FIVE-YEAR STATUS REPORT

I. COMMON NAME: Island Fox
SCIENTIFIC NAME: Urocyon littoralis
CURRENT CLASSIFICATION: Threatened

II. RECOMMENDED ACTION:

Retain Threatened classification

III. SUMMARY OF REASONS FOR RECOMMENDED ACTION:

Retention of the Threatened classification for the Island Fox (IF) is warranted, based on continued degradation of habitat from wild herbivorous mammals on Santa Rosa, Santa Cruz, Santa Catalina and San Clemente islands, on the fact that wild domestic cats have not been eliminated from Santa Catalina, San Nicolas, and San Clemente islands, and on the need for knowledge of current population status on islands other than San Miguel and San Nicolas.

IV. NATURE AND DEGREE OF THREAT:

The known threats to the continued existence of the IF continue to be habitat loss or degradation and direct interaction with wild domestic cats. Laughrin (1973) stated that "[t]his investigation into the status of the island fox has indicated that on 5 of the 6 islands where they occur, they are widespread and relatively abundant. On the sixth island--Santa Catalina Island--the fox population appears to be very low and possibly restricted in distribution." "At this time, with the limited information available, the Santa Catalina Island fox can be considered at a point of endangerment. The other island populations appear to be doing well considering the habitat available and current land ownership and land use. Until further monitoring of island fox populations and intensive study of the Santa Catalina situation is accomplished, a change in legal status is not in order" (Laughrin, 1973).

In a later report Laughrin (1980) commented that "[w]hile San Nicolas initially showed a population level comparable to similar situations on other islands, data from later visits indicated a decline in abundance. The population on Santa Catalina appears to have been, and remained, at a rather low level. Propst's (1975) study indicated a slightly greater abundance, or the possibility of an increase, but this was not substantiated in 1977. Other signs of fox activity, such as scat,

tracks, trails, and casual sightings by me and other island personnel, were also very limited for these two islands. Qualitative observations of the vegetation in habitats on these islands did not offer any clues for causes of low numbers of foxes. On San Nicolas Island there was an alarming trend of an increase in abundance and dispersal of feral cats. Feral cats have also been trapped on Santa Catalina, but there is no information regarding the extent of their distribution or relationship to fox population levels. San Clemente has a large number of feral cats, but apparently there has been little adverse effect on the fox population (R. Wilson, pers. comm.). I suspect, however, that the fox population would be higher in the absence of the cats." S. Kovach (pers. commun.) believes that the long-established feral cat population on San Clemente Island may have evolved into a state of equilibrium, resulting in the reduction of IF densities during the process.

Kovach and Dow (1985) found that on San Nicolas Island "[t]he research has confirmed ...that feral cats can and do displace island fox [sic] from habitat; and when feral cat densities are reduced island fox [sic] will repopulate suitable habitat."

P. Collins (pers. commun.) believes that the Threatened classification is not applicable to the IF populations on San Miguel, Santa Rosa, Santa Cruz, and San Nicolas islands, even though feral mammals have not been completely removed from all of these islands. He does state that further research is needed on Santa Rosa Island to determine the status of the IF there. S. Kovach (pers. commun.) recommends that the Threatened classification be retained for any IF population which coexists with feral cats (currently, Santa Catalina, San Nicolas, and San Clemente islands). He also believes that the Santa Catalina Island population is endangered, and recommends that an investigation be done to determine whether that population deserves Endangered classification.

V. HISTORIC AND CURRENT DISTRIBUTION:

The IF is found on the six largest of the Channel Islands. These are San Miguel, Santa Rosa, Santa Cruz, Santa Catalina, San Nicolas, and San Clemente islands. Collins (1982) provided a very complete discussion of the origin and evolution of the IF. He suggested that, prior to the arrival of Indians, the IF was present as a small insular form differentiated from the mainland Gray Fox on San Miguel, Santa Rosa, and Santa Cruz islands, which are remnants of a much larger single island in a time of lower sea levels, and "[f]ollowing the arrival of Indians to these islands, the dwarf Island Foxes of the Northern Channel Islands were transported via Indian plank canoe to the three Southern Islands [of Santa Catalina, San Nicolas, and San Clemente]."

VI. HISTORIC AND CURRENT ABUNDANCE:

Laughrin (1973) reported IF densities in number of foxes per mi.^{2} for individual islands, as follows: San Miguel - 7; Santa Rosa - 11; Santa Cruz - 33; Santa Catalina - 0.3; San Nicolas - 7; San Clemente - 11.

In a later report Laughrin (1980) gives updated densities (in some cases) for the six islands, respectively, as 7, 11, 20.4, 0.8, 3, and 11 IF per $mi.^2$. However, he states that "[n]ot all of the island habitats [on any island] were sampled, nor were the extents of these habitats determined. Sampling was not done over most of each island's area. Thus, only a crude estimate of each island's total fox population is available." The data are useful for general comparative purposes as to the ability of a particular island to support the IF, at least before 1980. However, the estimates are based on very limited field work, as the researcher indicates (Laughrin 1973, 1980). Propst (1975) reported 2 IF per $mi.^2$ on Santa Catalina Island, an estimate 2.5 to 6.7 times higher than either of Laughrin's (1973, 1980) estimates for that island. Collins and Laughrin (1979) reported the IF density for San Miguel Island as 12 per $mi.^2$ All of these studies are based on the line trapping technique. Collins and Laughrin (1979) pointed out that the relative abundance estimates using this technique are "useful for comparisons between different islands, different habitats or geographical locations, but the same trapping methods have to be used in order for the comparisons to be valid. Uncertainties arise when one tries to extrapolate from these indices to more absolute estimates of density and total population size. Part of the difficulty is due to the logistics and inefficiencies involved in trapping the complete area of any one of the islands. Another problem arises from applying data from one site to the complete area of an island. Sampling the important habitat types and estimating their relative areas would minimize such errors. The lack of knowledge of individual home ranges, movements, and degree of overlap are also sources of uncertainty. As this information continues to be gathered, it will be possible to make more reliable estimates."

Had the original data in the various studies been reported as capture rates, it would be easier and more accurate to compare relative densities of the IF from one island to another. In addition, S. Kovach (pers. commun.) believes that roads have an influence on IF use of an area. Thus, IF density data which were collected using line transects established adjacent to roads may be biased.

The work done on San Nicolas Island has yielded the most reliable density information for any island. For 1984 Kovach and Dow (1985) reported IF densities in five different ranges of numbers, or zones, covering all of San Nicolas Island. The lowest density estimate was in a zone of 9.0-15.0 IF per km^2, and the highest density estimate was in a zone of 33.1-39.2 IF per km^2. The only island-wide estimate of an IF population is that for San Nicolas Island, given as 600 animals for 1984 by Kovach and Dow (1985) and revised to 660-720 animals (S. Kovach pers. commun.). Subsequent estimates for San Nicolas Island of 535-595 (1985) and 510-570 (1986) are more reflective of the average IF carrying capacity on the island (S. Kovach pers. commun.).

VII. SPECIES DESCRIPTION AND BIOLOGY:

The IF is a member of the mammalian Family Canidae, which includes foxes, wolves, coyotes, and dogs.

The IF is very similar in appearance to the Gray Fox found on the mainland, although the IF is about 20% smaller in size and has a conspicuously short tail. The coloration consists of a pepper-and-salt fur with a rufous or buffy underfur, and a dorsal median black stripe ending in the black tip of the tail. This coloration is similar to that of the Gray Fox, but is duller in tone contrasts.

Collins and Laughrin (1979) state that "[w]hether the Island Fox is a species closely related to the Gray Fox, or whether its populations are merely subspecies of the Gray Fox, is largely a matter of opinion unsupported by any recent studies". Each of the six isolated populations of the IF has been recognized as being its own subspecies. However, Collins (1982) states that the IF is a distinct species which is closely allied to the Gray Fox. The island populations do show morphological differences which enable specimens to be identified. The fact that Indians may have been responsible for introduction of the IF to Santa Catalina, San Nicolas, and San Clemente islands suggests that a taxonomic system of a separate subspecies for each island may not be warranted. There simply may be a series of island races.

"Island Foxes, like the Gray Foxes, are opportunistic feeders; they take whatever food items are readily available within their normal area of activity" (Collins and Laughrin 1979). Insects, particularly grasshoppers, crickets, and beetles, and the fruits of plants are the most important components of the IF diet (Collins and Laughrin 1979). Birds, their eggs, mammals, and grasses are also components. On San Nicolas Island, Kovach and Dow (1986) observed the IF entering a Western Gull colony to prey on eggs or very young chicks. The food habits of the IF on San Miguel Island have been studied by Collins (1980). P. Collins (pers. commun.) states that the diet of the IF varies from island to island, but that fruits, insects, and small mammals comprise the key elements on all islands. S. Kovach (pers. commun.) has observed the IF foraging along roads for road-killed animals and under large antennas for wire-killed birds, on both San Nicolas and San Clemente islands. He has observed the IF on San Nicolas Island take land snails within three days of their emergence and Sea Fig fruits within five to seven days after becoming ripe.

VIII. HABITAT REQUIREMENTS:

The IF appears to use most habitat types found on the six occupied islands, although they may have a preference for the woodland or chaparral types typical of mainland Gray Fox habitat. These habitats are not available on all islands. S. Kovach (pers. commun.) comments that the IF uses every habitat available to it, natural and man-made, including dunes, cliffs, rocky and sandy beaches, trees, and buildings.

The vegetation of San Miguel Island is basically a coastal sage scrub type (Laughrin 1973). Santa Rosa Island is predominantly grassland with an Atriplex component, although there is some chaparral and coastal sage scrub on the island (Laughrin 1973). Santa Cruz Island has the most varied vegetation of the six islands occupied by the IF, with grassland, coastal sage scrub, chaparral, oak woodland, and closed-cone pine (Laughrin 1973). Riparian woodland is also present. The vegetation of

Santa Catalina Island has the same habitat types. San Nicolas Island is basically a maritime scrub community. San Clemente Island is predominantly grassland, but with coastal sage scrub on the lower terraces and trees in the canyons (Laughrin 1973).

All of the islands have been heavily overgrazed by livestock. Such grazing continues on Santa Rosa, Santa Cruz and Santa Catalina islands.

IX. CURRENT AND RECOMMENDED MANAGEMENT:

The chief management need in conservation of the IF is elimination of exotic mammals from all of the Channel Islands. These mammals include cattle, sheep, bison, pigs, goats, Blackbuck, elk, deer, and domestic cats. All but the cats are grazers, browsers, or up-rooters of native vegetation. The cat seems to directly inhibit the distribution of the IF on an island, probably through agonistic interaction.

The Department of Fish and Game (DFG) has no reason to recommend that the IF be classified as a federal Endangered or Threatened species at this time. Although four of the islands (San Miguel, Santa Rosa, San Nicolas, and San Clemente) are under federal ownership and management, a federal classification of the IF may not be necessary to influence the management of the islands for native species. The advantage of a federal classification of Endangered or Threatened for the IF would be that federal agencies which permit, finance, or undertake projects would be required to avoid or compensate for impacts to the IF and its habitat. In addition, the habitat on non-federal lands would have a measure of protection under the federal Endangered Species Act, if an action to destroy or alter IF habitat on these lands required federal approval, funding, or a permit. No such habitat protection is available under the California Endangered Species Act.

Efforts are well under way to remove or significantly reduce feral mammals, on all islands except Santa Catalina. The U.S. Navy has dramatically reduced the numbers of cats on San Nicolas Island, and the IF has responded by moving into areas of the island once occupied exclusively by cats. During this reduction effort the Navy has compiled much information on the biology of the IF (see Kovach and Dow 1985, 1986). Cooperation between the DFG and private owners is needed on the islands (Santa Cruz and Santa Catalina) not in federal ownership, to reduce or eliminate feral mammals.

A series of surveys is needed to determine the size and distribution of the population of the IF on each of the islands except San Miguel and San Nicolas islands, and to describe the current threats to the IF and its habitat. The islands which are most in need of study are Santa Catalina, San Clemente, and Santa Rosa. Each island survey should include an investigation of IF demographics, reproduction, presence of disease titers, potential disease threats, condition and trend of habitats, and current and planned land management practices. S. Kovach (pers. commun.) recommends that the role of Bald Eagles as predators on the IF be investigated on Santa Catalina Island.

A recovery plan which would incorporate elements of the management needs discussed herein should be prepared.

In summary, the management needs of the IF in priority are as follows:

1. Elimination or significant reduction of exotic mammals on all islands occupied by the IF.

2. Preparation of a recovery plan which would incorporate the elements of exotic mammal elimination or reduction, and of surveys and studies of the IF.

3. Surveys on each of the islands except San Miguel and San Nicolas to determine the status of the population, investigate various life history factors, and describe threats to its continued existence.

X. SOURCES OF INFORMATION:

Collins, P. W. 1980. Food habits of the Island Fox (Urocyon littoralis littoralis) on San Miguel Island, California. Pp. 152-164 in Proceedings of the second conference on scientific research in the national parks; volume 12: Terrestrial Biology: Zoology. Natl. Park Serv., Wash. DC, NTIS Rep. PB81-100133.

Collins, P. W. 1982. Origin and differentiation of the Island Fox: a study of evolution in insular populations. M.A. Thesis, Univ. of Calif., Santa Barbara.

Collins, P. W. and L. H. Laughrin. 1979. Vertebrate Zoology: the Island Fox on San Miguel Island. Chap. XII in Natural resources study of the Channel Islands National Monument, California. Santa Barbara Mus. of Natur. Hist. (Santa Barbara, CA) Rep. submitted to U.S. Natl. Park Serv. (Denver) under contract no. CX-2000-8-0040.

Kovach, S. and R. Dow. 1985. Island Fox research, San Nicolas Island, Ventura County, California. Annual rep. submitted to Calif. Dep. Fish Game as require. of memo. of understand. between U.S. Navy (Pt. Mugu, CA) and CDFG.

Kovach, S. and R. Dow. 1986. Island Fox research on San Nicolas Island, Ventura County, California. Annual rep. submitted to Calif. Dep. Fish Game as require. of memo of understand. between U.S. Navy (Pt. Mugu, CA) and CDFG.

Laughrin, L. L. 1973. California Island Fox survey. Calif. Dep. Fish Game, Wildl. Manage. Branch Admin. Rep. 73-3.

Laughrin, L. 1980. Populations and status of the Island Fox. Pp. 745-749 in The California Islands: proceedings of a multidisciplinary symposium (ed. by D. M. Power). Santa Barbara Mus. of Natur. Hist. (Santa Barbara, CA).

Propst, B. 1975. A population survey of the Santa Catalina Island Fox, 1975. Calif. Dep. Fish Game Final Rep., Proj. W-54-R-8, Job I-1.10.

XI. REPORT PREPARED BY:

Nongame Bird and Mammal Section
Wildlife Management Division
California Department of Fish and Game

14 May 1987 (revised 15 December 1987)

XII. CONTACT FOR FURTHER INFORMATION:

John R. Gustafson
Nongame Bird and Mammal Section
916-322-1260

XIII. DRAFT REPORT REVIEWED BY:

Paul W. Collins
Santa Barbara Museum of Natural History
Santa Barbara, CA

Steven D. Kovach
Naval Facilities Engineering Command
U.S. Navy
San Bruno, CA