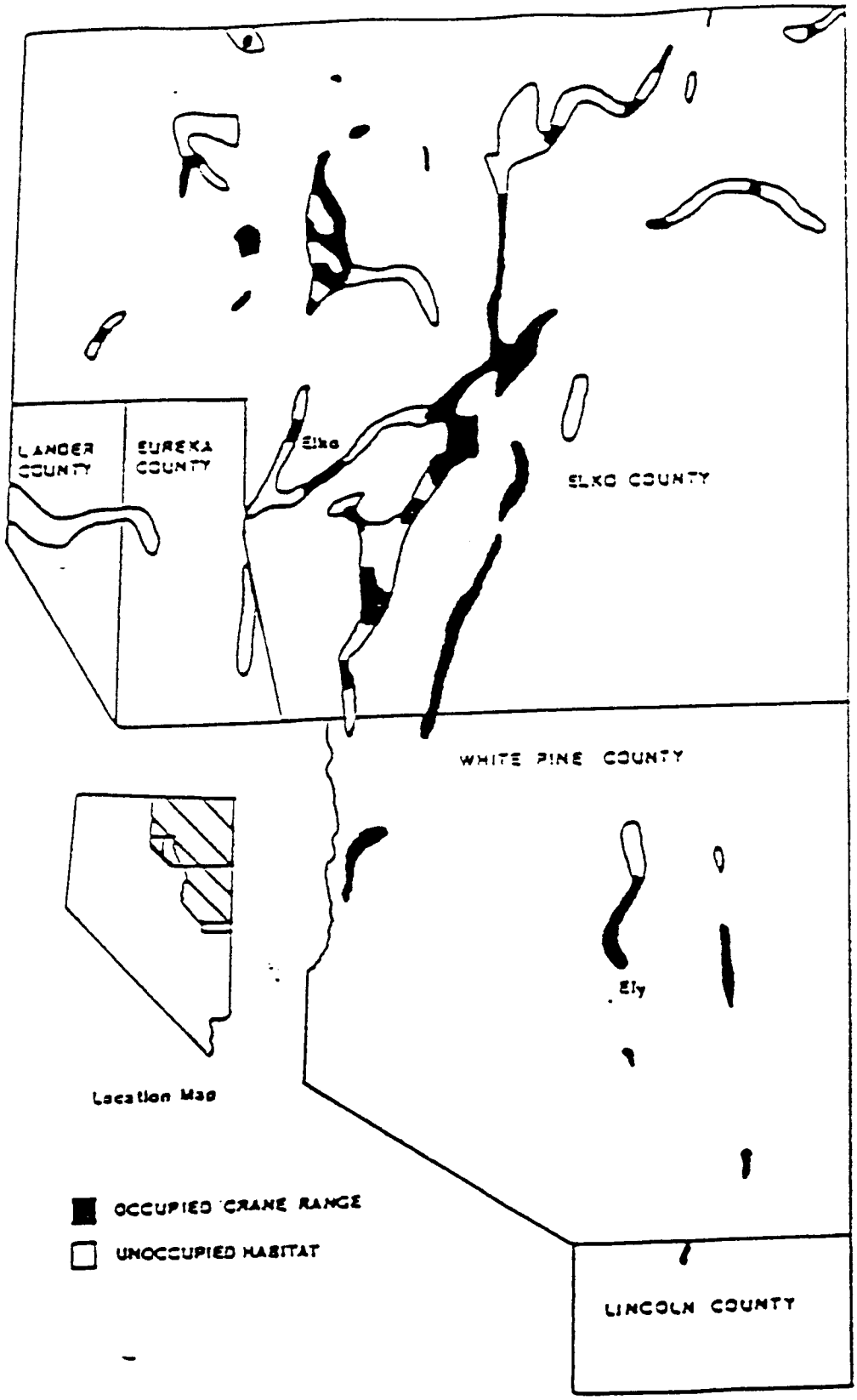


Figure 2. Spring-summer distribution of sandhill cranes in Nevada and locations unoccupied by cranes which appeared to provide suitable crane nesting habitat.

Available information on population trends since 1955 shows a marked increase in the number of cranes wintering in the Colorado River Valley in Arizona (Table 1, Appendix C). Winter counts indicate the population currently numbers between 1800 and 2200 (Appendix C).

The spring migration stopover near Lund, Nevada is attractive to cranes because of the availability of wet meadows for loafing and feeding, a playa for roosting and proximate grain fields for feeding. These habitats are not in public ownership and future protection and management of these areas are uncertain.

Observations of cranes marked in Elko County, Nevada showed birds summering in Nevada used the Lund spring stopover. At least three cranes marked at Lund were observed at fall staging areas in Colorado and wintering areas in New Mexico (Appendix A) indicating that some are affiliated with the the Rocky Mountain Population (RMP).

Several deficiencies in roosting, loafing and feeding habitat on winter range are apparent. Suitable roosts are limited because of rip-rapped river alignments, dredged channels, levies and associated access roads. Grain crops grown on the CRIR and the sand bars in the adjacent undisturbed river are attractive to wintering cranes, but the amount of grain on the Reservation is apparently decreasing while recreational activity on the river is increasing. Either human disturbances at roost sites or insufficient food supplies probably caused some cranes to move from the CRIR south to Cibola NWR. Feeding areas near Cibola NWR are currently limited to a few wheat, milo or corn fields, but the amount of corn grown on the Refuge has increased recently. Cranes loaf in alfalfa fields, irrigated pastures and plowed fields which are presently adequate. The number of cranes wintering along the lower Gila river and southeast of Brawley has increased in recent years (Appendix C). With the development of an artificial crane roost and plantings of cereal grains at the Cibola NWR, cranes using the refuge has steadily increased (W. Martin pers. comm.).

The greater sandhill crane is classified as a "Threatened" subspecies by the California Department of Fish and Game. Only occasional crane surveys were done in the Brawley, California area prior to 1990. Cranes are no longer present at the Salton Sea and birds using the Imperial Valley, California may mingle with the larger flocks along the Colorado River.

The small flock on the lower Gila River between Gila Bend and Buckeye, Arizona, is presently experiencing low food crop availability. Although cultivated acreage in this area is increasing, it is devoted primarily to cotton and alfalfa, crops of minimal value to cranes. Because of frequent disturbance on roosts, primarily by farmers and waterfowl hunters, roosting sites are limited to a few relatively remote stretches of the Gila River.

Use

1. Viewing. The principal use of LCRVP cranes is viewing. Except at Cibola NWR, this activity is presently unmeasured but is thought to be significant and increasing, particularly at Lund and Ruby Lake NWR. In 1988, over 37,000 hours of bird watching was recorded at Cibola NWR; including over 16,000 hours directed at cranes. The 16,000 hours of crane watching exceeds the 1978 total recorded number of bird watching hours. A few birds are no doubt illegally shot, and some may be legally taken in Mexico.

Management

Other than receiving statutory protection, this population has, until recently, been passively managed. Present plans call for regulatory practices including access restrictions to benefit cranes at NWRs.

In 1981, Cibola NWR initiated efforts towards active management for cranes by constructing a 20-acre roosting area and planting milo, corn and/or wheat. Use by cranes indicate those efforts have been

successful, as 350 to 700 use the roosting site from late September until March. Recently, cranes have also used alternate roosts on the refuge; up to 1200 birds during December 1986 and January 1987 (W. Martin pers. comm.). During 1993-94 the refuge held approximately 1,100 cranes throughout November - February. This increase may be attributed to the high water level in the Colorado River which precluded grain crop production at Imperial NWR and inundation of sand bar roosting areas.

The Cibola Irrigation District has expressed a desire to sell all or portions of the affected cultivated lands to the U.S. Fish and Wildlife Service. This addition would alleviate depredation problems by providing additional feeding and loafing areas for the increasing number of waterfowl and cranes wintering along the lower Colorado River. The crane depredation problem, experienced by Cibola area farmers, has been virtually eliminated by the increased grain production on the refuge.

IV. PROBLEMS

Problems identified with the LCRVP fall into 2 broad categories; those dealing with the ability of responsible state and federal agencies to monitor the population and those dealing with the loss of habitat or lack of habitat to accommodate an expanding population.

Table 1. Important crane counts and population estimates from fall migration and wintering areas.

Year	Location	Number Of Cranes	Source
1961	Parker-Poston, Arizona	210	L.D. Hatch (Phillips et al. 1964)
1968	Parker-Poston, Arizona	500	R. Kinghorn (Drewien et al. 1976)
1970	Parker-Poston, Arizona, Gila River (estimate)	850	C.D. Littlefield, W.H. Mullins (Lewis 1977)
1973	All Areas (estimate)	1000	C.D. Littlefield, (Drewien et al. 1976, Lewis 1977)
1973	Lund, Nevada	1003	Drewien et al. 1976
1973	Parker-Poston, Arizona	1100	R. Kinghorn (Drewien et al. 1976)
1976	Parker-Poston, Arizona, Cibola NWR	1850	K.V. Rosenberg (Witzeman et al. 1977)
1978-79	All Known Wintering Areas	1601	Perkins and Brown (1981)
1979-80	All Known Wintering Areas	1681	Perkins and Brown (1981)
1980-81	All Known Wintering Areas	1807	Perkins and Brown (1981)
1984	Lund, Nevada	1459	Herron et al. (1984)
1987	Lund, All Known Wintering Areas	1736	Rawlings (1987)
1988	Cibola NWR, CRIR and Gila River, Arizona	1764	Arizona mid-winter waterfowl survey
1989	Cibola NWR, CRIR and Gila River, Arizona	1546	Arizona mid-winter waterfowl survey
1990	Cibola NWR, CRIR and Gila River, Arizona	1433	Arizona mid-winter waterfowl survey
1991	Cibola NWR, CRIR and Gila River, Arizona	1257	Arizona mid-winter waterfowl survey
1992	Cibola NWR and Gila River	1123	Arizona mid-winter waterfowl survey
1993	Cibola NWR & Gila River	1081	Arizona mid-winter waterfowl survey
1994	Cibola NWR & Gila River	1178	Arizona mid-winter waterfowl survey
1994	All known wintering areas	2024	Special Cooperative Survey

Population Monitoring

Population estimates for the LCRVP have been based on counts at the Lund stopover and on identified wintering areas (Brown 1983). Recent investigations indicate that assessing population size at the stopover is invalid because peak numbers and peak periods of crane use vary annually and an unknown number at Lund apparently are associated with the RMP (Appendix A and B).

Counts on the winter range are currently employed to monitor the population trend. However, validity of winter counts are uncertain. A cooperative survey conducted on November 22, 1994 located a total of 2024 LCRVP cranes. That survey probably represents the most comprehensive winter survey. Most observations of marked birds have been within the defined wintering range (Appendix A). In January 1986, a search for marked birds was conducted at the Gila River area, Cibola NWR, CRIR and in the Brawley area, 61% of the cranes marked on Nevada summer ranges were observed on identified LCRVP winter range. Only cranes marked at the Lund stopover have been observed outside the defined LCRVP winter range (Appendix A). Only 30% + of the LCRVP wintering population has been located on Nevada summer range. This discrepancy suggests several possibilities, including; a) the summer range of the LCRVP includes a larger area than previously believed, b) the summer ranges of the LCRVP, RMP and Central Valley Population (CVP), or RMP and LCRVP are not mutually exclusive, c) there is only one population of western greater sandhill cranes, subpopulations of which utilize distinct wintering areas and/or d) summer ranges are distinct and at least some mixing of populations occurs during migration and on winter ranges.

Except in Mexico, the major wintering areas are reasonably well defined. To better define the summer range it may be necessary to mark wintering birds. Since cranes are widely scattered on the summer range such a project would require considerable effort by wildlife agencies to locate marked cranes on the summer range.

The Nevada Division of Wildlife (NDOW) conducted fall recruitment surveys from 1977 to 1983 to determine percent young in the population as an index to productivity. These counts were abandoned in 1984 because NDOW could not classify a statistically sufficient number of cranes (based on a sampling formula presented by Czaplewski et al. 1983, NDOW, on average, was classifying less than 41% of the required sample of cranes) and because age ratio data could not be correlated to population trend. California and Arizona initiated efforts to determine age ratios of wintering cranes in December 1989. Arizona initiated recruitment surveys in 1989 on the CRIR and Cibola NWR. Surveys were conducted in late November in 1989, 1992 and 1993 and in late October in 1990 and 1991 (Appendix F). Although young birds were more readily identified in October there was a greater chance of biased results as pairs with young tended to remain apart from large aggregations. Pairs with young appeared to accept larger congregations later in the winter.

Habitat

Habitat problems of primary concern on a summer range include:

1. Preferred nesting habitats throughout the described breeding range are largely in private ownership. Summer livestock grazing and early harvest of meadow grasses are potential limiting factors on reproductive success.
2. Water management and agricultural practices which contribute to desiccation of nesting meadows. Large scale conversion of wet meadow/willow riparian to upland shrub/exotic forb/grassland type due tothe destabilization of the hydrology of the Humbolt River system by unsound agricultural practice continue to threaten long term summer range health.
3. Depredation complaints may be expected to increase with expanding grain production on some summer ranges.
4. Reductions in grain production at Lund could alter current migration patterns. This may result in longer use of wintering areas and increased crop damage.
5. Conversion of native hay meadow/willow riparian habitats to gravel pits is increasing.

Habitat problems of primary concern on winter range include:

1. A shortage of suitable undisturbed roosting sites in close proximity to small grain crops to meet desired distribution on the winter range, i.e., the Colorado River including NWRs, the Lower Gila River and Imperial Valley.
2. Wildlife managers are unable to control agricultural practices and land use on private and Indian lands which may not benefit cranes in LCRVP wintering areas.
3. Roost site destruction through past and proposed dredging, channelization and other activities of the Bureau of Reclamation and/or Corps of Engineers on the lower reaches of the Colorado River.
4. Conversion of lands currently in small grain production to non food crops such as cotton and alfalfa.

Disease

There have been no unusual mortality of LCRVP cranes documented either on winter or summer habitats. Sandhill cranes are known to be susceptible to several diseases including botulism, tuberculosis, avian cholera, avian salmonellosis, inclusion body disease of cranes, aspergillosis, lead poisoning and Leucocytozoonosis. Since this population is not hunted, the incidence of disease related mortality is difficult to monitor and would probably go undetected unless a significant die-off occurs. Preliminary analysis of blood samples taken by Utah DWR from sandhills captured for marking showed no evidence of Leucocytozoonisis.

V. RECOMMENDED MANAGEMENT PROCEDURES

The following management actions are recommended. The degree and timing of their implementation by responsible agencies will be influenced by manpower, fiscal and legislative constraints beyond the scope of this plan. Whenever possible, the management procedures in this plan should be coordinated with and incorporated into plans for other species and populations of Pacific Flyway birds.

Habitat

1. General - Identify, classify, rank and catalog habitats used now and historically by LCRVP cranes to facilitate acquisition of habitat and to protect areas through public awareness, cooperative agreements, conservation easements, special-use permits and mitigation. Classification should include, but not be limited to, land status and use, vegetative composition, physiognomic characteristics, relative importance to cranes (current and potential) and threats to continued existence of that habitat. Priority for acquisition and possible manipulation of specific land should be identified. All interested agencies, groups and individuals are encouraged to participate in this effort.

   Lead Agencies: Arizona Game and Fish Department
   California Department of Fish and Game
   Idaho Department of Fish and Game
   Nevada Division of Wildlife
   Utah Division of Wildlife Resources
   U.S. Fish and Wildlife Service
   Direccion General de la Fauna Silvestre de Mexico
   Colorado River Indian Tribes

   Priority: 2

   Schedule: 1994-1999

2. Nesting Habitats - Protect areas used by nesting cranes. Suitable areas should be prioritized for acquisition through purchase, lease or easement and managed for optimum production of sandhill cranes.

   Specific recommendations are:

   a. Encourage responsible agencies to strictly enforce the terms of the 1977 Clean Water Act (P.L. 95-217) on public and private lands where greater sandhill cranes nest.

Enforcement by state and federal agencies would reduce destruction of nesting habitat. Draining, diking, filling and other destructive practices on nesting meadows should be discouraged.

b. Encourage public and private land managers to keep meadows wet through July. Rapid drying of meadows while young cranes are dependent on invertebrates can result in starvation.

c. Discourage the construction of dams that would inundate or dewater crane nesting habitat.

d. Seek easements with private landowners to delay hay mowing on nesting areas until at least August 1. Encourage land management agencies to delay hay mowing on public lands until August 1 to prevent the loss of young cranes. Hay stacks should be removed because "moldy" hay provides favorable conditions for aspergillosus which has been known to infect young cranes at Malheur NWR.

e. Encourage land management agencies to limit livestock grazing on public lands encompassing crane nesting/brooding habitat to levels that do not compromise crane production. In general, summer livestock grazing on crane nesting habitat is detrimental to crane production. The policy of grazing on public lands should be critically reviewed from the standpoint of maximizing crane production and other wildlife uses.

f. Encourage land management agencies to reduce or terminate winter livestock grazing on public lands that support nesting cranes except in marsh areas where there has been extensive encroachment by emergent vegetation.

g. Seek removal of unnecessary internal fences on National Wildlife Refuges and other public lands in crane use areas. Sandhill cranes have been killed in fences and 4 whooping cranes have been killed in Colorado and Idaho after colliding with or becoming entangled in fences. Necessary fences should be the 3-strand design used successfully at Grays Lake NWR, Idaho.

h. The subcommittee should be notified by the responsible subcommittee representative and/or the U.S. Fish and Wildlife Service of proposed projects and/or actions which will use federal funds or require federal approval or permits that may have a significant adverse impact on

summer range habitats. Upon such notification, recommendations to the appropriate funding/permitting agency(s) should be prepared and presented.

Lead Agencies/Group: Subcommittee

Idaho Department of Fish and Game

Nevada Division of Wildlife

Utah Division of Wildlife Resources

U.S. Fish and Wildlife Service

Priority: Item 2 through 2c: Priority 1

Item 2d through 2h: Priority 2

Schedule: Item 2 - 1994-1998

Items 2A through 2H - 1994 and ongoing.

3. Stopovers - Investigate opportunities to preserve and develop stopover sites. Special consideration should be given to the Kirch Wildlife Management Area at Sunnyside, White Pine County, Nevada. Possibilities for the retention, development and management of key habitats at the stopover site near Lund should also be investigated.

Lead Agencies: Nevada Division of Wildlife

U.S. Fish and Wildlife Service

Priority: 2

Schedule: 1994 - 1999

4. Winter Range - Protect roost sites. Those on public lands should be protected from degradation and disturbance. Attempts should be made to acquire, through fee acquisition or easement, important roost areas in private ownership and manage them for cranes. Depredations on private croplands may be expected to increase as numbers of wintering cranes increase. Reoccurring depredation problems should be documented. When considering options to reduce crop damage, the impact a given control method may have on the entire population should be considered in the selection process.

Specific recommendations:

a. Through direct acquisition, lease or easements protect the 2 winter roost sites identified southeast of Brawley, California which are owned by the D & K Duck Club and Ostercamp Farms. If these roost sites are lost through a change in management, this wintering flock may be lost.

b. Vigorously oppose proposed projects and programs that will degrade riverine roost sites. Special consideration should be made to prevent dredging of shallow water sites and to prevent vehicle access to shorelines. Cooperation from the U.S. Army Corps of Engineers and the Bureau of Reclamation is essential.

c. The subcommittee should be notified by the responsible subcommittee representative and/or the U.S. Fish and Wildlife Service of proposed projects and/or actions which will use federal funds or require federal approval or permits that may have a significant adverse impact on the crane wintering habitats. Upon such notification recommendations to the appropriate funding/permitting agency(s) should be prepared and presented.

Lead Agencies/Group: Subcommittee
Arizona Game and Fish Department
California Department of Fish and Game
U.S. Fish and Wildlife Service
Direccion General de la Fauna silvestre de Mexico

Priority: 1

Schedule: 1994 and ongoing.

5. Habitat Management on National Wildlife Refuges - All lower Colorado River NWRs, especially the Cibola NWR, should maintain or modify practices to ensure adequate cereal grains (milo, wheat, barley, rice) are available for cranes during the winter period (October-March). Manipulation of grain crops, such as bumping, chopping or swathing, should be practiced to increase food availability. Grain fields should be dispersed over farm units to reduce crowding. Note: Grain production on the Cibola NWR has been increased and the relatively large number

of cranes using the refuge throughout the winter reflects the effectiveness of this practice. Roost sites should be protected and enhanced and new ones developed where necessary.

All forms of disturbance in feeding and roosting areas should be minimized. Planned activities should be kept at a distance compatible with maintenance of cranes on refuge units. Operation of farm machinery does not generally disturb cranes as do some other activities; however, care should be taken to operate farm machinery in only one portion of a refuge farm unit at a time. It is important to give cranes the option to move to alternate areas away from farming activities. In refuge farm units where fog, rain or other causes reduce visibility, overhead powerlines should either be removed, marked (yellow vibration dampers) or placed underground (Brown and Drewien, 1995). Internal fences in areas managed for cranes should be removed or modified to a 3-strand design successfully used at Gray Lake NWR, Idaho.

The U.S. Fish and Wildlife Service is considering acquisition of croplands adjacent to the Cibola NWR. If these are acquired, a portion should be managed specifically for wintering cranes and, among other management options, be planted to cereal grains to provide feed.

Lead Agency: U.S. Fish and Wildlife Service (NWRs)

Priority: 1

Schedule: Continuing

Environmental Education and Law Enforcement

1. Interpretive Programs - Encourage and promote the nonconsumptive use of greater sandhill cranes throughout their range. Nonconsumptive use and the need for a better understanding of these cranes is recognized as an integral part of this plan. Subcommittee member agencies should publish information on the life history of these cranes and the need for a cooperative management program. The development of interpretive programs by participating agencies, other groups and organizations that include cranes is encouraged.

Lead Agencies: Arizona Game and Fish Department

California Department of Fish and Game

Idaho Department of Fish and Game

Nevada Division of Wildlife

U.S. Fish and Wildlife Service (NWRs)

Utah Division of Wildlife Resources

Direccion General de la Fauna Silvestre de Mexico

Priority: 2

Schedule: 1994-1999

2. Hunter Education - Inform hunters of the presence of cranes and alert them to the physical similarities and differences between cranes and geese. Special law enforcement efforts are encouraged by responsible agencies in situations where illegal shooting occurs.

Lead Agencies: Arizona Game and Fish Department

California Department of Fish and Game

Idaho Department of Fish and Game

Nevada Department of Wildlife

U.S. Fish and Wildlife Service (NWRs)

Utah Division of Wildlife Resources

Direccion General de la Fauna Silvestre de Mexico

Priority: 2

Schedule: 1994 and ongoing.

Regulations

No change in regulations is necessary. Should the wintering population exceed 2,500 cranes and the severity of depredation problems increase, a limited hunt following the close of the waterfowl season should be considered.

Inventories

1. Breeding Ground Survey - The Utah Division of Wildlife Resources is encouraged to complete breeding ground surveys and The Idaho Department of Fish and Game is encouraged to initiate breeding ground surveys. These surveys are necessary to determine the size and distribution of summering populations. When inventories are completed, state agencies should assess the need for follow-up surveys. Results should be reported to the Subcommittee at the annual March meeting. Surveys in Nevada and Utah have been completed.

   Lead Agencies: Idaho Department of Fish and Game
   Utah Division of Wildlife Resources
   Nevada Department of Wildlife

   Priority: 2

   Schedule: 1994 and ongoing.

2. Population Count - Conduct winter counts during late November or early December to ascertain age ratios. The mid-winter survey will index the winter population, and document changes in distribution. To obtain the most accurate recruitment data, surveys should be conducted in November. Survey results should be reported to the Subcommittee at the annual March meeting.

   Lead Agencies: Arizona Game and Fish Department
   California Department of Fish and Game
   U.S. Fish and Wildlife Service

   Priority: 1

   Schedule: 1994 and ongoing.

3. Winter Range Inventory - Distribution and habitat preferences of LCRVP cranes wintering in California and Arizona have been documented, however, little is known of LCRVP cranes wintering in Mexico. Specific inventories recommended for the portion of the LCRVP wintering in Mexico are:

   a. Surveys of California, Sonora, Sinaloa and Nayarit to determine the distribution of sandhill cranes.

b. Once wintering areas have been identified, measurements of mid-toe track impressions should be obtained to determine subspecific composition of cranes in Mexico. Track measurements greater than 95mm will confirm the presence of greater sandhill cranes.

c. Identify and describe key habitats used by cranes, particularly wetland roosts used by various wintering flocks.

Priority: 3

Schedule: 1994 and ongoing.

Research

1. General - The subcommittee shall propose and develop research projects for federal, states or other source funding, recommend needed research and review unsolicited research proposals. In this process, the Subcommittee shall give priority to information needed on the population (or subpopulation) rather than to projects involving local flocks.

   Lead Agency/Group: Subcommittee

   Priority: 2

   Schedule: Ongoing.

2. Delineation of Population - The population affiliation of cranes known to nest in some areas in western Idaho, Oregon and eastern Washington is currently unknown (R. Drewien pers. comm.). Cranes from these locations should be banded and color marked to determine if all or a portion cranes are LCRVP cranes.

   Lead Agencies: Arizona Game and Fish Department

   California Department of Fish and Game

   Idaho Department of Fish and Game

U.S. Fish and Wildlife Service

Direccion General de la Fauna silvestre de Mexico

Priority: 2

Schedule: 1994 and ongoing

3. Annual Production Surveys - Annual recruitment surveys should be conducted on the winter range during late-November or early-December to determine annual reproductive success.

Lead Agencies: Arizona Game and Fish Department

California Department of Fish and Game

U.S. Fish and Wildlife Service

Priority: 1

Schedule: Ongoing

Annual Review

The Subcommittee shall meet annually or as needed to measure progress toward achieving the goal and objectives of this plan and to recommend revisions. For the Subcommittee to initiate effective management, representatives should inform the Subcommittee of local issues or problems which may pose a threat to the population or its crucial habitats. The Subcommittee shall report on accomplishments and shortcomings of the cooperative management efforts to the Pacific Flyway Council (through the Pacific Flyway Study Committee), those state and federal agencies having management responsibilities, and those agencies and organizations either interested in or cooperating in crane management.

Lead Agency/Group: Subcommittee

Priority: 1

Schedule: Annually (March meeting of the PFSC) or as needed.

VI. SUBCOMMITTEE COMPOSITION

The composition of the Subcommittee will be comprised of representatives from the states of Arizona, California, Idaho, Nevada and Utah and a representative for the Direccion General de la Fauna Silvestre de Mexico. The Subcommittee chairmanship will be held for a period of 2 years and rotated between Arizona and Nevada starting with Arizona on October 1, 1988.

VII. LITERATURE CITED AND SELECTED REFERENCES

Abbott, C.G. 1940. Notes from the Salton Sea, California. Condor 42:264-265.

Belding, L. 1890. Land birds of the Pacific district. California Acad. Sci. Occas. Papers 2:1-274.

Braun, C.E., R.C. Drewien, C.D. Littlefield, and L.H. Walkinshaw. 1975. Conservation Committee on status of sandhill cranes. Wilson Bull. 87(2):297-302.

Brown, D.E., Chairman. 1983. Pacific flyway management plan for the greater sandhill crane population wintering along the lower Colorado River Valley. U.S. Fish Wildl. Serv. Portland, OR. 26pp.

Brown, W.M., and R.C. Drewien. 1995 (In press). Marking power lines to reduce crane and waterfowl collision mortality in the San Luis Valley, Colorado. Wildl. Soc. bull. 23(2).

Cottam, C. 1936. Notes on the birds of Nevada. Condor 38:122-123.

Czaplewski, R.L., C.M. Crowe, and L.L. McDonald. 1983. Sample sizes and confidence intervals for wildlife population Ratios. Wildl. Soc. Bull. 11:121-128.

Drewien, R.C., R.J. Oakleaf and W.H. Mullins. 1976. The sandhill crane in Nevada. Pages 130-138 in J.C. Lewis, ed., Proc. Int. Crane Workshop. Oklahoma State Univ. Publ. Print., Stillwater.

Drewien, R.C., J.C. Lewis, 1987 status and distributuin of cranes in North America. Pages 469-477 in Archibald and R.F. Pasquier, eds. Proc. 1983 Int. Crane Workshop. Int. Crane Found.; Baraboo, WI.

Drewien, R.C., W.M. Brown, and W.L. Kendall. 1995. Recruitment in Rocky Mountain greater sandhill cranes and comparison with other crane populations. J. wildl. Manage. 59: in press.

Ellis, R. 1935. Bird records from northeastern Nevada. Condor 37:86-87.

Gabrielson, I.N. 1949. Bird notes from Nevada. Condor 51:179-187.

Grayson, A.J., J. Zantus and F. Bischoff. 1874. Birds of western and northwestern Mexico. Boston Soc. Nat. Hist. 2:265-319.

Grinnell, J. 1928. A distribution summation of the ornithology of the Lower California. Univ. California Publ. Zool. 32:1-300.

Hargrave, L.L. 1939. Bird bones from abandoned Indian dwellings in Arizona and Utah. Condor 41:206-210.

Henshaw, H.W. 1875. Report upon the ornithological collections made in portions of Nevada, Utah, California, Colorado, New Mexico and Arizona during the years 1871, 1872, 1873, and 1874. Pages 133-305 in Report upon geographical and geological explorations and surveys west of the 100th Meridian, Vol. 5. Dept. Army, U.S. Army Eng. Washington, D.C.

Herron, G.B., M.S. Rawlings and C.A. Mortimore. 1984. Popuation surveys, species distribution, and key habitats of selected nongame species. Nevada Dept. of Wildl. Job Progress Rep.; Project W-53-R, Study I, Jobs I through VII. 20pp.

Lamb, C. 1912. Birds of a Mohave Desert oasis. Condor 14:32-40.

Leopold, A. 1949. A Sand County almanac. Oxford Univ. Press, NY.
Lewis, J.C. ed. 1976. Proc. Int. Crane Workshop. Oklahoma State Univ. Publ. Print., Stillwater. 355pp.

Lewis, J.C., Chairman 1977. Sandhill crane. Pages 5-43 in G.C. Snderson, ed., management of migratory shore and upland game birds in North America. Int. Assoc. Fish Wildlife Agencies.

Lewis, J.C. ed. 1979. Proc. 1978 Crane Workshop. Colorado State Print. Serv., Ft. Collins. 259pp.

Linsdale, J.M. 1936. The birds of Nevada. Cooper Ornithol. Club 23. 145pp.

Littlefield, C.D. 1973. Report on sandhill cranes for Baja California, California, Oregon, Washington and Alaska. Sandhill Crane Comm. Rep., Unpubl. ms. 19pp.

Littlefield, C.D. 1976. Status of the Central Valley population of greater sandhill cranes, winter 1975-76. U.S. Fish Wildl. Serv., Malheur Nat. Wildl. Ref., Burns, OR. Unpubl. rep. 15pp.

Littlefield, C.D. 1982. The greater sandhill crane. Pages 163-166 in Crane Research Around the World. J.C. Lewis and H. Masatomi, eds. Int. Crane Found., Baraboo, WI.

Littlelfield, C.D. and S.P. Thompson. 1979. Status and distribution of the Central Valley population of greater sandhill cranes. Pages 113-120 in J.C. Lewis, ed., Proc. 1978 Crane Workshop, Colorado State Univ. Print. Serv., Ft. Collins.

Lumholtz, C. 1912. Travels in Arizona and Sonora. Reprint Rio Grande Press, Glorieta, NM.

Merns, E.A. 1890. Observation on the avifauna of portions of Arizona. Auk 70:45-55, 251-264.

Mullins, W.H. 1974. Summer food habits, chemical contaminants, and distribution of greater sandhill cranes. M.S. Thesis, Univ. Idaho, Moscow.

Mullins, W.H. and E.G. Bizeau. 1978. Summer foods of sandhill cranes in Idaho. Auk 95 (1):175-178.

Perkins, D.L. and D.E. Brown. 1981. The sandhill crane in Arizona. Arizona Game Fish Dept. Spec. Publ. 11. Phoenix 47pp.

Peters, J.L. 1925. Notes on the Taxonomy of Ardea canadensis, Linneus. Auk 42:120-122.

Phillips, A., J. Marshall and G. Monson. 1964. The birds of Ariz. Univ. Ariz. Press, Tucson.

Price, W.W. 1899. Some winter birds of the Lower Colorado Valley, Bull. Cooper Ornith. Soc. 1:89-93

Rawlings, M.S., R.D. Haley and L.A. Neel. 1986. Population surveys, species distribution, and key habitats of selected nongame species. Nevada Dept. Wildl. Job Progress Rep.; Project W-53-R-12, Study I, Jobs I through VI. 34pp.

Rawlings, M.S. 1987. Greater sandhill crane investigations. Nevada Dept. Wildl. Job Progress Rep.; Project W-53-R-13, Study I, Jobs IV . 15pp.

Ridgway, R. 1877. Ornithology (Part 3). Pages 303-669 in Report on the geological exploration of the 40th Parallel. U.S. Army Eng. Dept. 18 Washington, D.C.

Sheldon, C. 1979. The wilderness of desert bighorns and Seri Indians-the southwestern journals of Charles Sheldon. Arizona Desert Bighorn Sheep Soc. 177pp.

Stone, W. 1905. A collection of birds and mammals from the Colorado delta, Lower California. Proc. Acad. Nat. Sci. Philadelphia 47:676-690.

Sudgen, J.W. 1938. The status of the sandhill crane in Utah and southern Idaho. Condor 40:18-22

Van Rossen, A. 1911. Winter birds of the Salton Sea region. Condor 13:129-137.

Van Rossen, A. 1945. A distributional survey of the birds of Sonora, Mexico. Louisiana St. Univ. Zool. Occas. Papers, No. 21 379pp.

Will, G., Chairman. 1987. Management plan of the Pacific and Central flyways for the Rocky Mountain Population of greater sandhill cranes. U.S. Fish Wildl. Serv. Portland, OR. and Denver, CO. 57pp.

Witzenhman, J., J.P. Hubbard and K. Kaufman. 1977. Southwest Region Amer. Birds 31(3):359.

APPENDIX A

Minimum number of individual cranes marked in Nevada observed by location from 1984 to 1987 (Rawlings et al. 1987).

Location Observed	Trap Location	Minimum Number of Marked Individuals
Spring Stopover		
Lund, NV	Ruby Valley	3
	Lamoille Valley	8
	Lund, NV	6
Summer Range		
Ruby Valley, NV	Ruby Valley	2
	Lamoille Valley	3
	Lund, NV	3
Lamoille, NV	Ruby Valley	1
	Lamoille Valley	5
	Lund, NV	4
Mary's River, NV	Lamoille Valley	1
North Fork, NV	Lund, NV	1
Boise Natl. Forest, ID (Bruce Meadow)	Lund, NV	1
Fall Migration		
Alamosa, CO	Lund, NV	1
Key Pittman WMA, NV	Lund, NV	1
Winter Range		
Brawley, CA	Lamoille Valley	1
Colorado River IR	Ruby Valley	1
	Lund, NV	
Cibola NWR, AZ	Ruby Valley	2
	Lamoille Valley	6
	Lund, NV	3
Gila River, AZ	Ruby Valley	3
	Lamoille Valley	5
Polvadera, NM	Lund, NV	2[a]
Bosque del Apache NWR, NM	Lund, NV	2[a]

[a] At least 1 of these cranes wintered in both areas in successive years.

APPENDIX B

Peak numbers of cranes observed at the Lund, Nevada spring stopover from 1976 to 1987 (Nevada Department of Wildlife records.)

Year	Number Observed	Date	Number of Count Days
1976	497	Feb. 27	3
1977	850	Feb. 28	7
1978	485	Feb. 28	2
1979	768	Mar. 6	4
1980	1028	Mar. 6	6
1981	1094	Mar. 5	2
1982	324	Mar. 2	1
1983	1076	Mar. 1	5
1984	1459	Feb. 28	4
1985	1427	Mar. 6	20
1986	340	Feb. 20	24
1987	319	Feb. 28	5
1993	376	Mar. 11	1

APPENDIX C

Summary of some winter observations of Lower Colorado River Valley Sandhill cranes.

Location	Number of Cranes	Date	Source
ARIZONA			
Colo. R. Indian Res.	210	2-28-61	L.D. Hatch (Phillips et al. 1964)
	500	1968	R. Kinghorn (Drewien et al. 1976)
	160	1-24-70	C.D. Littlefield
	800	1970	C.D. Littlefield (Lewis, 1977)
	347	2-02-71	C.D. Littlefield
	576	2-05-72	C.D. Littlefield
	1,100	1973	R. Kinghorn (Drewien et al. 1976)
	571	1-31-76	C.D. Littlefield
	1,500	1976	K.V. Rosenberg (Witzeman et al. 1977)
	1,079	12-29-78	D.E. Brown, D.L. Perkins
	83	2-05-79	D.L. Perkins
	1,349	1-09-80	D.L. Perkins
	416	1-13-86	M.S. Rawlings
Cibola NWR	61	12-08-66	Cibola NWR Narrative Report
	150	12-1967	Cibola NWR Narrative Report
	20	1-1968	Cibola NWR Narrative Report
	42	11-1968	Cibola NWR Narrative Report
	121	11-21075	Cibola NWR Narrative Report
	120	12-10-75	Cibola NWR Narrative Report
	40	12-13-75	Cibola NWR Narrative Report
	250	11-26-76	Cibola NWR Narrative Report
	350	12-1976	K.V. Rosenberg
	50	2-1977	K.V. Rosenberg
	258	12-28-78	D.E. Brown, D.L. Perkins
	72	2-04-79	D.L. Perkins
	39	1-10-80	D.E. Brown, D.L. Perkins
	317	10-20-80	Cibola NWR (Perkins and Brown, 1981)
	270	2-04-81	Cibola NWR (Perkins and Brown, 1981)
	511	1-5-83	W. Martin
	350	1-6-86	W. Martin
	433	1-6-87	W. Martin
	584	1-2-88	W. Martin
	983	1-2-92	W. Martin
	800	1-5-93	W. Martin
	1,100	1-4-94	W. Martin
	481	1-14-86	M.S. Rawlings

Location	Number of Cranes	Date	Source
Imperial NWR	2	1-23-70	C.D. Littlefield
Gila R. (Between Buckeye and Gila Bend)	15	12-18-49	L.D. Yeager (Phillips et al. 1964)
	85	2-17-50	V.H. Householder (Phillips et al. 1964)
	200	2-18-52	V.H. Householder (Phillips et al. 1964)
	18	2-04-56	V.H. Householder (Phillips et al. 1964)
	50	1970	C.D. Littlefield
	12	11-21-78	D.E. Brown, D.L. Perkins
	51	12-02-78	D.E. Brown
	44	1-03-79	D.E. Brown
	54	1-25-80	C.M. Copley
	79	2-06-81	D.L. Perkins
	155	1-14-86	M.S. Rawlings
	120	1-4-88	P. Smith
	111	12-30-88	P. Smith
	115	1-2-91	P. Smith
	140	12-30-91	P. Smith
	132	12-31-92	P. Smith
	78	12-29-93	P. Smith
CALIFORNIA			
	60	12-1951	SS NWR Narrative Report
Brawley Area	12	10-22-65	SS NWR Records
	52	12-18-69	C.D. Littlefield
	40	1-24-70	C.D. Littlefield
	49	1-24-71	C.D. Littlefield
	35	11-24-71	C.D. Littlefield
	32	10-3-75	SS NWR Records
	82	12-4-75	SS NWR Records
	77	1-31-76	C.D. Littlefield
	128	2-03-79	D.L. Perkins
	139	12-29-79	A. Metcalf (Perkins and Brown, 1981)
	205	1-05-81	A. Metcalf (Perkins and Brown, 1981)
	253	1-16-86	M.S. Rawlings
	290	12-1989	SS NWR (E. Clark Bloom)
	100	10-4-91	SS NWR (E. Clark Bloom)
	252	11-15-91	SS NWR (E. Clark Bloom)
	210	11-11-92	SS NWR (E. Clark Bloom)
	229 (30 lesser)	11-23-92	SS NWR (E. Clark Bloom)

Location	Number of Cranes	Date	Source
	299	11-30-92	SS NWR (E. Clark Bloom)
	295 (45 lesser)	12-9-92	SS NWR (E. Clark Bloom)
	157	11-6-93	SS NWR (E. Clark Bloom)
	83 (17 lesser)	11-21-93	SS NWR (E. Clark Bloom)
	329	2-12-94	SS NWR (E. Clark Bloom)
	4	2-26-94	SS NWR (E. Clark Bloom)
Salton Sea NWR	4	1-30-46	Salton Sea NWR Narrative Report
	3	1-13-50	SS NWR Narrative Report
	4	11-25-50	SS NWR Narrative Report
	90	3-1951	SS NWR Narrative Report
	4	4-10-51	SS NWR Narrative Report
	4	12-25-51	SS NWR Narrative Report
	5	12-1951	SS NWR Narrative Report
	5	2-13-52	SS NWR Narrative Report
	5	3-03-52	SS NWR Narrative Report
	14	3-14-52	SS NWR Narrative Report
	5	12-18-52	SS NWR Narrative Report
	9	1-27-53	SS NWR Narrative Report
	20	2-03-53	SS NWR Narrative Report
	3	4-02-53	SS NWR Narrative Report
	4	Fall 1953	SS NWR Narrative Report
	3	10-12-53	SS NWR Narrative Report
	3	1-09-55	SS NWR Narrative Report
	2	2-18-55	SS NWR Narrative Report
	5	3-19-55	SS NWR Narrative Report
	13	10-21-55	SS NWR Narrative Report
	27	10-22-55	SS NWR Narrative Report
	19	11-01-55	SS NWR Narrative Report
	5	12-01-55	SS NWR Narrative Report
	1	11-28-56	SS NWR Narrative Report
	4	12-10-56	SS NWR Narrative Report
	7	1-20-57	SS NWR Narrative Report
	1	3-01-57	SS NWR Narrative Report
	7	10-22-65	SS NWR Records
	18	10-25-65	SS NWR Records
	2	11-11-65	SS NWR Records
MEXICO			
Ca. 25 mi. south of Yuma	135	12-1952	SS NWR Narrative Report
South of Mexicali	10	12-1953	SS NWR Narrative Report

APPENDIX D

Number of known breeding pairs and largest number of cranes observed in northeastern Nevada April-August, 1983-1986, by location (Rawlings 1987 and Bradley 1993)

Location	Breeding Pairs[a]		Largest Number Observed	
ELKO COUNTY	1983-86	1993	1993-86	1993
Humbolt River	2	6	27	14
South Fork Humbolt River	NS	3	NS	6
Upper North Fork Humbolt River	12	6	63	22
Mary's River	2	5	19	12
Susie Creek	2	NS	3	NS
Salmon Falls Creek	1	4	13	10
Horse Creek	1	NS	2	NS
Thousand Spring Creek	0	NS	10	NS
Penrod Creek	1	NS	2	NS
Goose Creek	1	NS	2	NS
Bruneau River	1	2	2	5
Yankee Bill Creek	1	NS	2	NS
Independence Valley & South Fork Owyhee River	15	7	116	43
Ruby Valley	25	30	182	60
Huntington Valley	7	13	37	38
Lammoille Valley	4	NS	59	NS
Starr Valley	6	3	12	11
Squaw Valley	0	1	2	8
Metropolis	2	NS	4	NS
Secret Valley	1	5	13	12
Deep Creek	NS	1	NS	15
Clover Valley	NS	0	NS	0
Owyhee River	NS	3	NS	10

APPENDIX D (Cont.)

Number of known breeding pairs and largest number of cranes observed in northeastern Nevada April-August, 1983-1986, by location (Rawlings 1987 and Bradley 1993)

Location	Breeding Pairs[a]		Largest Number Observed	
WHITE PINE COUNTY	1987	1993	1987	1993
Steptoe Valley	0	NS	17	NS
North Spring Valley	0	4	8	9
South Spring Valley	1	NS	2	NS
Newark Valley	3	1	13	7
LINCOLN COUNTY				
Lake Valley	1	0	0	0
LANDER COUNTY				
Reese River	NS	0	NS	2
Humboldt River	NS	1	NS	2
HUMBOLT COUNTY				
Little Humbolt River	NS	0	NS	2
TOTAL	95	96	610	288

[a] Based upon presence of a nest or young

APPENDIX E

Observations of summer-resident greater sandhill cranes in Utah, May-August, 1977-87, which probably contribute to the Lower Colorado River Valley Population (Utah Div. Wildl. Resources records).

Location	Number of Cranes	Date	Source
Along Goose Creek, Snake River Drainage	2 adults	1977	Ken Kimber-UDWR
Lynn Reservoir and Junction Creek, Raft River Drainage	2 adults	7-1977	Ken Kimber-UDWR
Raft River Narrows Raft River Drainage	2 adults 1 local imm.	6-16-81	Phil Wagner-UDWR
Dahar and Cotton Cr.	2 adults	5-22-86	John Kimball-UDWR
Locomotive Springs Waterfowl Management Area	2 adults 1 local imm.	7-08-86	Sam Manes-UDWR
Locomotive Springs Waterfowl Management Area	2 adults	5-30-87	PaulChristiansen-UDWR
Lyn Reservoir and South Fork Junction Cr. Raft River Drainage	2 adults 1 local imm.	1987	Sam Manes-UDWR

APPENDIX F

Recruitment estimates and counts of LCRVP of greater sandhill cranes, 1989-94.

	Colorado River Indian Lands				Cibola NWR				Total		
Year	(Date)	Cranes	Young (%)	Lesser	(Date)	Cranes	Young (%)	Lesser	Cranes	Young (%)	Lesser
1989	(11/28)	884	55 (6.3)	8	(11/27	442	16 (4.7)	3	1326	71 (5.4)	11
1990	(10/26)	287	15 (5.2)	0	(10/26	600	12 (2.0)	0	887	27 (3.0)	0
1991	(10/24)	337	8 (2.3)	1	(10/23	224	3 (1.3)	1	561	11 (2.0)	2
1992	(11/24)	230	7 (3.0)	0	(11/24	404	6 (1.5)	0	634	13 (2.1)	0
1993	No Survey	No Survey	No Survey	No Survey	(12/04)	387	33 (8.5)	No Data	387	33 (8.5)	No Data
1994	(11/22)	786	No Data	No Data	(11/22)	900	21[1](2.9)	5	987[1]	28(2.8)	5
1995											
1996											
1997											
1998											
1999											
2000											

[1]. 725 and 262 cranes were classified at Cibola and in the Imperial Valley, CA, respectively, including 21 and 7 young-of-the-year.