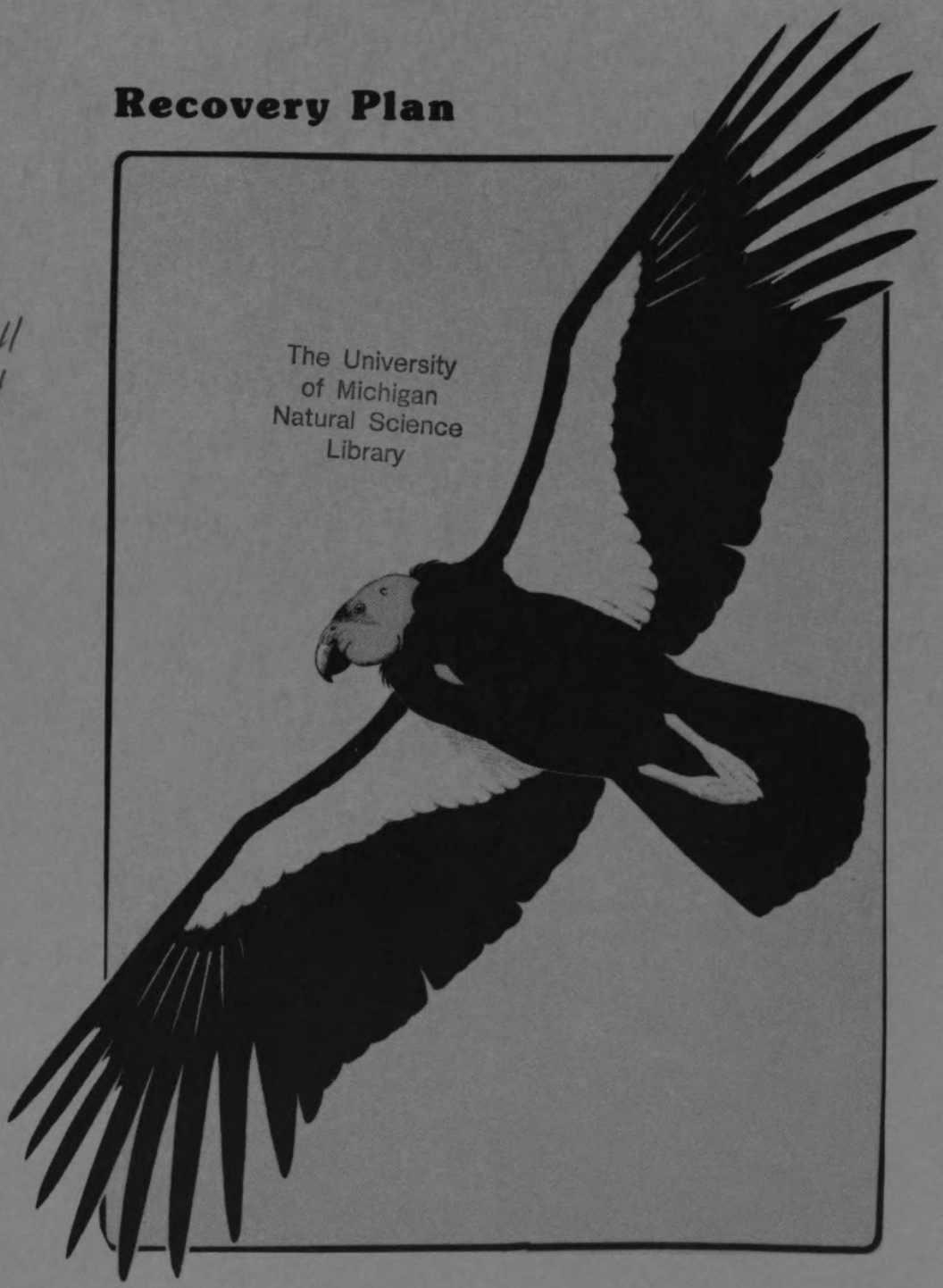
Recovery Plan



CALIFORNIA CONDOR

REVISED

CALIFORNIA CONDOR RECOVERY PLAN

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REVISED

CALIFORNIA CONDOR RECOVERY PLAN

Prepared by the

California Condor Recovery Team

June 1984

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Revised

California Condor Recovery Plan

Executive Summary

1. Point or condition when species can be considered for reclassification to threatened status? When a wild, self-sustaining population of about 100 individuals, including about 60 adults, is established in the wild.

2. What must be done to reach threatened status? Protect existing habitat and habitat for population expansion, establish genetically viable captive population to provide captive-reared birds for release to the wild, minimize or eliminate manageable mortality factors, and enforce area closures, laws, and regulations.

3. What specifically must be done to meet the needs of #2? Identify habitat requirements and mortality factors, determine amount of habitat needed, determine best means of protection and implement same, ensure adequate captive breeding program, provide for release of captive-reared condors to augment the wild population, and maintain and improve conservation education programs.

4. What management maintenance needs have been identified to keep species recovered? Preservation of habitat adequate to support a self-sustaining condor population in the wild.

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PART I. INTRODUCTION

Brief Overview

The California condor (Gymnogyps californianus) is one of the rarest bird species in North America, numbering fewer than 20 individuals in the wild in 1984. Long recognized as a vanishing species (Cooper 1890, Koford 1953, Wilbur 1978), the condor was given legal protection by the State of California around the turn of the century (Wilbur 1978). In 1953, the California Fish and Game Commission expressly forbade the taking of condors for any purpose. In 1967, it was included on the first official Federal list of endangered species, and in 1971 it was placed on California's first State endangered species list. The Endangered Species Act of 1973 made the taking of any endangered species a Federal offense and imposed stringent requirements on Federal agencies to insure that none of their actions would jeopardize the continued existence of endangered species.

Despite decades of conservation efforts by many government agencies and private organizations, the species declined to perilously low numbers by the 1970s (Wilbur 1978). During the past decade, the California Condor Recovery Team has developed recommendations for actions necessary to halt the decline and to identify what is necessary to restore the species to non-endangered status.

The Team prepared the first California Condor Recovery Plan in 1974 (U.S. Fish and Wildlife Service 1975) and revised it in 1979 (U.S. Fish and Wildlife Service 1980) in recognition of the need for a more intensive program, including the implementation of a captive breeding program and radio-telemetry studies. Significant progress has been made in the recovery effort since 1979.

This, the third edition of the California Condor Recovery Plan, incorporates information obtained from this intensive program and updates recommended recovery program actions. It includes information on the research program up to March 1984.

Taxonomy and Paleontology

The California condor is a member of the family Cathartidae or New World vultures, a family of seven species including the closely related Andean condor (*Vultur gryphus*) and the sympatric turkey vulture (*Cathartes aura*). The inclusion of the Cathartidae in the order Falconiformes is uncertain. Taxonomists now believe that New World vultures should be included in the order Ciconiiformes (Rea 1983).

The fossil record of the California condor goes back only about 100,000 years, making it a young species by avian standards (Brodkorb 1964). At the La Brea tar pits in Los Angeles, condor remains are found with many contemporary species such as robins (*Turdus migratorius*), scrub jays (*Aphelocoma coeorulescens*), and mourning

doves (Zenaidura macroura) (Howard 1962). Condor remains reveal that it once ranged over much of western North America, from British Columbia to northern Baja California and east to Florida (Brodkorb 1964, Wilbur 1978). Condors nested in west Texas, Arizona, and New Mexico until about 2,000 years ago (Wetmore and Friedmann 1933). Populations persisted in the Pacific Coast region, especially in the Columbia Gorge area until the 1800s, and northern Baja California until the early 1930s (Koford 1953, Wilbur 1973, Wilbur and Kiff 1980).

Physical Characteristics

Condors are among the largest flying birds in the world. Adults weigh approximately 9 kg and have a wing span up to 2.9 m. Adults are black except for white underwing linings and edges of the upper secondary coverts. The head and neck are mostly naked; the skin on the neck area is gray, grading into various shades of yellow, red, and orange on the head. Males and females cannot be distinguished by size or plumage characteristics. Five or six years are required for individuals to attain adult characteristics (Koford 1953). Wilbur (1975) observed that birds 5 years old are essentially indistinguishable from adults, and most earlier subadult age classes cannot be separated with certainty. Among subadults, the age class that can be most reliably distinguished is the so-called "ring-necked" stage of birds from 3 to 4 years old. The heads of juveniles (up to 3 years old) are grayish-black, and the wing linings are variously mottled or completely dark. From the "ring-necked" stage, the grayish-black head variably fades to the adult head color.

Life History

Habitat Requirements

The California condor has three basic habitat needs: nesting sites, roosting sites, and feeding habitat.

Nesting areas - Condors nest in various types of caves, crevices, and potholes in isolated areas of the Coast and Transverse Ranges. Judging from historical records, suitable locations were found scattered throughout the coastal mountains. Two nests have been recorded in giant sequoias in the Sierra Nevada, Tulare County, and this may be a regular occurrence for condors resident in this area.

In the past 15 years condors have nested in San Luis Obispo, Ventura, Los Angeles, Santa Barbara, and Tulare Counties. The Sespe-Piru area supported the largest nesting numbers of condors. Sibley (1969) wrote: "The importance of the Sespe-Piru area to condor survival cannot be overstated. This has been the major center for the condor population at least since 1960. It contains most of the nesting sites and winter roosts. It is a unique area not duplicated elsewhere in the condor's present or past range. Adequate reproduction can be assured only by avoiding adverse modifications of this area." The Sespe-Piru area continues to be important to condor nesting, but other areas also are of importance.

Human disturbance normally will not cause condors to abandon their nests, in the sense that they will fly from nest sites and not return. In fact, some nests have succeeded in spite of repeated disturbance (Koford 1953, Sibley 1969). Nevertheless, human disturbance may discourage condors from nesting in otherwise suitable habitat and may cause nest failure. This may also reflect an increased opportunity for human caused mortality of condors where disturbance is greater.

Sibley (1969) found a correlation between the location of recently used condor nest sites and the location and magnitude of human activity. The greater the disturbance, either in frequency or noise level, the less likely condors are to nest nearby.

Nests may be found closer to lightly used roads and intermittently used foot trails than to regularly travelled routes or oil well operations. Condors have nested very near intermittently used foot trails.

Roosting areas - California condors often have traditional roosting sites near important foraging grounds. A typical site has rock cliffs, dead snags, or stands of live conifers and is in an isolated area. Foraging condors may utilize a wide variety of less typical sites, such as large oak trees and rock outcroppings. Roosting sites are of major importance in the life of the condor. Depending upon weather conditions and the hunger of the bird, a condor may spend many hours perched at a roost.

Although condors commonly remain in roosts until mid-morning, and generally return in mid- to late afternoon, it is not unusual for a bird to stay perched throughout the day. While at roost, condors devote considerable time to preening and other maintenance activities. Roosts may also serve some social functions, as it is common for two or more condors to roost together and to leave a roost together.

Condors apparently will tolerate more disturbance at a roost than at a nest. One traditional roost is within 1 km (0.6 mi) of radio towers, a fire lookout, and summer homes, although the intervening terrain is dense woods through which few people pass. More typically, roosting sites and nesting sites are susceptible to similar disturbance threats, and their preservation requires isolation from human intrusion. There may be adaptive as well as traditional reasons for condors to continue to occupy a number of widely separated roosts, such as reducing food competition between breeding and non-breeding birds.

Feeding habitat - Most condor foraging occurs in open grassland and oak-savannah habitats, primarily in the foothills surrounding the southern San Joaquin Valley. Although the condor is not so ungainly on the ground as portrayed in popular literature, it does require fairly open terrain for feeding. This ensures easy take-off and approach and makes food finding easier, since condors apparently depend on sight rather than smell to locate food. It appears likely that condors regularly locate food by the presence of other birds, such as eagles and ravens. Because of their great mobility, condors

may forage over great distances. It is not uncommon for a condor to travel 80-160 km (50-100 mi) per day.

Reproductive Biology

Courtship and nest site selection by breeding condors occur from December through the spring months. Condors lay a single egg between late January and early April; it is incubated by both parents and hatches after about 56 days. Both parents share in feeding the nestling. Feeding usually occurs daily for the first 2 months, then gradually diminishes in frequency. The chick takes its first flight at about 6 months of age, but may not become fully independent of its parents until the following year. Parent birds occasionally continue to feed the chick even after the young bird has begun to make longer flights to foraging grounds.

Because of the long period of parental care, it has been assumed that condor pairs normally nest every other year. However, this pattern seems to vary depending on the time of year that the nestling fledges and on food availability. For example, if the nestling fledges in late summer or early fall, its parents may nest the following year. But consecutive-year nesting likely will result in the egg being laid late during the second year.

Condors can lay replacement eggs if their first (Harrison and Kiff 1980), or even their second egg is lost (Snyder and Hamber ms.). Whether they lay a replacement egg may depend on the time of year, at

what stage of incubation the egg is lost, individual variation, and perhaps genetic factors. In Andean condors and other captive cathartids, some females apparently will lay three or even four clutches in a season while others will lay only two.

Because subadult birds have never been observed as members of breeding pairs, Koford (1953) concluded that age at first reproduction in California condors is at least 6 years. But the age is more likely to be at least 8 years, based on knowledge of the age at first breeding among other large bird species with long reproductive periods, as well as the fact that a California condor in the National Zoological Park was 12 years old when it laid its first egg (Dixon 1924). A condor trapped in 1982 as a "ring-necked, grayheaded bird" and estimated at the time to be between 3 and 4 years of age appeared to be in almost full adult plumage 1 year later. At best, then, our estimate of the mean age is only an intelligent guess; unfortunately, an error of only 1 year profoundly affects our ability to assess accurately whether condor reproduction is sufficient to maintain the population (compare Cole 1954). Furthermore, the key element is not the youngest age at which reproduction occurs among the condors, but the average age of the first successful reproduction. In most bird species for which an analysis of breeding success in relation to age has been possible, there is significantly lower success in the first breeding effort than in later efforts (Lack 1966).

Feeding Habits

California condors feed only on the carcasses of dead animals. Historically, this probably included deer, elk, pronghorn, whales, sea lions, and smaller mammals. Although many species are eaten, Koford noted in 1953 that domestic cattle constituted the most important food source by far. Cattle are even more important today than during Koford's research period, because domestic sheep have declined drastically in California (California Crop and Livestock Reporting Service 1970). In one important condor foraging area, periods of greatest condor use correlated with the period of cattle abortions and births (Johnson et al. 1983). Mule deer (Odocoileus hemionus), although possibly a "preferred" food (Koford 1953), tend to drift toward canyon bottoms to die (Taber and Dasmann 1958, Blong 1954), where steep terrain and brush interfere with condor foraging. Carcasses under brush are hard to see, and condors apparently cannot locate food by odor (Beebe 1909, Stager 1964). Thus, although deer may be important as food in some locations or during some seasons, they may have never been a major food item for condors since other large herbivores were abundant until the introduction of cattle. Expansion of the deer population in some areas (Miller et al. 1965) and apparent declines in other areas may not have altered condor food supplies overall. Ground squirrels (Spermophilus beechyi) killed by animal damage control programs have been locally important food sources in the past (Koford 1953) but are now seldom available in significant numbers. All things considered, an evaluation of condor food supply must consider cattle

availability first, followed by other sources to the extent of their quantity, periodicity, and dependability within the condor range.

Population Trends

The most defensible estimates of past population size of the condor are those of Wilbur (1980), who suggested 50-60 birds for 1968 and 25-35 birds for 1978. Recent photographic censusing of the population suggests a population of only 20-25 birds for 1982 (Snyder and Johnson ms.) and 18-20 birds for 1983 (Snyder pers. comm. U.S. Fish and Wildlife Service, Ventura, CA). Taken together, these estimates indicate a net loss averaging about two birds per year in the wild population during the last decade. If this rate were to continue, extinction in the wild would come in about a decade. The estimate of 60 birds for the late 1930s and 1940s by Koford (1953) and the estimate of 40 birds for the early 1960s by Miller et al. (1965) were probably too conservative, judging from comparisons of flock sizes seen in various areas over the years. These older estimates, together with the estimates for 1982 and 1983, project to extinction in the wild in about 2 decades. Since the remnant population may become effectively extinct on genetic grounds long before the last bird perishes, the number of years before recovery becomes impossible in the wild could be much less than a decade unless the rate of mortality is decreased and/or birds are released from captivity to bolster the wild population.

In 1982 and 1983 eight condors were brought into captivity to join Topatopa (a captive since 1967). Thus, the total number of condors apparently increased slightly in 1983. The large number of captives taken in the past 2 years resulted from a deliberate attempt to induce multiple-clutching and annual-nesting in the wild population.

Although the wild population has been producing about two fledglings per year in recent years, the production in 1983 was six fledglings, all of which were taken captive. Even greater increases in production are theoretically possible.

With reasonably good survival of the remaining wild pairs, continued multiple-clutching and annual-nesting may allow establishment of a viable captive population and initiation of a release program of captives within a few years. Conceivably, such a release program might bolster the wild population sufficiently to temporarily arrest or even reverse the decline. By about 1990, most birds held as permanent captives will become old enough to begin breeding and producing progeny for release to the wild.

Reasons for Decline

Causes of the condor population decline have probably been diverse. However, little hard information is available to document precise causes. Review of historical and recent reproduction of the species suggests that 50 percent nesting success has been usual over the past

40 years, a rate comparing favorably with that found for several species of African vultures (Mundy 1982). Thus, although the nesting success of the condor has not been particularly high, no clear evidence shows that it is abnormally low or has changed greatly in recent decades. Unless the fraction of the adult population that attempts to breed has increased greatly in recent years (most adults are currently members of breeding pairs), it appears that the decline may have resulted more from mortality than from reproductive factors (Snyder 1983). However, productivity may have been adversely affected during periods of DDT use in California, and continues to be a concern. Kiff et al. (1979) showed that condor eggs contaminated with DDE have thinner shells. This thinness may have caused increased breakage or embryonic death and, hence, lower productivity.

Verner (1978) estimated that a stable condor population would not be possible with mortality rates over 5 percent annually in adults and 15 percent annually in immatures. Rates of decline and reproduction in the last 2 years (1982-83) suggest an overall mortality rate exceeding 15 percent for all ages considered together, again suggesting that the major problems have been ones of mortality rather than reproduction.

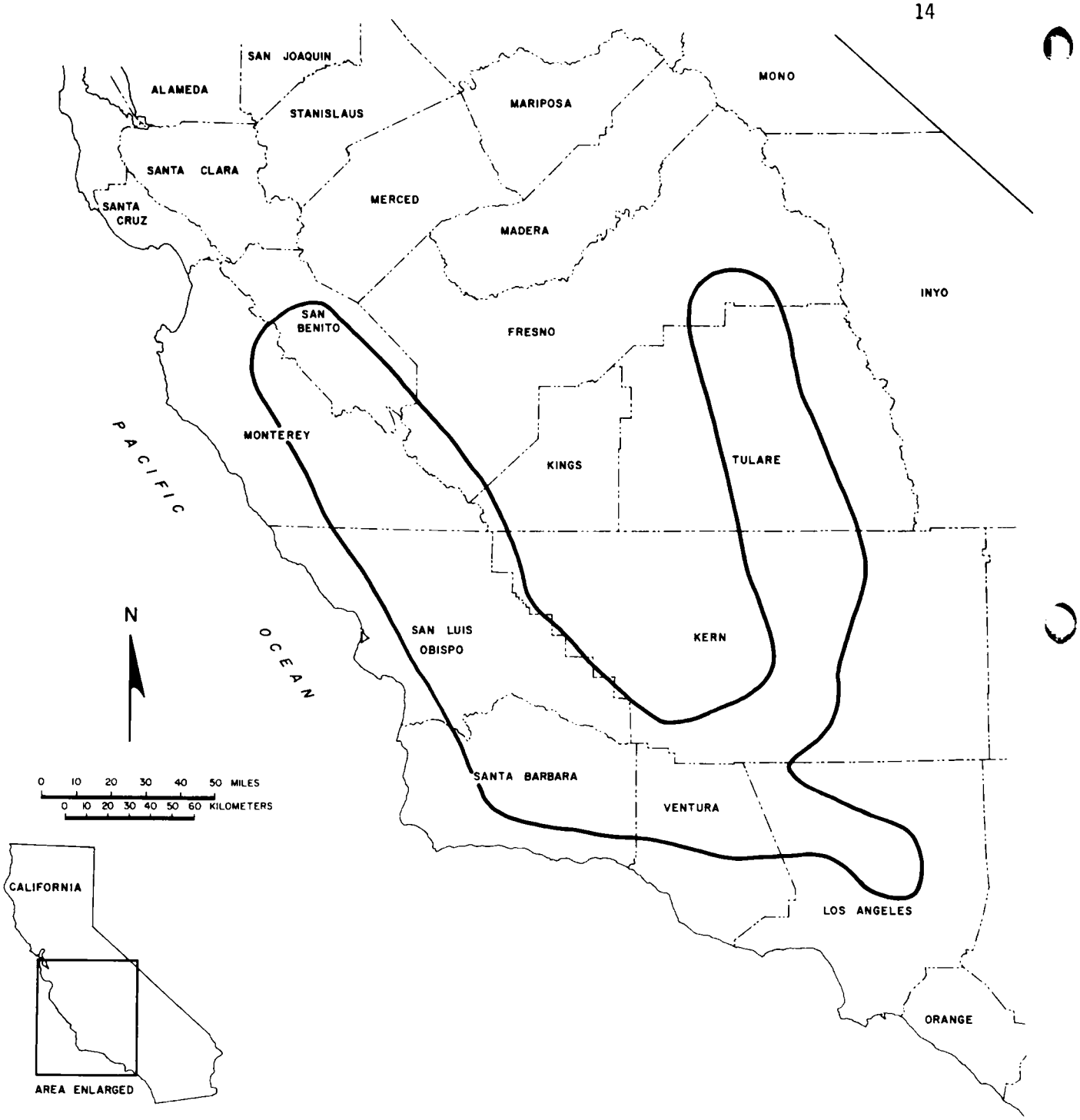
Adult California condors have no known regular natural enemies, and judging from zoo records of condors living to be 30 to 45 years of age, they potentially have a long life. Some former causes of mortality--egg and skin collecting, collecting for quills, Indian ceremonial use, and capturing for sport--are illegal now and are no

longer threats to condors. Specific causes of mortality include shooting, lead poisoning, and collision. Other mortality factors may include various forms of poisoning (DDT, cyanide, strychnine, compound 1080), becoming fouled in oil sumps, and disease. Whether certain of these potential causes have been dominant in the decline is unknown. Relatively few condors have been found dead over the years, and causes of death have been determined in only a few of these cases (see Miller et al. 1965, Wilbur 1978). Moreover, they may represent a biased sample of birds dying primarily from certain causes, such as shooting. A truly definitive assessment of causes of mortality may only be achieved through extensive radio-telemetry studies.

Current Range

Data on locations and movements of condors used in developing this section were limited to those collected between 1980 and 1984. These data were obtained from the radio-telemetry program, the analysis of flight photographs of known condors, and from hundreds of well-documented condor sightings collected from many sources. Figure 1 depicts the current condor range as now perceived, although condors periodically wander outside of this range. For detailed information on the historical condor range, the reader should refer to Wilbur (1978).

Recent studies show that all remaining wild California condors are a single population of birds. So far as can be determined, every condor



Range of the California Condor
Figure 1

in the wild population encounters most, if not all, other wild condors many times during the course of a year. Immature condors seem to be especially mobile. For example, during the first 12 months following its release, a radioed immature used foraging and roosting sites in five different counties, in both the coastal and inland mountain ranges.

The telemetry program has also shown that condors are capable of sustained flight speeds of between 70 and 95 km per hour (45 and 60 mi per hour), and a maximum speed of approximately 125 km per hour (80 mi per hour). Condors may fly up to 225 km (140 mi) per day on flights between roosts and foraging grounds or in shifting from one part of the range to another.

The wide-ranging flights of condors are explained in part by their feeding habits. Condors may shift from one primary foraging region to another several times per year. Depending upon whether a bird also shifts its roosting sites (which may not be the case for pairs with active nests), each change between foraging regions usually requires changes in the direction and distance of daily flights. In addition, because non-nesting condors seem to feed only 1 to 3 days per week, a condor may spend non-feeding days in wide ranging flights over one or more foraging grounds. This behavior may be a useful means of locating carcasses in advance of the next feeding.

Almost all flights by condors, whether covering long distances or not, follow routes over the foothills and mountains bordering the southern

San Joaquin Valley. It is rare for a condor to cut a corner by passing over the flat, agricultural floor of the Valley. Thus the likely route for a bird starting from the coastal mountains of Santa Barbara County on its way to foraging grounds in Tulare County would be to cross northern Ventura County, pass through the Tehachapi Mountains in southern Kern County, then turn north to pass closely by Breckenridge Mountain, and enter Tulare County somewhere between the Greenhorn Mountains and Blue Mountain. Where flat, agricultural regions are much less extensive, such as the Cuyama Valley in Santa Barbara and San Luis Obispo Counties, condors freely pass high above enroute to foraging grounds.

Nesting Range

Although potential (and apparently suitable) nesting habitat still remains over a relatively large geographical region of coastal and interior mountains in central and southern California, the present nesting range is quite limited. All but one nest site known to be active since 1979 have been in a narrow belt of chapparal and coniferous forested mountains from central Santa Barbara County across northern and central Ventura County to northwestern Los Angeles County. The total area is approximately 90 km (56 mi) from west to east, only about 15 km (9 mi) from north to south, and entirely within the boundaries of the Los Padres and Angeles National Forests. A pair of condors was found in March 1984 nesting in a giant sequoia in Tulare County. This discovery indicates that they may have been

nesting in this area over the years since the new nest is only a few miles from a giant sequoia nest active in 1951.

Since the status of some adult condors in the wild population remains unknown, it is possible that other nesting sites are active.

Foraging Range

The principal foraging regions used by condors since the late 1970s have been the foothills bordering the southern San Joaquin Valley and axillary valleys in San Luis Obispo, Santa Barbara, Kern, and Tulare Counties. Typically, foraging sites are in grasslands or oak-savannah regions at lower elevations than most roosting and nesting sites. The important foraging areas are primarily private grazing lands.

In San Luis Obispo County condors forage in the eastern part of the county, generally east of the Los Padres National Forest boundary and west of the Temblor Mountains. Rangelands along either side of the entire length of San Juan Creek may be important to condors, although most recent foraging flights by radioed condors were to the upper drainage, south of Highway 58. Further south, the Carrizo Plain, Panorama Hills, and the Elkhorn Plain in the region between the Caliente Mountains and the Temblors are all important foraging areas. Less frequently, condors still find food in the Cuyama Valley.

Foraging in Santa Barbara County is mainly to the north in portions of the Cuyama Valley and, occasionally, on potreros along the ridge line

of the Sierra Madre Mountains. The nesting pair in Santa Barbara County also forages to the south into the Santa Ynez Valley, mainly along the northern portions as far west as the Los Olivos area and the Zaca Creek drainage.

In Kern County condors forage extensively in the foothills adjacent to the northern boundary of Los Padres National Forest, to Reyes Station in the west, to the Pleito Hills west of Interstate Highway 5, and eastward throughout much of the region from the Tehachapi Mountains north to the slopes of Cummings Mountain. This entire region, like the similar foraging country in the Carrizo and Elkhorn Plains, is relatively close to most nesting sites; thus, it is of prime importance to the nesting pairs.

Another major foraging region in Kern County is the foothill rangelands around Glennville. There, condors roost primarily on National Forest lands in the Greenhorn Mountains and forage daily in the Cedar Creek and upper Poso Creek drainages, as far west as Blue Mountain and the old Granite Station crossroads south of Woody. This foraging region may be of special importance to immature and non-mated adult condors between late fall and late spring. It is used by one nesting pair year around.

The same foothill foraging zone continues north to central Tulare County, although condor activity in Tulare seems to be on a somewhat different seasonal schedule than in northern Kern. In Tulare County condors forage extensively through the oak-savannah and grassland hill

country north from the Kern border and west of the National Forest boundary, including the Tule River Indian Reservation. As in northern Kern, important roosting sites are to the east on higher slopes in Sequoia National Forest and on higher peaks within the foraging zone, including Blue Ridge. Condors have recently foraged as far north as the Lake Kaweah region, with the White River, Deer Creek, Lake Success, and Yokohl Valley areas being of special importance.

Although these foraging regions have been identified as being important to condors since 1980, they should not be considered as all inclusive. Like most scavenging birds, condors are opportunistic. Through the course of a year they will feed on carcasses found in many locations. Condors still occasionally feed at U.S. Fish and Wildlife Service (USFWS) baiting stations on Hopper Mountain National Wildlife Refuge in southeastern Ventura County, and they may be expected to use local abundances of foods almost anywhere within their normal range. Condors are still occasionally reported in areas of this former range, especially north in the coastal range to Monterey and San Benito Counties, but also east into the San Gabriel Mountains in Los Angeles County. As additional condors are provided with radio transmitters, other major foraging regions may be identified.

Previous Conservation Efforts

The California condor was protected by the State of California at least as early as 1901. The law was nonspecific, merely prohibiting the taking of any nongame bird or its eggs or nests without a permit.

In 1908, a man was fined $50.00 for shooting a condor in the San Gabriel Mountains near Pasadena. This was the only known conviction of its kind. In 1917 an illegally captured condor was confiscated, but no one was prosecuted. In general, early nongame laws were not strictly enforced, and a number of condors were shot and eggs were collected until about 1920.

Official concern began to be expressed for the condor in the 1930s. At the urging of Robert O. Easton, a Santa Barbara County rancher, and the National Audubon Society (NAS), the U.S. Forest Service (USFS) established the Sisquoc Condor Sanctuary in 1937. This encompassed 1198 acres in Santa Barbara County that included an important condor roost, nest site, and bathing pool. Following field studies by Carl B. Koford between 1939 and 1946, a sanctuary was established in 1947 in Los Padres National Forest in Ventura County. Originally about 35,000 acres, the Sespe Condor Sanctuary was enlarged to include approximately 53,000 acres in 1951. These two sanctuaries remain under the administration of the USFS. The Sisquoc Condor Sanctuary is closed to all entry, and the Sespe Condor Sanctuary is closed with the exception of two travel corridors that allow hikers and horseback riders to pass through the area.

The first specific legal mention of the California condor came in 1953. Section 1179.5 of the California Fish and Game Code stated: "It is unlawful to take any condor at any time or in any manner. No provision of this code or any other law shall be construed to authorize the issuance of a permit to take any condor and no such permit heretofore issued shall have any effect for any purpose on and

after January 15, 1954." The condor was retained in this "fully protected" status, with no authority to issue any type of permit for trapping or handling, until 1971. Then the Fish and Game Code was amended (Stats. 1970, Ch. 1036) to allow issuance of permits for collecting fully protected species when necessary for scientific purposes.

A NAS-sponsored field survey in 1963-64 resulted in the hiring of a NAS "condor naturalist" in 1965. That same year, the USFWS initiated the Endangered Wildlife Research Program, and a research biologist was assigned to study the condor in 1966. Both NAS and USFWS positions have been occupied since then. From 1968 to 1973, the USFS employed a condor biologist to prepare a comprehensive condor habitat management plan for the national forests. The California Department of Fish and Game (CDFG) added a full-time condor biologist in 1982. Cooperation and assistance from other agencies has been organized through the USFS Condor Advisory Committee and the California Condor Recovery Team (and its predecessors, the Condor Survey Committee and Condor Technical Committee).

The California condor was recognized by the Federal government as "endangered" in 1967, but the first specific Federal legal protection did not occur until 1972 when the U.S. Migratory Bird Treaty with Mexico was amended to include vultures and certain other families of birds. The passage of the Endangered Species Act of 1973 (Public Law 93-205) made the taking of any endangered species a violation of Federal law.

An important outgrowth of Federal endangered species legislation was the concept of "critical habitat." According to Section 7(a)(2) of the Endangered Species Act of 1973, as amended, "each Federal agency shall, ...insure that any action authorized, funded, or carried out by such agency...is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary [of Interior] ...to be critical." "Critical habitat" (Section 3(5) (A)) has been determined for the California condor (50 CFR 17.95), and all Federal agencies are required to consult (50 CFR Part 402) with the USFWS any time their activities may affect the species.

Considerable effort to preserve condor habitat was made in the late 1960s and the 1970s. Yet, the condor continued to decline rapidly. The California Condor Recovery Team prepared the first draft "California Condor Contingency Plan" in 1976, which recommended captive breeding and other intensive recovery efforts. A revised version was approved "in concept" in 1977 by the USFWS. In 1978, a panel of experts appointed by the American Ornithologists' Union and the NAS prepared a report on the California condor that recommended an aggressive program of trapping condors for captive breeding and radio-telemetry studies (Ricklefs 1978). These reports led to the signing of a Cooperative Agreement in 1979 among the USFWS, NAS, CDFG, USFS, and U.S. Bureau of Land Management (USBLM). The purpose of the agreement was to expedite the condor recovery effort and to cooperate on information and education. The Condor Research Center (CRC) was

established in 1980 as a result of this agreement. Appendix III provides a detailed outline of significant events in the condor recovery program from 1976-1983. The following lists summarize significant condor recovery actions taken since the late 1960s, when an accelerated condor recovery effort began following establishment of the Condor Technical Committee (predecessor to the Condor Recovery Team) in 1966.

Land Preservation

1. A 77-acre San Cayetano parcel within the Sespe Sanctuary was acquired by the USFS in 1969.

2. The 162-acre Hi Mountain parcel was acquired by The Nature Conservancy in 1971 and is currently administered by the USFS.

3. The 318-acre Green Cabins parcel within the Sespe Sanctuary was acquired by the NAS in 1974 and turned over to the USFS.

4. An 80-acre Coldwater Canyon parcel within the Sespe Sanctuary was acquired by CDFG in 1974 and is currently admininstered by the USFS.

5. Surface rights to the 1707-acre Hopper Ranch, Ventura County, were acquired by the USFWS in 1975 and it is now administered as the Hopper Mountain National Wildlife Refuge. Personnel

have been assigned to manage the supplemental feeding program and to patrol the Refuge.

6. The 160-acre Squaw Flat parcel within the Sespe Sanctuary was acquired by the USFS in 1976 and is administered by that agency.

7. The 320-acre Sespe Hot Springs parcel adjacent to the Sespe Sanctuary was purchased in 1981 by the USFS.

8. In 1981 the California Wildlife Conservation Board, at the request of the CDFG, purchased 596 acres of condor critical habitat at Blue Ridge, Tulare County. CDFG is in the process of acquiring additional nearby parcels. The USFWS purchased an additional 900 acres in 1983, which is now the Blue Ridge National Wildlife Refuge. The USBLM is currently preparing a Habitat Management Plan for public lands within the Blue Ridge area. These lands have been proposed as an Area of Critical Environmental Concern pursuant to the USBLM's Resource Management Planning Process.

9. In 1983, CDFG acquired 160 acres in Elkhorn Plain, San Luis Obispo County, for the protection of habitat for five endangered species, including foraging habitat for condors.

10. In 1983, the USFS purchased the 80-acre parcel known as Cottrell Flat and 32 acres adjacent to Willett Hot Springs.

11. In 1984, the USFS purchased 343 acres at Willett Hot Springs, Oak Flat, and Ten Sycamore Flat.

Administrative Closures

1. Effective September 27, 1980, the USFS closed Piru Gorge to public use during the condor nest selection period or year round if nesting occurs. Firearm use is prohibited.

2. The USFS restricts motorized activity and blasting within 2.4 km (1.5 mi) of condor nest sites, and limits human use within 0.8 km (0.5 mi) of nests. On March 3, 1975, the courts upheld a USFS-Department of the Interior decision to deny a permit for road access to an oil drilling site near a condor nest site.

3. The USFS closed the vicinity of active nest site #S-353 on Angeles National Forest to public entry.

4. Public use closures of the Sisquoc and Sespe Condor Sanctuaries have been maintained.

5. In 1976 the USFS closed the Mt. Pinos - Mt. Abel trail to motor vehicle use.

6. The USFS placed a locked gate on Slide Mountain road, which traverses a ridgetop within 0.8 km (0.5 mi) of the Piru Gorge historical nest site.

7. The USFS closed a spur road located near nest site #135.

8. The USFS annually closes large areas of forest lands to public use during high fire danger seasons, thus indirectly benefitting the condor. Included in such closures is a total of 572,000 acres in Los Padres alone.

9. An aircraft restriction enacted by the California Assembly in 1973 and administered by the Federal Aviation Administration makes it illegal to fly any aircraft less than 3,000 feet above the Sespe Condor Sanctuary, with prescribed exceptions.

10. The USFS has enacted a vehicular closure on Pine Springs road near Bear Trap historical nest site, San Luis Obispo County.

11. In 1971 the USFS enacted a vehicular closure on the last (easternmost) mile of Pine Mountain road, Ventura County, to improve condor nesting and roosting conditions.

Firearms Control and Law Enforcement

1. Patrol and posting of public use closures in the Sisquoc and Sespe Condor Sanctuaries have continued. Signs informing people of the condors' protected status are routinely placed at campgrounds and other public areas. New signs were developed by the USFS in 1981 for this purpose.

2. The Los Padres National Forest and the CDFG have implemented a cooperative law enforcement program whereby CDFG wardens can enforce Federal CFR closures, thereby assisting in patrol of condor use areas.

3. The Angeles National Forest instituted a forest-wide target shooting closure, allowing shooting only at ten designated shooting areas, that are away from condor habitat.

4. To reduce shooting and disturbance threats to condors during the main condor use period in August and September, the California Fish and Game Commission changed the hunting season at Mt. Pinos from the coastal season to the inland season, which begins in late September.

5. Sensitive areas adjacent to the Sespe Condor Sanctuary and its two public access corridors have been closed to firearms use since 1971, including Agua Blanca Creek, Sespe Creek, and Santa Paula Creek.

6. In 1980 the USFS enacted a firearms closure in the Hardluck area.

7. In 1983 the USFS implemented a patrol of the Pine Mountain area.

Toxic Chemical Management

1. Use of animal control toxicants on Federal lands within the range of the condor has been restricted for a number of years.

2. The CDFG and U.S. Department of the Interior have a cooperative agreement that provides for CDFG monitoring of pesticide and rodenticide uses in California. CDFG can make recommendations on the use of chemicals to minimize impacts to condors.

3. Additional precautions on the use of M-44 coyote control devices within condor range were taken following the death of a condor in November 1983, possibly from M-44 originated cyanide. An internal USFWS Section 7 consultation concerning M-44 use has been re-initiated.

Investigations

1. Captive-bred Andean condors have been released successfully to the wild in Peru.

2. Routine surveillance of condor nesting areas during breeding seasons is an important aspect of protection efforts and of management programs.

3. Research biologists have visited inactive condor nest sites and found that sharp rocks may contribute to egg breakage. They have removed possible hazardous rocks from these nests. They have also determined that predators may be a problem at some nest sites. Control of problem predators is now implemented on a case-by-case basis.

4. The CDFG and the USBLM have contracted for baseline studies and surveillance of the Blue Ridge State Ecological Reserve area, which should provide useful information for identifying management needs at Blue Ridge.

5. Data obtained from two radio-tagged condors have helped to identify important habitat areas.

6. During 1981 the CRC undertook two research projects to study habitat uses on privately owned lands in Kern County. One study reviewed ranch management practices and land use

activities and their relationship to the condor. The second analyzed the status of rangeland in Kern County. Studies of this kind will continue; a full-time habitat specialist was funded by the NAS as of 1982.

7. The USFWS contracted with CDFG for the collection of potential condor food items and surrogate species within the condor range. These collections were completed, and the items were provided to the Patuxent Wildlife Research Center where they were analyzed.

8. Analysis of turkey vulture eggshells from California for organochlorine residues has been conducted.

9. Condor eggshells from pre- and post-DDT years have been analyzed for organochlorine residues and thinning.

10. Analysis of dead condors and other condor materials (feces, molted feathers, eggshells and biopsy samples of muscle and fat) for organochlorine residues and heavy metals is being conducted routinely.

11. The Santa Barbara Museum of National History initiated nesting studies in the mid-1970s on condors in Santa Barbara County, and has continued these studies annually.

12. In 1980 California Polytechnic Institute, the USFS, and Audubon chapters began the Valle Vista foraging and population survey that continues annually.

Other Actions

1. Critical habitat for the condor was designated by the Secretary of the Interior in 1976 in the following areas: Sespe-Piru, Matilija Canyon, Sisquoc-San Rafael, Hi Mountain-Beartrap, Mt. Pinos, Blue Ridge, Tejon Ranch, and Kern County and Tulare County rangelands.

2. USFWS management of the Hopper Mountain National Wildlife Refuge is directed toward providing local food for condors nesting in the Sespe Condor Sanctuary. Currently, carcasses are provided during winter months and may be continued through the nesting and fledging periods if condor use is apparent.

3. The California Condor Recovery Plan was approved in 1975 and the Recovery Team was officially designated. A revision of this Plan was approved in 1980.

4. Contacts were made with planning departments in Kern, San Luis Obispo, Los Angeles, and Tulare Counties regarding condor needs.

5. The USFS is relocating Hardluck Campground and locating the old road so that it lies further than 0.8 km (1.5 mi) from the White Mountain roost area.

6. In 1980 the California Department of Fish and Game appointed a State Condor Advisory Committee, composed of university scientists. In 1983, CDFG appointed a Habitat Advisory Committee composed of representatives from State and Federal agencies and private conservation interests. These committees advise the Department on condor research and habitat management matters.

7. Wildfire control procedures which provide for protection of condors and their habitat have been developed by the Los Padres and Angeles National Forests. These procedures are contained in Emergency Field Procedures for Protection of the California Condor, approved by the forest supervisors in fall, 1982.

8. The Los Padres National Forest is developing a Land Management Plan that will include recommendations addressing the use of prescribed fire in and adjacent to the Sespe Sanctuary to improve condor habitat.

9. CDFG maintains Ecological Reserves at Coldwater Canyon, Blue Ridge and Elkhorn Plain.

PART II. RECOVERY

Objectives

The primary objective of the California Condor Recovery Plan is to increase and maintain a self-sustaining condor population of about 100 individuals, including 60 adults, at which point the species could be considered for reclassification to threatened status. Mortality must be reduced to the lowest level possible. Productivity must be rapidly increased, which can only be accomplished through a captive breeding program in combination with multiple-clutching of wild nesting pairs. Progeny of the captive flock and individuals resulting from multiple-clutched wild pairs must supplement the existing population through reintroduction. More birds should be established in the existing population or in one or more additional populations before delisting is possible. Actual population levels for delisting cannot be determined at this time.

To support a viable population of wild condors and provide for population expansion, habitat assessment and identification of key areas must continue. Radio-telemetry studies of the wild population are essential for habitat assessment, identification of mortality factors, and monitoring of released condors. Key habitat areas must be protected to support a viable wild condor population.

Population Goals

The short-term goal is to establish a wild, self-sustaining population of about 100 individuals, including 60 adults. When this short-term goal is reached and the habitat to support such a population is secure, the species can be considered for reclassification to threatened status.

The short-term population goal set here is based on genetic consequences of inbreeding in small populations. Animal breeders have long known that inbreeding depression precludes long-term maintenance of small, closed populations (Conway 1980, Senner 1980). Symptoms of inbreeding depression are (1) lowered viability (failure to live to breed), (2) lowered fecundity, and (3) abnormal biases in sex ratios. These are thought to be the combined results of a loss of heterozygosity (hence reduced heterosis) and of fixation of deleterious alleles of some genes. Inbreeding and genetic drift (random genetic change) are the ultimate causes (Franklin 1980, Soule 1980). Although small populations are more subject to genetic loss than large ones, the size of a founder population (as for a captive flock in a zoo) has less impact than the eventual size of the maintenance population (Senner 1980). A founding group of even ten unrelated individuals can bring about 95 percent of the genetic information of the parent population (Frankel and Soule 1981).

The concept of effective population size, N_e (the "variance effective number" of a population of N individuals, Franklin 1980:138--see

Kimura and Crow 1963, for a more detailed explanation), is central to an understanding of the role of genetic drift and inbreeding in the extinction of populations. N_e is rarely, if ever equal to N, the number of breeding adults in a population. Empirical studies show that it ranges from 0.6N to 0.85N (Franklin 1980). Important aspects of N_e related to planning for recovery of the California condor include:

1. N_e is more nearly equal to N in monogamous species, such as the California condor, than in polygamous species (Franklin 1980).
2. N_e is increased if all adults contribute an equal number of offspring to the next generation (Franklin 1980).
3. N_e can be as much as doubled by controlled mating to maximize the genetic difference between members of mated pairs (Senner 1980).
4. Population crashes substantially reduce long-term average N_e (Franklin 1980).

The relationship between inbreeding and N_e is critical. The degree of inbreeding in a population, measured by the inbreeding coefficient ($\underline{f}$), increases by $1/2N_e$ per generation (Franklin 1980) (generation time is approximately equal to the average age at first successful reproduction). Unless the resulting loss of genetic variability is balanced by recurrent mutation, inbreeding depression results. The experience of animal breeders shows that a population cannot tolerate more than about 2 to 3 percent inbreeding per generation. N_e = 50, with random mating, will keep inbreeding below the 1 percent level.

However, such a population will still lose 25 percent of its genetic variability in 20 to 30 generations (Soulé 1980). Therefore, N_e = 50 can be considered an appropriate goal only for short-term maintenance of a population (Soulé 1980). Assuming an average generation time of 8 years for the California condor (see Verner 1978), this would result in retention of about 75 percent of the original genetic variability after about 200 years.

We cannot precisely determine N_e for a population of California condors just from knowledge of the number of breeding adults. Because the species is apparently life-long monogamous and has a uniform clutch size of 1 (increasing the likelihood that each breeding adult will contribute equally to annual recruitment), its N_e should be nearly equal to N (here we assume 0.85N).

The wild population of California condors, assuming ten breeding adults during the 1981-1984 seasons, probably has an effective population size of about 8 or 9 (10 X 0.85 = 8.5). It is therefore subject to an annual loss of heterozygosity of about 6 percent. This is unacceptably high, because it much exceeds expected rates of recurrent mutation. Emperical studies by Barrowclough and Shields (1984) suggest that N_e = 100, may be sufficient for long-term maintenance of California condors. This probably means about 120 reproductively active birds in the population (100 ÷ 0.85). However, further research on this topic, especially among birds, and studies on the genetic variation in the condor population may require later adjustment of this population goal. Enzyme polymorphism studies may

reveal information on the degree of inbreeding in the wild population. This and other factors must be considered before a determination of the condor recovery goal can be made.

Because N_e is markedly lowered when individuals contribute unequally to future generations, the release program will need to balance as much as possible the number of offspring released from each pair of breeding adults. Similar concerns for maximizing N_e in the captive flock may lead to the necessity of using young from pairs that produce more than others to initiate new captive subpopulations. Regular consultation with professional population geneticists will be necessary to make the best decisions in all cases involving optimum population sizes, releases to the wild, exchange of individuals between captive subpopulations, and possible initiation of other captive subpopulations with young from more successful breeders.

Step-down Outline

Prime Objective: To restore and maintain a self-sustaining population of California condors in currently occupied habitat through judicious management of the wild population, captive propagation, and exchange of birds between captive and wild populations. The short-term goal to consider reclassification to threatened status is 100 birds in the current range, with production equalling or exceeding mortality for at least a ten year period. More birds should be established in the existing population and in one or more additional populations, before consideration of delisting is possible. Actual population goals for delisting cannot be established at this time.

1. Provide adequate habitat for condor recovery in the wild.
    11. Protect all suitable nesting sites, both currently used and historical.
        111. Prevent disturbance and human interference to nesting condors by restricting development activities and environmental modifications near nest sites.
            1111. Prohibit motorized activity, blasting and development within the vicinity of nest sites by closing the area within a 2.4 km (1.5-mi) radius of nest sites to all surface mineral entry, motorized activity and blasting, except when a nest territory management plan has been approved that provides necessary protection.

1112. Restrict all human use within 0.8 km (0.5 mi) of nest sites.

11121. Maintain public use closures of the Sespe Condor Sanctuary except in designated access corridors, and maintain the moratorium on mineral leasing.

11122. Restrict public use in Piru Creek Canyon between Frenchman Flat and Ellis Apiary during condor use periods.

1113. Restrict aircraft activity in the airspace extending to 915 meters (3,000 feet) elevation over condor nesting terrain.

11131. Provide legal and administrative restrictions against air activity.

11132. Maintain liasion with military and civilian aircraft operators to gain acceptance of and compliance with regulations.

1114. Patrol condor use areas on National Forest System lands and increase posting and publicity to ensure compliance with regulations.

1115. Extinguish wildfires and manage controlled fires in condor nesting areas to ensure minimum disturbance and provide maximum benefit for condors.

11151. Prepare and implement fire management plans for condor nesting areas.

11152. Implement USFS Emergency Field Procedures for Protection of the California Condor.

1116. Modify or oppose proposed developments that threaten condors or condor habitat.

1117. Place nest sites under surveillance to minimize disturbance to nesting condors.

112. Secure privately owned land in condor nesting areas.

1121. Acquire the Pothole parcel.

1122. Secure Hopper Mountain mineral rights.

1123. Acquire the Cayetano parcels.

1124. Acquire the Indian Creek parcels.

1125. Acquire the Knapp Ranch property.

1126. Acquire the Matilija parcels.

1127. Acquire the Pine Mountain properties.

12. Provide adequate roosting habitat.

121. Restrict development in the Mt. Pinos/Mt. Abel area.

122. Manage and administer critical habitat for condors at Blue Ridge, Tulare County.

1221. Preserve the Pearson parcel through a cooperative agreement, easement, or purchase.

1222. Preserve the Boston Ranch parcel through a co-operative agreement, easement or purchase.

1223. Assess impacts of human use at Blue Ridge throughout the year.

1224. Restrict human activity during condor use periods.

12241. Post signs designating areas closed to human entry and firearms discharge.

12242. Determine if restrictions or termination of firearms discharge in the Blue Ridge critical habitat area is needed.

12243. Maintain an observer in the Blue Ridge area annually during condor use periods.

1225. Implement needed habitat manipulations to improve and perpetuate suitable condor habitat in the Blue Ridge area.

12251. Improve bathing pools.

12252. Manage roost trees and understory to ensure continuing existence of adequate roost sites.

12253. Develop a fire management plan.

123. Preserve roosting areas in Bear Trap Canyon, Winters Ridge, and El Paso Creek watershed, Tejon Ranch, Kern County.

124. Preserve roosting habitat and limit human activity in the Basket Peak area by restricting further development.

125. Preserve roosting habitat and limit human activity in the Breckenridge Mountain area.

126. Maintain public closure of the Sisquoc Condor Sanctuary.

127. Develop management plans for other roosts as discovered.

13. Provide optimum feeding habitat.

    131. Encourage open space preservation and a continuing livestock economy throughout the condor range.

    132. Preserve key feeding areas near nests and roosts.

        1321. Preserve feeding habitat in the foothills of southwestern Kern County.

        1322. Preserve feeding habitat in the Carrizo and Elkhorn Plains.

        1323. Preserve foothill rangelands in southern Tulare County between Lake Kaweah and White River as feeding habitat.

        1324. Preserve feeding habitat in the Glennville/Woody area, Kern County.

        1325. Preserve key feeding areas on the Tejon Ranch, Kern County.

        1326. Manage Hopper Mountain National Wildlife Refuge as a condor feeding area and protective buffer for the Sespe Condor Sanctuary.

            13261. Prevent mineral development and other activities on the eastern portion of the Refuge.

            13262. Continue supplemental feeding and protective management.

        1327. Preserve the San Juan Creek region of San Luis Obispo County as feeding habitat.

    133. Encourage land managers to leave dead livestock on the range to be available to foraging condors.

134. Undertake socioeconomic and human demographic studies within the condor's range.

1341. Evaluate the locations and extent of development pressures resulting from residential needs.

1342. Evaluate the locations and extent of development pressures resulting from industrial and energy development.

135. Work with local government agencies to include and maintain information on the condor in planning documents and policies; review the status of all general plans and land use control programs in the condor's range; monitor all development proposals within known condor use areas, and recommend appropriate protection measures as necessary.

14. Reduce condor mortality.

141. Minimize or eliminate animal damage control programs that leave toxicant-killed animals in areas frequented by condors.

142. Patrol key condor use areas to reduce the potential for shooting losses.

1421. Develop and implement a CDFG/USFWS/USFS cooperative law enforcement program for patrol of key condor use areas.

1422. Prohibit shooting from roadways in key condor use areas.

1423. Post educational material near key condor use areas to reduce potential shooting losses.

143. Maintain existing firearms closures in the Sespe Condor Sanctuary and adjacent areas.

144. Evaluate recreational uses in the Pine Mountain/Reyes Peak area to determine potential effects on condors.

145. Evaluate recreational uses in the Basket Peak area to determine potential effects on condors.

146. Investigate the effects of environmental contaminants on condor survival and reproduction, and develop management recommendations to eliminate or reduce adverse impacts.

1461. Determine contaminant levels in condor blood, feathers, eggshells, and other materials.

1462. Determine the effects of various poisons and pollutants on captive vultures and Andean condors.

14621. Investigate possible sublethal effects of Compound 1080, and zinc phosphide on condor reproduction and survival with surrogate species.

14622. Investigate the relative exposures to lead from various sources.

14623. Investigate the metabolism of lead in captive vultures.

147. Advise planning agencies on placement of power lines, wind turbines and other obstacles to avoid possible condor mortalities.

148. Control potential predators of eggs and nestlings in nesting areas.

149. Restrict aircraft activity, including military jet flights, in key condor areas where collisions with condors could occur.

15. Select habitat for new populations of captive-reared California condors to be established in the wild.

151. Survey potential habitat and select reestablishment areas.

152. Preserve selected habitat for release of condors when available.

16. Monitor condor populations to determine the well-being of the population and the success of management efforts.

161. Continue surveillance of condor nest sites to monitor reproduction.

162. Continue surveys of the condor population.

1621. Continue condor photo surveys.

1622. Continue to collect and analyze condor observations from cooperators.

163. Develop and carry out radio-telemetry studies of the condor population.

1631. Support necessary field personnel and equipment to monitor and study both wild and released condors.

16311. Conduct studies of feeding behavior, social relationships and movements of different age-classes of condors.

16312. Use telemetry to identify and characterize habitat requirements.

16313. Use telemetry to determine real and potential mortality factors for the remaining population of condors.

16314. Closely monitor released condors until they fully integrate with the wild population.

1632. Develop and construct an automated tracking system for the long-term monitoring of all radioed condors.

17. Implement information and education programs on condor habitat use, identification, and protection needs.

171. Provide information to key governmental land managers in the condor range.

172. Educate recreationists about condor habitat areas, the species' identification, and its legal protection.

173. Provide information on condor habitat needs to key private landowners.

174. Establish a Valle Vista condor observation point and educational facility.

175. Coordinate land protection efforts with key agencies and conservation organizations.

176. Prepare and/or revise educational material for public distribution.

177. Make a film on the California condor recovery effort for use as an education tool by all cooperating agencies and groups.

178. Provide training sessions on condor biology and key use areas to law enforcement agents.

179. Develop public information about the condor recovery program at zoological institutions.

1791. Provide informational kiosks with video monitor displays of captive condors.

1792. Continue to provide photos and videotapes of captive rearing efforts to the press and management agencies for educational uses.

18. Designate essential condor habitat to incorporate important areas not currently included in published critical habitat.

2. Increase and maintain condor numbers in their current range by releasing captive-reared condors.

21. Establish a captive breeding program to provide condors for release.

211. Remove older non-breeding condors from the wild for captive breeding.

212. Remove needed eggs and nestlings from currently breeding condors.

213. Determine the degree of inbreeding and develop a captive breeding strategy that will maximize N_e of the captive population.

22. Increase production of remaining wild pairs by multiple-clutching and removal of nestlings when appropriate.

23. Release captive-reared California condors to increase numbers in the wild.

231. Protect released birds with patrols, law enforcement, and education.

232. Monitor released birds to judge the success of the program.

Narrative

1. Provide adequate habitat for condor recovery in the wild.

The amount and quality of protected habitat needed to provide for a self-sustaining wild condor population is unknown. It is assumed, therefore, that key habitats must be protected until the needs of a recovered population are known. Areas considered essential to the California condor based on current information are described in Appendix II. Essential habitat areas will be updated on a yearly basis to incorporate new information, as needed. These areas, as as well as published critical habitat and other important condor use areas, should continue to be protected to provide for population expansion.

11. Protect all suitable nesting sites, both currently used and historical.

Protection of all suitable nest site habitat from adverse modification should provide adequate nesting habitat for reclassification of the wild population to threatened status. Historic nest sites considered suitable for future population expansion based on current knowledge are those in northwestern Los Angeles, Ventura, Santa Barbara, San Luis Obispo, Monterey and Tulare Counties.

111. Prevent disturbance and human interference to nesting condors by restricting development activities and environmental modifications near nest sites.

Condors, like other birds, are sensitive to human disturbances. Disturbances can prevent nesting in an area or lead to nesting failure. Any proposed activities in nesting areas must be carefully evaluated for impacts to condors and be prevented if there is any chance of adverse effects to condors. Most nests are on USFS lands. The USFS routinely evaluates projects for their impacts on nesting condors and requests consultation pursuant to the Endangered Species Act, when appropriate.

1111. Prohibit motorized activity, blasting and development within the vicinity of nest sites by closing the area within a 2.4-km (1.5-mi) radius of nest sites to all surface mineral entry, motorized activity and blasting, except when a nest territory management plan has been approved that provides necessary protection.

Sibley (1969) calculated that the minimum distance between recent nest sites and regularly used dirt roads from oil wells when shielded from sight and most sound was 2 km (1.2 mi). The minimum distance from oil wells that were in view of recent nests was 3.7 km (2.3 mi). The USFS restricts all motorized activity and blasting within 2.5 km (1.5 mi) of nest sites (Carrier 1971). These restrictions should be continued for all nests where specific nest territory plans have not been prepared and approved. In situations where condors have

selected nests in areas where human activites are an ongoing part of the environment, nest territory management plans should be prepared. These plans should provide protection from possible adverse disturbances and be approved by the USFS Regional Forester and USFWS Regional Director.

1112. Restrict all human use within 0.8 km (0.5 mi) of nest sites.

Sibley (1969) calculated that the minimum distance of nests from lightly used dirt roads was 1.3 km (0.8 mi) when unshielded from view and sound, and 0.8 km (0.5 mi) when completely shielded. The USFS adopted policy guidelines restricting all human activity within 0.8 km (0.5 mi) of nest sites (Carrier 1971).

11121. Maintain public use closures of the Sespe Condor Sanctuary except in designated access corridors, and maintain the moratorium on mineral leasing.

The Sespe Condor Sanctuary has long been considered the most important condor nesting area. Maintenance and enforcement of the Sanctuary closure is the easiest way to protect this area from human use. In 1970 a moratorium was placed by the Secretary of the Interior on all oil and gas and mineral leasing in the Sespe Sanctuary. Maintenance of this leasing moratorium is essential to provide for condor recovery.

11122. Restrict public use in Piru Creek Canyon between Frenchman Flat and Ellis Apiary during condor use periods.

This stretch of Piru Creek contains three known condor nest sites and other apparently suitable nesting habitat. Condors were last known to nest here in 1975. Human use should be prohibited whenever condors are using the area.

1113. Restrict aircraft activity in the airspace extending to 915 meters (3,000 feet) altitude over condor nesting terrain.

Low-flying military and civilian aircraft are thought to pose problems for condors by disturbing them at nest and roost sites. A California State law (Fish and Game Code 10501.5) prohibits low level flights over the Sespe Condor Sanctuary, and both civilian and military flight charts show some of the nesting areas as locations to avoid or maintain 3,000 foot terrain clearance. Airspace to 3,000-foot altitude is included in critical habitat designations. Nevertheless, low level flights continue to occur.

11131. Provide legal and administrative restrictions against air activity.

The Federal Aviation Administration has the authority to restrict airspace and place such restrictions on flight charts. The FAA should be requested to review existing restrictions and update them.

11132. Maintain liaison with military and civilian aircraft operators to gain acceptance of and compliance with regulations.

Military aircraft frequently fly low over condor nesting areas. Because of the aircrafts' rapid flight, there is concern for possible collisions, as well as disturbance from sonic booms and engine noise. Also, the Space Shuttle sometimes generates intense sonic booms when landing at Edwards Air Force Base. Condors have been disturbed by at least one shuttle overflight. Considerable effort must be made to contact appropriate military personnel on a regular basis and inform them of critical nesting areas.

1114. Patrol condor use areas on National Forest Service lands and increase posting and publicity to assure compliance with regulations.

Signing and patrol of important condor use areas are essential to discourage unauthorized or prohibited activities. Absence of perceived enforcement of closures will increase the likelihood of violation.

1115. Extinguish wildfires and manage controlled fires in condor nesting areas to ensure minimum disturbance and provide maximum benefit for condors.

Uncontrolled wildfires may directly and/or indirectly adversely impact condors and their habitat. Direct impacts would be actual loss of chicks or eggs due to burning, smoke inhalation,

or stress. Indirect impacts such as nest abandonment by adults, egg breakage by a disturbed adult, or increased access due to road construction and brush elimination, could result from fire suppression activities. Managed controlled fires may be used to improve condor foraging habitat and reduce the chance of catastrophic fire.

11151. Prepare and implement fire management plans for condor nesting areas.

Fire management or control burn plans should be developed for condor areas where an uncontrolled wildfire may adversely affect condors. Plans should be developed to reduce the chance of catastrophic fire either by implementing control burns when condors will not be present, or by preparing specific fire management plans to minimize impacts of wildfires on condors.

11152. Implement USFS Emergency Field Procedures for Protection of the California Condor .

The USFS has developed emergency procedures for dealing with a number of possible emergency situations, including wildfires (Freel 1982). These procedures are in effect, and implementation should greatly reduce the chance of mishap if a wildfire occurs in condor nesting habitat.

1116. Modify or oppose proposed developments that threaten condors or condor habitat.

The impacts of development in condor nesting habitat and the entire range are a major concern. Potential problems could result from oil and gas development, geothermal development, wind energy development, transmission/distribution lines, water impoundments and stream modifications, and residential and commercial developments. All proposals must be carefully evaluated for their short- and long-term impacts. Recommendations should be made to eliminate adverse impacts to condors.

1117. Place nest sites under surveilliance to minimize disturbance to nesting condors.

Currently, all known nesting pairs are kept under constant surveillance. These nest watchers periodically detect violations of area closures and report them to appropriate enforcement officials. They can also identify threats to condors other than man-related, such as ravens, golden eagles, or black bears.

112. Secure privately-owned land in condor nesting areas.

Nearly all recent and suitable historic nesting areas are on National Forest lands. However, some private parcels, principally inholdings within National Forests, are near nest sites. Habitat on these private parcels should be preserved to prevent disturbance of nesting areas.

1121. Acquire the Pothole parcel.

This 80-acre private parcel is adjacent to the Sespe Condor Sanctuary and within 2.7 km (1.5 mi) of an active condor nest. Any development could negatively impact the condor status in the wild.

1122. Secure Hopper Mountain mineral rights.

Surface entry for oil operations on, north of, or east of the high northeastern ridge of Hopper Mountain National Wildlife Refuge should be prevented. Such development would likely destroy the buffering effect of the Refuge to the Hopper Canyon portion of the Sespe Condor Sanctuary. This important nesting area might be rendered unsuitable for reoccupancy if development occurred. Securing mineral rights in the eastern portion of the Refuge would prevent development. A Land Protection Plan should be prepared to determine the most appropriate way to preserve the area.

1123. Acquire the Cayetano parcels.

This 76-acre parcel is adjacent to the Sespe Condor Sanctuary and near historic nest sites. Protection would allow for future nesting of a recovered condor population.

1124. Acquire the Indian Creek parcels.

This 440-acre inholding is near a condor nesting and roosting area. Protection will ensure continued use of the roost by condors.

1125. Acquire the Knapp Ranch property.

This private parcel is located within 2.7 km (1.5 mi) of an active condor nest. Land uses which disturb or harm condors could hinder their nesting nearby.

1126. Acquire the Matilija parcels.

This 360-acre inholding is near a recent condor nesting and roosting area. Protection would provide for future population recovery.

1127. Acquire the Pine Mountain properties.

Two private inholdings comprising about 120 acres lie near this important condor nesting and roosting area. These parcels should be preserved to protect the area from possible development.

12. Provide adequate roosting habitat.

Roosting habitat for both nesting and nonbreeding birds needs to be identified and protected. Roosts are likely selected to maximize energy conservation. They are usually located near nesting or feeding habitat in a secluded area that provides protection from weather, ground predators and disturbance.

121. Limit human activity in the Mt. Pinos/Mt. Abel areas.

The Mt. Pinos and Mt. Abel areas are important condor roosting habitats. Increased human use of these areas should be discouraged by restricting any new developments.

122. Manage and administer critical habitat for condors at Blue Ridge, Tulare County.

Blue Ridge has long been recognized as an important roosting area for California condors. Recent studies show that it is one of several key roosting areas in the southern Sierra Nevada. The area is also used by condors for bathing and perhaps occasionally for feeding. Most of the Blue Ridge area is in government ownership, either by USBLM, USFWS, or CDFG. However, a few important parcels are still in need of protection, and management should be undertaken.

1221. Preserve the Pearson parcel through a cooperative agreement, easement, or purchase.

This parcel lies adjacent to a known roost tree and is located about 3/4 mile from the most commonly used roost trees. Preservation of this parcel is important to the overall management of Blue Ridge by through increased control of use in the area.

1222. Preserve the Boston Ranch parcel through a cooperative agreement, easement, or purchase.

The Boston Ranch parcel includes the two most frequently used roost trees in the Blue Ridge area. Protection of this area from any adverse use should be given high priority.

1223. Assess impacts of human use at Blue Ridge throughout the year.

Studies of condor and human use at Blue Ridge to date have

emphasized spring and summer periods. Research during other periods of the year should be undertaken, particularly during late fall and early winter to assess condor and hunter use of the area.

1224. Restrict human activity during condor use periods.

Blue Ridge is a major traditional condor roost and is probably chosen due to its close proximity to foraging habitat, available snags, bathing areas, topographic placement, and good wind currents. Blue Ridge is likely energetically important to condors and should be protected from human disturbance during condor use periods.

12241. Post signs designating areas closed to human entry and firearms discharge.

Signs should be placed around the Blue Ridge area, particularly at known entry points, to inform the public of area closures or shooting restrictions. Much of the surrounding habitat is USBLM land and is currently open to shooting.

12242. Determine if restriction or termination of firearms discharge in the Blue Ridge critical habitat area is needed.

Hunting in the Blue Ridge area may occur at times that disturb or disrupt condor use. If impact assessment (1223) reveals a problem, and if signing and patrol do not prevent disturbances from shooting, then firearms discharge should be restricted in the area.

12243. Maintain an observer in the Blue Ridge area annually during condor use periods.

An observer can monitor both condor and human use of the Blue Ridge area. Also, an observer can serve to educate the public about the needs of condors and inform area users of means to minimize disturbance to condors.

1225. Implement needed habitat manipulations to improve and perpetuate suitable condor habitat in the Blue Ridge area.

An overall habitat assessment is needed. Appropriate actions should be taken to identify habitat management needs and to perpetuate and improve this important condor use area.

12251. Improve bathing pools.

Some pools at Blue Ridge need removal of vegetation and soil to make them more suitable for bathing by condors.

12252. Manage roost trees and understory to ensure continuing existence of adequate roost sites.

There may be a shortage of good roost trees in the future as existing trees deteriorate. Management actions include preservation of existing roost structures, modification of non-roost trees to create new roost sites, and planting of future roost trees.

12253. Develop a fire management plan.

A plan for controlling wildfires in the Blue Ridge area

should be developed. With a shortage of roost trees in the area, a wildfire could seriously impact condor use of the area. Controlled burning and selective mechanical brush removal during periods of condor absence should be considered as means of preventing a catastrophic wildfire.

123. Preserve roosting areas in the Bear Trap Canyon, Winters Ridge, and El Paso Creek watershed, Tejon Ranch, Kern County.

Tejon Ranch is a regular condor foraging area and lies along a major flyway for birds moving between Ventura County and the Sierra foothills. Condors regularly roost in several areas on Tejon Ranch where patches of conifers occur in relatively undisturbed areas. These areas should be preserved for current and future condor use.

124. Preserve roosting habitat and limit human activity in the Basket Peak area by restricting further development.

The Basket Peak region is perhaps the most important condor roosting area in the Sierra Nevada. Condors roost on Basket Peak and adjacent ridges in varying numbers virtually year around, but most frequently between October and April. The area has only recently been recognized for its importance, following preliminary results of radio-telemetry studies. Human activity in the area should be evaluated for impacts to condors, and appropriate steps should be taken if problems are identified. No new developments should occur in the area. The Basket Peak area should be regularly monitored and protected by on-site observers.

125. Preserve roosting habitat and limit human activity in the Breckenridge Mountain area.

Breckenridge Mountain is a known condor roost lying under the main artery of condor movements between the Sierra Nevada and Tehachapi Mountains. Condors periodically roost overnight on Breckenridge. Roosting habitat should be maintained and human activity limited in the area.

126. Maintain public closure of the Sisquoc Condor Sanctuary.

The Sisquoc Condor Sanctuary provides important roosting and bathing habitat. Condors regularly use the area. The public closure should be maintained and enforced, and the the Falls Creek trail should be rerouted or abandoned.

127. Develop management plans for other roosts as discovered.

Other important roosting areas may be discovered as more is learned about condor habitat use. Management plans should be developed for new areas as they are discovered.

13. Provide optimum feeding habitat.

Relatively undisturbed feeding habitat is essential to the continued survival and recovery of the California condor.

131. Encourage open space preservation and a continuing livestock economy throughout the condor range.

Most feeding by condors occurs on private rangelands in Tulare, Kern, and San Luis Obispo Counties. Typically, feeding occurs

on relatively large ranches with low levels of human activity. Preservation of this open space livestock economy is essential to the survival and recovery of the condor in the wild. Possible means for preserving this economic use of the land should be explored including but not limited to acquisition, tax incentives, easements, or zoning. The State-appointed Condor Habitat Advisory Committee is addressing this issue in detail.

132. Preserve key feeding areas near nests and roosts.

Some key feeding areas are currently known to be of major importance to condors. These areas have been identified by observations and radio-telemetry studies. They will likely become increasingly used as condor numbers increase in the future. Other important feeding areas will likely be discovered especially if efforts to increase the size of the wild population are successful. Therefore, prime foraging habitat within the condor historical range but presently not used, should be identified and preserved.

1321. Preserve feeding habitat in the foothills of southwestern Kern County.

The foothills of southwestern Kern County are heavily used by condors throughout the year. Two or more breeding pairs and other individuals feed there year around, and virtually the entire condor population feeds there in late summer and fall. The area is principally on three large, private cattle ranches in southern Kern County: San Emigdio, Snedden, and Hudson.

Dead livestock are the primary food source for condors while feeding in this area. A Land Protection Plan (LPP) should be prepared to determine the most appropriate way to preserve this important area.

1322. Preserve feeding habitat in the Carrizo and Elkhorn Plains.

The Carrizo and Elkhorn Plains in southeastern San Luis Obispo County and southwestern Kern County, are used for feeding by condors year around, with the heaviest use being recorded in late winter and spring. Much of the area is public land administered by the USBLM. Private inholdings should be evaluated for their importance to condors and other endangered species, and appropriate land protection efforts should be undertaken.

1323. Preserve foothill rangelands in southern Tulare County between Lake Kaweah and White River as feeding habitat.

Condors feed in this area year around with particularly heavy use in summer, fall and early winter. The area appears to be very important to condors, particularly nonbreeders. Continuation of a livestock economy is essential.

1324. Preserve feeding habitat in the Glennville/Woody areas, Kern County.

This key condor feeding area in northern Kern County receives heavy use, particularly between late fall and late spring. Efforts should be made to encourage continuation of a livestock economy.

1325. Preserve key feeding areas on the Tejon Ranch, Kern County.

The Tejon Ranch is an important condor feeding area throughout the year and especially in the fall. At least one breeding pair may feed here on a regular basis. Maintenance of favorable conditions for condor use of Tejon Ranch is important to the recovery effort. A LPP should be prepared to determine the best way to preserve this important area.

1326. Manage Hopper Mountain National Wildlife Refuge as a condor feeding area and protective buffer for the Sespe Condor Sanctuary.

The Hopper Ranch was purchased in 1974 to serve as a buffer to development for the Sespe Condor Sanctuary and to provide an area for a condor feeding program. Maintenance of this buffer to the Sespe is essential to the recovery of the condor in the wild.

13261. Prevent mineral development and other activities on the eastern portion of the Refuge.

Unfortunately, the mineral rights to Hopper Ranch were not purchased in 1974 because of the high cost. If the buffer effect of the Refuge is to be maintained, oil and gas development in the eastern half should not occur. The most prudent way to prevent such development is to acquire these mineral rights, or acquire the surface access rights to these resources or reach some other agreement with the mineral rights owner.

13262. Continue supplemental feeding and protective management.

A supplemental feeding program has been operated every year since purchase of Hopper Ranch. The level of condor use has dropped significantly. Continuation of the feeding may be important if condors are to again nest in Hopper Canyon. Feeding should be continued to encourage condors to use the Hopper Canyon portion of the Sespe Sanctuary.

1327. Preserve the San Juan Creek region of San Luis Obispo County as feeding habitat.

Rangelands on either side of the entire San Juan Creek are important for condor feeding. Most recently, foraging flights by radioed condors were in the upper drainage, south of Highway 58. The area has been recently used in summer by a breeding pair of condors and occasionally by other condors as well. The area should be maintained in a livestock economy.

133. Encourage land managers to leave dead livestock on the range to be available to foraging condors.

No evidence shows that food is in short supply for condors, but potential food should be maintained in condor habitat. Some ranches and other landowners or managers may be disposing of animal carcasses. Regular contacts with land managers should be maintained to inform them of condor needs and encourage them to leave dead stock for condors. Educate land managers as to State and county restrictions and requirements for animal disposal.

134. Undertake socioeconomic and human demographic studies within the condor's range.

The ultimate success of the condor recovery effort will depend upon the amount of suitable habitat that can be preserved into the future. Studies should be undertaken to disclose the rate and likely areas of human population growth, and expected changes in land use activities, in order to predict changes in condor habitat. Changes and trends in the amount of habitat used for livestock ranching and ranching practices should be monitored. Measures can then be recommended to most efficiently plan for condor and human needs. Emphasis in these studies should be on lands in private ownership where the threat of condor habitat loss is potentially greatest.

1341. Evaluate the locations and extent of development pressures resulting from residential needs.

How much land within the condor's range can be converted to residential use and to what extent mitigation such as cluster developments can reduce impacts from a growing human population are questions that cannot be answered in quantitative terms. Studies to deal with these questions should be undertaken.

1342. Evaluate the locations and extent of development pressures resulting from industrial and energy development.

Increased pressure for oil, solar and wind energy developments, and other industrial developments pose major threats to the condor and its habitat. Studies should be undertaken to

identify and evaluate these threats, and recommend alternatives where condor needs may be adversely affected.

135. Work with local government agencies to include and maintain information on the condor in planning documents and policies; review the status of all general plans and land use control programs in the condor's range; monitor all development proposals within known condor use areas, and recommend appropriate protection measures as necessary.

Routine close communication should be maintained with appropriate county and State planning offices in order to increase the awareness of planners about condor distribution and habitat use, and to provide the greatest lead time in dealing with development proposals.

14. Reduce condor mortality.

The condor population is so small that survival of every bird is vitally important. Therefore, it is essential that mortality factors be identified and curtailed if the species is to be saved from extinction and recover in the wild.

141. Minimize or eliminate animal damage control programs that leave toxicant-killed animals in areas frequented by condors.

Considerable anecdotal and hearsay information exists on the effects of animal damage control programs on condors, and a few certain instances of death caused by poisons have been documented. A strychnine-baited carcass was the likely cause of

one condor mortality and two sicknesses (Miller et al. 1965). Another sick condor was found near a strychnine-baited calf carcass. These incidents were associated with predator control programs. No instances are known of condors dying from poisons in rodent control programs (Studer 1983). The use of poisoned meat baits is illegal in California. Research should continue on the possible effects of rodent control compounds (see 1463).

142. Patrol key condor use areas to reduce the potential for shooting losses.

Shooting has perhaps been the primary cause of condor mortality. Dawson (1923) proposed that condor mortality was due to gun-fire "first and foremost". Wilbur (1978) determined that 41 condors were shot maliciously or out of ignorance between 1806 and 1976. Another 177 were shot for museum collections. Flying condors are vulnerable to shooting because they often closely approach people on the ground. Despite full legal protection and public education efforts, shooting losses may still occur.

Key condor congregation areas should be patrolled to lessen the the chance of condor shootings.

1421. Develop and implement a CDFG/USFWS/USFS cooperative law enforcement program for patrol of key condor use areas.

Adequate patrol of condor congregation areas will require considerable manpower and coordination. Many of the important areas receive attention by either condor biologists, enforcement personnel, or both. A formal program of patrol should be

developed that identifies responsibilities and informs condor observers of whom to notify in case of area closure violations or potential shooting violators.

1422. Prohibit shooting from roadways in key condor use areas.

Shooting from roadways is in some areas a regularly observed activity, even though it is illegal. Some roadways pass through major condor use areas or, in some cases, follow ridgelines used as condor flightways. These areas should be identified and patrolled to discourage shooting.

1423. Post educational material near key condor use areas to reduce potential shooting losses.

Posting of educational signs telling the public not to shoot large dark birds is an ongoing program. Posting should continue. Signs should be bilingual--English and Spanish.

143. Maintain existing firearms closures in the Sespe Condor Sanctuary and adjacent areas.

The Sespe Sanctuary and nearby Piru Gorge are important nesting habitats. Existing firearms closures should be maintained.

144. Evaluate recreational uses in the Pine Mountain/Reyes Peak area to determine potential effects on condors.

Pine Mountain/Reyes Peak in the Los Padres National Forest has long been recognized as a condor roosting area. In 1983, an active condor nest was located there. Pine Mountain is also on

an important flyway area for condors moving from nesting areas to foraging areas. Nest observers reported incidents of shooting in the area. The USFS increased patrols of the area to discourage shooting. This resulted in fewer reported shootings. However, no official firearms closure exists for the area. Studies should be undertaken to develop long-term solutions combining some level of official closure with enforcement patrols.

145. Evaluate recreational uses in the Basket Peak area to determine potential effects on condors.

Basket Peak in Sequoia National Forest has been identified as a major condor roosting area used virtually year around. The area is heavily used by recreationists during late summer and fall. A potential conflict between condor use and shooting has been identified. The area should be monitored to collect user information and assess possible impacts. Recommendations to control identified problems should be developed and implemented.

146. Investigate the effects of environmental contaminants on condor survival and reproduction and develop management recommendations to eliminate or reduce adverse impacts.

Condors have been poisoned by eating strychnine-treated meat, elevated lead levels have been found in tissue samples, and chlorinated hydrocarbon residues (particularly DDE) have been found in condors and their eggshells. Other environmental contaminants (including Compound 1080, zinc phosphide,

cyanide, and photochemical smog) have been suggested as possibly adversely affecting the condors. Because a number of these contaminants may cause either death or reduced reproductive performance, a thorough investigation of their potential is desirable. Considerable research in recent years has addressed levels of these various compounds in condor blood and other tissues as well as in condor food sources. Yet, much remains to be learned about the effects of environmental contaminants on condors. Research should continue on contaminants. Management recommendations should be developed to minimize or eliminate exposure to contaminants that adversely affect condors.

1461. Determine contaminant levels in condor blood, feathers, eggshells, and other materials.

Blood and feather samples are routinely taken for analyses from condors when they are trapped. Whenever condors are found dead or injured, blood and tissue samples are routinely tested for environmental contaminants and toxicants. These tests should continue so additional information can be learned about environmental effects on condors.

1462. Determine the effects of various poisons and pollutants on captive vultures and Andean condors.

Little is known about how certain contaminants may act to interfere with vulture reproductive performance and behavior, or at what levels and under what conditions the contaminants may lead to death. Investigations into these questions should

be undertaken with captive vulture species that are appropriate surrogates for the California condor.

14621. Investigate possible sublethal effects of Compound 1080 and zinc phosphide on condor reproduction and survival with surrogate species.

Compound 1080 (sodium monoflouroacetate) and zinc phosphide are rodenticides that occur in significant quantities in the range of the California condor. Compound 1080 and zinc phosphide are used frequently for ground squirrel and kangaroo rat control (Studer 1983). No evidence shows that Compound 1080 has killed any condors; evidence from other species shows that birds tend to be resistant to 1080 poisoning (Roszkowski 1967, cited in Studer 1983). However, a need still exists for careful study. Death from 1080 is not immediate, so an affected individual would likely leave the area where 1080 was ingested before dying. Existing laboratory toxicity studies leave doubt as to the effects of 1080 on vultures. Therefore, careful studies of the effects of 1080 should be done in a controlled environment. Zinc phosphide is considered less toxic than 1080 but may be more widely used. The effects of this compound should also be studied.

14622. Investigate the relative exposures to lead from various sources.

Lead can be ingested by condors while eating carcasses that have been shot. A California condor, found dead in March

1984, died of lead poisoning. A metal fragment identified as a bullet was found in its gizzard. Several captive cathartids have died from ingested lead (Decker et al. 1979 and Locke et al. 1969). Studies should be developed to determine the availability of lead to condors from the various potential food sources.

14623. Investigate the metabolism of lead in captive vultures.

Tests are routinely run for lead in condor blood, feathers, and other tissues as they become available. Research should be undertaken to determine what lead levels are retained in tissues and feathers relative to exposure levels, at what rate is lead passed from the body, and what can be done to reduce lead levels.

147. Advise planning agencies on placement of power lines, wind turbines, and other obstacles to avoid possible condor mortalities.

Condors have collided with objects while in flight, usually breaking a wing in the process. Koford (1953) reported two birds with broken wings, one of which apparently collided with a slender vertical pipe used as a survey stake. In 1966, a condor was killed when it flew into a power line. All of these birds were immatures, which are not as adept at flying as are adult birds. Death resulting from collisions with manmade objects is at least partially preventable through carefully planned placement of power lines, towers, wind turbines and other facilities within the condor range, particularly in

known or probable flight corridors or areas frequently inhabited by young birds. Wind energy development has increased dramatically in recent years because of escalating oil and gas costs and the tax advantages for alternative energy development provided by the Federal and California tax codes. Thousands of wind turbines have been or are currently proposed for placement in condor habitat. These are major intrusions into condor airspace because of their height (typically around 100 feet to the top of the rotor), their moving rotors, and the new transmission/distribution lines. Each wind turbine placed in the condor range increases the chances of a condor collision. Efforts should be made to prevent placement of new obstacles in major flight corridors and discouraging placement of such obstacles throughout the condor range by working closely with land planning agencies.

148. Control potential predators of eggs and nestlings in nesting areas.

Condor eggs have been lost to ravens, and condor nestlings have been threatened by the presence of potential predators such as golden eagles and black bears. Problem predators should be trapped, killed, or otherwise controlled when a threat is identified.

149. Restrict aircraft activity, including military jet flights, in key condor areas where collisions could occur.

Military and civilian aircraft are regularly observed flying

over condor foraging, nesting and roosting habitat. Low flying military jets are of particular concern because of their speed and because they often pass through a feeding congregation area. Steps must be taken to restrict such flights and to inform appropriate officials of the potential threat to condors and pilots. Consultations between the FWS and appropriate Federal agencies should be undertaken to accomplish this task.

15. Select habitat for new populations of captive-reared California condors to be established in the wild.

The long-term goal of the condor recovery program is to delist the species. It is impossible at this time to determine how many condors can be supported within the current range. From a genetic diversity viewpoint, it would be valuable to have more than one population of condors. Separation of a population into subunits helps maintain heterozygosity and alleviate inbreeding depression (Chesser 1983). Therefore, it will be valuable to the long-term goals of delisting the condor to identify an area or areas that would be suitable to support condors in the future.

151. Survey potential habitat and select re-establishment areas.

Once enough information is available to define potential condor habitat, surveys of the historical condor range should be undertaken. Areas that appear to best meet the needs to support condors should be selected.

152. Preserve selected habitat available for release of condors when available.

Potential habitat areas should be preserved as needed for future occupancy by condors. The likelihood of eventual occupation of these areas will depend on the success of the condor captive breeding and release programs.

16. Monitor condor populations to determine the well-being of the population and to assess the success of management efforts.

The condor population must be monitored closely to determine its status. This information is crucial to management decisions because, with such a small number of birds in the wild, small changes in numbers or age composition may require significant changes in current management strategies.

161. Continue surveillance of condor nest sites to monitor reproduction.

Surveillance of condor nest sites is important for undertaking management actions (e.g., egg removal, raven control) as well as determining reproductive success and mortality (loss of egg, nestling, or adult). These efforts are ongoing as part of the condor research program and should continue.

162. Continue surveys of the condor population.

Surveys are important to monitor condor population trends and habitat use. Surveys are an ongoing part of the condor research program.

1621. Continue condor photo surveys.

Snyder and Johnson (ms.) found that individual condors can be identified during periods of molt. Hundreds of photos are taken annually by condor researchers and many cooperators. These photos are then sorted into individual stacks until a population estimate is reached. The photo surveys should continue annually.

1622. Continue to collect and analyze condor observations from cooperators.

Observations of condors by many interested people are reported every year. These observations often do not provide enough information to determine whether they are reliable sightings. But confirmed observations have proven to be very valuable in learning more about condor movements and habitat use. Tags that are visible from below by careful observers are placed on all condors that are trapped and released for radio-telemetry studies. Reports of tagged birds should assist field study efforts. Evaluation of observer records should continue at least until radio-telemetry of all condors is possible.

163. Develop and carry out radio-telemetry studies of the condor population.

Radio-telemetry of condors has identified important habitat areas not previously known or not recognized for their importance. Yet the radio-telemetry program is still (1984) in its infancy and should reveal considerably more information as

additional birds are radioed. Radio-telemetry is the best method to identify habitat use, characterize habitat, observe behavior, find nests, and monitor mortality. More information can be gained in less time by fewer observers with radio-telemetry as opposed to traditional observational techniques. There has been no demonstrated risks from radio-tagging condors. These studies should be continued in the future. The goal of radioing as many birds as possible should be pursued, unless adverse effects of the tagging are identified. No problems have been observed from radio-tagging.

1631. Support necessary field personnel to monitor and study both wild and released condors.

Radio-telemetry studies require considerable observer field time to obtain information for maximum benefit. Adequate support should be provided for the personnel and equipment needed to monitor each radioed bird at least every other day.

16311. Conduct studies of feeding behavior, social relationships and movements of different age-classes of condors.

Different segments of the wild population (immatures, non-breeding adults, etc.) may have different seasonal movements. It is important to follow these groups to learn about their movements, social structure, habitat use, behavior, and feeding habits. This information is important to further refine our understanding of condor habitat requirements and to plan releases.

16312. Use telemetry to identify and characterize habitat requirements.

Condor habitat requirements will be difficult if not impossible to fully describe in a quantitative manner. Telemetry studies are essential for biologists to find condors in their habitat and record the characteristics of the habitat. Quantitative habitat information will be essential to define habitat goals.

16313. Use telemetry to determine real and potential mortality factors for the remaining population of condors.

Little quantitative information is available to determine the relative importance of mortality factors. Long-term radio-telemetry studies provide the best opportunity for identifying both real and potential mortality factors. The post-fledging period is a time of high mortality in birds. Radio-telemetry of fledglings could prove valuable for location of distressed birds, as well as identification of mortality factors if death occurs. Such studies should be undertaken only if adequate safeguards are provided for the fledgling.

16314. Closely monitor released condors until they fully integrate with the wild population.

Releases of captive-reared condors are scheduled to begin as early as 1985. All released condors will be radio-tagged to facilitate observations. If a released bird encounters problems or is not integrating into the wild population, radio-

tagging will help researchers determine its status. Released birds can be returned to captivity for care, if necessary. Much will be learned through radio-telemetry about integration of released birds into the wild population.

1632. Develop and construct an automated tracking system for the long-term monitoring of all radioed condors.

An automated radio-tracking system is being developed (1984) based on fixed-station receivers that feed information into a central computer. This system should greatly aid in the radio-telemetry studies. The automated system will keep track of the general location of condors, although it will be limited by local geography. With the general location information available from the computer, the radio-tracking crew can quickly find exact locations of birds. The automated tracking system should aid greatly in determining the relative use of various habitat areas, seasonal movements, daily or longer activity patterns, etc.

17. Implement information and education programs on condor habitat use, identification, and protection needs.

Dissemination of information on the plight of the condor, its habitat requirements, identification, and protection requirements is essential to the recovery program. Considerable time and effort is being expended on information transfer to decision makers and on public education. The education effort to date has included organized talks and field trips, conferences, regular

field contacts with the public, descriptive and informational posting and signing, designation of public condor observation sites, and dissemination of press releases and other printed literature. The NAS has had an educator working on the condor project since 1965. The USFS, CDFG, USFWS, and other cooperating groups participate in the educational effort. The program has been worthwhile but could be improved by development of a more formal program with regional and seasonal objectives.

171. Provide information to key governmental land managers in the condor range.

Land managers within condor habitat at the Federal, State and county levels must be kept informed of condor habitat needs and requirements. These decision makers must be aware of the plight of the condor and the goals of the recovery program so that they can make informed decisions on proposals that affect condor habitat.

172. Educate recreationists about condor habitat areas, the species' identification, and its legal protection.

Both consumptive and nonconsumptive recreational users of condor habitat need to be informed of the plight of the condor, condor habitat requirements, and legal protection. Recreational users should be made aware of the condor recovery program to engender interest, support, and an appreciation for the needs of the condor. Public viewing areas provide an excellent forum for education of recreationists. Two of these areas, Mt. Pinos

and Valle Vista, are attended by volunteer interpreter biologists as well as Condor Research Center staff during condor use periods. The volunteer personnel and their supporting organizations should be encouraged to continue their efforts.

173. Provide information on condor habitat needs to key private landowners.

Much condor habitat, particularly foraging habitat, is in private ownership. Periodic contact with these landowners should be made to provide information on condor needs and the recovery effort.

174. Establish a Valle Vista condor observation point and educational facility.

Valle Vista has become the most heavily used condor observation point. Thousands of observers from around the world visit Valle Vista in the summer and fall to observe condors (Eric Johnson pers. comm. California Polytechnic Institute, San Luis Obispo, CA). Many have left with a greater appreciation for condors. This site was popularized by an article in Birding magazine and has since been publicized in other articles. It is perhaps the most ideal location for the public to see condors without disrupting their behavior. Yet Valle Vista lacks adequate facilities to accommodate the public pressure it receives. Dr. Eric Johnson of California Polytechnic Institute, San Luis Obispo, has recruited students at low or no pay to serve as interpreters, record biological information, and maintain the

area in a clean condition. Valle Vista should be provided with appropriate facilities to handle public needs.

175. Coordinate land protection efforts with key agencies and conservation organizations.

The protection of condor habitat is an immense job. No single entity can undertake the effort on its own. Close coordination among all cooperating agencies and groups is important, not only to protect condor habitat, but also to coordinate protection efforts of other land uses (e.g., other endangered species habitats, unique ecosystems, open rangeland). The State Condor Habitat Advisory Committee is examining long-term condor habitat protection needs. Other interested groups and agencies should coordinate with this Advisory Committee, resource agencies, and the Condor Recovery Team.

176. Prepare and/or revise educational material for public distribution.

Educational hand-out material is very useful in disseminating information to the public and decision-makers. Publications for public education are available, but some are in need of revision and printing. The Condor Newsletter published by the Condor Research Center serves to keep the public and cooperators informed of progress in the recovery program. The newsletter should be continued.

177. Make a film on the California condor recovery effort for use as an educational tool by all cooperating agencies and groups.

A professional quality movie on the condor recovery effort would be valuable for use by cooperating agencies and groups. The film could be used for presentation at public meetings and for use by the news media.

178. Provide training sessions on condor biology and key use areas to law enforcement agents.

CDFG wardens, USFWS agents and others who are involved in law enforcement relating to condors and condor habitat must be kept informed of condor use areas, particularly where law enforcement is needed.

179. Develop public information about the condor recovery programs at zoological institutions.

Millions of people visit Los Angeles Zoo and San Diego Wild Animal Park annually. The opportunity to provide information on the condor recovery program is great. Widescale support of the program will be essential to its ultimate success. Therefore, a concerted effort should be made to make the public aware of the efforts of the animal park and zoo to save the condor, as well as the entire recovery effort by all cooperators.

1791. Provide informational kiosks with video monitor displays of captive condors.

Informational kiosks could be constructed where zoo visitors

could view captive condors through closed-circuit video monitors. These kiosks also could show slides or films on the recovery effort. Information on the efforts to save other endangered species might be included.

1792. Continue to provide photos and videotapes of captive rearing efforts to the press and management agencies for educational uses.

The zoos have provided video tapes and still photos of the efforts to hatch eggs and rear nestlings. These materials have been widely used by the news media, agencies and others to provide information to the public about the condor recovery effort.

18. Designate essential condor habitat to incorporate important areas not currently included in published critical habitat.

Much new information on condor habitat use has been learned since the publication in the Federal Register of critical habitat, pursuant to Section 4 of the Endangered Species Act, in 1976 (FR 4:47840-47841) (see Appendix I). Many areas now recognized as essential to the well-being of the condor are not included within the critical habitat zones. Appendix II depicts habitat that the California Condor Recovery Team currently considers essential to the condor. Essential habitat area maps should be updated on a yearly basis. Publication as critical habitat of these areas and areas to be identified for future population expansion may aid in their protection. Updating of critical habitat should be

undertaken only after a thorough assessment of condor habitat requirements is completed.

2. Increase and maintain condor numbers in their current range by releasing captive-reared condors.

The California condor population numbers less than 20 individuals in the wild and appears to still be declining at a rate of about two birds per year (Snyder 1983). Unless this trend is halted and reversed, the condor could become extinct in about a decade. It would likely be effectively extinct prior to that. Because of this precarious state of the population, an aggressive program of manipulation of reproduction (including double- and triple-clutching, and removal of nestlings) by free-living condors was begun in 1983 to establish a captive breeding program and initiate releases of condors perhaps as soon as 1985. "Initiation of the California Condor Captive Breeding and Release Programs" (hereinafter called Release Plan) was developed by the California Condor Recovery Team and adopted in concept by the California Fish and Game Commission and USFWS in February 1984 (Appendix IV). It outlines a strategy that should provide the best chance of maintaining a wild population until large scale releases of captive-reared condors can begin in the 1990s. This plan must be viewed as dynamic. The Release Plan should be updated annually to incorporate changes in the status of the wild and captive condor populations. The condor population is so severely depleted that the numbers of individuals cannot increase rapidly enough to overcome problems of genetic deterioration. The condor population

is essentially going through a genetic bottleneck with the dramatic collapse in numbers. It is not necessarily the bottleneck event itself that leads to genetic deterioration, but rather events that follow the bottleneck (Frankel and Soulé 1981; see particularly Chapter 3). Most genetic variation is usually maintained during a bottleneck, but the numbers of individuals must be increased to a safe level shortly after the bottleneck period to avoid the loss of genetic variation. The best means to increase the numbers of condors rapidly is by captive breeding and releases of captive-reared condors to the wild.

21. Establish a captive breeding program to provide condors for release.

The first step to large-scale condor releases is the establishment of an adequate captive-breeding population. Soule (1980:152) identified two primary goals of a captive breeding program: "(1) minimize genetic loss and phenotypic deterioration and (2) minimize the loss of genetic variation so that future adaptive options are retained. The cost of ignoring these objectives is almost certain failure (extinction)." These goals can be approached by assuring reasonably large captive populations, carefully matching pairs to minimize inbreeding, and endeavoring to balance reproductive output among reproductively active adults.

The Release Plan has set the goal to be reached by the end of 1985 for a captive flock to consist of four progeny from each

existing breeding pair and two additional unrelated birds, one of which is currently in captivity. These should represent about 95 percent of the genetic variability of the current condor population. Whether additional captives should be taken will be evaluated at the end of 1985. For genetic reasons, the captive flock should be as large as possible (Foose 1983). Further increases in the captive population will be advisable if these increases can be accomplished while still maintaining an adequate number of free-flying birds. Behavioral considerations based on experience with captive Andean condors at the Patuxent Wildlife Research Center suggest that a minimum of 15 birds is needed to ensure at least five breeding pairs (James Carpenter pers. comm. USFWS, Laurel, Maryland). This goal may not be attainable, but ideally, the goal for maintenance of a captive population of California condors would be 32 breeding adults, 16 of each sex, divided among two or more captive flocks. However, this goal will be subordinate to maintaining a wild population through releases. All flocks should have comparable genetic representation to minimize the impact of a catastrophic loss at one facility. Occasional exchange of offspring between subpopulations will be carefully controlled to simulate immigration, thereby giving each subpopulation the maximum benefit of access to a larger gene pool. In addition to the advantage of a reduced likelihood of catastrophic loss of all birds, two or more subpopulations increase the opportunity to maintain genetic variability in the population as a whole. Genetic drift is unlikely to fix the same alleles in all subpopulations, and

different mutations may arise in each. Occasional exchange of individuals between captive subpopulations and the wild can thus serve to replenish lost genetic information in all of them.

211. Remove older non-breeding condors from the wild for captive breeding.

Some wild adult condors are not members of breeding pairs. They may play an important role in the wild by replacing breeders that are lost to the population. But in recent years two or more pairs have lost one or more members and no replacement has occurred. A captive flock, based on eggs or young taken from five currently breeding pairs (1984), may not represent the entire genetic diversity of the species. Therefore, it is advisable to obtain individuals unrelated to these captives for the captive breeding program. This can best be accomplished by removal of a few nonbreeding adult birds. The Release Plan calls for the removal of one nonbreeding adult bird by the end of 1985. Other removals may be considered at a later date.

212. Remove needed eggs and nestlings from currently breeding condors.

Establishing a captive breeding flock with the least impact to the wild condor population is best accomplished by removal of eggs or young from wild breeding pairs. The goals of this effort are to obtain three progeny for captive breeding from each wild pair by the end of 1984, and to obtain a total of four progeny from each pair by the end of 1985. Progeny in excess of

these goals will be released to the wild. The need for additional captives will be re-evaluated at the end of 1985.

213. Determine the degree of inbreeding and develop a captive breeding strategy that will maximize N_e of the captive breeding population.

Enzyme polymorphism studies may reveal information on the degree of inbreeding in the condor population. Information from these studies may assist in the pairing of captive birds so as to maximize genetic diversity and outbreeding.

22. Increase production of remaining wild pairs by multiple-clutching and removal of nestlings when appropriate.

The number of California condors must be increased substantially to ensure the long-term survival of the species. Until the captive population is old enough to begin producing young, the only method of producing more condors is by increasing production of wild pairs. Condors are known to lay a replacement egg when one is lost. Some female condors are capable of laying three eggs in a breeding season, and most may lay two eggs in one season. By combining egg removals with removal of nestlings, it is theoretically possible to increase the production of one pair of condors four to six times over what they would produce naturally. Captive-reared condors then can either be retained for captive breeding or released to the wild (see Appendix IV for detailed discussion).

23. Release captive-reared California condors to increase numbers in the wild.

Condors reared in captivity and released to the wild will ultimately determine whether the species can be saved in the wild state. The success of these releases is essential to rapidly supplement numbers in the wild and thereby avoid extinction. In the near term, the origin of released birds will be eggs and young taken from wild breeding adults. In the long-term, the origin of released condors will be from captive adults. The release of captive-reared condors may begin as early as 1985. Ideally, three or more similar-aged condors should be released as a group into an area where they can interact with wild condors. Techniques for releasing condors have been field-tested with Andean condors in Peru (see Temple and Wallace 1983). These studies have shown that captive-reared condors can be successfully introduced to the wild. Results of this study provide the guidelines for release procedures of California condors (Appendix IV).

231. Protect released birds with patrols, law enforcement and education.

As with protection efforts for wild birds, released birds should be protected with patrols and education. Ground trackers can perform many of these tasks. But a communication system should be established with local enforcement agents, so that they can be notified if any assistance is required. Also, released birds will likely use private ranches in the release area.

Contacts with, and education of, landowners will be essential for permission to follow the birds.

232. Monitor released birds to judge the success of the program.

It is important to learn about the behavior of released birds, their habitat use, potential and real mortality factors, and other information. This knowledge should greatly enhance the successes of future releases, as well as increase our general knowledge of condor biology.

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PART III. IMPLEMENTATION SCHEDULE

The following table is a summary of scheduled actions and costs for the California condor recovery program. It is intended as a guide to meet the objectives of the plan, as elaborated in Part II, Narrative. This table indicates the priority in scheduling tasks to meet the objectives, the agencies responsible for performing these tasks, a timetable for accomplishing each task, and the estimated cost of each. Implementing Part III is the action of the recovery plan that, when accomplished, will satisfy the prime objective. Initiation of these actions is subject to availability of funds, priorities, and other budgetary constraints.

GENERAL CATEGORIES FOR IMPLEMENTATION SCHEDULES

Information Gathering - I or R (research)

1. Population status
2. Habitat status
3. Habitat requirements
4. Management techniques
5. Taxonomic studies
6. Demographic studies
7. Propagation
8. Migration
9. Predation
10. Competition
11. Disease
12. Environmental contamination
13. Reintroduction
14. Other information

Acquisition - A

1. Lease
2. Easement
3. Management agreement
4. Exchange
5. Withdrawal
6. Fee title
7. Other or to be determined

Management - M

1. Captive Propagation
2. Reintroduction
3. Habitat maintenance and manipulation
4. Predator and competitor control
5. Predation control
6. Disease control
7. Other management

Other - O

1. Information and education
2. Law enforcement
3. Regulations
4. Administration

RECOVERY ACTION PRIORITIES

1 = An action that must be taken to prevent extinction or to prevent the species from declining irreversibly.

2 = An action that must be taken to prevent a significant decline in species population/habitat quality, or some other significant negative impact short of extinction.

3 = All other actions necessary to provide for full recovery of the species.

DESIGNATIONS

FWS Program

WO	-	Washington Office
SE	-	Endangered Species Office
WR	-	Wildlife Resources (Refuges and Acquisition)
PWRC	-	Patuxent Wildlife Research Center
LE	-	Law Enforcement
PA	-	Public Affairs

Other Agencies

USFS	-	U.S. Forest Service
USBLM	-	U.S. Bureau of Land Management
CDFG	-	California Department of Fish and Game
NAS	-	National Audubon Society
TNC	-	The Nature Conservancy
ZSSD	-	Zoological Society of San Diego
LAZ	-	Los Angeles Zoo
SBMNH	-	Santa Barbara Museum of Natural History
WFVZ	-	Western Foundation of Vertebrate Zoology

Task Duration

Ongoing	-	Task currently being implemented; to remain active for an extended period of time.
*	-	Denotes lead agency
**	-	Costs absorbed by other programs or tasks

PART III
IMPLEMENTATION SCHEDULE
(revised 6/84)

General Category	Plan Task	Task No.	Priority	Duration (yrs)	Responsible Agency FWS Region	FWS Program	Other	Fiscal Year ($1,000) 84	85	86	Comments and Notes
04	Prohibit motorized activity, blasting and development near nest sites	1111	2	Ongoing			USFS	**	**	**	
04	Maintain Sespe Sanctuary public closure and moratorium	11121	2	Ongoing			USFS	10	10	10	
02	Continue to restrict public use in Piru Creek	11122	2	Ongoing			USFS	10	10	10	
04	Restrict aircraft in nesting areas	1113	2	Ongoing	1	SE*	USFS	1 **	1 **	1 **	FY '84 PA Obj IIA5f
02	Patrol condor use areas on USFS lands	1114	2	Ongoing			USFS	30	30	30	Areas to be patrolled may vary from year to year
M3	Extinguish wildfires and manage control burns	1115	3	Ongoing			USFS	**	**	**	

General Category	Plan Task	Task No.	Priority	Duration (yrs)	Responsible Agency: FWS Region	FWS Program	Other	Fiscal Year ($1,000): 84	85	86	Comments and Notes
04	Modify or oppose proposed developments throughout condor range	1116	2	Ongoing	1	SE*		3	3	3	FY '84 PA Obj. IIA5f
							USFS	**	**	**	
							USBLM	**	**	**	
							CDFG	2	2	2	
							NAS	2	2	2	
M3	Place nest sites under surveillance to minimize disturbance to nesting condors	1117	1	Ongoing	8	PWRC		**	**	**	Costs covered under Task 161, FY '84 PA Obj. IIIA2d(1)
A6	Acquire Pothole parcel	1121	2	1			USFS		40		
A3	Secure Hopper Mountain mineral rights	1122	3	1	1	WR		- To Be Determined -			
A6	Acquire San Cayetano parcels	1123	3	1			USFS			40	
A6	Acquire Indian Creek parcel	1124	2	1			USFS		400		
A7	Acquire Knapp property	1125	2	1			USFS*	- To Be Determined -			
							CDFG				
							TNC				
A6	Acquire Matilija parcels	1126	3	1			USFS			480	
A6	Acquire Pine Mtn. properties	1127	2	1			USFS		140		

General Category	Plan Task	Task No.	Priority	Duration (yrs)	Responsible Agency FWS Region	FWS Program	Other	Fiscal Year ($1,000) 84	85	86	Comments and Notes
O4	Restrict development in the Mt. Pinos/Mt. Abel area	121	2	Ongoing			USFS	**	**	**	
A6	Preserve Pearson parcel	1221	2	1			CDFG	-	To Be Determined	-	
A6	Preserve Boston Ranch parcel	1222	2	1			CDFG* TNC	-	To Be Determined	-	
I2	Assess impacts of human use at Blue Ridge	1223	2	3			CDFG* USBLM	13 7	15	-	
O4	Restrict human activity at Blue Ridge during condor use periods	1224	2	Ongoing	1	WR	USBLM CDFG	-	To Be Determined	-	Lead to be determined. Costs for USFWS funded from O & M budget for Kern-Pixley NWR Complex
M3	Implement needed habitat manipulations at Blue Ridge	1225	3	Unknown	1	WR	USBLM CDFG	-	To Be Determined	-	Lead to be determined
A7	Preserve roosting areas in Bear Trap Canyon, Winters Ridge and El Paso Creek, Tejon Ranch	123	2	Unknown	1	WR		-	To Be Determined	-	
M3	Preserve roosting habitat at Basket Peak	124	1	Ongoing			USFS	-	To Be Determined	-	

General Category	Plan Task	Task No.	Priority	Duration (yrs)	Responsible Agency FWS Region	FWS Program	Other	Fiscal Year ($1,000) 84	85	86	Comments and Notes
M3	Preserve roosting habitat at Breckenridge Mtn.	125	3	Ongoing			USFS	- To Be Determined -			
04	Maintain Sisquoc Sanctuary public closure	126	1	Ongoing			USFS	10	10	10	
04	Develop management plans for other roosts as discovered	127	3	Unknown	1	SE	CDFG USBLM USFS	**	**	**	Management plans developed by responsible land management agency
A6	Encourage open space preservation and continuing livestock economy in condor range	131	1	Ongoing	1	SE	CDFG* NAS	1 1 1	1 1 1	1 1 1	FY '84 PA Obj. IIA 5f
A6	Preserve feeding habitat in the foothills of southwestern Kern County	1321	1	Unknown	1	WR*	CDFG NAS TNC	5,000		2,000	Includes Hudson Ranch acquisition, Bitter Creek area
A7	Preserve feeding habitat in Carrizo and Elkhorn Plains	1322	1	Unknown	1	SE	CDFG* USBLM TNC NAS	- To Be Determined -			

General Category	Plan Task	Task No.	Priority	Duration (yrs)	Responsible Agency FWS Region	FWS Program	Other	Fiscal Year ($1,000) 84	85	86	Comments and Notes
04	Preserve foothill rangelands in southern Tulare County	1323	1	Unknown	1	SE	CDFG* NAS TNC	- To Be Determined -			
04	Preserve feeding habitat in Glennville/Woody Area, Kern County	1324	1	Unknown	1	SE	CDFG* NAS TNC	- To Be Determined -			
A7	Preserve feeding areas on Tejon Ranch	1325	1	Unknown	1	WR*	NAS	- To Be Determined -			
M3	Manage Hopper Mtn. NWR	1326	3	Ongoing	1	WR		12	12	12	Costs from O&M budget for Kern-Pixley NWR Complex.
04	Preserve San Juan Creek region	1327	1	Unknown	1	SE	 CDFG*	1 1	1 1	1 1	
01	Encourage land managers to leave dead livestock on range for condors	133	2	Ongoing			NAS* CDFG	1 1	1 1	1 1	
I1	Undertake socioeconomic and demographic studies within condor range	134	2	Ongoing			NAS	40	40	40	
01	Work with local agencies in planning process	135	1	Ongoing	1	SE	 CDFG NAS*	1 1 5	1 1 5	1 1 5	FY '84 PA Obj. IIA5f

General Category	Plan Task	Task No.	Priority	Duration (yrs)	Responsible Agency FWS Region	FWS Program	Other	Fiscal Year ($1000) 84	85	86	Comments and Notes
04	Minimize or eliminate control programs that leave toxicant-killed animals in condor use areas	141	1	Ongoing	1	WR	CDFG*		2	2	Funding for USFWS through ADC O & M
02	Patrol key condor use areas	142	1	Ongoing	1	LE*		10	20	20	FY '84 PA Obj. IIA4a
							CDFG	10	10	10	
03	Maintain existing firearms closure in Sespe Condor Sanctuary and adjacent areas	143	2	Ongoing			USFS	**	**	**	
02	Evaluate recreational uses in Pine Mountain area	144	2	1			USFS		10		
02	Evaluate recreational uses in Basket Peak area	145	2	1			USFS		10		
R12	Determine contaminants in condor blood, eggshells, feathers and other tissues	1461	2	Ongoing	8	PWRC*		5	5	5	FY '84 PA Obj IIIA 2d(5)
							WFVZ				

General Category	Plan Task	Task No.	Priority	Duration (yrs)	Responsible Agency FWS Region	FWS Program	Other	Fiscal Year ($1,000) 84	85	86	Comments and Notes
R12	Investigate sublethal effects of 1080 and zinc phosphide	14621	2	2	8	PWRC	CDFG*	10	10	10	To be funded with Sec. 6 monies
R12	Investigate the relative exposures to lead from various sources	14622	1	2	8	PWRC	CDFG	- To Be Determined -			Lead to be determined
R12	Investigate the metabolism of lead in captive vultures	14623	1	2	8	PWRC	CDFG	- To Be Determined -			Lead to be determined
M3	Advise planning agencies on placement of obstacles	147	2	Ongoing	1	SE		2	2	2	FY '84 PA Obj. IIA5f
							CDFG*	2	2	2	
							NAS	2	2	2	
M5	Control potential predators of condor eggs and nestlings	148	2	Ongoing	8	PWRC		2	2	2	FY '84 PA Obj. IIIA 2d(1)
03	Restrict aircraft activity in key condor areas	149	2	Ongoing	1	SE		1	1	1	FY '84 PA Obj. IIA5f
A0	Select potential habitat for population establishment	151	3	Unknown	8	PWRC		- To Be Determined -			

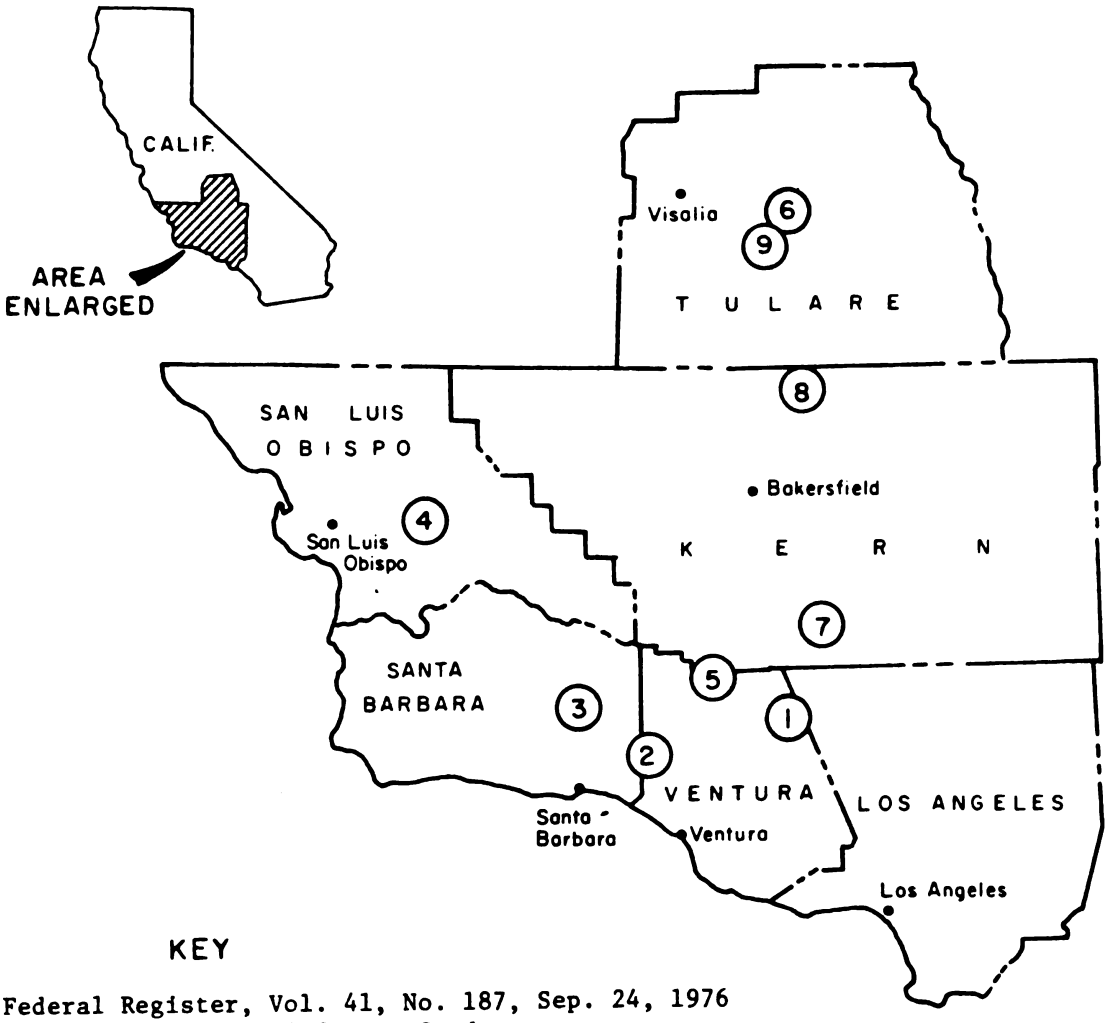
General Category	Plan Task	Task No.	Priority	Duration (yrs)	Responsible Agency FWS Region	FWS Program	Other	Fiscal Year ($1,000) 84	85	86	Comments and Notes
A7	Secure habitat for new populations	152	3	Unknown	1	WR	?	- To Be Determined -			
R1	Continue surveillance of condor nest sites	161	1	Ongoing	8	PWRC*		100	100	100	FY '84 PA Obj. IIIA2 d(1) (Part)
							NAS				
							SBMNH				
R1	Continue condor photo surveys	1621	1	Ongoing	8	PWRC*		3	3	3	FY '84 PA Obj. IIIA2 d(1) (Part)
							NAS	1	1	1	
							CDFG	1	1	1	
I1	Collect and analyze cooperator records	1622	3	Ongoing	8	PWRC*		1	1	1	FY '84 PA Obj. IIIA2 d(1) (Part)
							NAS	1	1	1	
R3	Develop and carry out radio-telemetry studies	163	1	Ongoing	8	PWRC		30	30	30	FY '84 PA Obj. IIIA2 d(2) and (4)
							NAS*	100	100	100	
01	Provide information to key governmental land managers	171	2	Ongoing	1	SE		1	1	1	FY '84 PA Obj. IIA5f
							CDFG	1	1	1	
							NAS*	5	5	5	
01	Educate recreationists about condors	172	2	Ongoing			NAS	1	1	1	Lead depends on land management agency
							USFS	3	3	3	
							USBLM	1	1	1	
							CDFG	1	1	1	
01	Provide information to private landowners	173	2	Ongoing			CDFG	1	1	1	
							NAS*	1	1	1	

General Category	Plan Task	Task No.	Priority	Duration (yrs)	Responsible Agency FWS Region	FWS Program	Other	Fiscal Year ($1,000) 84	85	86	Comments and Notes
01	Establish Valle Vista observation point	174	3	1			USFS*		250		
							NAS		2		
01	Coordinate land protection efforts with key agencies and conservation groups	175	3	Ongoing	1	SE		1	1	1	FY '84 PA Obj. IIA5f
							CDFG*	2	2	2	
							USFS	1	1	1	
							USBLM	7	7	7	
							NAS	1	1	1	
							TNC	1	1	1	
01	Prepare educational material for public distribution	176	3	Ongoing	1	SE		3	3	3	FY '84 PA Obj. IIA5f
							CDFG*	25	5	1	
							USBLM	1	1	1	
							NAS	3	3	3	
							USFS	3	3	3	
01	Make a film on condor recovery effort	177	3	1	9	PA*		- To Be Determined -			
							NAS				
01	Provide training sessions on condor biology to law enforcement agents	178	2	Ongoing	1	SE		1	1	1	FY '84 PA Obj. IIA5f
							CDFG*	2	2	2	
							NAS	1	1	1	
01	Develop public information facilities at zoos	179	3	Ongoing			ZSSD*	- To Be Determined -			Zoos share lead
							LAZ*				
04	Designate essential condor habitat	18	1	Ongoing	1	SE*		1	1	1	FY '84 PA Obj. IIA5c
							CDFG	1	1	1	
							NAS	1	1	1	

General Category	Plan Task	Task No.	Priority	Duration (yrs)	Responsible Agency FWS Region	FWS Program	Other	Fiscal Year ($1,000) 84	85	86	Comments and Notes
M1	Establish captive breeding program	21	1	Ongoing	8	PWRC		**	**	**	Zoos share lead; FY '84 PA Objs. IIIA 2d(3) and IIIA2d(b)
							ZSSD*	150	180	180	
							LAZ*	100	150	150	
M1	Increase production of wild pairs	22	1	Ongoing	8	PWRC*		20	20	20	FY '84 PA Objs. IIIA 2d(3), IIIA2d(6), and III2d(7) (Part)
							ZSSD	20	20	20	
							LAZ	10	10	10	
							CDFG	2	22	22	
M2	Release captive-reared condors	23	1	Ongoing	8	PWRC*			40	40	Release scheduled to begin in 1985; preliminary work under FY '84 PA Obj. III A2d(3).
							CDFG		170	170	
							NAS		40	40	
							ZSSD		90	90	
							LAZ		80	80	

APPENDIX I

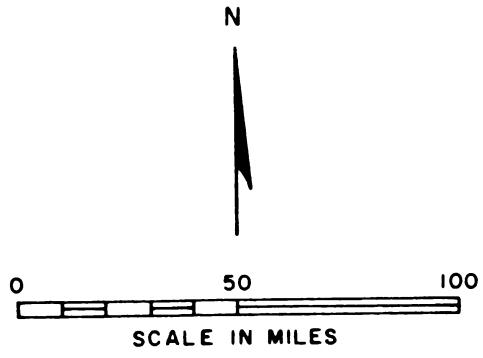
CALIFORNIA CONDOR CRITICAL HABITAT



KEY

Federal Register, Vol. 41, No. 187, Sep. 24, 1976
Paragraph 17.64 California Condor
(a)

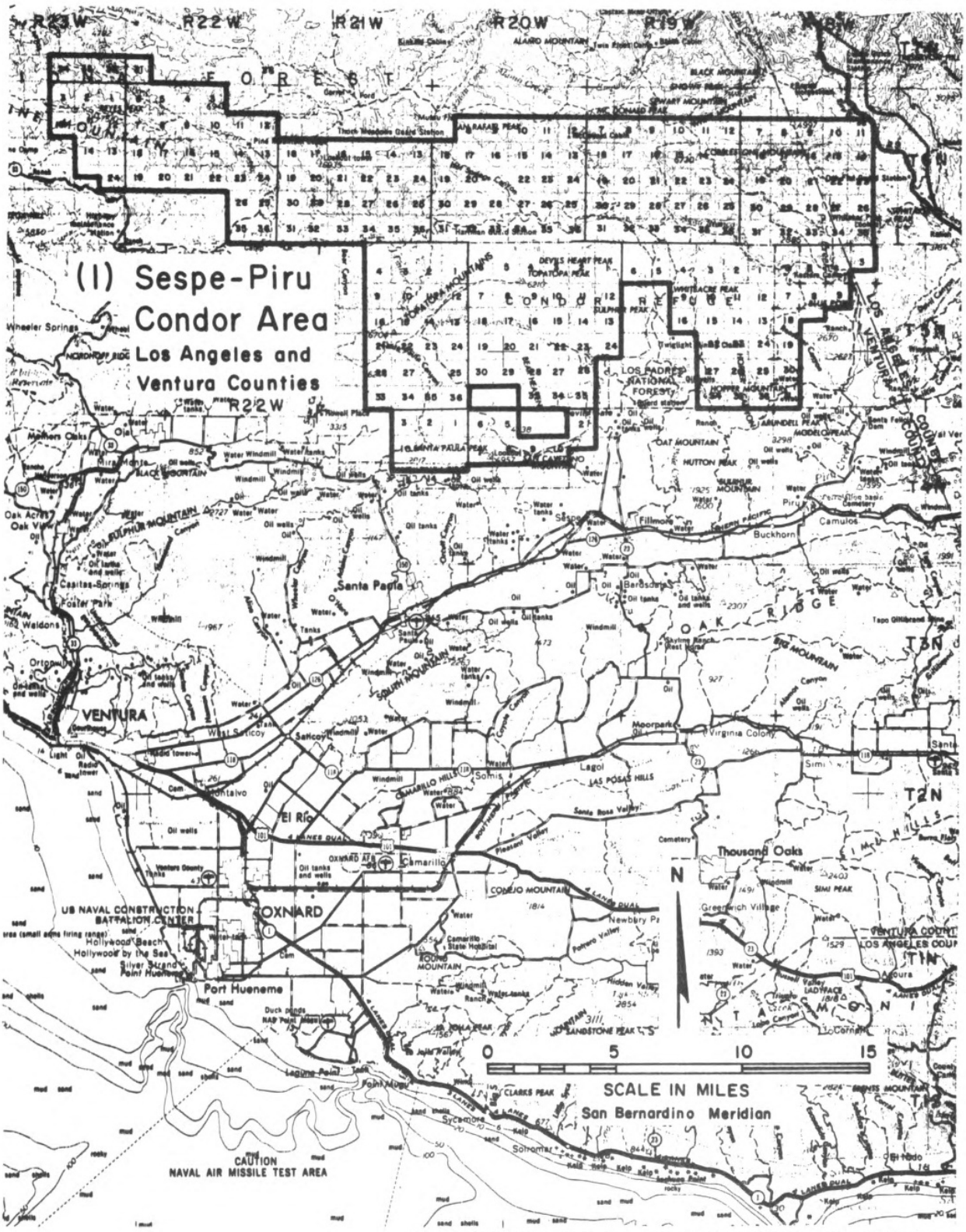
(1) Sespe-Piru Condor Area
(2) Matilija Condor Area
(3) Sisquoc-San Rafael Condor Area
(4) Hi Mountain-Beartrap Condor Areas
(5) Mt. Pinos Condor Area
(6) Blue Ridge Condor Area
(7) Tejon Ranch
(8) Kern County rangelands
(9) Tulare County rangelands



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

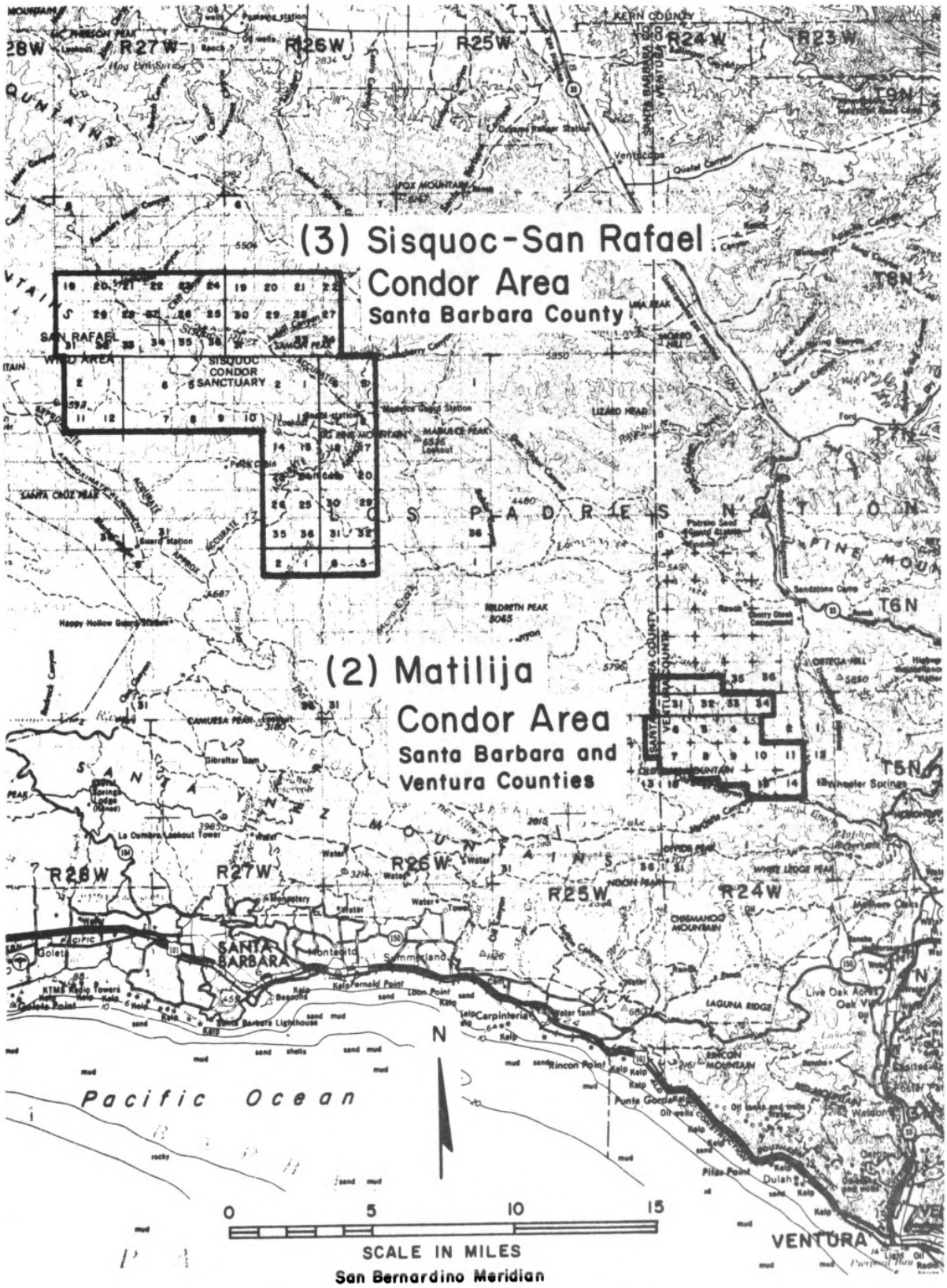
DETERMINATION OF CRITICAL HABITAT
FOR
CALIFORNIA CONDOR

Sheet 1 of 7



DETERMINATION OF CRITICAL HABITAT FOR CALIFORNIA CONDOR

Reference: Federal Register, Vol. 41, No. 187, Sep. 24, 1976



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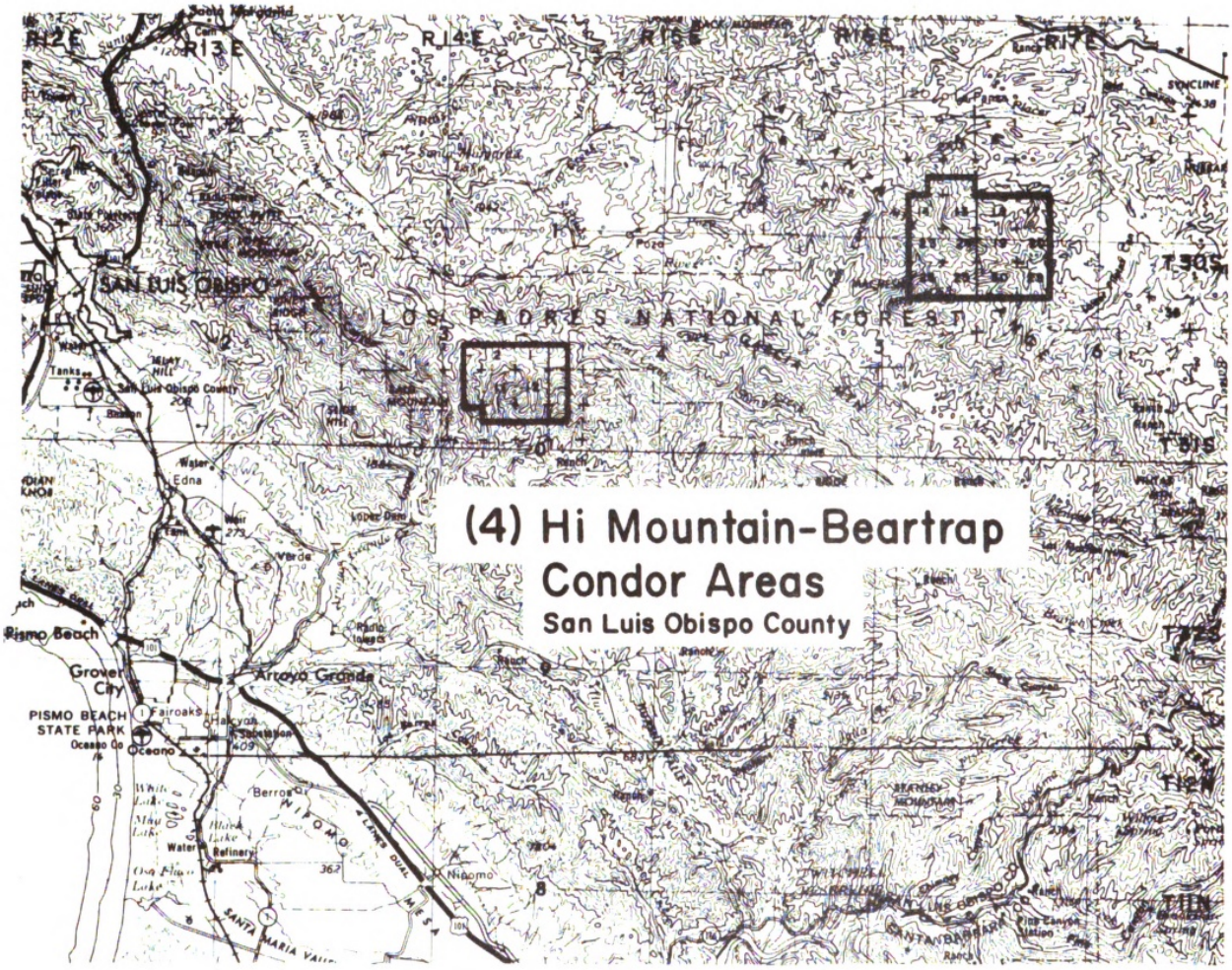
Reference: Federal Register, Vol. 41, No. 187, Sep. 24, 1976



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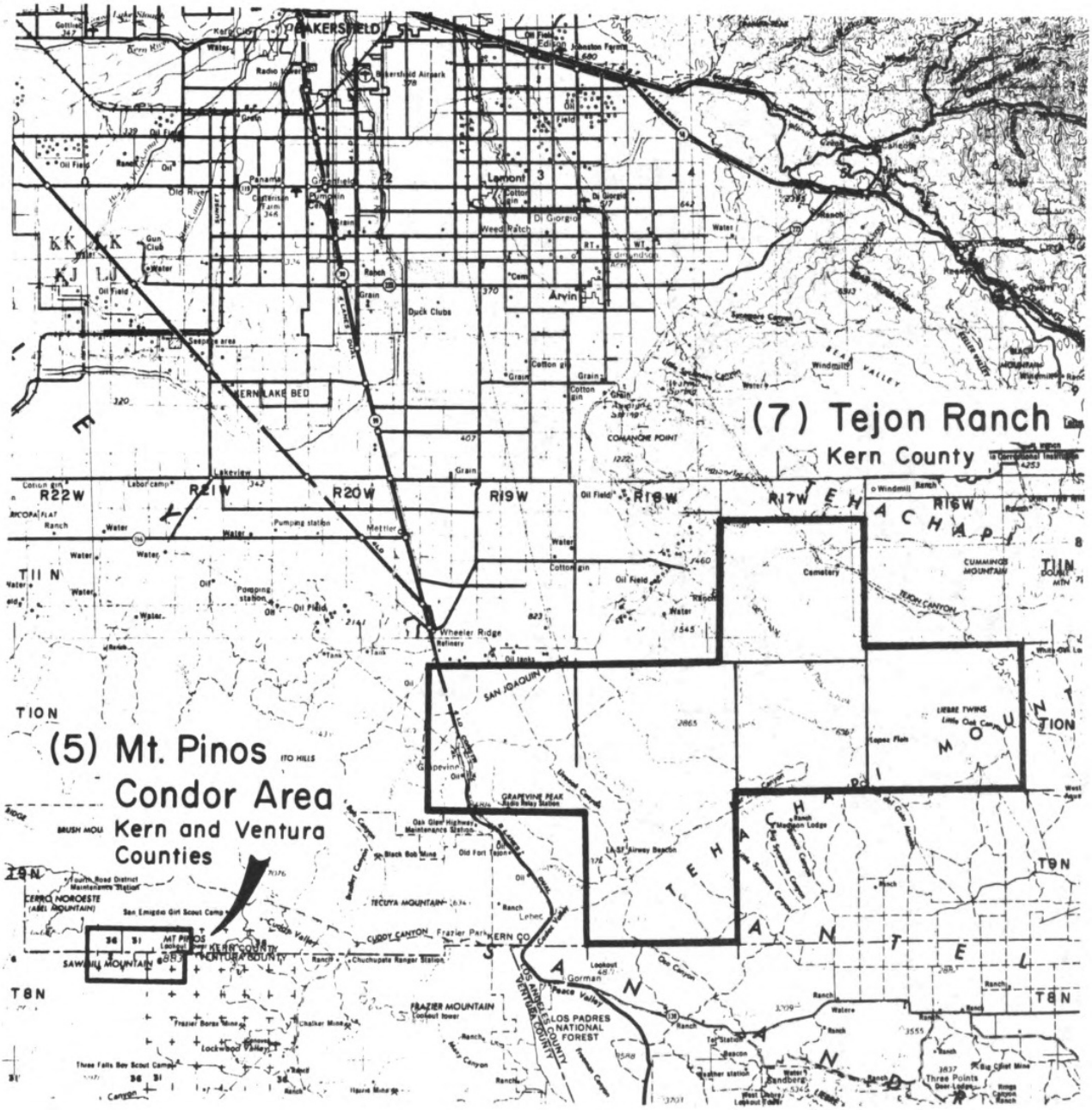
SCALE IN MILES

Mt. Diablo Meridian

DETERMINATION OF CRITICAL HABITAT FOR CALIFORNIA CONDOR

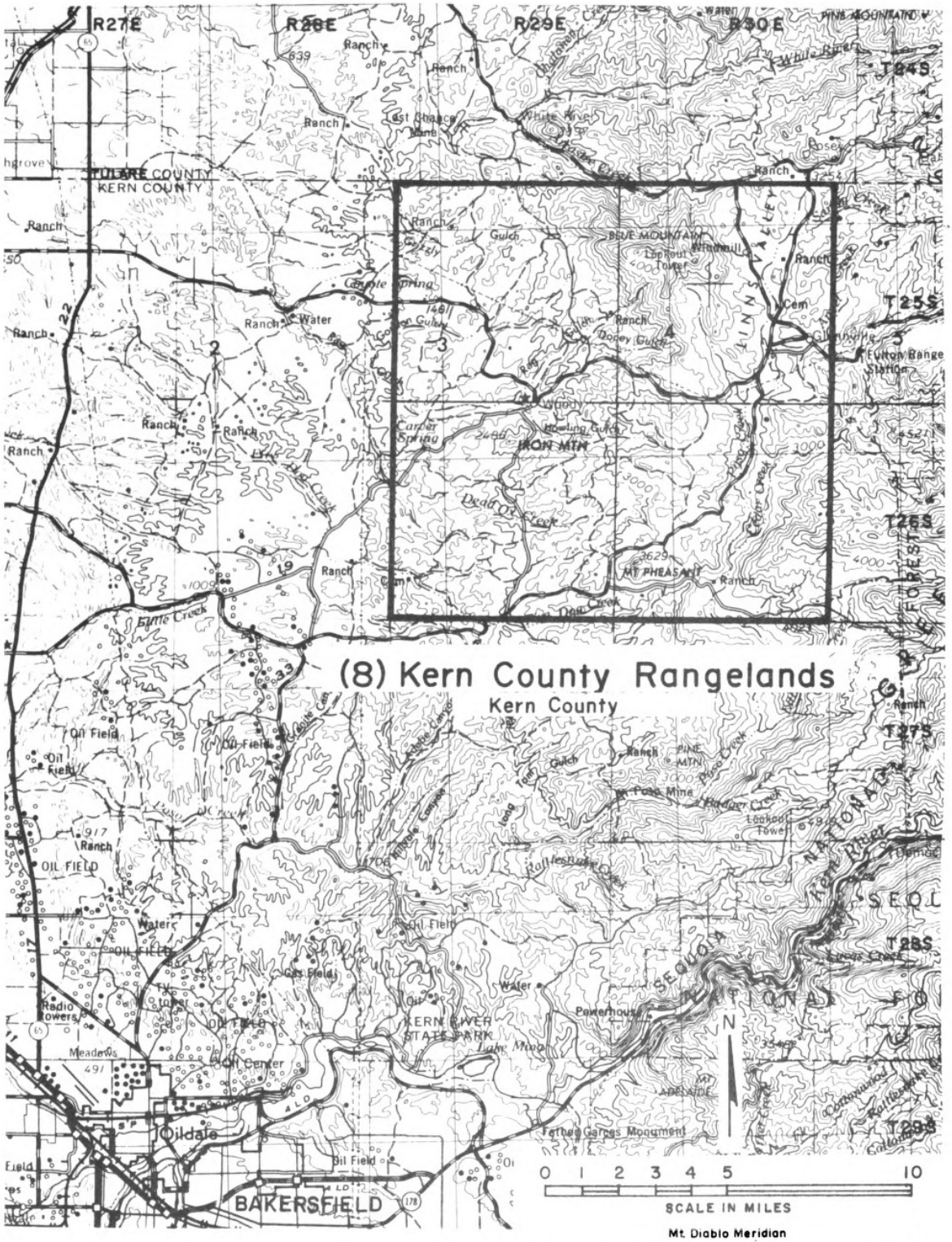
Reference: Federal Register, Vol. 41, No. 187, Sep. 24, 1976

Sheet 4 of 7



DETERMINATION OF CRITICAL HABITAT FOR CALIFORNIA CONDOR

Reference: Federal Register, Vol. 41, No. 187, Sep. 24, 1976

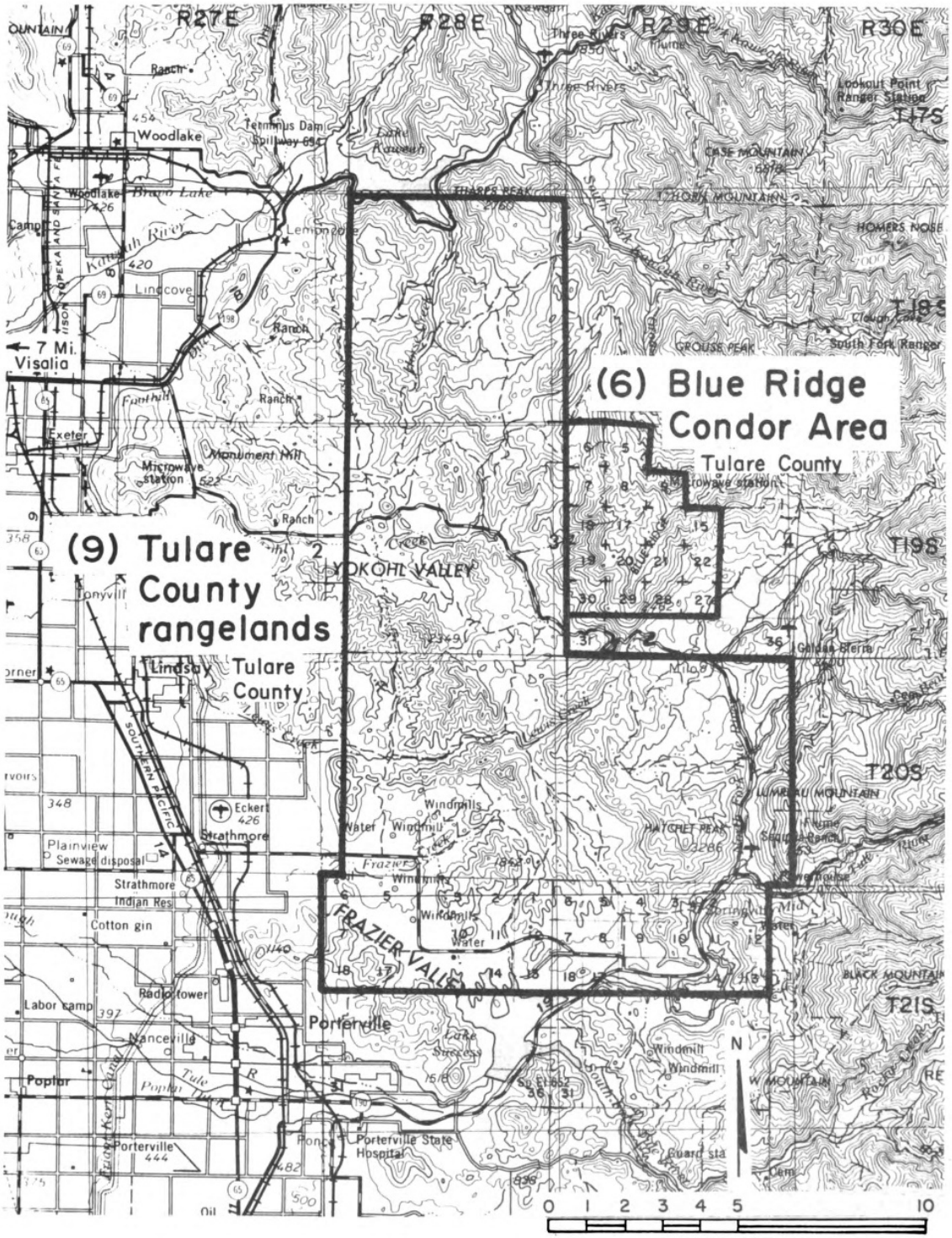


Mt. Diablo Meridian

DETERMINATION OF CRITICAL HABITAT FOR CALIFORNIA CONDOR

Reference: Federal Register, Vol. 41, No. 187, Sep. 24, 1976

Sheet 6 of 7



Mt. Diablo Meridian

DETERMINATION OF CRITICAL HABITAT FOR CALIFORNIA CONDOR

Reference: Federal Register, Vol. 41, No. 187, Sep. 24, 1976

Sheet 7 of 7

September 1, 1976 make the following corrections:

1. On page 36873, in the third column, in the fifteenth line of the first paragraph, change the word "self-supporing" to read "self-supporting".

2. In the twelfth line of the middle column on page 36876, change the word "regulation" to read "regular".

3. On page 36881, change the fourth line of the middle column which now reads "regulations and in § 144.15 of the pro-" to read "regulations. The statement may be in-".

4. On page 36884, in the eleventh line of § 175.2(p), change the word "source" to "course" and in the 25th line of § 175.2 (v) insert "n" after the letter "i".

5. On page 36890, change the second word in § 175.18(b)(2) from "Commission" to "Commissioner".

Title 49—Transportation

CHAPTER I—MATERIALS TRANSPORTATION BUREAU, DEPARTMENT OF TRANSPORTATION

[Docket No. HM-134; Amdts. 171-34, 172-32, 173-100, 174-27, 175-2, 176-2, 177-37, 178-40, 179-17]

PARTS 171-179—HAZARDOUS MATERIALS REGULATIONS

Reissuance; Corrections

Correction

The FR Doc. number of the above-described document, appearing at page 40475 in the issue of Monday, September 20, 1976 (see file line following document on page 40476) should have read "FR Doc. 76-27693".

Title 50—Wildlife and Fisheries

CHAPTER I—UNITED STATES FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR

SUBCHAPTER B—TAKING, POSSESSION, TRANSPORTATION, SALE, PURCHASE, BARTER, EXPORTATION, AND IMPORTATION OF WILDLIFE

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

Determination of Critical Habitat for American Crocodile, California Condor, Indiana Bat, and Florida Manatee

The Director, U.S. Fish and Wildlife Service (hereinafter, the "Director" and the "Service," respectively) hereby issues a Rulemaking pursuant to Section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543; 87 Stat. 884; hereinafter, the "Act") which determines Critical Habitat for the American Crocodile (*Crocodylus acutus*), California Condor (*Gymnogyps californianus*), Indiana Bat (*Myotis sodalis*), and Florida Manatee (*Trichechus manatus*).

BACKGROUND

In the FEDERAL REGISTER of December 16, 1975 (40 FR 58308-58312) the Service proposed the determination of Critical Habitat for the California Condor, Indiana Bat, Florida Manatee, American Crocodile, Whooping Crane (*Grus americana*), and Snail Darter (*Percina tanasi*). On April 1, 1976 (41 FR 13926-13928) the Service issued a Final Rulemaking determining Critical Habitat for the Snail Darter, but not the other five species. The present Rulemaking deals with four of those other species, but not the Whooping Crane. So much information on the Whooping Crane was received that more time will be required for evaluation and determination of additional measures on that species.

SUMMARY OF COMMENTS

Of the responses received to the Proposed Rulemaking of December 16, 1975, some dealing only with the Snail Darter were discussed in the Final Rulemaking of April 1, 1976, and 35 dealing only with the Whooping Crane will be discussed at a later time. Of the approximately 100 remaining comments, nine simply expressed general support for the Proposal and none indicated general opposition.

With regard to the American Crocodile, the National Park Service recommended that the Critical Habitat zone be expanded to include a portion of Everglades National Park to the west of that delineated in the original Proposal. Since the recommended area is within the Park, the Service considers it proper to include this area as part of the Critical Habitat designated below. The National Audubon Society suggested approximately the same addition as the Park Service, and also several other modifications which remain under consideration.

With regard to the California Condor, one person simply expressed approval of the Proposed Critical Habitat designation, and one expressed disapproval. The California Department of Fish and Game and the Director of the Santa Barbara Museum of Natural History suggested that small additional areas be designated as Critical Habitat, and these areas now are under consideration. Five major conservation organizations expressed concern that the western boundary of the Sespe-Piru Condor Area might have been drawn so as to deliberately exclude the land within a phosphate mining lease application from the Critical Habitat zone. In fact, however, the area of importance to the Condor long was recognized to have approximately the same boundary as that delineated in the Proposal, and there seems no biological justification to extend this boundary into the area of the phosphate lease application. Moreover, a letter from the United States Gypsum Company stated that although the Proposed Critical Habitat zone did not enter the phosphate lease application area, it did include most of an adjacent phosphate prospecting permit area. The Company recommended that the Critical Habitat zone be redrawn to exclude this permit area. The Service, however, considers the original boundary to be appropriate with respect to the biological situation, and no adjustment is being made.

The State of Illinois and two other parties expressed general approval of the Proposed Critical Habitat for the Indiana Bat. The States of Indiana, Kentucky, Missouri and Tennessee; three university professors; and three other parties all recommended the designation of additional Critical Habitat, either more caves or other components of the habitat of the species. These recommendations are now under consideration and may be expressed, at least in part, in a future proposal.

The State of Florida and approximately 64 other parties expressed approval of the Proposed Critical Habitat for the Florida Manatee. The Director of the Florida State Museum suggested adding an additional area in Florida; and the Georgia Conservancy and Mr. Jerry L. McCollum of the Georgia Department of Natural Resources suggested adding parts of Georgia. These suggested additions now are under consideration.

BASIS FOR DETERMINATION

All of the areas delineated below are considered Critical Habitat because they contain constituent elements necessary to the normal needs or survival of one of the species in question. Specifically for the American Crocodile the delineated area must be considered an absolute minimum amount of Critical Habitat in Florida. The current population of the State, with only 200 to 300 individuals, is concentrated in this area and is dependent upon the included habitat of Florida Bay and associated brackish marshes, swamps, creeks, and canals. All known breeding females, of which there are less than ten in Florida, inhabit and nest in the delineated area.

With regard to the California Condor, the Sespe-Piru, Matilija, Sisquoc-San Rafael, and Hi Mountain-Beartrap Condor areas, as described below, are considered critical for nesting and related year-long activity. The Mt. Pinos and Blue Ridge Condor areas, as described below, are considered critical for roosting. The Tejon Ranch, Kern County rangelands, and Tulare County rangelands, as described below, are considered critical for feeding and related activities. The Tejon Ranch is very important because it contains the only significant feeding habitat remaining in close proximity to the Sespe-Piru Condor nesting area. In most cases Condor feeding habitat is not so restricted as nesting and roosting sites, and only certain portions of the areas described below are needed at any one time. Because, however, the location of food is directly related to both Condor distribution and reproductive success, substantial areas of open range, with adequate food, and limited development and disturbance, would have to be preserved in each delineated area in order to maintain the species.

With regard to the Indiana Bat, approximately 75 percent of the known population hibernates at the sites designated below. The bats are entirely dependent on the shelter provided by these caves and mines during the winter. Their loss or subjection to excessive disturbance or modification would lead to the near or total extinction of the species.

With respect to the Florida Manatee, the areas delineated below contain the largest concentrations in the United States, and are the only areas that pres-

ently can be defined as having major dependent populations. The Crystal River and its King's Bay headwaters form one of the largest natural warm water resources for Manatees. Up to 60 Manatees possibly representing six to ten percent of the total population of the species in the United States, utilize this refugium during cold weather periods. The Little Manatee, Manatee, Myakka, and Peace rivers, and Charlotte Harbor all support large Manatee concentrations. Manatees also utilize the Caloosahatchee River and associated coastal areas. The warm water discharge of the Florida Power and Light Company Ft. Meyers power plant into the Orange River, on the south bank of the Caloosahatchee River at Tice, is known to attract as many as 75 Manatees during cold periods. The area off the coast of Collier and Monroe Counties, southwestern Florida, is the center of a large, but uncounted Manatee population. This population is at least partially resident and is dependent on the extensive local growths of *Thalassia* and *Diplanthera* as a primary food resource. Concentrations of as many as 75 Manatees are observed in Whitewater Bay. The waterway formed by Card, Barnes, Blackwater, and Buttonwood sounds may constitute the Manatee's essential thoroughfare between Miami-Biscayne Bay and the lower Keys and Florida Bay. Seaward movement along the upper Keys is very rare. Biscayne Bay, with its adjoining waterways is of central importance to the large Manatee populations of southeastern Florida. Abundant food resources exist in the area, and the warm water flow from the Florida Power and Light Company Miami River plant provides an important refugium. Lake Worth supports a large Manatee population year-round, and also serves as a warm water refugium for additional wintering Manatees. The outfall from the Florida Power and Light Company River plant supports up to 75 Manatees during cold weather. The Indian and Banana rivers may contain the largest Manatee population in Florida. These areas provide warm, quiet waters and abundant food resources. The St. Johns River also provides ample food resources to a significant Manatee population, and several of its spring-fed tributaries provide warm water refugia during cold spells. In Lake Monroe, two power plants provide warm water outfalls which are used by Manatees during cold periods. The Intracoastal Waterway from the St. Marys River to Highway A1A is a major concentration area and thoroughfare for Manatees.

It is emphasized that the areas delineated below may not represent the entire Critical Habitat of the species named. This Rulemaking in no way precludes the Service from at any time proposing additions or modifications to the designated Critical Habitat. It now seems likely that more Critical Habitat will be proposed for at least the California Condor, Indiana Bat, and Florida Manatee in the near future.

Effects of the Rulemaking

The effects of this determination are involved primarily with Section 7 of the Act, which states:

> The Secretary shall review other programs administered by him and utilize such programs in furtherance of the purposes of this Act. All other Federal departments and agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act and by taking such action necessary to insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of such endangered species and threatened species or result in the destruction or modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with the affected States, to be critical.

An interpretation of the term "Critical Habitat" was published by the Fish and Wildlife Service and the National Marine Fisheries Service in the Federal Register of April 22, 1975 (40 FR 17764–17765). Some of the major points of that interpretation are: (1) Critical Habitat could be the entire habitat of a species, or any portion thereof, if any constituent element is necessary to the normal needs or survival of that species; (2) actions by a Federal agency affecting Critical Habitat of a species would not conform with Section 7 if such actions might be expected to result in a reduction in the numbers or distribution of that species of sufficient magnitude to place the species in further jeopardy, or restrict the potential and reasonable recovery of that species; and (3) there may be many kinds of actions which can be carried out within the Critical Habitat of a species which would not be expected to adversely affect that species.

This last point has not been well understood by some persons. There has been widespread and erroneous belief that a Critical Habitat designation is something akin to establishment of a wilderness area or wildlife refuge, and automatically closes an area to most human uses. Actually, a Critical Habitat designation applies only to Federal agencies, and is a notification to such agencies that their responsibilities pursuant to Section 7 of the Act are applicable in a certain area.

Final Rulemaking

The Director has considered all comments and data submitted in response to the proposed determination of Critical Habitat for the American Crocodile, California Condor, Indiana Bat, and Florida Manatee. The Director also has considered other information received by the Service both prior to and subsequent to the publication of the Proposal in the Federal Register of December 16, 1975. Based on this review, the areas delineated below are determined to be Critical Habitat for the American Crocodile, California Condor, Indiana Bat, and Florida Manatee. (Since the time when proposed Critical Habitat Regulations for these species were published in the Federal Register (December 16, 1975), additional Subparts have been proposed for Part 17. Accordingly, the Section numbers in the Final Regulations have been changed to those shown below.)

These Final Regulations will become effective on October 22, 1976.

Dated: September 14, 1976.

Lynn A. Greenwalt,
Director, Fish and Wildlife Service.

Accordingly, 50 CFR Part 17 is hereby amended as set forth below:

1. The Table of Sections for Subpart F of Part 17 is amended to read as follows:

Subpart F—Critical Habitat

Sec.
17.60 [Reserved]
17.61 Snail Darter.
17.62 American Crocodile.
17.63 [Reserved]
17.64 California Condor.
17.65 Indiana Bat.
17.66 Florida Manatee.

2. A new § 17.62 is added reading as follows:

§ 17.62 American crocodile.

(a) The following area (exclusive of those existing man-made structures or settlements which are not necessary to the normal needs or survival of the species) is critical habitat for the American crocodile (*Crocodylus acutus*): All land and water within the following boundary in Florida: beginning at the easternmost tip of Turkey Point, Dade County, on the coast of Biscayne Bay; thence southeastward along a straight line to Christmas Point at the southernmost tip of Elliott Key; thence southwestward along a line following the shores of the Atlantic Ocean side of Old Rhodes Key, Palo Alto Key, Anglefish Key, Key Largo, Plantation Key, Windley Key, Upper Matecumbe Key, Lower Matecumbe Key, and Long Key, to the westernmost tip of Long Key; thence northwestward along a straight line to the westernmost tip of Middle Cape; thence northward along the shore of the Gulf of Mexico to the north side of the mouth of Little Sable Creek; thence eastward along a straight line to the northernmost point of Nine-Mile Pond; thence northeastward along a straight line to the point of beginning.

(b) Pursuant to section 7 of the act, all Federal agencies must take such action as is necessary to insure that actions authorized, funded, or carried out by them do not result in the destruction or modification of this critical habitat area.

3. A new § 17.63 is added and reserved as follows:

§ 17.63 [Reserved]

4. A new § 17.64 is added reading as follows:

§ 17.64 California condor.

(a) The following areas (exclusive of those existing man-made structures or

settlements which are not necessary to the normal needs or survival of the species) in California are critical habitat for the California condor (*Gymnogyps californianus*).

(1) *Sespe-Pine Condor Area:* an area of land, water, and airspace to an elevation of not less than 3,000 feet above the terrain, in Ventura and Los Angeles Counties, with the following components (San Bernardino Meridian): Sespe Condor Sanctuary, as delineated by Public Land Order 695 (January 1951); T4N R20W Sec. 2, 5–10, N½ Sec. 11; T4N R21W Sec. 1–3, 10–12, N¼ Sec. 13, N¼ Sec. 14, N¼ Sec. 15; T3N R18W Sec. 4–9, 18, 19, 30, 31, N½ Sec. 3, N½ Sec. 17; T3N R21W Sec. 1–4, 9–16, 21–28, 33–36; T4N R18W Sec. 7–11, 14–23, 26–35; T4N R19W Sec. 7–36; T4N R20W Sec. 8–36; T4N R21W Sec. 13–36; T4N R22W Sec. 3–26, 35, 36; T4N R23W Sec. 1–3, 10–14, 24, N½ Sec. 23; T7N R22W Sec. 31; T7N R23W Sec. 34–36.

(2) *Matilija Condor Area:* an area of land, water, and airspace to an elevation of not less than 3,000 feet above the terrain, in Ventura and Santa Barbara Counties, with the following components (San Bernardino Meridian): T5N R24W W½ Sec. 3, Sec. 4–11, 14, 15, N½ Sec. 16, N¼ Sec. 17; T5N R25W E½ Sec. 1, NE¼ Sec. 12; T5½N R24W Sec. 31–34; T6N R24W S½ Sec. 32, S½ Sec. 33, S½ Sec. 34.

(3) *Sisquoc-San Rafael Condor Area:* an area of land, water, and airspace to an elevation of not less than 3,000 feet above the terrain, Santa Barbara County, with the following components (San Bernardino Meridian): T6N R26W Sec. 5, 6; T6N R27W Sec. 1, 2; T7N R26W Sec. 5–8, 17–20, 29–32; T7N R27W Sec. 1–14, 23–26, 35, 36; T7N R28W Sec. 1, 2, 11, 12; T8N R26W Sec. 19–22, 27–34; T8N R27W Sec. 19–36.

(4) *Hi Mountain-Beartrap Condor Areas:* areas of land, water, and airspace to an elevation of not less than 3,000 feet above the terrain in San Luis Obispo County, with the following components (Mt. Diablo Meridian): T30S R16E Sec. 13, 14, 23–26, SE¼ Sec. 11, S½ Sec. 12; T30S R17E Sec. 17–20, 29, 30; T31S R14E Sec. 1, 2, 11, 12, E½ Sec. 3, E½ Sec. 10, N½ Sec. 14, N½ Sec. 13; T31S R15E W½ Sec. 6, W½ Sec. 7, NW¼ Sec. 18.

(5) *Mt. Pinos Condor Area:* An area of land, water, and airspace in Ventura and Kern Counties, with the following components (San Bernardino Meridian): T8N R21W W½ Sec. 5, Sec. 6 N½ Sec. 7, NW¼ Sec. 8; T8N R22W Sec. 1, 2, E½ Sec. 3, NE¼ Sec. 10, N½ Sec. 11, N½ Sec. 12; T9N R21W Sec. 31, 32, W½ Sec. 33; T9N R22 W E½ Sec. 35, Sec. 36.

(6) *Blue Ridge Condor Area:* An area of land, water, and airspace in Tulare County, with the following components (Mt. Diablo Meridian): T19S R29E Sec. 5–9, 15–22, 27–30.

(7) *Tejon Ranch:* an area of land, water, and airspace in Kern County, with the following components (San Bernardino Meridian): R16W T10N, R17W T10N, R17W T11N, R18W T9N, R18W T10N, R19W T10N.

(8) *Kern County rangelands:* an area of land, water, and airspace in Kern County between California State Highway 65 and the western boundary of Sequoia National Forest, with the following components (Mt. Diablo Meridian): R29E T25S, R29E T26S, R30E T25S, R30E T26S.

(9) *Tulare County rangelands:* an area of land, water, and airspace in Tulare County between California State Highway 65, State Highway 198, and the western boundary of Sequoia National Forest, with the following components (Mt. Diablo Meridian): R28E T18S (all sections); R28E T19S (all sections); R28E T20S (all sections); R28E T21S Sec. 1–18; R29E T20S (all sections); R29E T21S Sec. 1–18.

(b) Pursuant to section 7 of the act, all Federal agencies must take such action as is necessary to insure that actions authorized, funded, or carried out by them do not result in the destruction or modification of these critical habitat areas.

5. A new § 17.65 is added reading as follows:

§ 17.65 Indiana bat.

(a) The following areas (exclusive of those existing man-made structures or settlements which are not necessary to the normal needs or survival of the species) are critical habitat for the Indiana bat (*Myotis sodalis*):

(1) *Illinois.* The Blackball Mine, La Salle County.

(2) *Indiana.* Big Wyandotte Cave, Crawford County; Ray's Cave, Greene County.

(3) *Kentucky.* Bat Cave, Carter County; Coach Cave, Edmonson County.

(4) *Missouri.* Cave 021, Crawford County; Cave 009, Franklin County; Cave 017, Franklin County; Pilot Knob Mine, Iron County; Bat Cave, Shannon County; Cave 029, Washington County [numbers assigned by Division of Ecological Services, U.S. Fish and Wildlife Service, Region 6].

(5) *Tennessee.* White Oak Blowhole Cave, Blount County.

(6) *West Virginia.* Hellhole Cave, Pendleton County.

(b) Pursuant to section 7 of the act, all Federal agencies must take such action as is necessary to insure that actions authorized, funded, or carried out by them do not result in the destruction or modification of these critical habitat areas.

6. A new § 17.66 is added reading as follows:

§ 17.66 Florida manatee.

(a) The following areas (exclusive of those existing man-made structures or settlements which are not necessary to the normal needs or survival of the species) in Florida are critical habitat for the Florida manatee (*Trichechus manatus*): Crystal River and its headwaters known as King's Bay, Citrus County; the Little Manatee River downstream from the U.S. Highway 301 bridge, Hillsborough County; the Manatee River downstream from the Lake Manatee Dam, Manatee County; the Myakka River downstream from Myakka River State Park, Sarasota and Charlotte Counties; the Peace River downstream from the Florida State Highway 760 bridge, De Soto and Charlotte Counties; Charlotte Harbor north of the Charlotte-Lee county line, Charlotte County; Caloosahatchee River downstream from the Florida State Highway 31 bridge, Lee County; all U.S. territorial waters adjoining the coast and islands of Lee County; all U.S. territorial waters adjoining the coast and islands and all connected bays, estuaries, and rivers from Gordon's Pass, near Naples, Collier County, southward to and including Whitewater Bay, Monroe County; all waters of Card, Barnes, Blackwater, Little Blackwater, Manatee, and Buttonwood sounds between Key Largo, Monroe County, and the mainland of Dade County; Biscayne Bay, and all adjoining and connected lakes, rivers, canals, and waterways from the southern tip of Key Biscayne northward to and including Maule Lake, Dade County; all of Lake Worth, from its northernmost point immediately south of the intersection of U.S. Highway 1 and Florida State Highway A1A southward to its southernmost point immediately north of the town of Boynton Beach, Palm Beach County; the Loxahatchee River and its headwaters, Martin and West Palm Beach Counties; that section of the intracoastal waterway from the town of Sewalls Point, Martin County to Jupiter Inlet, Palm Beach County; the entire inland section of water known as the Indian River, from its northernmost point immediately south of the intersection of U.S. Highway 1 and Florida State Highway 3, Volusia County, southward to its southernmost point near the town of Sewalls Point, Martin County, and the entire inland section of water known as the Banana River and all waterways between the Indian and Banana rivers, Brevard County; the St. Johns River, including Lake George, and including Blue Springs and Silver Glen Springs from their points of origin to their confluences with the St. Johns River; that section of the Intracoastal Waterway from its confluence with the St. Marys River on the Georgia-Florida border to the Florida State Highway A1A bridge south of Coastal City, Nassau and Duval Counties.

(b) Pursuant to section 7 of the act, all Federal agencies must take such action as is necessary to insure that actions authorized, funded, or carried out by them do not result in the destruction or modification of the critical habitat area.

[FR Doc.76-28066 Filed 9-23-76;8:45 am]

PART 32—HUNTING

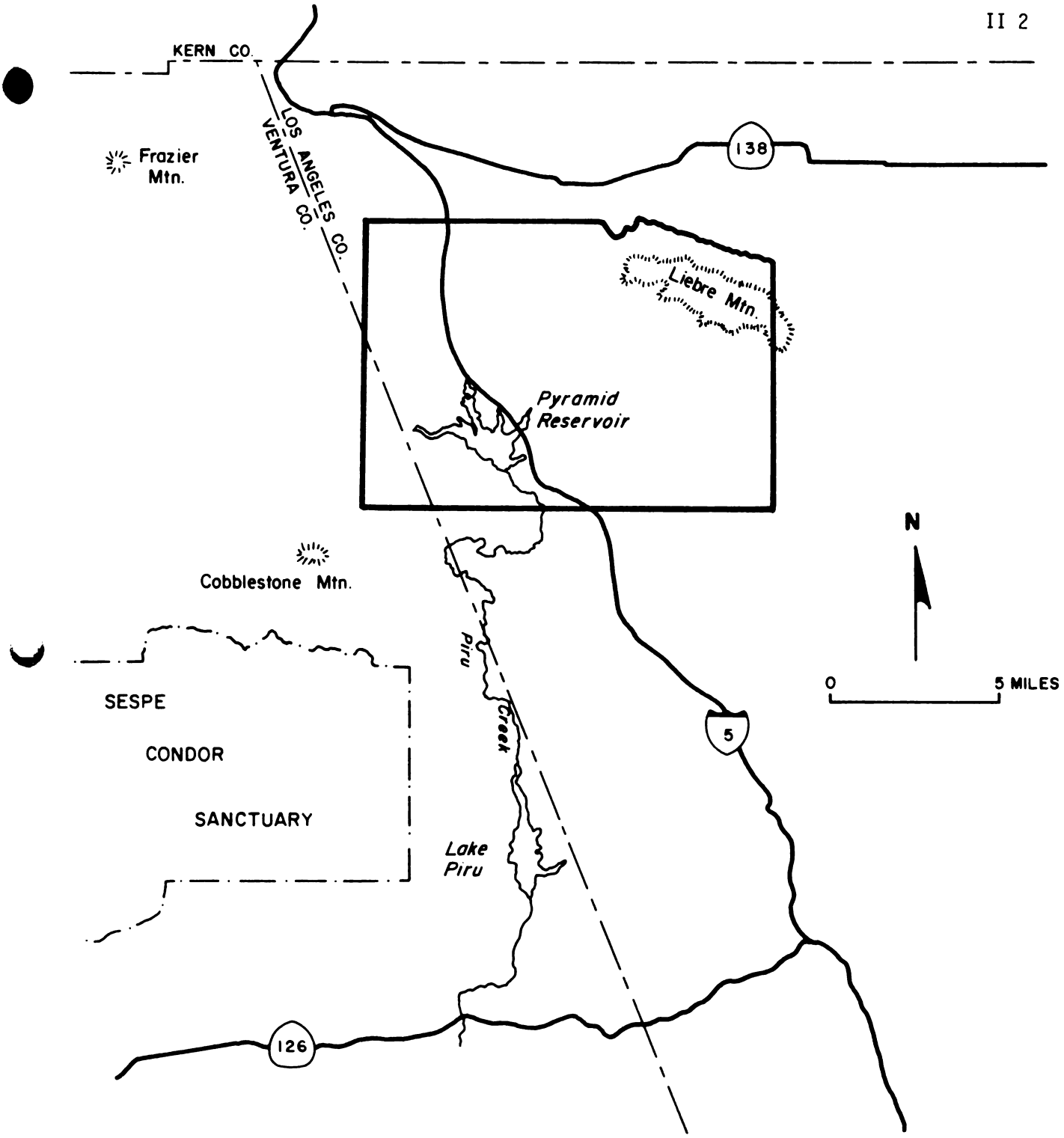
De Soto National Wildlife Refuge, Iowa

The following special regulation is issued and is effective on September 24, 1976.

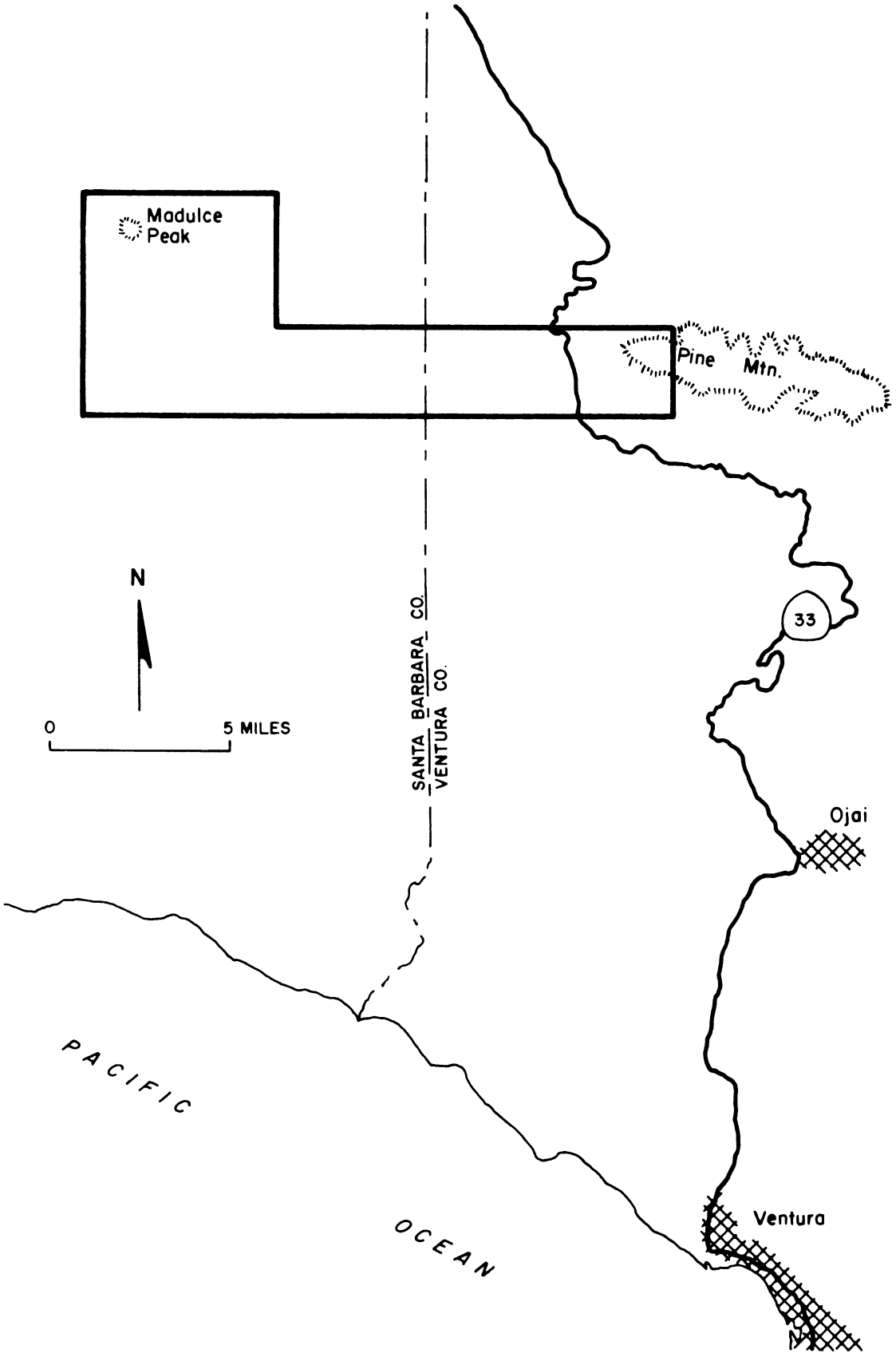
APPENDIX II

CALIFORNIA CONDOR ESSENTIAL HABITAT

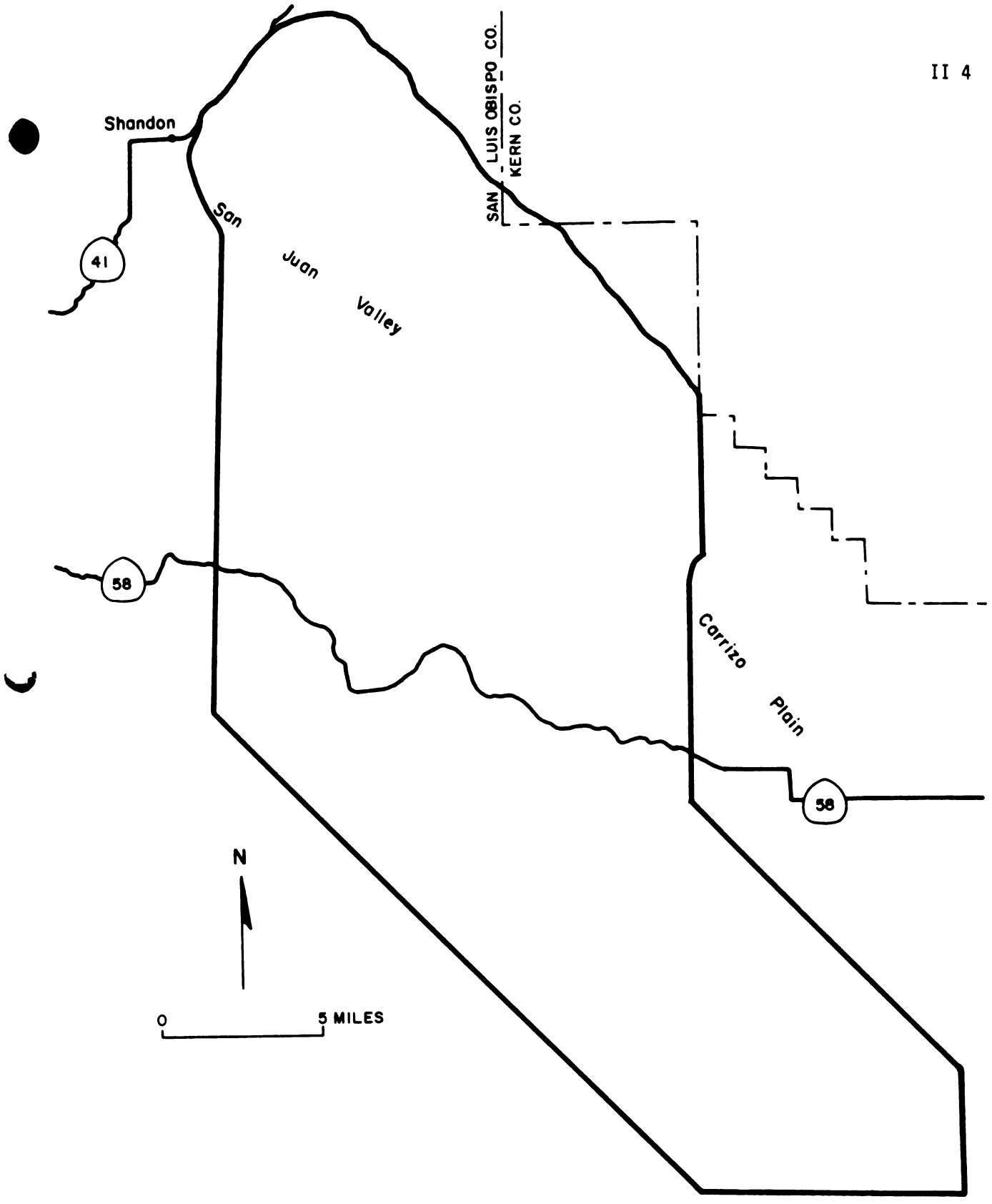
The following maps depict condor areas considered essential to the California condor that are not published critical habitat. They are intended to supplement, not replace, critical habitat areas. These maps are prepared for informational purposes only and have no legal status. Essential habitat will be updated annually or on an as needed basis.



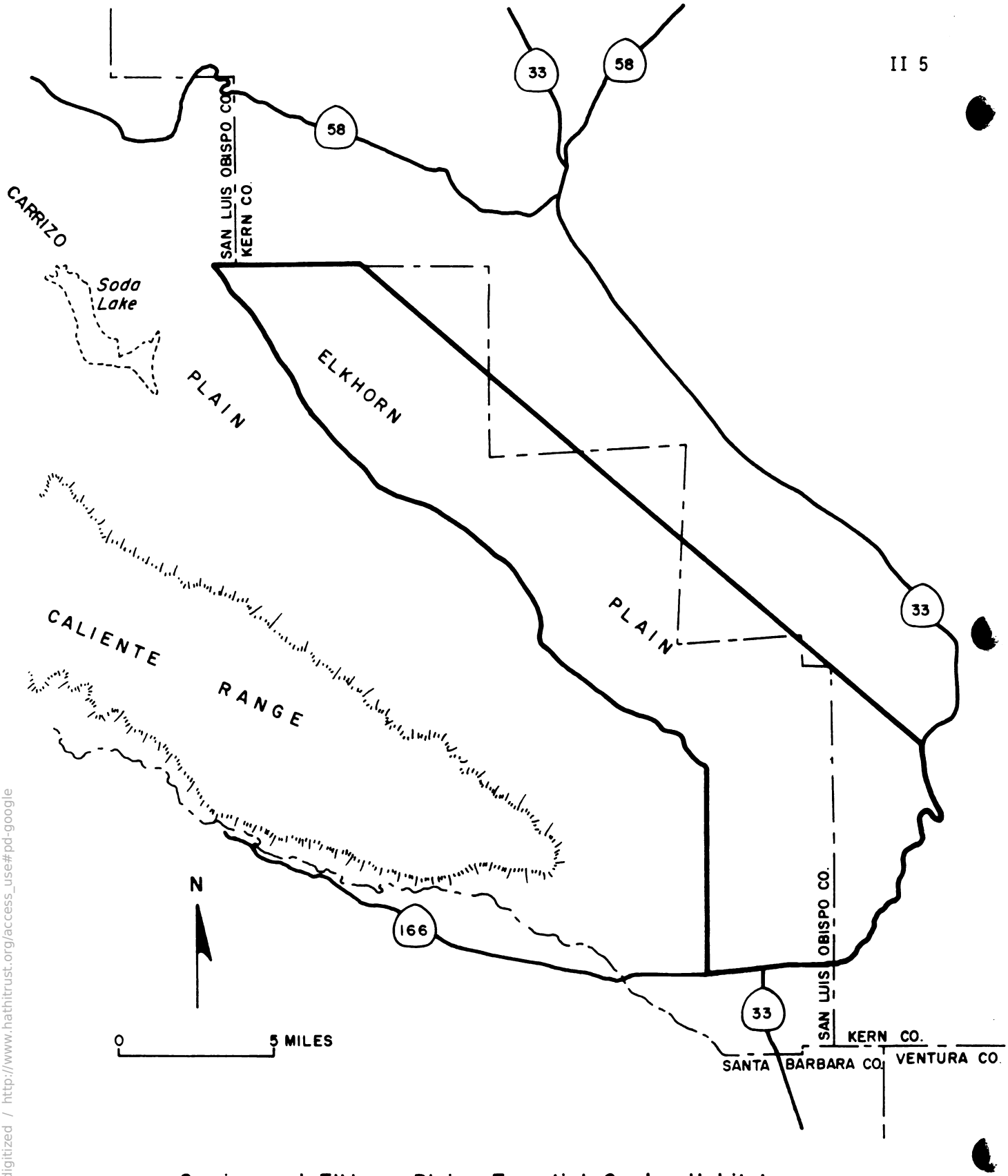
East Piru Area Essential Condor Habitat



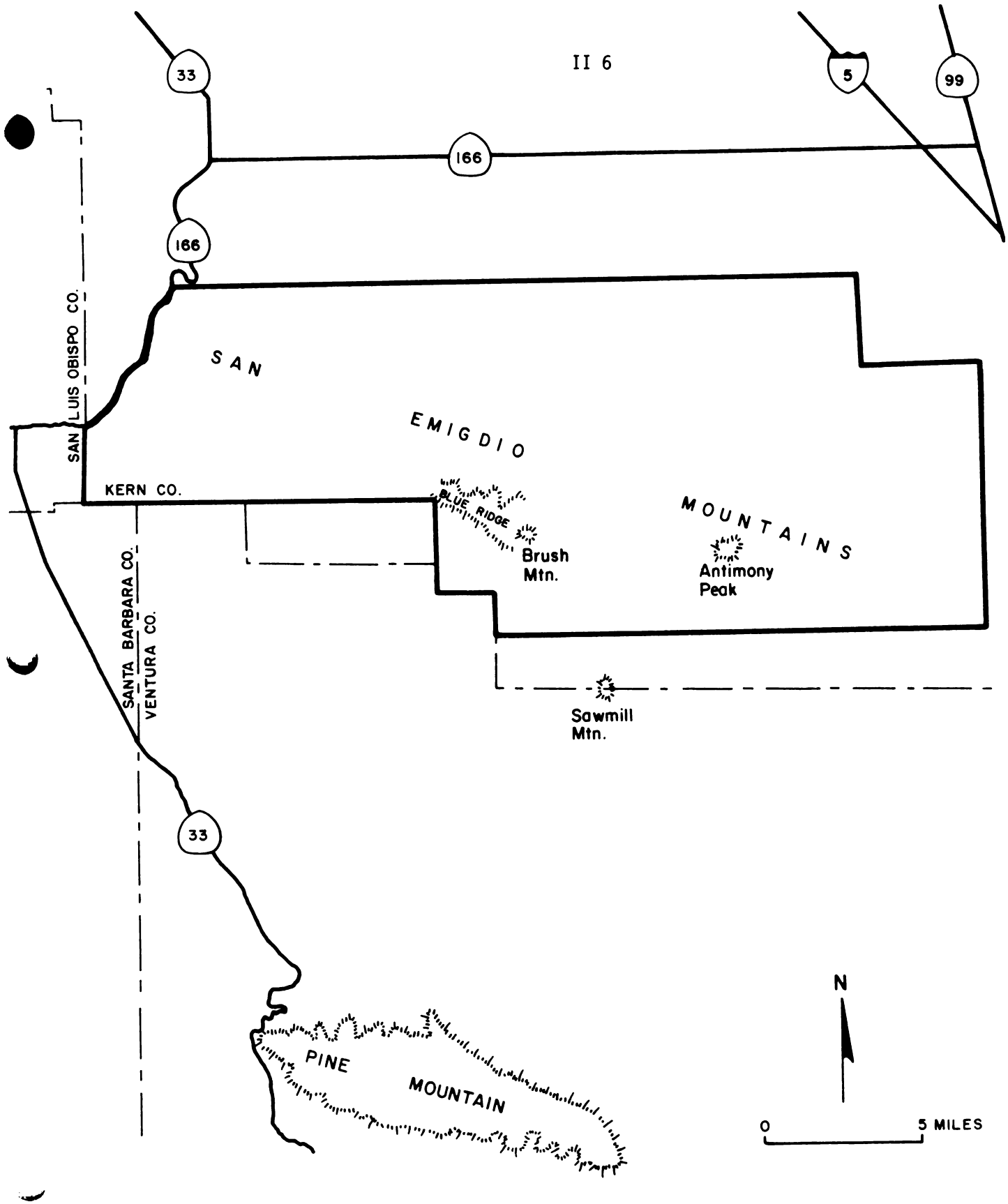
Sespe-Sisquoc Essential Condor Habitat



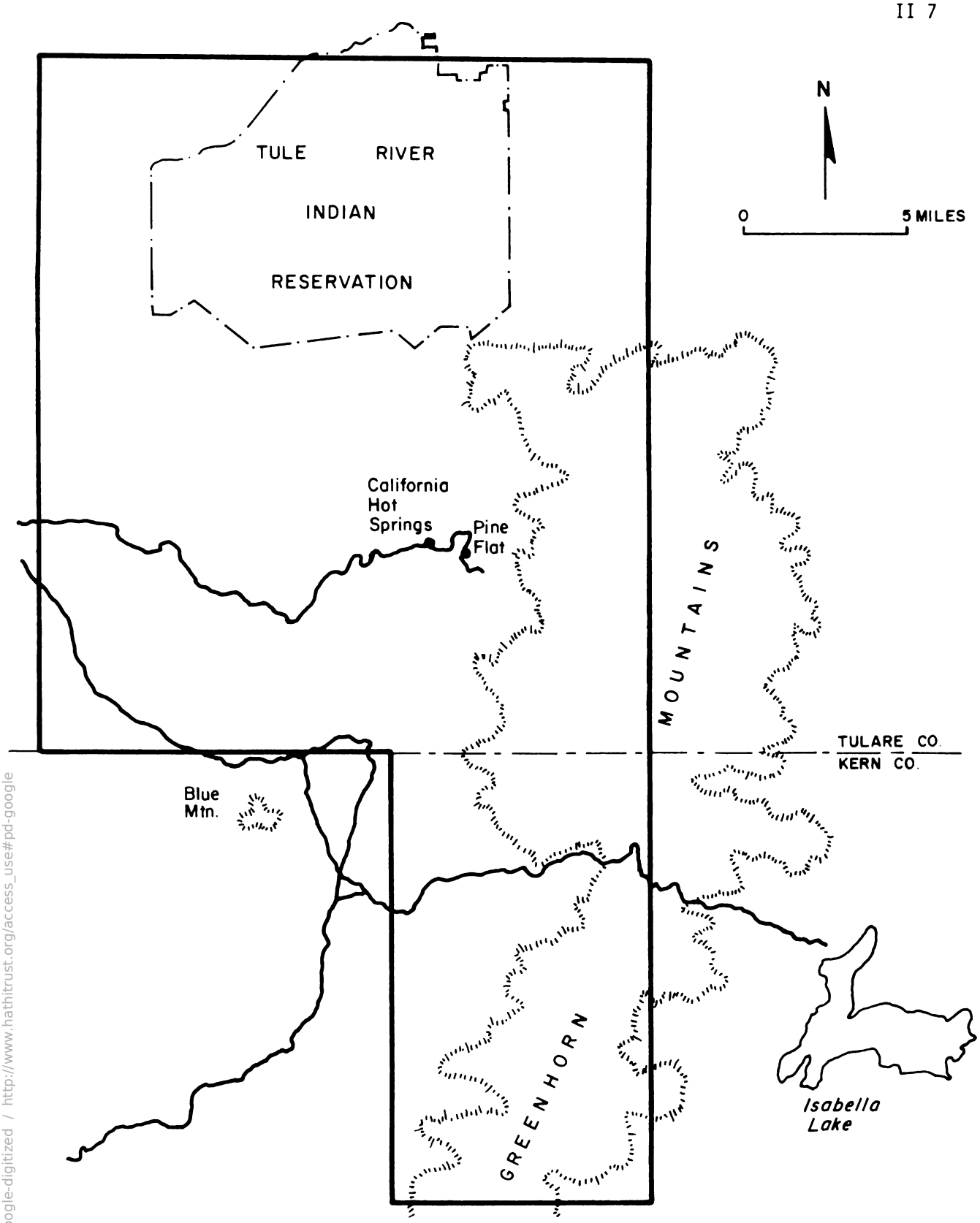
San Juan Creek Essential Condor Habitat



Carrizo and Elkhorn Plains Essential Condor Habitat



Southwestern Kern County Essential Condor Habitat



Glennville/Woody Essential Condor Habitat

APPENDIX III

RECENT SIGNIFICANT EVENTS IN THE CONDOR RECOVERY PROGRAM, 1976-1983

RECENT SIGNIFICANT EVENTS IN THE CONDOR RECOVERY PROGRAM

1976-83

III 2

by

Ronald M. Jurek

The California Condor recovery effort has progressed rapidly during the past several years. The following chronology of events covers the period from 1976, following U.S. Fish and Wildlife Service approval of the first California Condor Recovery Plan, through 1983. The events leading to development of the program and its implementation are characterized by a great deal of public involvement, particularly at the many Fish and Game Commission public meetings wherein State permit conditions have been addressed.

This chronology updates the "Chronology of Significant Events in California History," which is contained in Appendix IV of Sanford R. Wilbur's monograph on the California Condor. published in 1978 and listed below. Also, it updates the chronology published in California Department of Fish and Game's magazine, Outdoor California, of September-October 1983.

1976

- Recovery Team prepared first draft of "California Condor Contingency Plan," recommending implementation of captive breeding and other intensive recovery efforts if the condor population continues to decline.

- Designation of California Condor Critical Habitats by Secretary of the Interior, delineating nine "Condor Areas" (September 24).

- Acquisition by Forest Service of 160-acre Squaw Flat private inholding within the Sespe Condor Sanctuary.

1977

- Department of Fish and Game concurred in principle with Fish and Wildlife Service on expanding condor research efforts. awaiting a definitive proposal.

- Forest Service Regional Forester's Condor Advisory Committee terminated (1965-1977).

- Conditional approval by Fish and Wildlife Service of the Contingency Plan. Recovery Team prepared a second draft: "A Contingency Plan for Preserving the California Condor."

- Publication of Fish and Wildlife Service monograph in North American Fauna (Number 72): "The California Condor, 1966-76, A Look At Its Past and Future," by Sanford R. Wilbur.

- Publication of Forest Service General Technical Report PSW-28/1978, "California Condors: Status of the Recovery Effort," by Jared Verner.

- Issuance of Audubon Conservation Report No. 6: "Report of the Advisory Panel on the California condor"; condor status and proposals for research were reviewed and evaluated by a panel of nine scientists appointed by the American Ornithologists' Union and National Audubon Society.

- Experimental releases of black vultures and turkey vultures to determine best ways to release captive-reared vultures.

1979

- Fish and Wildlife Service approved "Recommendations for Implementing the California Condor Contingency Plan," prepared by a FWS Task Force reviewing the NAS/AOU Advisory Panel Report, the Recovery Team's Contingency Plan, and public comments.

- Completion by Fish and Wildlife Service of Land Acquisition Assertainment Report for Tejon Ranch.

- "International Symposium on the Vultures" held in Santa Barbara, a major forum for vulture researchers around the world to discuss condor conservation.

- Beginning of two-year study of wild Andean Condors in Peru to test methods of trapping, radiotelemetry markings, and release to the wild of captive-bred young condors.

- Congress approved first special appropriation for the California Condor program to expedite the recovery effort.

- Fish and Game Commission public meeting (December 7): Fish and Wildlife Service presented a proposal for a condor research program involving trapping for telemetry studies and captive propagation. Commission delayed taking action pending receipt of, and public distribution of, a completed California Condor Recovery Plan revision and an environmental assessment of proposed research.

- "Cooperative California Condor Conservation Program" agreement signed between U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Bureau of Land Management, National Audubon Society, and California Department of Fish and Game outlining objectives and member responsibilities relating to condor recovery efforts.

1980

- Establishment of the Condor Research Center in Ventura, comprising biologists from Fish and Wildlife Service and National Audubon Society assigned to conduct program field studies.

- Formation of the American Ornithologists' Union and National Audubon Society California Condor Scientific Review Committee, composed of five professional ornithologists appointed by, and advisory to, AOU and NAS, and charged with reviewing scientific aspects of the recovery program implementation.

- Fish and Wildlife Service approved a revised California Condor Recovery Plan incorporating Contingency Plan elements.

- Fish and Wildlife Service held a public information meeting in Sacramento on its proposal for condor research studies (May 19).

- Issuance by Fish and Wildlife Service of their "Finding of No Significant Impact" regarding condor conservation program. Final Environmental Assessment completed by the Service.

- Fish and Game Commission public hearing (May 30): Commission approved a Fish and Wildlife Service proposal for a 35-year condor research program involving trapping for radiotelemetry, captive breeding, and other studies.

- Accidental death of one of two condor chicks being handled in wild nests while Condor Research Center biologists were obtaining biological data on nestling development and growth (June 30). Department of Fish and Game revoked all Fish and Wildlife Service condor research permits and authorizations (July 3). Public fact-finding meeting held by the State to investigate the chick death incident (July 7).

- Forest Service completed management plan for Piru Gorge Habitat Area, an important condor area.

- "California Condor Advisory Committee," composed of five scientists, appointed by Department of Fish and Game, Fish and Game Commission, and Resources Agency, to

counsel the Commission and the Department on condor program matters.

- Fish and Game Commission adopted a "Resolution Supportive of the Sespe-Frazier Wilderness Concept," in part, to greatly enhance the opportunity to protect condors.

1981

- California Administrative Code, Title 14, Section 670.7 amended to add provisions that Commission approval is required prior to the issuance by the Department of any memorandum for condor studies, that memorandums shall be subject to conditions established by the Commission, and that Commission approval is required for studies involving the take of condors for scientific purposes.

- Fish and Game Commission public hearing (April 3): Commission approved Fish and Wildlife Service request for a Memorandum of Understanding establishing emergency field procedures to be used by Condor Research Center to assist condors threatened with injury or death.

- Issuance by Fish and Wildlife Service of a three-year Federal Fish and Wildlife Permit to Patuxent Wildlife Research Center for condor research (July 24).

- Fish and Game Commission public hearing (July 28): review of a revised proposal by Fish and Wildlife Service for a condor research program involving radiotelemetry, captive breeding and other studies. On August 7, the Commission approved the revised program, authorizing a three-year permit with a provision for annual review by the Commission through public hearings.

- Department of Fish and Game issued Memoranda of Understanding permitting San Diego Zoo and Los Angeles Zoo to maintain California Condors for breeding.

- Department of Fish and Game issued a Memorandum of Understanding (October 15) permitting Fish and Wildlife Service and cooperators to conduct the three-year, Commission-authorized studies, followed by DFG issuance of a supplement (Appendix A) permitting specific research actions for the period November 6, 1981 to August 31, 1982, including the trapping of three condors for captive breeding. Radiotelemetry tagging approval was postponed.

- Annual October Cooperative Survey (1965-1980) of condor population replaced by intensive photographic survey.

- Acquisition by The Nature Conservancy and Forest Service of 320-acres of private parcels in condor nesting area.

- Acquisition by Wildlife Conservation Board of a 596-acre private parcel in Blue Ridge Condor Area Critical Habitat for Department of Fish and Game to operate as an Ecological Reserve to protect an important condor roosting area.

- Condor-type radiotransmitters field tested on Turkey Vultures in California.

1982

- Department of Fish and Game permitted Fish and Wildlife Service to use solar-powered, wing-mounted radiotelemetry devices for condor studies.

- World Conference on Birds of Prey held in Thessalonika, Greece, gave worldwide forum for discussion of condor recovery program.

- Fish and Game Commission public hearing (August 5): Commission authorized specific condor program activities for the period September 1, 1982 to August 31, 1983 (Appendix B of the Memorandum of Understanding) and authorized immediate capture of a wild nestling neglected by its parents.

- Wild California Condor population comprises 20 known individuals, based on photographic survey (later revised to a minimum of 21).

- Department of Fish and Game biologist assigned to work with the Condor Research Center.

- Fish and Game Commission issued a statement reiterating its approval for captive breeding, radiotelemetry and habitat restoration aspects of the condor recovery program, and calling for cooperation by all interested parties to work together in the recovery effort.

- Issuance by Forest Service of "Emergency Field Procedures for Protection of the California Condor."

- Fish and Game Commission public hearing (November 5): Commission expanded Appendix B permit authorizations for trapping, radiotelemetry and captive breeding.

- Four condors trapped by cannon netting: two released with radiotelemetry tags, one released untagged, and one retained for captive breeding under special Commission authorization following two public meetings (December 18 and January 7).

- The Fish and Game Commission and Department of Fish and Game sponsored a conference in Santa Barbara on the

"Status and Survival of the California Condor," organized and hosted by the California Condor Advisory Committee (November 12).

- Working Group on Captive Breeding and Reintroduction of California Condors formed by Fish and Wildlife Service to coordinate zoo breeding programs and to develop field handling procedures for eggs and birds.

1983

- Fish and Game Commission public hearing (January 7): Commission further expanded Appendix B conditions by authorizing Fish and Wildlife Service to take for captive incubation all first eggs of condor breeding pairs in 1983, to retain one of the trapped male condors for captive breeding, to use various trapping methods in an attempt to capture an adult female, and to radiotag two additional wild condors.

- Fish and Game Commission public hearing (March 3): Commission further expanded Appendix B authorizations, allowing Fish and Wildlife Service to take additional immature condors, including nestlings, for captive breeding.

- Acquisition by Fish and Wildlife Service of 900 acres of Blue Ridge Condor Area Critical Habitat. Management plan prepared for Department of Fish and Game's Blue Ridge Ecological Reserve.

- Establishment by Department of Fish and Game of a "California Condor Habitat Advisory Committee" of 12 appointed citizens and agency representatives to counsel the Department on habitat issues.

- Four condor eggs removed from wild nests were hatched in incubators at San Diego Zoo. At the April 28 Commission meeting, Commissioners reviewed circumstances relating to emergency taking of one of these eggs that had been neglected by the parents.

- Radiotelemetry-equipped dummy egg was placed in an active wild nest to gather data on incubation, and later it was replaced by an Andean Condor chick to monitor response by adults to a "fostered" young.

- Two nestlings were removed from wild nests, bringing to nine the number of condors in captivity.

- Fish and Game Commission public hearings were held (August 26, October 7, and November 4) on Appendix C permit conditions, expanding authorizations for radiotelemetry studies and the captive breeding program.

Only partial approval was given for taking eggs or nestlings from wild nests in 1984 for captive breeding and release programs; the Commission requested a detailed plan of these programs, to be prepared by the California Condor Recovery Team.

- An immature female condor was found dead on November 23, and an intensive investigation was begun to determine the cause of death.

- Photosurvey analyses in November indicated a minimum population of 18 condors, including 14 adults.

- A Federal allocation of $5,000,000 was approved for the acquisition of Hudson Ranch, a major feeding area of condors.

- Recovery program successes lead to significant increases in national media coverage and conservation education efforts.

APPENDIX IV

INITIATION OF THE CALIFORNIA CONDOR CAPTIVE BREEDING AND RELEASE PROGRAMS

INITIATION OF THE CALIFORNIA CONDOR CAPTIVE BREEDING AND RELEASE PROGRAMS

Introduction

Historical records leave no doubt that the number of California Condors has been declining for many decades. The current recovery effort is designed to reverse this trend by increasing reproduction and decreasing mortality in the wild population. A number of interrelated programs (Figure 1) promise to increase the reproductive rate by multiple clutching of wild pairs, removal of nestlings to promote annual nesting of their parents, and release of birds to the wild from captivity. These efforts should also reduce mortality in three ways: (1) Eggs taken from nests for incubation in captivity should have a significantly higher survival rate, because natural sources of mortality (e.g., raven predation) will be eliminated. (2) The survival rate of young taken from nests and held in captivity for later release should be significantly greater than in the wild. (3) A slight increase in survivorship should occur among adults not required to care for young through the full reproductive cycle, as care of young has been shown in other species to decrease the chance that a breeding adult will survive to the next breeding season.

The current size of the wild California Condor population is approximately 16 or 17 individuals, and the best recent estimate of the net rate of population decline is about two birds per year. Thus, unless measures are taken quickly to reverse the decline, the wild population could be lost within a decade.

Unfortunately, causes of the decline are still poorly understood.

Loss of all wild condors would not necessarily mean extinction of the species, assuming that a viable captive population is established in the next few years. However, such a loss would be a severe blow to recovery of the species in the wild, because preservation and appropriate management of necessary habitat would be difficult in the absence of a wild population, and because re-establishment of a viable wild population from captivity would be difficult, though not necessarily impossible, if no remnant wild population remained for released birds to join. Significant production of releasable offspring from the captive population is not expected until after 1990 because nearly all present captives have been taken as eggs or nestlings and will not reach maturity until then. Because a wild population may not survive that long, procedures for bolstering it should be implemented soon in order to ensure that a wild population will still exist through the next decade.

Fortunately, events of the past few years have demonstrated that reproduction of the wild population can be greatly increased by taking eggs and nestlings into captivity, processes which stimulate multiple-clutching and annual nesting in the breeding pairs.

The five pairs of wild birds currently known to exist produced 13 young in 1983 and 1984. The four pairs from which eggs were taken produced 12 young from 14 eggs. Twelve of the eggs were artificially incubated and 83% of these produced a healthy fledgling, a success rate about twice that known for eggs

incubated in the wild. In 1980, 1981, and 1982 overall natural production of the wild population averaged only about 2 young annually. Multiple-clutching and artificial incubation in conjunction with taking of nestlings into captivity more than triples this rate in 1983 and 1984.

The young produced in 1983 and 1984 have all been taken into captivity, allowing rapid progress toward the goal of establishing a viable captive population. This effort should continue, but concurrent releases of a few birds to the wild should begin in 1985. Available demographic data suggest that a reasonable near-term goal would be three birds per release. Productivity of wild pairs will dictate the actual number available for release. Although continued losses of wild pairs can be expected to progressively reduce the number of birds released, in the near term, it may be possible to release enough birds to stabilize or even increase the wild population for a few years if loss of the remaining wild breeding pairs does not occur too rapidly. It is realistic to hope that the wild population can be sufficiently bolstered by releases in the mid-to late 1980's to provide a reasonable chance that it will still exist when truly large-scale releases of young from captive-produced eggs become possible in the early 1990's (Figure 2).

Success of a release program hinges on beginning the releases as soon as possible, because the progeny of the remaining wild pairs are the only current source of birds for release. Only five productive pairs were found in the wild population in 1984, and the net rate of loss of productive pairs has been approximatly one pair every two years. We will be

fortunate if five pairs breed in 1985.

The program success will be critically tied to maximizing reproduction in the remaining wild pairs. Maximal reproduction can be achieved only by ensuring that they nest annually (by ensuring that they do not fledge young naturally), and by removing eggs from each pair each year to induce replacement egg laying (multiple-clutching"). Whether all pairs are capable of triple-clutching (three eggs laid by one pair in a season) remains to be seen, but several may (one did in 1983, another did in 1984) and all should at least regularly double-clutch.

We emphasize that establishing a genetically viable captive population and maintaining a viable wild population are both important, but the goal of five progeny in captivity from every wild pair should take precedence over releases of captives to the wild in the near term and the birds released in the wild should be limited to young in excess of the 5 young per pair to be retained in captivity. Present representation in captivity of the remaining five pairs in the wild is 5, 5, 2, 2 and 1 progeny, respectively. If the two pairs currently represented by 5 progeny apiece in captivity return to breed, and are successfully multiple-clutched in 1985, it should be possible to release several of these progeny in 1985 and still have 5 young from each in the captive breeding flock.

The number of young available for release in the next few years will depend on their survival, and production actually achieved from the wild pairs. With the present decline of the wild population, the offspring from the captive population offer the only long-term hope of significantly increasing condor

numbers in the wild. With ten breeding pairs in captivity it is reasonable to expect 15 young to be available for release annually. The earliest we can reasonable expect to have young from the captive flock in 1990.

Major Goals for Initiation of Captive Breeding and Release Programs

Initiation of a captive breeding program will involve some penalty to the wild population and the prospective release program. Although the success and viability of the captive population would be maximized by taking as many birds into captivity as possible, such a strategy would probably guarantee the demise of the wild population. Conversely, concentrating all efforts on releases of birds to the wild might preclude the establishment of a viable captive population, and result ultimately in genetic deterioration and extinction of the species. Fortunately, a middle ground appears to exist that will allow establishment of a viable captive population and a release program to bolster the wild population.

In order to establish a viable captive population a high degree of genetic diversity in the breeding stock is needed. This can be obtained in several ways. One is to procure equal and substantial representation of all known nesting pairs by taking eggs and nestlings, a process which also has the lead impact on the wild population of any method for forming a captive flock. However, because only five productive pairs were known in the wild population in 1984, it is questionable that enough genetic diversity for a viable captive population can be obtained from their progeny alone. If any new pairs form in the years ahead it is essential that representation of these pairs also be achieved in captivity. In addition it may prove advisable to bring some unmated adults into captivity, especially if it can be determined that there is a significantly skewed sex ratio in the

wild population.

The birds most likely to be distantly related to the known productive pairs are other adults. Most, if not all, existing juveniles in the wild population are probably siblings of birds already in captivity. In contrast, at least some of the existing nonbreeding or nonproductive adults have almost surely come from breeding pairs that no longer exist. Thus, taking nonbreeding or nonproductive adults into captivity carries a reasonable probability of representing additional family lines. While taking of unmated adults into captivity will also reduce the chances of new pairs forming in the wild, this effect can be expected to be of small importance if there is a significantly skewed sex ratio in the wild.

The amount of genetic diversity sufficient for a truly viable captive population is not presently determinable, especially since the degree of relatedness of the remaining pairs is unknown. Nonetheless, there is a consensus among those working closely with condors that a captive population should include at least five progeny from each of the remaining pairs and 32 birds overall. Judging from the experience of researchers at Patuxent Wildife Research Center with Andean Condors, a population of 32 birds should result in 10 productive breeding pairs. The 12 surplus birds are needed because of problems in incompatibility, infertility, aging, etc. The immediate goals for the captive flock should be to obtain five progeny per pair and at least one older bird in addition to Topatopa. The earlier these goals are reached the sooner we will have young to release from the captive flock.

Researchers generally agree that it is critical that the time endangered species spend in populations less than the minimum viable population size, be as short as possible, as genetic deterioration is a function of the number of generations spent at low population levels. A minimum viable population for the short term is thought to be about 100 birds. The present wild population of condors, 16 or 17 birds, is well below this number. Only through multiple clutching of the wild birds and early establishment of a captive flock can there be a reasonable hope of attaining a minimum viable population size in the wild before genetic deterioration begins to occur.

Specific Recommendations

The following goals represent a prudent and biologically defensible position with regard to initiating captive breeding and release programs:

1. By the end of 1986, the captive breeding population should consist of a minimum of 27 birds including at least five progeny from each of the five presently known productive wild pairs and two birds four years old or older, one of them Topatopa. The older bird taken in 1985 or 1986 should be unmated and if possible a female to serve as a mate for Topatopa; however, the primary value of the older birds to the captive flock is genetic, so sex of the older birds should not be an overriding consideration. The pool of unpaired older birds in the wild population is small, and it may not be possible to obtain birds of both sexes from this group. If by 1986 it can be determined that a strongly skewed sex ratio exists in the wild, an additional unmated older bird may be taken from the predominant sex. If any new productive wild pair (one or both members being new) are found in this period maximal efforts should be made to obtain 5 progeny for the captive flock. Once five young are obtained from a pair, additional young from the pair produced by continued multiple-clutching will be available for release.

2. Ultimately, the captive population should include 32 birds. An effort should be made to get as close as possible to this goal by 1986, consistent with the principle of not taking successful breeding birds out of the population, and not taking a significant number of unmated birds out of the population.

3. Taking all nestlings into temporary captivity and multiple-clutching of all wild pairs should continue in all breeding seasons in the near future.

4. Under the above scheme it should be possible to initiate a release program in 1985 with birds produced in 1984, assuming successful breeding in 1985 by the two pairs currently represented by 5 progeny apiece in captivity. The number of birds available for release in 1985 and subsequent years will depend on survival of the breeding pairs, how successfully their reproduction can be maximized, and how many birds are retained in captivity under the above recommendations.

General Release Procedures

Birds will be released by a method of gradually decreasing food subsidization, known as "hacking". Release procedures will closely follow those developed for Andean Condors in Peru by Temple and Wallace (1983). Birds will first be conditioned to the release site for several weeks, receiving food similar to that they will find after release. Food will be provided in outdoor screened areas of their pens. If possible, wild condors will be baited to within viewing distance of the birds during this period. Birds in pens will be isolated from visual contact with humans to minimize problems of tameness. Likewise, prior to being placed in the pens, birds intended for release will be maintained as free as possible from direct human contact at the zoological institutions where they are held.

After release, the screened pens will be left open and the birds allowed freedom of movement to the wild, although food subsidies adjacent to release pens will be maintained for some time. Carcasses will be placed only at night to avoid the birds associating food with humans. Once birds are accustomed to moving back and forth between release pens and the wild, food will be moved farther from the pens in a progressively less predictable manner, forcing the birds to roam ever more widely in search of food.

Temple, Stanley A. and Michael P. Wallace. 1983. A study of techniques for releasing hand-reared Andean condors to the wild. A final report submitted to the U.S. Fish and Wildlife Service on contrct FWS 14-16-0009-78-923.

This will continue until the released birds forage over an area large enough that they find natural carcasses with greater frequency than provided ones. To facilitate locating released birds, all will be fitted with patagial mounted radio transmitters. Birds will be closely monitored until they are independent. Necessary actions will be taken if the birds experience difficulties or if they go more than five days without having the opportunity to feed either on a provided or natural carcass until they are independent.

Parent-reared birds will be selected for releases when choices between parent-reared and puppet-reared birds exist. Only birds that are in a good state of health will be considered for release. Birds will generally be released in groups of 3 or 4, and all birds released in a group will be of comparable age (no more than a year spread in ages).

Choice of Release Site

Judging from experience gained in the Andean Condor release program in Peru, the most favorable area to release captive California Condors will be in a commonly used foraging area. Young birds released in breeding areas may experience problems with territorial responses by resident breeding birds.

The Hudson Ranch, in the southern San Joaquin Valley, would provide one of the best locations for releases (excellent access; birds are easily observed there; high density of foraging condors; availability of roosts; potential control of human depredation; and low density of predators). Congress has appropriated funds to purchase the ranch. If Hudson Ranch is not

acquired in time, then other arrangements would be made to gain access to it or to one of several other ranches in the southern San Joaquin that would be suitable for releases.

Another heavily used foraging area that will be considered for releases is near Glennville in northern Kern County. This area is used heavily by the wild population and food is abundant here. However, because this area is partially wooded it will be a relatively difficult one in which to follow released birds.

Timing of Releases

The most favorable time for releasing birds will be late spring through fall. Captives fledged the previous fall, as well as captives fledged in earlier years, would be flying well by then, and weather conditions would be consistently good. Andean Condor releases succeeded without significant problems with birds ranging in age from a couple weeks beyond fledging to three years old. Favorable weather will be an advantage both for the health of the birds as they learn to forage and move about in the wild, and for the research team's ability to efficiently find birds that get into problem situations. Because access to almost all areas is by dirt roads, it would be inadvisable to time releases when rainfall would likely make travel difficult.

Characteristics of Release Pens

The release pens utilized in the Andean Condor program in Peru provide a reasonable model for releases of California Condors, with some modifications.

The most important modification would be to make pens safe from terrestrial predators, such as coyotes. In Peru no terrestrial

predators were large enough to threaten pre-release condors.

The release pens used in Peru were 16' x 16' x 4'. Half of this space was an enclosed plywood chamber providing shelter for the birds; the other half was an area completely enclosed by wire screening. The release pens for the California Condor will be 30' long x 15' wide x 10' high and 6 feet off the ground. Pens should be located in the open in view of nearby roost snags and be oriented to provide visual isolation from human activity.

Figure 1. Prospective Trends in Condor Numbers, Releases to the Wild from Captivity, and Taking of Captives.

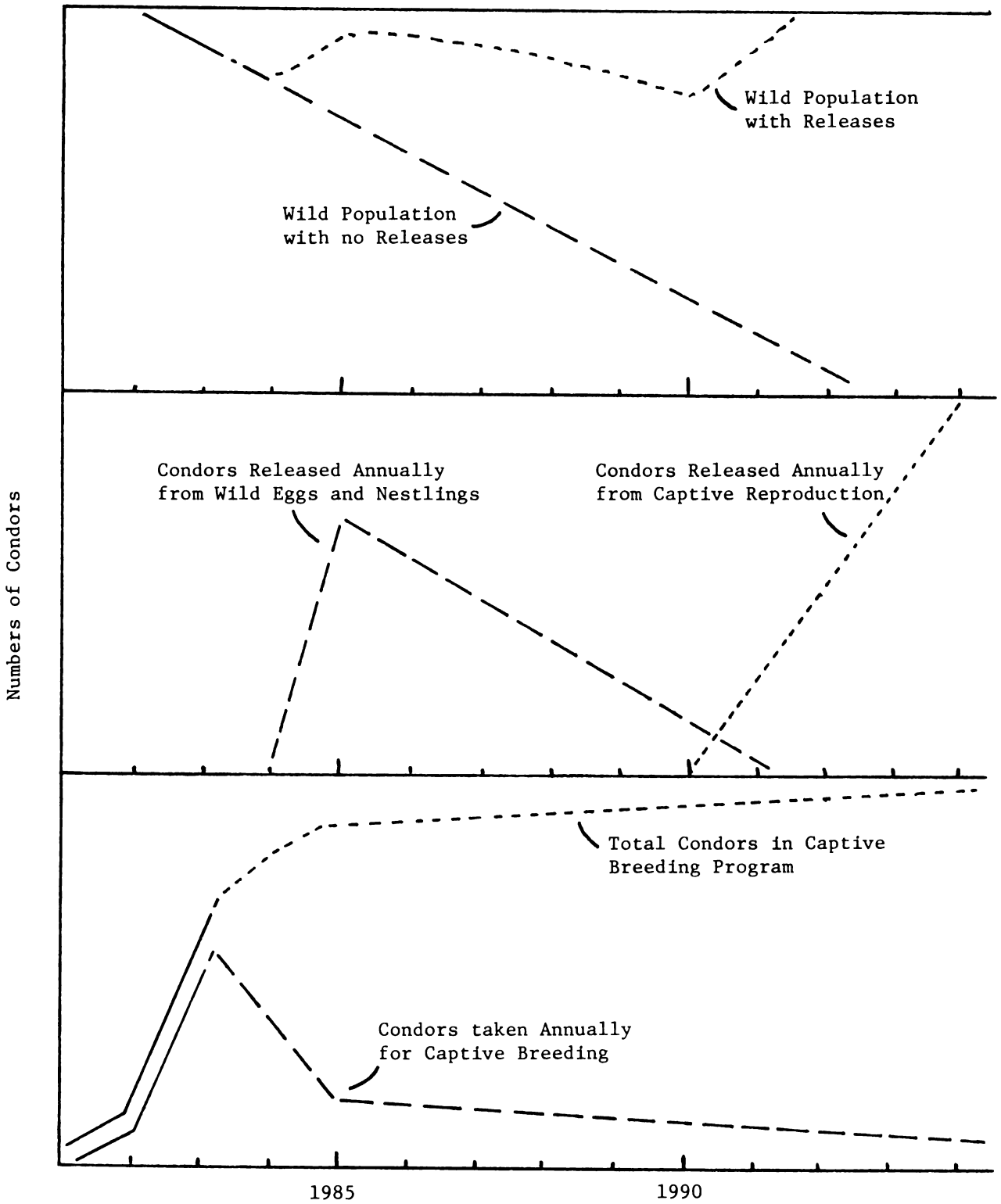
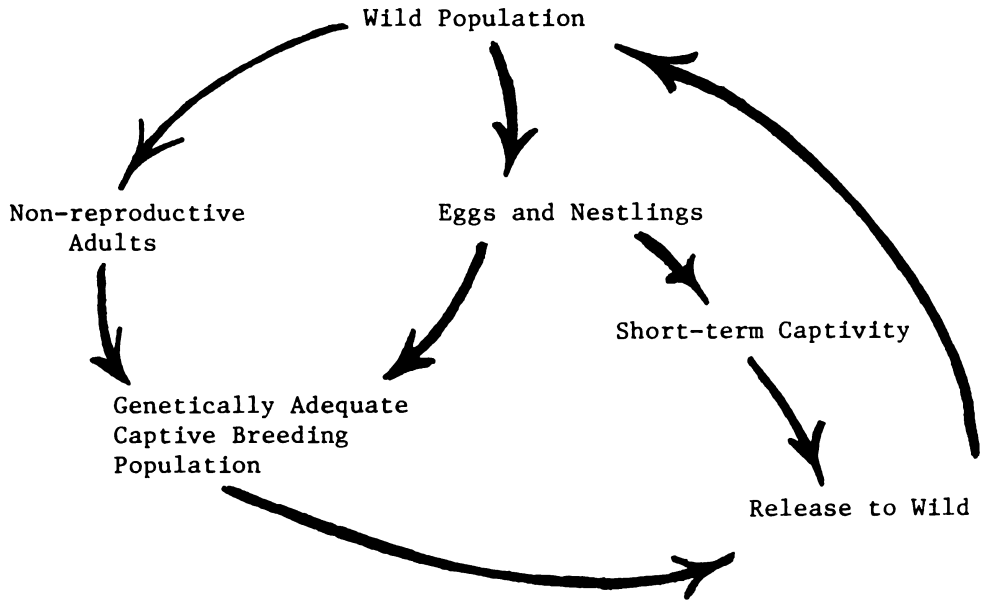


Figure 2. Relationship of Wild Condor Population with Captive Breeding and Release Programs



APPENDIX V

LIST OF AGENCIES ASKED TO PROVIDE REVIEW COMMENTS

Navy Natural Resources Program, Washington, D.C.

National Aeronautics and Space Administration, Washington, D.C.

U.S. Bureau of Land Management, Bakersfield, Riverside, and Sacramento, CA

U.S. Bureau of Indian Affairs, Sacramento, CA

Western Power Administration, Sacramento, CA

Federal Aviation Administration, Washington, D.C.

Kern County Planning Department, Bakersfield, CA

Los Angeles County Department of Regional Planning, Los Angeles, CA

Ventura County Planning Division, Ventura, CA

San Luis Obispo Planning Department, San Luis Obispo, CA

Tulare County Planning Department, Visalia, CA

Santa Barbara County Resource Management Department, Santa Barbara, CA

California Department of Fish and Game, Sacramento, CA

California Department of Food and Agriculture, Sacramento, CA

U.S. Air Force, Washington, D.C.

U.S. Forest Service, San Francisco, Pasadena, Goleta, Porterville and Fresno, CA

California Fish and Game Commission