ENVIRONMENTAL ASSESSMENT

FOR THE

RESTORATION OF SAN NICOLAS ISLAND'S SEABIRDS AND PROTECTION OF OTHER NATIVE FAUNA BY ERADICATING FERAL CATS

VENTURA COUNTY, CALIFORNIA

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LIST OF ABBREVIATIONS

AVMA	American Veterinary Medical Association
CDFG	California Department of Fish and Game
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Data Base
CZMA	Coastal Zone Management Act
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
GIS	Geographic Information System
GPS	Geographic Positioning System
INRMP	Integrated Natural Resources Management Plan
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
PIT	Passive Integrated Transponder
SHPO	State Historic Preservation Offices
TNR	Trap-Neuter-Release
USFWS	U.S. Fish and Wildlife Service

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EXECUTIVE SUMMARY

Islands support a diversity of life rich in endemic species and provide important habitat for seabirds and marine mammals. Nonetheless, between 80% and 90% of all recent extinctions have been of island species, and more than half of those have been the direct result of the effects of invasive species (IUCN 2006). The feral cat (*Felis silvestris catus*), a generalist predator, is among the most detrimental of such invasive species, causing population decline, extirpation, and extinction in a diverse array of animals, including mammals, birds, reptiles and invertebrates. On San Nicolas Island, feral cats are known to kill seabirds, including Brandt's cormorants (*Phalacrocorax penicillatus*) and western gulls (*Larus occidentalis*); other birds, including the federally threatened western snowy plover (*Charadrius alexandrinus nivosus*); the federally threatened island night lizard (*Xantusia riversiana*); and the endemic deer mouse (*Peromyscus maniculatus exterus*). They also compete with the state threatened San Nicolas island fox (*Urocyon littoralis dickeyi*) for food and habitat. Fortunately, techniques to remove feral cats from islands have been developed, making feral cat eradication possible. The eradication of introduced species, such as feral cats, has become a widely accepted method for restoring island ecosystems.

The Trustee Council for the Montrose Settlements Restoration Program selected the restoration of seabirds to San Nicolas Island, California, through the eradication of feral cats as a priority project in their Montrose Settlements Restoration Program Final Restoration Plan (www.montroserestoration.gov/). This selection was based on injury to several seabird species from past releases of DDT off the coast of southern California. Injury is defined in Natural Resource Damage Assessment regulations under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as an adverse biological, chemical, or physical effect (such as death) on natural resources. In particular, Brandt's cormorants, brown pelicans (*Pelecanus occidentalis*), and western gulls, whose populations were affected by past releases of DDT off the coast of southern California, are expected to benefit by the eradication of feral cats on San Nicolas Island. The control / removal of feral cats on San Nicolas Island is also listed as a recommended management action by the Department of the Navy (Navy) in their Integrated Natural Resources Management Plan (U.S. Navy 2005) for the protection and restoration of seabirds and other native wildlife on San Nicolas Island.

The purpose of the Proposed Action is to restore San Nicolas Island's seabird populations and protect other native fauna, including federally and state listed threatened species, from population decline and potential extirpation or extinction. The U.S. Fish and Wildlife Service (USFWS) and Navy propose to restore and protect these species and their habitat by eradicating feral cats from the island. The most common techniques used globally for eradicating feral cats from islands are trapping, hunting, and poisoning. The presence of the San Nicolas island fox, however, restricts the available techniques in this case, making poisoning infeasible. The Proposed Action is to use a combination of trapping and hunting through integrated adaptive management to eradicate feral cats from San Nicolas Island. A field study on San Nicolas Island conducted in 2006 demonstrated that padded leg-hold live traps can be used to trap feral cats effectively with minimal

injury to cats and foxes. Furthermore, a trap monitoring system would minimize the time animals are held in traps prior to release (foxes) or euthanasia (cats). The USFWS and Navy propose to use padded leg-hold live trapping as the primary eradication method. Hunting with and without specialized dogs would be used strategically as a supplemental method.

The feasible alternatives to the Proposed Action that were analyzed include No Action (Alternative 1), trapping only (Alternative 2), hunting and limited trapping (Alternative 3), and hunting with specialized dogs and limited trapping (Alternative 4). Other methods were also considered but not analyzed in detail as they were determined to not meet the purpose and need of the project proponents, the Montrose Trustee Council.

The Proposed Action and alternatives, including the No Action Alternative, are subject to review under the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [USC] 4321 *et seq*). The Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] 1500-1508) were used as a guide in preparing this document. The USFWS is the Lead Agency for this NEPA review, and the Navy is a Cooperating Agency (NEPA 40 CFR, 1501.6). The project as proposed would be funded by the Montrose Trustee Council as part of the Montrose Settlements Restoration Program. Natural resource trustees act on behalf of the public to ensure that funds recovered from parties responsible for natural resource damages as public compensation are used solely "to restore, replace, or acquire the equivalent of the injured resources" (42 USC §9607(f)(1)). Trustee authority is designated pursuant to 9607(f)(2) of CERCLA, Subpart G of the National Oil and Hazardous Pollution Contingency Plan (40 CFR 300.600(b)). Trustees must maintain the link between injury and restoration and are accountable to the public for settlement funds, including NEPA [42 U.S.C.§ 4321] compliance and restoration planning requirements under CERCLA [42 U.S.C. § 9607]. In 2005, the Trustees finalized a programmatic Environmental Impact Statement / Environmental Impact Report (EIS / EIR) addressing this and other natural resource restoration actions (available at: www.montroserestoration.gov/); this Environmental Assessment (EA) tiers off that programmatic EIS / EIR (Montrose Trustee Council 2005).

CHAPTER 1. INTRODUCTION

1.1 PURPOSE AND NEED FOR THE PROPOSED ACTION

For more than 5 decades, DDT and PCBs have contaminated the Southern California marine environment. Although the major point source discharges of these chemicals were curtailed in the 1970s, large amounts of DDT and PCBs persist in ocean water and sediments, and certain fish, birds, and other wildlife continue to accumulate DDT and PCBs in harmful amounts. The state and federal governments investigated these problems and in 1990 filed an action in U.S. District Court against several of the parties responsible for the discharges of DDT and PCBs. This action resulted in a settlement that provided funding to implement the actions necessary to restore the natural resources and their services that were injured by the DDT and PCBs. Seabirds in the southern California marine environment were considered a priority for restoration, especially those species with documented injury such as egg shell thinning and elevated DDT levels. The Montrose Trustee Council identified the restoration of seabirds to San Nicolas Island, California, through the eradication of feral cats (*Felis silvestris catus*) as a priority project in their Montrose Settlements Restoration Program Final Restoration Plan (www.montroserestoration.gov/). In particular, Brandt's cormorants (*Phalacrocorax penicillatus*), brown pelicans (*Pelecanus occidentalis*), and western gulls (*Larus occidentalis*), whose populations were affected by past releases of DDT off the coast of southern California, are expected to benefit by the eradication of feral cats on San Nicolas Island. The Trustees prepared a programmatic Environmental Impact Statement / Environmental Impact report (EIS / EIR) in 2005 addressing this and other natural resource restoration actions; this Environmental Assessment (EA) tiers off that programmatic EIS / EIR (Montrose Trustee Council 2005).

Feral cats are among the most detrimental of invasive species, causing population decline, extirpation, and extinction in a diverse array of animals, including insects, reptiles, birds, and mammals (Lowe et al. 2000, Nogales et al. 2004). The effects of feral cats are particularly severe on islands (Whittaker 1998). On San Nicolas Island, feral cats are known to kill seabirds, including Brandt's cormorants and western gulls; other birds, including the federally threatened western snowy plover (*Charadrius alexandrinus nivosus*); the federally threatened island night lizard (*Xantusia riversiana*); and the endemic deer mouse (*Peromyscus maniculatus exterus*). They also compete with the state threatened San Nicolas island fox (*Urocyon littoralis dickeyi*) for food and habitat. Feral cats on San Nicolas Island are hosts for toxoplasmosis, which is a health risk to humans (Peterson et al. 1972), the San Nicolas island fox, and the federally threatened southern sea otter (*Enhydra lutris nereis*; Conrad et al. 2005). Therefore, eradicating feral cats from San Nicolas Island will help restore the island's seabird populations and protect other native fauna, including federally and state listed threatened species, from population decline and potential extirpation or extinction. Eradication is defined as the elimination of every individual feral cat from the island.

To protect the island's native fauna, the Department of the Navy (Navy) has funded intermittent efforts to control feral cats since the 1980s. The Integrated Natural Resource Management Plan for San Nicolas Island (U.S. Navy 2005) identifies the continued control / elimination of feral cats as a recommended activity to protect the island night lizard, western snowy plover, resident and migratory birds, endemic deer mouse, and island fox. These control efforts, which are carried out periodically, have been limited in area, intensity, and duration, and each has resulted in the euthanasia of an unknown proportion of the total feral cat population. The Proposed Action would be an enhancement of these ongoing control efforts, designed specifically to eliminate every individual feral cat from the island.

1.2 SCOPE OF THE DOCUMENT

This document aids in the lead agency's compliance with the National Environmental Policy Act (NEPA). It describes why the project is being proposed, alternatives for the project, including the No Action alternative, the existing environmental conditions that could be affected by the project, and the potential environmental effects of the project. If the analysis indicates that the project has the potential to significantly affect the quality of the environment, an EIS will be prepared. If the analysis indicates that significant adverse effects would not occur, then a Finding of No Significant Impact (FONSI) will be prepared.

1.3 PUBLIC PARTICIPATION

The public will be provided the opportunity to participate in this NEPA process to promote open communication and better decision-making. All persons and organizations having a potential interest in the Proposed Action and Alternatives are encouraged to participate in the NEPA environmental analysis process. The EA will be circulated for a 30-day public review period. Copies of the EA will be provided to local libraries and are mailed to individuals, organizations, and government agencies that request copies. The EA will be posted on the Montrose Settlements Restoration Program's web page (www.montroserestoration.gov).

The Montrose Settlements Restoration Plan EIS / EIR (www.montroserestoration.gov), which was finalized in October 2005, described the proposed project and identified it as a priority to restore seabirds to San Nicolas Island. The public had the opportunity to comment on this document, and several public meetings were held.

1.4 AUTHORITIES FOR ACTION

1.4.1 Key Statutes, Regulations, and Policies

1.4.1.1 Federal Authorities

Several federal laws and their implementing regulations and policies guide the activities discussed in this EA and are summarized below.

National Environmental Policy Act, 42 U.S.C. 4321, et seq.; 40 C.F.R. Parts 1500–1508

NEPA sets forth a specific process of impact analysis and public review. NEPA is the basic national charter for the protection of the environment. Its purpose is to "encourage productive and enjoyable harmony between man and the environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; and to enrich the understanding of the ecological systems and natural resources important to the Nation." The law requires the government to consider the consequences of major federal actions on human and natural aspects of the environment to consider minimizing, where possible, adverse impacts. Equally important, NEPA established a process of environmental review and public notification for federal planning and decision making.

This EA has been prepared in accordance with NEPA requirements for the San Nicolas Island Seabird Restoration Project that was previously selected by the Montrose Trustee Council. As the federal lead agency for this project, the USFWS has prepared this EA to tier off the October 2005 Montrose Settlements Restoration Program Final Restoration Plan Programmatic EIS / EIR, in which this project was identified, to consider the more fully developed, specific activities that might be undertaken to implement this project.

Endangered Species Act, 16 U.S.C. 1531, et seq.

The purpose of the Endangered Species Act (ESA) is to conserve endangered and threatened species and the ecosystems on which they depend. The ESA directs all federal agencies to use their authorities to further these purposes. Pursuant to Section 7 of the ESA, each federal agency shall, in consultation with the secretary, ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat.

Chapter 6 of this EA describes potential effects to federally-listed species, and Section 3.1.12.4 describes the measures that will be implemented to avoid and minimize those potential effects. The USFWS has determined that this project might affect the island night lizard, western snowy plover, and California brown pelican (*P. o. californicus*) but is not likely to adversely affect these species. As lead agency, the USFWS will conduct an internal Section 7 consultation on this project to ensure compliance with ESA requirements.

Coastal Zone Management Act, 16 U.S.C. 1451, et seq.

The goal of the Coastal Zone Management Act (CZMA) is to encourage states to preserve, protect, develop, and, where possible, restore and enhance valuable natural coastal resources. Participation by states is voluntary. The State of California has enacted the federally approved California Coastal Act.

Section 1456 of the CZMA requires that any federal action inside or outside of the coastal zone that affects any land or water use or natural resources of the coastal zone shall be consistent, to the maximum extent practicable, with the enforceable policies of approved state management programs. It states that no federal license or permit may be granted without giving the state the opportunity to concur that the project is consistent with the state's coastal policies. The CZMA implementing regulations, and those of the approved State program, outline the consistency procedures.

Lands, the use of which is by law subject solely to the discretion of, or which is held in trust by, the federal government are excluded from the coastal zone. No federal action to implement this project will occur within the coastal zone. To the extent that implementation of this project has the potential to result in spillover impacts affecting coastal zone resources in areas subject to California's coastal management program, any such impacts, in particular increased numbers of seabirds, will be beneficial to the environment. The Navy and federal trustee agencies have coordinated with the California Coastal Commission for this project.

Sikes Act (Fish and Wildlife Conservation and Natural Resources Management Program on Military Reservations) (16 U.S.C. 670a et seq.), as amended

The Sikes Act requires the Department of Defense to manage the natural resources of each of its military reservations within the United States and to provide sustained, multiple use of those resources. To meet these goals, the act requires integrated natural resource management plans be prepared for military installations. These plans must be developed in coordination with the USFWS and the appropriate State fish and wildlife agency and reflect the mutual understanding of the parties concerning conservation, protection, and management of fish and wildlife resources.

In accordance with the Sikes Act, the Navy has developed and adopted the San Nicolas Island Integrated Natural Resources Management Plan (INRMP; U.S. Navy 2005). The INRMP is in the Administrative Record. The purpose of INRMP is to establish a framework for management of natural resources at the island. The INRMP identifies natural resources and provides recommendations for managing the significant natural resources at San Nicolas Island. This project will be implemented in accordance with the INRMP.

National Historic Preservation Act of 1966 (U.S.C. 470 et seq.), as amended

Congressional policy set forth in the National Historic Preservation Act (NHPA) includes preserving "the historical and cultural foundations of the Nation" and preserving irreplaceable examples important to our national heritage to maintain "cultural,

educational, aesthetic, inspirational, economic, and energy benefits". The NHPA also established the National Register of Historic Places composed of "districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture". Section 106 of the NHPA requires that federal agencies take into account the effects of their actions on properties eligible for or included in the National Register of Historic Places and coordinate such actions with State Historic Preservation Offices (SHPO). Implementing regulations for Section 106 of the NHPA are contained in 36 CFR 800.

The Proposed Action and its alternatives would be subject to consideration under Section 106 of the NHPA because they would each qualify as an "undertaking" as defined in the regulations for implementing Section 106. The Navy will determine the appropriate level of coordination with SHPO regarding the Proposed Action.

1.4.1.2 State Authorities

The California Department of Fish and Game (CDFG) has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and the habitats necessary for biologically sustainable populations of those species (California Fish and Game Code Section 1802). California's fish and wildlife resources, including their habitats, are held in trust for the people of the California by the CDFG (California Fish and Game Code Section 711.7). The CDFG's fish and wildlife management functions are implemented through its administration and enforcement of the Fish and Game Code (Fish and Game Code Section 702). Additionally, the CDFG is entrusted to protect state-listed threatened and endangered species, such as the San Nicolas island fox, under the California Endangered Species Act (Fish and Game Code Sections 2050-2115.5) (CESA).

The CDFG does not have jurisdiction to manage or regulate natural resources on federal lands, such as San Nicolas Island, where the federal government has exclusive jurisdiction. It also does not regulate federal government agency activities. Although, the CDFG does not regulate fish and wildlife resources on San Nicolas Island, the lead and cooperating federal agencies regularly coordinate with the CDFG, under the Sikes Act and otherwise, to ensure the proper protection of the island's natural resources. Thus, while CESA restrictions do not apply to the proposed restoration project on San Nicolas Island, the USFWS and Navy will continue to coordinate with CDFG regarding actions that could potentially affect state-listed species and the proposed conservation measures designed to avoid or minimize adverse effects.

1.4.13 Other Potentially Applicable Authorities

Additional statutes, regulations, or Executive Orders listed below may be applicable to this project, and, if so, the USFWS will comply with their requirements.

- Fish and Game Code Section 3003.1 prohibits the use of certain types of traps, however, federal courts have found that federal law preempts its application to federal agencies

- Archaeological Resources Protection Act, 16 U.S.C. 460, et seq.
- Native American Graves Protection and Repatriation Act of 1990 (25 USC 3000-3013, as amended)
- Curation of Federally Owned and Administered Archeological Collections (36 CFR 79)
- Executive Memorandum – Government-to-Government Relations with Native American Tribal Governments (59 FR 85, April 29, 1994)
- Executive Order 13007 – Indian Sacred Sites (61 FR 104, May 24, 1996)
- Executive Order 13175 – Consultation and Coordination with Indian Tribal Governments (65 FR 218, November 9, 2000)

CHAPTER 2. BACKGROUND

This chapter provides a general description of the effects of feral cats on seabirds and island ecosystems; the historical and current status of feral cats on California islands, including San Nicolas Island; the history of the eradication of feral cats from islands worldwide; and a summary of the known effects of feral cat eradication on islands. For a description of San Nicolas Island, see Section 5.1.

2.1 OVERVIEW OF EFFECTS OF FERAL CATS ON ISLAND ECOSYSTEMS WORLDWIDE

Feral cats are responsible for the extinction of at least 33 bird species worldwide (Lever 1985). Even small numbers of feral cats can have detrimental effects on island birds as evidenced by their effect on the Steven's island wren (*Traversii lyalli*; New Zealand), which was driven to extinction by only a few feral cats in 1894 (Fuller 2000). On the islands off Baja California, feral cats have been responsible, at least in part, for the extinction of 11 mammal and 10 bird species and the extirpation of 22 bird populations (Keitt et al. 2005, Wolf 2002). Feral cats are documented to have a detrimental effect on island seabird colonies. Researchers have estimated cat-induced seabird mortality at Marion Island (Indian Ocean sub-Antarctic) at 450,000 seabirds annually (Van Aarde 1980). Mortality at Macquarie Island (Pacific Ocean sub-Antarctic) was estimated at 47,000 Antarctic prions (*Pachyptila vittata)* and 110,000 white-headed petrels (*Pterodorma lessonii*) annually (Jones 1977). Finally, at Kerguelen Island (south-Indian Ocean), feral cat populations have contributed to the mortality of 1.2 million seabirds annually (Pascal 1980). Feral cats are known to depredate adult and juvenile seabirds, from the smallest storm-petrels to the largest albatrosses (Keitt et al. 2005).

In addition to seabirds, the diet of feral cats on islands includes small mammals and reptiles (Biro et al. 2005, Harper 2005). Feral cat diet varies with food availability, however, and cats are known to prey on the most abundant food source at any one time (Van Aarde 1980, Veitch 1985). On islands with seabirds, this may result in reduced seabird mortalities when other prey items are more abundant. The dietary adaptability of feral cats increases their adverse effect on island ecosystems by enabling them to maintain relatively high populations throughout the year even if a major food source,

such as breeding seabirds, is present for only part of the year (Courchamp et al. 1999, 2000).

2.2 HISTORICAL AND CURRENT STATUS OF FERAL CATS ON THE CALIFORNIA ISLANDS

The California Islands are a biogeographic region that extends from San Miguel Island off Point Conception, U.S. in the north to Asuncion Island at Point Eugenia, Mexico in the south. The 18 islands or island groups in this region share a similar suite of flora and fauna, including introduced mammal species (McChesney and Tershy 1998). Sixteen of the 18 islands or island groups have at one time supported populations of feral cats, and presently, only 5 islands still support cats (Table 1). Within the biogeographic region, feral cats are at least partially responsible for several extinctions of birds and mammals (Table 2).

Table 1. Historical and current status of feral cats on the California Islands.

	Island	Historical Status	Current Status
California	San Miguel	P	E
	Santa Cruz	P	E
	Anacapa	P	E
	Santa Barbara	P	E
	San Nicolas	P	P
	Santa Catalina	P	P
	San Clemente	P	P
Mexico	Guadalupe	P	P
	Asuncion	P	E
	Coronado North	P	E
	Natividad	P	E
	San Benitos (3)	P	E
	Cedros	P	P
	San Martin	P	E
	San Roque	P	E
	Todos Santos (2)	P	E
SUM islands/groups with cats		**16**	**5**

(P = Present, E = Extirpated/No longer present).

Table 2. Number of extinctions and extirpations (local extinction) of bird and mammal taxa on the California Islands that were at least in part a result of feral cat predation.

	Island	Extinct mammals	Extinct birds	Extirpated birds
California	Anacapa	-	-	1
	Santa Barbara	-	-	3
	San Clemente	-	-	3
Mexico	Guadalupe	-	6	~8
	Asuncion	-	-	5
	Coronado North	-	-	2
	Natividad	-	-	1
	San Benito	-	1	-
	San Martin	1	-	1
	San Roque	1	-	4
	Todos Santos	-	1	1
	SUM	**2**	**8**	**~29**

Data are from Wolf (2002), McChesney and Tershy (1998), and Diamond and Jones (1980).

2.3 HISTORICAL AND CURRENT STATUS OF FERAL CATS ON SAN NICOLAS ISLAND

Cats were introduced to San Nicolas Island in historic times, probably originally as pets but later possibly for pest control. It is not known when the feral population became established, but Hillinger (1958) reported that large numbers of feral cats were roaming the island by the late 1950s. By the late 1970s, the population of feral cats on the island was thought to exceed 100 animals (Schwartz 1994). The current population size is not known, and numbers likely fluctuate over time in relation to prey availability and other factors. Feral cats range over the entire island; however, as on other islands, higher densities occur along coastal fringes where vertebrate prey is more plentiful. Feral cats typically avoid areas near inhabited buildings.

The number of feral cats on an island usually does not influence eradication methods (Nogales et al. 2004). Because feral cats on San Nicolas Island occur in all natural habitats across the island, the same methods are required regardless of the exact number of feral cats. Therefore, a detailed population assessment would not change the analysis in this document.

The Navy maintains a prohibition on keeping and / or bringing cats to San Nicolas Island and conducts intermittent feral cat control efforts to protect species at risk of feral cat predation (see Section 1.1).

Feral cats are the only non-native mammal remaining on San Nicolas Island. Rats are not present on the island. This is important because the eradication of feral cats would not result in the increase in population size of another invasive mammal (e.g., black rat, *Rattus rattus*), which might then have the potential to offset some of the expected ecological benefits of eradicating feral cats (Rayner 2007).

2.4 EFFECTS OF FERAL CATS ON SAN NICOLAS ISLAND

2.4.1 Feral Cats Prey on Seabirds

Feral cats were introduced to the island before monitoring of seabird abundance and diversity began. It is well documented, however, that feral cats prey on large numbers of seabirds when available and can kill from the smallest species, including storm-petrels and auklets (McChesney and Tershy 1998) to the largest, including cormorants (McChesney 1997), pelicans (Anderson et al. 1989), and albatrosses (Keitt et al. 2005). Many seabirds nest on the ground, including Brandt's cormorants and western gulls on San Nicolas Island, a characteristic that makes them even more vulnerable to feral cat predation. In a review of the effects of introduced mammals on breeding seabirds on the California Islands, including San Nicolas Island, McChesney and Tershy (1998) documented that feral cats have had detrimental effects on local populations of seabirds. These included the extinction of the Guadalupe storm-petrel (*Oceanodroma macrodactyla*) and the extirpation or severe reduction of black-vented shearwater (*Puffinus opisthomelas)*, Cassin's auklet (*Ptychoramphus aleuticus*), and Xantus's

murrelet (*Synthliboramphus hypoleucus*) colonies. On San Nicolas Island it has been documented that feral cats prey on western gulls and Brandt's cormorants (Kovach and Dow 1981, McChesney 1997).

Seabird populations have recovered following the removal of feral cats from several islands in the region. On Natividad Island, mortality of the California Island endemic black-vented shearwater went from more than 1,000 dead birds per month to less than 100 after feral cat eradication (Keitt and Tershy 2003). On Santa Barbara Island, another California Island where feral cats have been eradicated, Xantus's murrelets have recovered and now constitute the largest colony of this species in the U.S. Similar recovery of seabirds on San Nicolas Island can be expected (see Section 6.1.1)

2.4.2 Feral Cats Prey on Native Species, Including the Federally Threatened Island Night Lizard and Western Snowy Plover

Kovach and Dow (1981) studied feral cat diet on San Nicolas Island during the spring and summer of 1980. Stomachs had fewer items and less prey diversity than scats. Endemic island deer mice were the most common prey item, occurring in 100% of spring scats and 81.8% of summer scats. Birds, including the western gull and western meadowlark (*Sturnella neglecta*), were found in 50% and 100% of spring and summer scats, respectively. Reptiles, invertebrates, and plant matter were also found. Notably, the federally threatened island night lizard was found to be a prey item. Feral cat stomachs examined on San Nicolas Island in 2006 also contained night lizards (Island Conservation 2007). In addition, feral cats are known to prey on the federally threatened western snowy plover (USFWS 2007) and are suspected of preying on plovers on San Nicolas Island (U.S. Navy 2005).

2.4.3 Feral Cats Compete with the State Threatened San Nicolas Island Fox

Concerns over the impact of feral cats on the island fox have been longstanding. In a status review, the CDFG recommended that the island fox remain listed as threatened in part due to the presence of feral cats on Santa Catalina, San Nicolas, and San Clemente islands (Gustafson 1987). Feral cats outweigh island foxes by an average of 2 to 1 and may negatively affect island foxes by direct aggression, predation on young, disease transmission, and competition for food resources (Laughrin 1980). Results of a study by Kovach and Dow (1981) indicate that feral cats compete with San Nicolas island foxes directly by preying upon one of the foxes' key food items, the endemic deer mouse. Estimates of the population size of the island fox on San Nicolas indicated a decrease of 95% between 1971 and 1977 (Laughrin 1980). The decrease in the island fox population on San Nicolas Island was accompanied by a concomitant increase in the feral cat population (Kovach and Dow 1985), and feral cats have been found to displace island foxes from habitats on San Nicolas Island (Moore and Collins 1995). The population estimates derived from Laughrin (1980) of as few as 10 or 20 island foxes on San Nicolas in the mid 1970s are likely low (Gustafson 1987). However, genetic variability of the San Nicolas island fox is extremely low, indicating extensive inbreeding or a period of

very low population, such as indicated by Laughrin's data (Wayne et al. 1991, Aguilar et al. 2004).

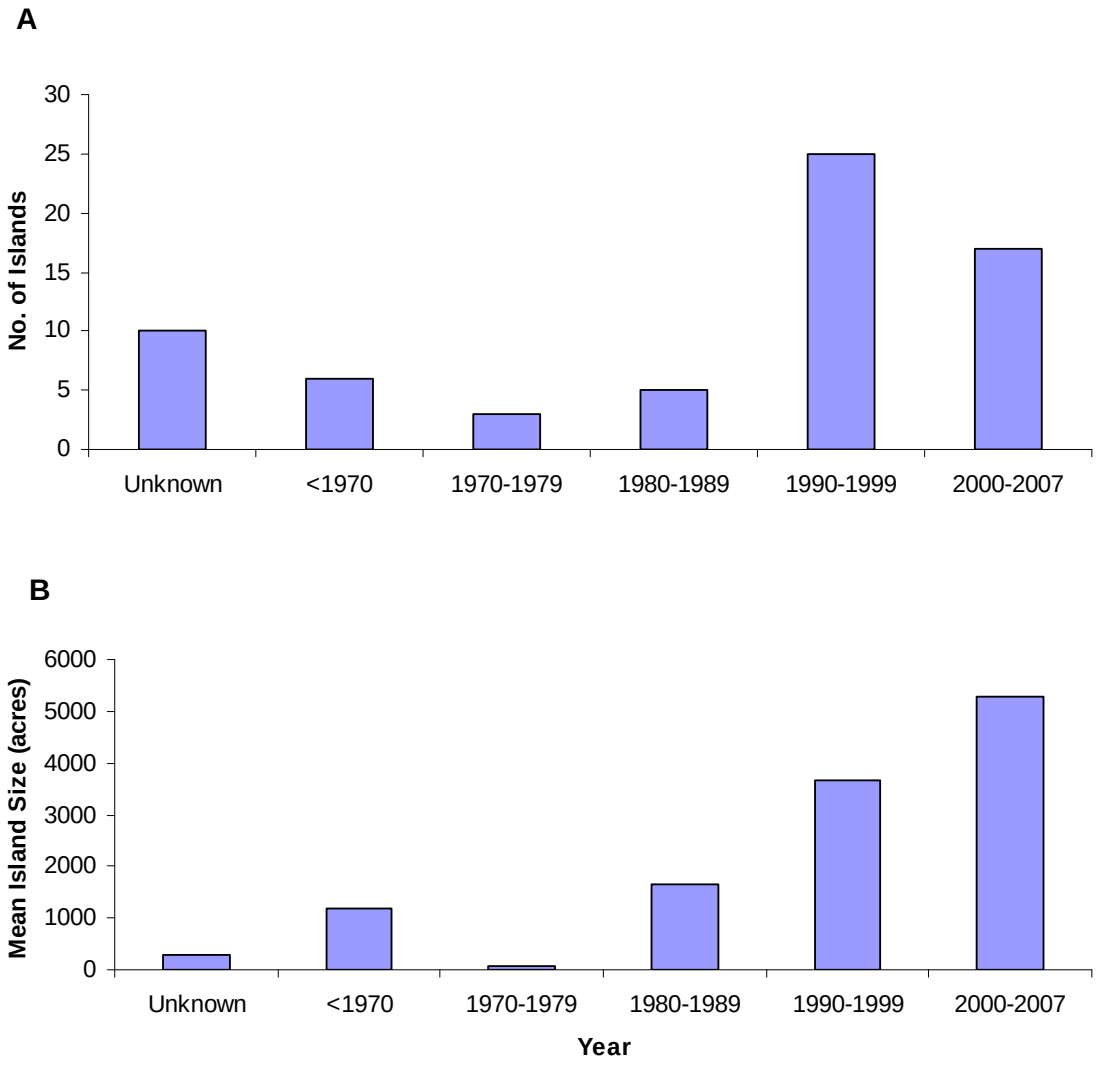
In the 1980s, control of feral cats was initiated to protect the island fox and other native species on San Nicolas Island. As feral cat populations decreased on the island, island fox numbers increased dramatically, reaching more than 500 in 1986. Since then, the island fox population has stabilized at around 500 to 600 animals (Schmidt et al. 2007), which may be a result of the periodic control of feral cats.

The presence of feral cats also increases the risk of a transfer of infectious disease to island foxes (Roelke-Parker et al. 1996).

2.5 OVERVIEW OF FERAL CAT ERADICATIONS FROM ISLANDS WORLDWIDE

Eradicating feral cats from islands has been shown to be an important tool for protecting threatened island species (Donlan and Keitt 1999, Keitt and Tershy 2003, Keitt et al. 2002, Nogales et al. 2004). Since the first recorded eradication in 1925, there have been at least 66 successful feral cat eradications (K. Campbell personal communication, Nogales et al. 2004). Island size is one of the most important determinants of successful eradication. The majority of these islands (68%) have been smaller than 1,000 acres, while 3 have been larger than 24,000 acres (K. Campbell personal communication, Nogales et al. 2004, Figure 1, Figure 2). San Nicolas Island, at 14,562 acres, is at the larger end of islands from which feral cats have been eradicated. Three islands larger than San Nicolas Island have been successfully eradicated of feral cats: Ascension Island, United Kingdom, at 24,000 acres; Macquarie Island, Australia, at 29,600 acres; and Marion Island, South Africa, at 71,600 acres. Over time, as methods have become more effective it has been possible to achieve successful results on larger and larger islands (Figure 2).

Figure 1. Number of islands from which feral cats have been eradicated by decade (A) and the mean size of those same islands (B). The islands in the unknown year category are mostly less than 500 acres.



Data are from Nogales et al. (2004).

Figure 2. Size distribution of 66 islands from which feral cats have been eradicated.

Data from Nogales et al. (2004). Arrow indicates size class of San Nicolas Island.

2.6 FERAL CAT ERADICATIONS ON MEXICAN CALIFORNIA ISLANDS

Mexico is the world leader in efforts to protect biodiversity through the eradication of feral cats from islands. More than one-quarter of the world's 66 feral cat eradications have occurred in northwest Mexico. Eight of these have occurred on the Mexican owned California Islands (Nogales et al. 2004), which are part of the same archipelago that extends into Southern California and includes the Channel Islands. This is relevant to San Nicolas Island because San Nicolas Island shares floral, faunal, and climatic characteristics with the Mexican California Islands.

2.7 EFFECTS OF FERAL CAT ERADICATIONS ON WILDLIFE ON THE MEXICAN CALIFORNIA ISLANDS

Feral cat eradications on islands are known to provide dramatic benefits to native wildlife. In northwest Mexico, several studies have documented benefits to native species as a result of feral cat eradication. On Natividad Island, feral cats were documented to have killed more than 1,000 black-vented shearwaters per month (Keitt et al. 2002). Following feral cat eradication, mortality was reduced to less than 100 birds per month, a result of natural mortality from native avian predators such as peregrine falcons (*Falco peregrinus*, Keitt and Tershy 2003, Wood et al. 2002). On Asuncion Island, feral cats were eradicated in 1994, and the Mexican endemic subspecies of Cassin's auklet (*Ptychoramphus aleuticus australe*; extirpated in the 1970s) was re-discovered on the island in 2004 (B. Keitt personal communication). After feral cat eradication programs on Todos Santos, San Martin, and Los Coronado Islands, brown pelicans and double-crested cormorants (*Phalacrocorax auritus*) re-colonized these islands (Palacios et al. 2003). On Coronados Island, following feral cat eradication in 2000, 2 suppressed endemic rodent populations (*Peromyscus pseudocrinitus, Chaetodipus spinatus pullus*) increased in numbers, thereafter fluctuating with resource availability (Rodríguez-Moreno et al. 2007).

CHAPTER 3. PROPOSED ACTION

3.1 DESCRIPTION OF THE PROPOSED ACTION

Under the Proposed Action (preferred alternative), feral cats would be eradicated from San Nicolas Island using a combination of techniques, including extensive padded leg-hold live trapping, spotlight hunting, and hunting with specialized dogs. An adaptive management approach would be used, which involves carefully monitoring the project and effectiveness of each method to maximize efficiency and humaneness of the effort. Many factors can influence the effectiveness of eradication methods. Rainfall, for example, can severely hamper trapping efficiency because it tends to foul trap sets and reduce the effectiveness of scent lures. If an El Niño event resulting in above average rainfall occurred during the project, hunting with dogs, which can track a cat's scent even in wet weather, may be more effective than trapping or hunting without dogs. The most effective approach to feral cat eradication on San Nicolas Island, therefore, would be to integrate the use of several methods simultaneously or sequentially. Integrated adaptive management, as it applies to this project, would involve the application of humane and practical methods to eradicate feral cats based on local problem analysis and the informed judgment of trained personnel. The purpose of implementing this approach is to apply effective and humane feral cat eradication techniques, while minimizing adverse effects to staff, dogs, target and non-target species, and the environment. While the proposed methods have already been evaluated for efficacy (Island Conservation 2007), data would continue to be collected throughout the project on each method (leg-hold trapping, spotlight hunting, and hunting with dogs) to assess its effectiveness, humaneness, potential environmental effects, and cost. This information would be periodically analyzed throughout the project, allowing for flexibility in methods based on direct feedback from events in the field.

The use of integrated adaptive management is especially critical on large islands such as San Nicolas Island. Eradications at large scales require specialized methods and management tools, such as species-specific trained dogs, telemetry systems, and Geographic Information Systems (GIS), where information is continually gathered, integrated and applied to function efficiently and ensure success. A combination of trapping and hunting is an effective method that has been used on at least 10 islands to achieve eradication. The largest island on which these 2 techniques have exclusively been used to achieve eradication is the 7,600-acre Santa Catalina Island, Gulf of California, Mexico (B. Wood personal communication). Trapping was used as the main technique in this case, with hunting accounting for the removal of only a small number of the animals from the island. Through the use of a suite of proven methods modified specifically for San Nicolas Island, feral cat eradication could be conducted safely, humanely, and efficiently. A combination of trapping with padded leg-hold live traps and hunting with and without specialist dogs to eradicate feral cats from San Nicolas Island would provide the most effective and efficient combination, allowing feral cats to be eradicated from San Nicolas Island in a relatively short amount of time. Efficiency and speed would minimize replacement reproduction and thus reduce the total number of feral cats that would need to be euthanized over the course of the project.

Island size is generally the greatest predictor of difficulty for the eradication of feral cats. San Nicolas Island, at 14,562 acres, is in the upper size range of islands from which feral cats have been eradicated (Figure 1B). However, the island is dry, has low sparse vegetation, and, most importantly, has an established network of roads and trails that allow easy and rapid access to most parts of the island. These characteristics make the island considerably easier to work on than a similar sized island lacking these features.

The following sections describe the details of the Proposed Action.

3.1.1 Padded Leg-Hold Live Trapping

Padded leg-hold live trapping is the most effective technique for capturing feral cats (Nogales et al. 2004, Veitch 1985, Wood et al. 2002) and would be the primary method used on San Nicolas Island as part of the Proposed Action. Locations for placing padded-leg-hold live traps would be determined using a variety of methods including brushed track pads. Track pads are sites with a sandy substrate that are brushed smooth so that the footprints of any animals passing through the site would be visible.

There are 2 main types of padded leg-hold trap sets: trail sets and cubby sets. Trail sets are placed such that an animal will pass through the set in the course of its normal activity (Figure 3). The area around the trap is modified to guide the animal to the trap. Cubby sets are located to the side of an established trail. Scents and other lures are often used for both trap types, including visual lures like flags and olfactory lures such as scent or food. However, cubby sets require a greater use of scent lures to encourage the animal to investigate off of the primary trail (Wood et al. 2002).

Figure 3. Expert trapper demonstrating the preferred set method for a trail set trap.

Padded leg-hold live traps require experienced personnel to select trap placement locations and to correctly set the traps. Skilled trappers are crucial to the efficiency and success of this method. Poorly set traps (i.e., those that are triggered but fail to capture animals) can result in feral cats that are trap-shy. Padded leg-hold live traps must be checked at regular intervals (Wood et al. 2002). Under this alternative, all traps would be checked at least daily, either manually (visually) or electronically using a telemetry monitoring system (see 3.1.1.1). All traps would be monitored each morning, such that the maximum amount of time an animal would spend in a trap would be overnight, for a period of about 14 to 15 hours. Traps would be monitored continuously by the monitoring system. Although fewer traps are expected to be sprung during the day due to the primarily crepuscular and nocturnal activity patterns of the foxes (and feral cats), those that are sprung would be identified and checked as soon as possible. Due to

personnel safety, traps would not be checked at night; traps sprung during these hours would be checked the next morning.

Technicians would place traps in locations based on their knowledge of feral cat behavior. They would also use sign (tracks and scat) to determine trap placement. Traps (approximately 200) would be set over the entire island, with the majority along the coast. Feral cats concentrate their activity around landscape features such as gullies, ridges, and rock piles. The inland area, which has few of these features, would require a lower number of strategically set traps. Traps typically would be several hundred yards apart. The estimated number of traps required on San Nicolas Island is based on work on similar islands, the island's topography and number of drainages, and constraints on the duration of the trapping period to avoid the island fox breeding season.

After traps are set on the entire island, field personnel would continue to search for feral cat sign while checking traps. In addition to searching for sign, camera stations may also be used to assist in determining trap locations. When feral cats are detected, traps may be relocated to increase capture rates. Additional traps may be set in the vicinity of detections, and if the sign is very recent, hunters with dogs may be deployed (see 3.1.2).

3.1.1.1 Trap Monitoring

Padded leg-hold live traps must be checked regularly. Due to the number of traps (approximately 200) required for an island the size of San Nicolas, an automated system to identify which traps have been tripped would be used to enhance animal welfare by allowing trapped animals to be removed as quickly as possible from traps. Additionally, the system would ensure cost-efficiency during the project. The system is also expected to improve trap effectiveness because less frequent physical trap checks will reduce the amount of human scent and disturbance at the trap sites. Each trap would have a telemetry transmitter. When a trap is sprung, a switch would trigger the transmitter to send an identification (ID) code indicating the status of the trap. The unique ID code of each transmitter would identify each trap, the location of which would have been recorded by a Global Positioning System (GPS). In addition to the ID code sent when a trap is sprung, the transmitters would send a test signal several times each day to inform project staff that the transmitter is operational. Most traps would be sprung overnight due to the activity patterns of the species. Each morning, the GIS technician would produce a list of the sprung traps that require checking. Information about additional traps sprung while trappers are in the field would be relayed to trappers by radio. If no test signal is received from a trap transmitter or if a trap indicates that it has sprung, it will be checked as soon as possible during daylight hours.

3.1.1.2 Firearms

At any one time, as many as 8 field personnel would carry firearms while checking traps and hunting with or without dogs. Firearms used would include .380 caliber pistols, .223 caliber rifles, and 12 gauge shotguns, all with lead-free, non-toxic projectiles and primers. These calibers were chosen because they are sufficient to render an immediate, humane

death and it is possible to purchase non-toxic ammunition in these sizes. Because widely-accepted policies for caliber and weapon type in relation to humane control of feral cats are not available in the U.S., firearms were selected based on the criteria for Australia as discussed by Sharp and Saunders (2005b, c). Firearms would be unloaded when not in use, including during transport to and from the day's worksite. At worksites, firearms would be loaded, but a round would not be chambered until the hunter / trapper intended to shoot. Further protocols for storage of firearms and ammunition would be determined in consultation with the Navy. Consultation with the Navy may also determine zones where no firearms may be discharged.

3.1.2 Hunting with Dogs

Dogs are widely used in conservation programs and can be trained to perform specific tasks. Because of their well-developed sense of smell and ability to cover large areas over difficult terrain, dogs can greatly increase the ability to detect and locate feral cats. On San Nicolas Island, hunting dogs would be trained to focus exclusively on feral cats and completely disregard other species including island foxes, birds, and rodents (Appendix 1). Dogs would be trained to find feral cats by following ground and / or wind-borne scents. Dogs would not attack the feral cats, but would "bail them", that is drive them by barking, into holes, rocky features, or trees. The dog handler would shoot the feral cat when a clear, fatal shot can be delivered. In some instances feral cats may be deep in holes where they cannot be shot. If this occurs, padded leg-hold live traps would be set at the entrance to the hole. Hunting with dogs would occur most often during daylight hours when target identification is easier. However, if hunting with dogs were to occur at night, great care would be exercised and a shot would be fired only after the dogs had been moved away and when the shooter is 100% certain of the identity of the target. Hunting dogs would not be allowed to approach feral cats in padded leg-hold live traps to avoid any stress to the feral cat this might cause.

3.1.2.1 Hunting Approach, Data Collection and Adaptive Utilization

To facilitate hunting with dogs, the island would be divided into blocks, allowing dogs and their handlers to systematically search the island. Blocks would be worked in an order that takes into consideration wind direction and topography; un-worked blocks would remain upwind of teams that maintain a rolling front going into the wind and, where possible, along or down slopes. This would provide dogs with the best chance of detecting wind borne scents and less chance of feral cats detecting dog scent. Block size would be dictated by the amount of terrain able to be covered by dog handlers and dogs in one day. These blocks would be delineated by GIS and uploaded into GPS units carried by dog handlers to be used as a guide. These blocks might change over the course of the project as fewer feral cats are encountered and climatic conditions change. The handler's GPS units would be programmed to create track logs, showing where they have traveled (Lavoie et al. 2007). Dogs would be fitted with GPS collars, which, along with the handlers' GPS units, would be downloaded daily to the GIS system, allowing managers to visually track progress. This information would be used adaptively to determine any areas not sufficiently covered and plan the next day's work. Handlers and

dogs would continue with this protocol into the monitoring / eradication confirmation phase (Section 3.1.6).

3.1.2.2 Dog Handling

Hunting dogs would be handled and managed by experienced dog handlers. Humane handling and training methods that aim to prevent injury or stress to dogs would be employed. Veterinarians would oversee the dog preventative health program and handle major injuries (Appendix 1). The care and management of hunting dogs on San Nicolas Island would meet or exceed standards set for working dogs (Sharp and Saunders 2005a, Appendix 1).

As dogs may carry disease and parasites that might affect the native island fox, a quarantine protocol would be implemented and strictly adhered to in conjunction with the Island Fox Veterinarian Working Group. Appendix 1 provides an outline of the recommended quarantine procedures to be followed. The final quarantine procedures would be approved by a veterinarian familiar with island fox disease issues.

3.1.3 Spotlight Hunting

Hunting feral cats is typically conducted at night with the use of spotlights or headlamps. Spotlight hunting may be of limited use on San Nicolas Island due to the high density of foxes causing false alarms that require further investigation. Because distinguishing a feral cat from a fox in some circumstances can be difficult and killing foxes must be avoided, a shot would be fired only when the shooter is 100% certain of the identification of the target. This would result in some feral cats not being shot because a positive identification could not be made. Spotlight hunting may prove to be an important technique in special circumstances but would most often be combined with the use of dogs (Section 3.1.2).

3.1.4 Euthanasia

Trapped feral cats restrained in padded leg-hold traps would be euthanized according to protocols established by the American Veterinary Medical Association (AVMA) for live captured feral species (AVMA 2007) to ensure the feral cats are euthanized in the most humane way possible. The AVMA (2007) report details acceptable methods of euthanasia with the acknowledgement that the "AVMA is fully committed to the concept that, whenever it becomes necessary to kill any animal for any reason whatsoever, death should be induced as painlessly and quickly as possible". AVMA (2007) separates euthanasia methods into 3 categories: inhalant agents, noninhalant pharmaceutical agents, and physical methods. The primary methods of euthanasia that would be used on San Nicolas Island are noninhalant pharmaceutical agents such potassium chloride combined with a general anesthetic and physical methods, specifically an accurately placed gunshot. The precise method of euthanasia used in each case on San Nicolas Island would depend on the situation. Considerations to be made in determining the method of euthanasia would include the ability to: 1) induce death as painlessly as possible, 2)

induce death as quickly as possible, 3) minimize distress associated with handling, and 4) maximize effectiveness of the method. All persons implementing euthanasia would be appropriately trained in the technique used.

3.1.5 Carcass Disposal

Where possible, carcasses would be collected, bagged, and transported to Navy facilities for disposal. In at least some cases, however, entire carcasses or parts may be retained for study.

3.1.6 Eradication Monitoring and Confirmation

Monitoring would begin during the eradication phase and would continue through the removal of the last feral cats. Trapping would continue uninterrupted throughout the eradication phase and aid in the confirmation of eradication. As part of the adaptive management approach, population indices would be derived from trapping rates and other detection methods (Forsyth et al. 2005) and would be used by managers throughout the project to gauge effectiveness of methods and progress towards the goal of eradication. Thus, as the eradication progressed, feral cat padded leg-hold live trap captures would diminish. Island fox captures would also drop to low levels, as foxes learned to avoid traps that offer no reward and detain them until release. This would mean that staff would need to spend less time tending to traps. At that point, various detection methods would be employed to aid in the detection of the general location of the last feral cats, facilitating their removal. Scent stations with track pads would likely be implemented at this stage, and the use of other detection methods would be intensified. Brushed track pads at strategic locations would have been in use since the preparation phase to aid in determining where to place traps. During the eradication phase, results from the brushed track pads would determine the need to change trap locations.

Camera stations would be deployed prior to trapping or hunting activities and would provide a population index of feral cat, island fox, and other species throughout the project. Additionally, toward the end of the eradication phase, feral cats captured would also be photographed, so that managers could determine if feral cats being detected are the same animals being removed. Camera stations could remain for several months after the primary eradication team leaves the island and would be checked periodically.

Hunters with dogs would survey the island systematically throughout the eradication phase and continue in the same fashion after the last feral cat is believed to be removed to aid in confirming eradication. The end of the systematic island-wide eradication effort would be determined in consultation with the lead and cooperating agencies, Montrose Trustee Council, island fox experts, and other relevant stakeholders.

Following the trapping phase and the primary eradication phase, monitoring trips would be conducted at set intervals. Using a network of roads and trails (Section 3.1.8), teams of 2 or 3 experienced personnel on motorcycles would search the island for sign, check cameras, and, if deployed earlier, collect hair from hair sampling devices for analysis.

Depending on weather conditions and available time, the team may construct scent stations and track pads for use in monitoring. Ideally, 3 monitoring trips would be conducted at 6, 12, and 24 months after the primary eradication phase has ended. Monitoring trips would occur during the driest months when sign would be most obvious and any feral cats remaining are likely to range farther in search of food. The use of dogs during monitoring trips is not anticipated due to the extensive quarantine procedures. If the adaptive management process determines dogs are necessary during the monitoring phase, dogs would go through complete quarantine procedures prior to use (Appendix 1).

3.1.7 Use of GIS and Databases for Adaptive Management

GIS would be used extensively in planning, reviewing, and reporting work on the island. GIS would provide a key tool for the development of trail networks, facilitation and management of an automated trap monitoring system (with approximately 200 traps) and track pads (>1000), and the management of hunter and dog teams. GIS would generally provide management with a 'birds-eye' view of the project and its progress. In conjunction with the GIS, databases that track effort (e.g., person and dog hours, trap nights) by method (hunting, trapping, camera trap, etc.), and trap and hunter success would provide feedback to managers on a catch-per-unit basis. This information would aid in determining the most efficient method of removing the last animals, tracking the eradication progress, and guiding the adaptive management process.

3.1.8 Island Transportation and Access

In addition to currently maintained roads and trails, crews would use old roads and trails to access trapping, hunting, and monitoring sites. Limited repairs to these roads and trails would require using hand tools to gather and place fill material. Although more than 125 miles of roads and trails exist on the island, to facilitate travel to strategic areas that are otherwise inaccessible, technicians would use wide-wheeled and low-geared motorcycles off road and off trail. This activity would result in an estimated 17 miles of additional temporary trails on the island. Areas from which fill may be gathered and the exact routes for temporary trails would be determined in consultation with the island's natural resource manager and archaeologist, who would flag sensitive resources to be avoided following protocols established for Navy operations. An estimated 12 miles of trails would go through annual grassland and coastal scrub plant communities, which have low erosion potential (U.S. Navy 2005), while an estimated 5 miles of trails would go through barren areas, which have moderate erosion potential. No trails would be created in areas of high erosion potential. These trails would be at least 300 ft from marine mammal haul outs, 500 ft from seabird roosting areas, and 1,000 ft from seabird nesting areas. They would avoid woody vegetation, rare natural communities, prime habitat areas for the island night lizard (Figure 6), and nesting areas for the western snowy plover (Figure 8). All new trails would be closed to further access at the conclusion of the eradication monitoring and confirmation phase of the project (Section 3.1.6).

Proposed Erosion Minimization Measures

To minimize the risk of erosion, the following measures would be implemented:

- Trails would avoid grades of greater than 30%
- Trails would avoid wet soils
- Prior to the wet season, water bars and / or rolling dips would be installed as needed at strategic locations along the trails
- At the conclusion of the project, any incised areas would be returned to the existing grade
- Trail impact areas would be seeded with site-specific native herbaceous species if needed

3.1.9 Schedule

Proposed Island Fox Impact Minimization Measure

Because island foxes would be caught in the same traps used to capture feral cats, field work would be scheduled to avoid or minimize potential effects on island foxes. Trapping would begin after island fox pups are out of dens and large enough to feed independently. The timing for shutting down traps (i.e., the end of the trapping period) would take into account the trapping rate of the island fox, the timing of its breeding season during the trapping year, and the progress of the feral cat eradication effort. The end of the systematic, island-wide trapping effort would be determined in consultation with the lead and cooperating agencies, Montrose Trustee Council, island fox experts, and other relevant stakeholders.

3.1.10 Project Management

A Project Advisory Team, consisting of representatives from the lead and cooperating agencies, project contractor, and the Montrose Trustee Council, along with outside experts, would review project progress, provide input upon request from the field operations manager or project director, and provide an independent assessment of the project and its progress. This team would seek input from island fox experts and other stakeholders, as appropriate. The proposed structure of the field team and its relation to the Project Advisory Team is shown in Figure 4.

3.1.11 Quarantine: Preventing the Introduction of Invasive Species

Before an eradication project is completed there must be a clear and actionable plan for stopping the reintroduction of the target species. In addition, the plan should include steps to prevent the introduction of new invasive species to the island. Transportation to and from San Nicolas Island is well-regulated, making a quarantine program much easier to implement than on islands with unregulated transport.

The Navy currently has a no pet policy on the island, and no animals are allowed to be brought to the island without permission, which is granted only when a justified need is provided. Thus, the risk of intentional introduction is low. However, unintentional introductions have occurred. In 1996, a Virginia opossum (*Didelphis virginiana*) was trapped on the island during a feral cat trapping program (Thomson 1997). In 1994, three sightings of non-native California ground squirrels (*Spermophilus beecheyi*) occurred, although none have been seen since (Archuleta 1996). These non-native mammal introductions likely occurred as a result of transport from the mainland. These events underscore the importance of enacting strict rules and enforcement procedures for quarantine to prevent unintentional introductions of non-native species. The quarantine action plan would include the following:

- Site visits to the island to determine likely paths of introduction
- A review of transportation policies
- A written report outlining paths of greatest risk and recommendations on how to minimize those risks
- A plan for rapid emergency response in case a high-risk species (rodent, certain plant species) is detected on the island

Such an action plan would be developed as part of the Proposed Action, but its implementation would be subject to separate environmental review, if necessary. Given the risk of reintroduction, genetic samples from all feral cats captured during the eradication phase would be collected. If a feral cat were found on the island after the eradication project, genetic data could be used to determine whether the feral cat were the result of a failure to eradicate or came from a newly introduced animal.

3.1.12 Conservation Measures to Minimize or Avoid Impacts to Sensitive Species

This section presents proposed measures designed to avoid and / or minimize potential adverse effects to special-status plants and rare natural communities, common wildlife, the state threatened San Nicolas island fox, other threatened and endangered species, and cultural and historic resources. These conservation measures are incorporated into the project description and are considered part of the Proposed Action.

3.1.12.1 Special-Status Plants and Rare Natural Communities

1) Field technicians would be trained to recognize special-status plants and would avoid them when hiking off trail.
2) Field technicians would avoid or minimize all types of travel through highly invasive weed-infested areas to avoid or minimize weed dispersal.
3) Vehicles would be subject to regular pressure washes at a designated wash site. Seeds and plant parts would be collected when practical and disposed of.

4) Repairs to roads and trails requiring fill and materials to be brought from other areas of the island would be taken from areas free of invasive plant infestations to avoid dispersal.

5) Old roads and trails would be routed around special-status plants, should they occur on existing road or trail beds.

6) Technicians would use wide-wheeled and low-geared motorcycles off roads and off trails. Exact routes would be determined in consultation with the resident biologist, who would flag special-status plants to be avoided should they occur, following protocol established for Navy operations. Routes would avoid rare natural communities.

7) Vehicles would be equipped with fire extinguishers and devices to reduce the risk of accidental fire.

3.1.12.2 Wildlife

1) Technicians, hunters, and dogs would maintain at minimum a 300-ft buffer from marine mammals hauled out on the island, a 500-ft buffer from roosting seabirds and shorebirds, and a 1,000-ft buffer from nesting seabirds and shorebirds (Rodgers and Smith 1995). In some situations a greater buffer distance may be required for marine mammals, and these would be set in coordination with the island's natural resource manager.

2) All dogs used in hunting activities would undergo extensive avoidance training for all but the target species. While not working, dogs would be kenneled or leashed to prevent roaming on the island.

3) Ammunitions used on San Nicolas Island would have lead-free projectiles and primers. These ammunitions would be used exclusively.

4) Traps would be set in areas away from nesting or roosting birds to avoid incidental captures of those species.

3.1.12.3 San Nicolas Island Fox

1) The use of traps would be restricted during the fox breeding season to minimize potential effects.

2) Trap sets would (1) be designed to reduce the number of fox captures, the amount of time foxes spend in traps, and the risk of injury, (2) be placed in locations that appear to be used primarily by feral cats, and (3) functionally encourage foxes to avoid trap sets in the future.

3) Trapped foxes that require veterinary care would be kept on the island and treated by a fox biologist / technician and a licensed veterinarian, as necessary. With specialized trapping techniques designed to minimize injuries to foxes, few injuries are expected.

4) Trappers targeting feral cats traditionally use padded leg-hold size 1.5 traps (Oneida Victor soft-catch®). Under the Proposed Action, however, trappers would use size 1 traps of the same brand, which are smaller and lighter. This would reduce the weight of the trap on the leg and likewise reduce the risk of injury.

5) Very short (approximately 11-inch) anchor chains and extra swivels, which enable free movement by the captured animal, would be used to reduce the risk of injuries to the leg.

6) Trap sites, free of special-status plants, would be cleared of vegetation and other objects that may immobilize trap swivels.

7) All traps would be marked with unique scent and visual cues to provide foxes a way to recognize trap sets, facilitating their aversion to them, while captured feral cats would be euthanized and would not have opportunities to learn to avoid traps.

8) No food lures would be used, so foxes receive no reward. Olfactory lures would be used to provide a unique scent for foxes to recognize and also to attract feral cats.

9) A trap monitoring system would be used that provides immediate notification when a trap is sprung. Traps would be monitored continuously by the monitoring system. Due to personnel safety, traps would not be checked at night; traps sprung during these hours would be checked the next morning. Although fewer traps are expected to be sprung during the day due to the primarily crepuscular and nocturnal activity patterns of the foxes (and feral cats), those that are sprung also would be checked as soon as possible by radioing to the trappers in the field and identifying the trap or traps to check. Thus the average maximum amount of time a fox would spend in a trap would be overnight, for a period of about 14-15 hours.

10) Trappers would be trained by personnel experienced in fox handling, including Passive Integrated Transponder (PIT) tagging and injury evaluation. An island fox biologist / technician would periodically accompany trappers in the field to review their fox handling techniques and assist in assessing any fox injuries if any were encountered. Data collected on foxes would be provided to the Navy for their use or dissemination. Duplicate copies of fox data forms would be held by the organization contracted by the Navy to conduct annual monitoring of the San Nicolas island fox population and maintain a database of all known PIT tagged foxes on the island.

11) In addition to monitoring and evaluation during the project, post-project monitoring of island foxes would occur to ensure that foxes were not negatively affected.

12) The following protocol would be followed when a fox is inadvertently trapped:

    a. Padded leg-hold trapped foxes would be approached directly and at a fast walking pace. This would maintain them at the full extent of the

chain away from the handler who then would capture the fox with the aid of a towel or small blanket.

b. Once the trapper had the animal under control, its foot would be released.

c. The trapper would then systematically inspect the animal from tail to nose, noting any injuries (old and new) or abnormalities, which leg(s) were trapped, its sex, and sexual condition. If the trapper were uncertain of the injury status, an island fox biologist / technician would be radioed for assistance. If no assistance were available, the fox would be taken to an on-island clinical facility dedicated to caring for island foxes. This facility would be well equipped with medical and surgical equipment.

d. The fox would be scanned for an existing PIT tag with a receiver. If the animal did not have a PIT tag, one would be implanted to give it a unique identification number. All information recorded would be associated with a unique PIT tag number, identifying that particular animal.

e. Foxes would be aged by tooth wear and eruption; dentition would be recorded, and age estimated.

f. Any animal with moderate to severe injuries such as broken bones or large / deep lacerations would be taken to the on-island clinical facility for inspection by a fox biologist / technician who would consult with a veterinarian and then determine the necessary course of action. This procedure will be followed even for any pre-trap injuries a fox may have. A detailed report of moderate to severe injuries would be developed and sent to the CDFG, USFWS, Navy, and Montrose Trustee Council.

g. Foxes requiring care would be held in a clinical facility on-island and given all necessary treatment until they could be released. Foxes that require fracture repair would be treated surgically on-island by a licensed veterinarian experienced with the island fox and cared for until they could be released. Animals would be released at the site of capture.

h. A fox that cannot be successfully treated, regardless of the cause, would be humanely euthanized as determined by a licensed and permitted veterinarian. A detailed report on any foxes that are euthanized or die incidentally would be sent to the CDFG, USFWS, Navy, and Montrose Trustee Council. The carcasses would be shipped to an authorized facility (e.g., the University of California at Davis) for necropsy. At any time, if the group concluded that the risk of continued fox injury or mortality is too high, the methods causing injury or mortality would be stopped.

3.1.12.4 Other Threatened and Endangered Species

As described in more detail in Section 5.3.2, five other state and / or federally listed species have the potential to occur in the Proposed Action area. These species include the federally and state threatened island night lizard, federally and state endangered California brown pelican, federally threatened western snowy plover, federally threatened southern sea otter, and federally and state threatened Guadalupe fur seal (*Arctocephalus townsendi*). The following species-specific conservation measures would be incorporated into the Proposed Action:

Island Night Lizard

To minimize or avoid potential effects to island night lizards, new temporary trails would be routed outside of prime habitat areas for island night lizards (Figure 6) and field personnel would avoid, where feasible, hiking off trail in these areas. Field personnel would not disturb abandoned materials (boards, metal, etc.), which may provide cover for night lizards.

California Brown Pelican and Western Snowy Plover

Field technicians, hunters, and dogs, would maintain a 500-ft buffer from roosting pelicans and plovers and a 1,000-ft buffer from known nesting plovers at all times (Rodgers and Smith 1995).

Southern Sea Otter and Guadalupe Fur Seal

Although neither species is expected to occur onshore during the project, technicians, hunters, and dogs would maintain a 300-ft buffer from the animals at all times.

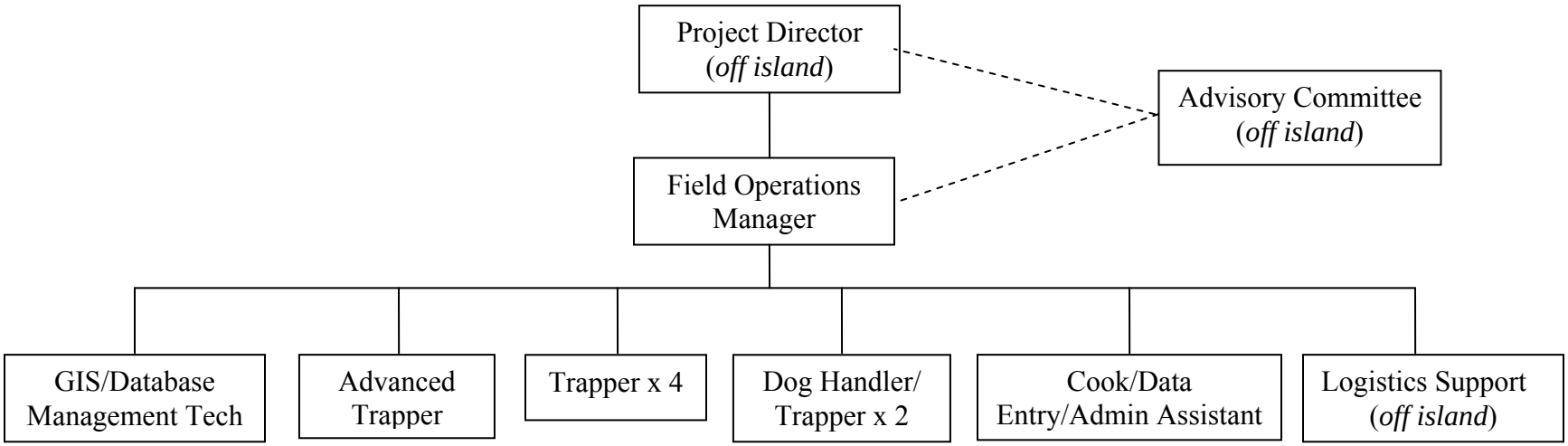
3.1.12.5 Cultural and Historic Resources

Ground disturbance activities associated with the Proposed Action, such as the repair of roads and trails, might require using hand tools to gather and place limited amounts of fill material. These activities have the potential to adversely affect cultural resources, but this is very unlikely. Field technicians would consult with the resident archeologist to clearly identify areas from which fill can or cannot be taken prior to initiation of any project activities. Likewise, routes of new trails would be determined in consultation with the resident archaeologist, who would flag cultural and historic resources to be avoided should they occur, following protocol established for Navy operations. Should archaeological artifacts or other cultural materials be uncovered during road repairs or any other phase of the Proposed Action, workers would cease activities and report the discovery to the resident archaeologist and / or other authorities as appropriate.

All of San Nicolas Island has been surveyed for the presence of archaeological sites several times, most recently in 2002. Although it is possible that unknown resources could be present in areas covered by sand dunes or recent deposition, it is unlikely that

any new resources would be located in the areas potentially affected by trail improvements. Nevertheless, the Navy routinely provides an archaeologist to monitor road repairs and would do so as part of this project. In the event that any new resources were discovered, the Navy would ensure appropriate measures were undertaken in compliance with 36 CFR 800.

Figure 4. Personnel and command structure.



CHAPTER 4. PROJECT ALTERNATIVES

4.1 SELECTION CRITERIA FOR ALTERNATIVES

The primary methods previously used for feral cat eradications include trapping, hunting with or without dogs, poison, and disease. Of the successful feral cat eradications on islands cited by Nogales et al. (2004), about 90% have included trapping or a combination of hunting and trapping. Other techniques include poison, used in 30% of eradications, and disease, used in 4% of eradications (Nogales et al. 2004). The presence of the island fox, and the need to avoid or minimize adverse effects to the species, restricts the available techniques on San Nicolas Island, thereby limiting the number of reasonable alternatives.

In addition to the No Action alternative, 10 other alternatives were evaluated for the potential to fulfill the purpose and need described in Chapter 1. Six of those alternatives did not meet the purpose and need of the project proponents and therefore were dismissed with rationale (Section 4.3). Four other alternatives, including the Proposed Action, did meet the purpose and need of the project proponents and therefore were retained for consideration (Section 4.2). To be considered and analyzed, an alternative had to (1) meet the purpose and need described in Chapter 1, (2) have an acceptably low probability for adverse effects on non-target species and the environment, (3) be humane and (4) be economically and logistically feasible. Alternatives 2 through 4 and the Proposed Action have many shared features, described above, including the use of padded leg-hold live trapping (3.1.1), intensive eradication monitoring efforts (3.1.6), and geographic information systems (GIS; 3.1.7), and would follow the same schedule (3.1.9), management structure (3.1.10), transportation and access requirements (3.1.8), quarantine program (3.1.11), and conservation measures (3.1.12). These alternatives differ mainly in their degree of trapping effort and their use of hunting with or without dogs.

4.2 ALTERNATIVES ANALYZED

4.2.1 Alternative 1. No Action

The No Action alternative, under NEPA (40 CFR 1502.14 [d]), serves as a baseline for the comparison of alternatives. Under the No Action alternative, the current intermittent feral cat control efforts would continue (Section 1.1), but a comprehensive eradication strategy would not be implemented. As funding allowed, the Navy would conduct intermittent feral cat control efforts in accordance with the Invasive Species Executive Order (E.O. 13122) and general recommendations in the INRMP for San Nicolas Island (U.S. Navy 2005). Feral cats, however, would continue to reproduce, prey on seabirds and other native wildlife, including federally and state threatened species, and compete with the state threatened island fox.

4.2.2 Alternative 2. Padded Leg-Hold Live Trapping Only

Under this alternative, feral cats would be eradicated from San Nicolas Island using padded leg-hold live traps exclusively (Section 3.1.1). This alternative works well under dry conditions; however, rainfall tends to compromise the effectiveness of traps and lures, thereby reducing capture rates. Because its utility is subject to weather conditions, using this alternative exclusively could increase the number of months required to eradicate all of the feral cats from the island. Increasing the time to complete the project would give the feral cats more time to reproduce, ultimately resulting in more feral cats being euthanized. Some feral cats are also expected to be trap-shy, which would further increase the time and cost to complete the project Accordingly, while this method could fulfill the purpose and need discussed in this EA, for the reasons discussed above it was not selected as the Proposed Action.

4.2.3 Alternative 3. Spotlight Hunting and Limited Leg-Hold Trapping

Under this alternative, feral cats would be eradicated from San Nicolas Island primarily by use of spotlight hunting (Section 3.1.3) and secondarily by use of padded leg-hold live trapping followed by euthanasia (Section 3.1.1).

Spotlight hunting can be an effective technique to reduce feral cat numbers locally but is generally not a viable tool for extensive use in larger scale eradication efforts. Only 2 eradications have been accomplished using hunting as the sole method, and those were on small islands (370 and 445 acres) with few feral cats (15 and 50 animals respectively, Nogales et al. 2004).

Spotlight hunting takes advantage of the distinctive brilliant green eye shine, which makes feral cats particularly visible at night. Lights can be visually uncomfortable for cats, however, and they can learn to avoid looking at them, resulting in animals that can effectively avoid detection. Furthermore, hunting requires the hunter and feral cat to be in the same place at the same time; whereas other methods, such as trapping, can be effective over a longer period of time even after the field technician has left the area. If a feral cat has been detected using other methods and its general location known, hunting may be useful in removing that individual. In combination with limited but strategic leg-hold live trapping, spotlight hunting may be an effective eradication method; however, due to the limitations discussed above this was not selected as the Proposed Action.

4.2.4 Alternative 4. Hunting with Dogs and Limited Leg-Hold Trapping

Under this alternative, feral cats would be eradicated from San Nicolas Island primarily through the use of hunting with dogs (Section 3.1.2) and secondarily by padded leg-hold live trapping (Section 3.1.1). Hunting with dogs can greatly increase the effectiveness of spotlight hunting, especially when feral cats are wary of other methods or they occur at low densities. Dogs are able to detect feral cats from wind-borne or ground scents and track them to resting places or dens. Dogs are especially useful when feral cat densities are low because of their keen sense of smell and ability to follow scents over large

distances in a relatively short amount of time. In combination with limited but strategic leg-hold live trapping, hunting with dogs may be an effective eradication method. However, this was not selected as the Proposed Action because padded leg-hold live trapping has been proven to be the most effective technique for feral cat eradications, and relying primarily on hunting with dogs would likely lengthen the duration of the project and increase cost.

4.3 ALTERNATIVES DISMISSED FROM ANALYSES WITH RATIONALE

Six potential alternatives were considered and rejected from further analyses. Each of these alternatives and the reasons for their rejection are described below.

4.3.1 Poison

The compounds used most commonly in feral cat eradications are sodium monofluoroacetate, brodifacoum, and N-(3-chloro-4-methylphenyl) acetamide. Sodium monofluoroacetate has been banned for most uses since 1972 in the U.S., and neither brodifacoum nor N-(3-chloro-4-methylphenyl) acetamide are registered in the U.S. for use with feral cats.

A drawback with the use of poisons for feral cats is that baits typically used to deliver the poison become unpalatable after a few hours. In addition, distributing these baits can be time intensive, and in certain locations the threats to non-target animals outweigh the benefits of this technique. On San Nicolas Island, the island fox and other non-target species would equally be at risk of poisoning if toxic baits were used. Capturing and holding all foxes until the bait were unpalatable or the toxin inactive would be prohibitively expensive and carries unacceptable risks, such as injury and disease outbreaks, to the fox population on San Nicolas Island. Toxins, therefore, are inappropriate for use in feral cat eradication on San Nicolas Island.

4.3.2 Disease

Disease has been used in only 2 cat eradications (Nogales et al. 2004). There are 2 main diseases available: the retroviruses feline immunodeficiency virus (FIV) and feline leukemia (FeLV), also known as enteritis and feline panleukemia virus. Both are transmitted between individuals through bites, while FeLV is also transmitted through food sharing and communal grooming. Disease is most effective on islands where feral cats have existed for a long time without multiple introductions; it is typically these populations that have no immunity to the disease. On islands where endemic carnivores or carnivore populations of concern are present, disease may be inappropriate due to the potential risk of immunocompromised cats facilitating disease transfer to other carnivores such as the island fox (Clifford et al. 2006).

On San Nicolas Island, disease is not a viable option because the anticipated effectiveness of other methods (due to access around the island) and the risk of immunocompromised

cats potentially facilitating disease transfer to island foxes (Clifford et al. 2006). This method, therefore, is inappropriate for feral cat eradication on San Nicolas Island.

4.3.3 Non-Leg-Hold Trapping

4.3.3.1 Cage Traps

Cage traps have been determined to be inefficient at catching feral cats (Twyford et al. 2000). While some feral cats (typically juveniles or those scavenging human refuse) will enter cage traps, the majority will not, thereby making cage traps ineffective for a program whose goal is to catch all feral cats (Short et al. 2002). Furthermore, cage traps require bait or lures, which attract non-target species such as foxes. Foxes on San Nicolas Island have been trained through positive conditioning to enter cage traps for a food reward during annual population surveys leading to an anticipated unacceptably high recapture rate for foxes. This method, therefore, is inappropriate on San Nicolas Island.

4.3.3.2 Kill Traps

Kill traps (e.g., conibear) have failed to meet animal welfare standards in the U.S. and elsewhere and are not recommended (Warburton and Poutu 2002). Additionally, on San Nicolas Island, island foxes would be equally at risk of capture and death. Therefore, the use of kill traps is inappropriate on San Nicolas Island.

4.3.4 Immunocontraception

Immunocontraception is a process by which the immune system of an individual is made to attack its own reproductive cells, leading to sterility. This is achieved by infecting individuals using a gamete protein that triggers an immune response; the resulting antibodies bind to these proteins and block fertilization (Bradley et al. 1997). Infection occurs by injection, bait, or living vectors (Courchamp and Cornell 2000 and references therein). Immunocontraceptive agents that have been successfully used in other species have been ineffective with cats. Furthermore, searches for other agents for feral cats have not revealed any effective candidates (Levy et al. 2005). Even if agents were developed, delivery to the target species remains problematic. Bait delivery may be effective, but immunocontraceptive agents are not species specific (Levy et al. 2005); native foxes on San Nicolas Island would also consume baits and likely be affected. Finally, virus-vectored immunocontraception, which utilizes a species-specific virus to disseminate the vaccine through a pest population by placing the gene encoding the reproductive protein into the genome of the virus (Tyndale-Biscoe 1994), has not been developed for cats and is still a theoretical science (Courchamp and Cornell 2000). Immunocontraception, therefore, is an inappropriate method on San Nicolas Island.

4.3.5 Trap-Neuter-Release

Trap-neuter-release (TNR, also known as Trap-Neuter-Return and Trap-Neuter-Re-abandon; Jessup 2004) involves capturing feral cats using traps, neutering the animals, and returning them to where they were captured. While most TNR programs use cage traps, the limitations of which have already been discussed (Section 4.3.3.1), padded leg-hold live traps could also be used to capture the animals. But because padded leg-hold live trapping also has its limitations and by itself is unlikely to capture all feral cats on San Nicolas Island (Section 4.2.2), TNR is unlikely to fulfill the purpose and need of the project proponents. Furthermore, the presence of neutered and re-abandoned feral cats on San Nicolas Island would greatly affect the ability to trap the remaining feral cats because of an inability to determine through traditional methods (sign, dog tracking, etc.) between feral cats that had already been neutered and re-abandoned and new or not previously trapped feral cats.

TNR has been used widely in efforts to reduce feral cat populations but has not been used as part of an eradication (Nogales et al. 2004). TNR is contrary to the goals of most eradication efforts because it requires the return of captured animals into the wild where they continue to prey on native fauna. Furthermore, the justification of TNR programs has been widely questioned on the grounds of effectiveness, legality, and ethicality for the feral cats and the wildlife on which they prey (Barrows 2004, Foley et al. 2005, Jessup 2004, Winter 2004).

Federal law may limit or prohibit abandoning / releasing non-native wildlife, including feral cats. For example, the release of feral cats may result in the take of listed species or migratory birds, resulting in a potential violation of the ESA and/or the Migratory Bird Treaty Act (Barrows 2004). In addition, Navy environmental policy (Mattheis 2002) states that "Trap/Neuter/Release (TNR) programs will no longer be established on Navy land" due to their potential impact on human health and native wildlife, and additional Navy policy (OPNAVINST 5090.1C) prohibits implementing TNR on Navy property because of the recognized impact these feral populations have on native wildlife. The ethicality of TNR has been a concern because of questions surrounding 1) the humaneness for other wildlife of releasing cats in the wild knowing they will kill and maim other wildlife and 2) the quality of life for the cats themselves. Many feral cats live unnaturally short lives. The average lifespan of feral cats is only 2 years, compared to 10 for owned cats (AVMA 2003), and others have estimated that feral cats live half as long as cats owned and cared for (Santa Clara County Humane Society 1995).

Accurately assessing the effectiveness of TNR programs is difficult, and many of the programs that have claimed success at reducing feral cat populations did not use sufficiently rigorous monitoring protocols to substantiate their claims (Winter 2004). Two studies of TNR programs that did use relatively rigorous monitoring are reported in Foley et al. (2005). These programs, despite a "substantial expenditure of resources," resulted in no measurable decrease in feral cat populations. Foley et al. (2005) used mathematical modeling to determine that 75% of animals in a population would need to be neutered annually to reduce the population. This level of effort was recognized as

unrealistic by the authors. In addition, their model did not account for density dependence in the feral cat population. Given a cat's ability to reproduce rapidly (Stoskopf and Nutter 2004), if TNR is successful in reducing a population, the increase in cat reproduction as a function of newly available territory and food would offset this decrease, and a much greater effort would be required to maintain a decreasing population. Another study, comparing TNR and Trap and Remove (euthanasia) used mathematical modeling to demonstrate that Trap and Remove is more effective than TNR at achieving a sustained decrease in population (Andersen et al. 2004).

For all of these reasons, TNR is inappropriate for use on San Nicolas Island and would not meet the purpose and need of the project proponents.

4.3.6 Trap and Transport

This method would involve trapping all feral cats on San Nicolas Island and transporting them to the mainland to be released into animal shelters or to roam free. Because the feral cats on San Nicolas Island have no history of being in captivity, there is a high probability that they would not adapt well to cages for care and transport, and there would be a high level of stress to the cats associated with this technique. It is also unlikely that all feral cats on San Nicolas Island could be trapped for transport off the island for logistical reasons previously discussed (Section 4.3.5), and thus this method would not meet the purpose and need of the project.

Releasing feral cats from San Nicolas Island into animal shelters would likely result in the euthanasia of those cats. Feral cats from San Nicolas Island are wild animals and are not suitable as pets. It is important to distinguish the feral cats from San Nicolas Island that have had no human interaction for their entire lives from feral cats in populated areas where these animals may have been fed by humans or formerly owned and cared for. The feral cats on San Nicolas Island are far less adoptable than cats considered feral that have had some previous human contact. Already, more than 3 million cats are euthanized in shelters every year in the U.S., and many of them are adoptable (Levy and Crawford 2004). Cats brought from San Nicolas Island to a shelter would almost certainly be euthanized because they are less adoptable than socialized cats. For example, the National Humane Education Society attempted to socialize feral cats for adoption, and the effort led to a reduction in cat adoptions for all cats, feral and non-feral, because the feral cats never became tame and potential adopters were discouraged by the feral cats' behavior. This program had to be stopped (Levy and Crawford 2004). Some shelters in the U.S. are no-kill shelters. Most feral cats brought to these sites would have to be kept in cages for the remainder of their lives, and, due to aggressive behavior inherent in many feral cats, solitary cages might be needed to reduce stress and injury.

Feral cats on islands may have high rates of disease and the potential to harbor unique parasites that pose a risk to populations of cats and wildlife on the mainland (W. Vickers personal communication). On Santa Catalina Island, feral cats were found to have relatively high rates of feline leukemia virus and feline immunodeficiency virus (Guttilla 2007). These conditions require euthanasia on Santa Catalina Island and would pose a

risk of disease infection to humans and other animals if these feral cats were brought to shelters, allowed to roam outside, or released in the wild. Furthermore, there is evidence that feral populations of non-native mammals on islands have the potential to harbor unique pathogens that pose a greater threat to mainland mammal populations than pathogens normally present on the mainland. It is therefore prudent to assume that feral cats on San Nicolas Island pose a threat via disease transmission to mainland populations (W. Vickers personal communication).

Another option possible under trap and transport is trapping animals and releasing them into a fenced outdoor exclosure, either on the mainland or on San Nicolas Island. This would ameliorate the concern for most wildlife because the exclosure would exclude most wildlife while containing the cats, and an exclosure on San Nicolas Island would ameliorate the concern over disease transmission. Because of the territorial nature of cats and the potential for aggressive behavior, this exclosure would have to be of sufficient size to provide suitable space to avoid excessive fighting and the injuries and suffering associated with this aggression. A large exclosure as described here would be extremely expensive and require long-term management of the cats and maintenance of the fence. A site for such an exclosure that would avoid considerable impacts to native species does not exist on San Nicolas Island. This option also would not change the fact that millions of cats are being euthanized in shelters every year in the U.S. and similar efforts are not being carried out for the majority of those animals. Trap and transport, therefore, is inappropriate for use on San Nicolas Island.

Young kittens that are healthy and likely to be adoptable will be considered for transport to the Ventura County animal shelter. This decision will be made in consultation with a licensed veterinarian on a case-by-case basis.

CHAPTER 5. AFFECTED ENVIRONMENT

This chapter describes the current status of baseline information from inventories, monitoring, and research projects on resources potentially affected by the Proposed Action and its alternatives.

As part of the scoping and environmental analysis conducted for the project, the following environmental issues were considered, but no adverse effects were identified. Consequently, there is no further discussion regarding these issues in this document:

- Climate — The project has no potential to affect climate.
- Air Quality — The project would result in negligible emissions associated with routine use of vehicles to transport personnel and equipment. The Channel Islands are designated Unclassified / Attainment for both federal and state standards for all criteria pollutants and are exempt from air conformity standards.
- Topography and Geology — The project would result in negligible effects to topography or geology. Repairs to roads and trails might require using hand tools to gather and place small quantities of fill material; no large earth-moving

equipment would be used. New trails would be routed to avoid areas with high erosion potential. Erosion potential would otherwise be avoided or minimized (Section 3.1.8).

- Hydrology and Water Quality — The project would result in negligible effects to hydrology and water quality. No floodplains have been identified on San Nicolas Island, and no development or disturbance would occur in wetlands, seasonal drainages, seeps, or springs as part of this project.
- Economic — No potential economic effects have been identified. Other than minor uses of fuels for transportation, the project would not result in irreversible or irretrievable commitments of resources.
- Land Use — The project has no potential to affect land use, and the project area is owned by the Navy and does not include prime or unique farmland.
- Social / Environmental Justice — No potential social effects have been identified. Per Executive Order 12898, the project would not result in adverse or disproportionate environmental effects to minority or low-income persons or populations.
- Navy Mission, Operations, and Infrastructure — The project would not negatively influence the Navy's mission or operations. Project personnel would be able to work around Navy operations but would require advanced notice of closures of any part of the island and the duration of these restrictions. Infrastructure on the island includes an asphalt runway, water wells, a desalination plant, water distribution and sewage systems, roads, telecommunication facilities, and buildings. Approximately 150 to 200 people work and live on the island. However, there is no public access to the island primarily due to security and safety requirements. Therefore, no potential effects to infrastructure have been identified.
- Noise — The island provides missile and aircraft launch facilities and radar tracking in support of the Navy's mission. Annually, up to 40 missiles are launched from San Nicolas Island, the largest of which produces a 100 decibel (dBA) acoustic contour that extends approximately 14,000 ft from its launch track (U.S. Navy 2000). The nature and location of the Proposed Action are such that they would not expose persons to noticeable groundborne vibration or noise or create a substantial periodic and / or permanent increase in ambient noise levels. Disturbance from the use of firearms would be temporary and of short duration. It is anticipated that fewer than 8 hunters would use firearms to hunt feral cats or euthanize trapped feral cats at any given time. The number of firearm shots would be few initially and would become increasingly infrequent as the number of feral cats on the island decreased. Motorcycles would be low-geared, four-stroke, off-road types with wide tires and exhaust silencers to minimize noise disturbance; an example would be the Yamaha TW200 with an after-market exhaust silencer. Trained dogs bark only when they encounter a cat or cat sign.
- Hazards / Toxic Materials — Ammunitions used on San Nicolas Island would have lead-free non-toxic projectiles and primers. Therefore, the Proposed Action is not expected to have adverse hazardous waste / materials effects.

- Traffic and Transportation — The Proposed Action would not result in adverse effects to traffic and transportation facilities on the Island.
- Aesthetics – The Proposed Action would result in improvements to the Island's aesthetic values by helping to restore a full range of native wildlife and natural biological diversity for the viewing public. There are likely to be no negative effects of the Proposed Action on the Island's aesthetic values.

5.1 BIOLOGICAL RESOURCES

San Nicolas Island is one of 8 Channel Islands and is located in the Santa Barbara Channel off southern California; it is the farthest island from the mainland, 61 miles offshore and about 85 miles southwest of Los Angeles (Figure 5). The island is 9 miles long and about 3.5 miles wide. The interior of the island is a rolling mesa with many gullies. There is a gradual slope on the north side of the island and steep cliff faces on the south side. Elevations of the southern cliff faces average 500 ft, and the maximum island elevation is 908 ft. The beaches primarily consist of loose sand. There are semi-transient sand dunes on the western tip of the island and a low sand spit on the eastern tip. There are no permanent streams, but the island has many seeps and springs. Normal conditions on the island are dry, with an average annual rainfall of less than 7 inches, low clouds and fog most of the year, prevailing westerly winds that regularly reach velocities of 35 to 50 mph, and rough surf.

San Nicolas Island is the least biologically diverse of the California islands (Schoenherr et al. 1999). Its small size, distance from the mainland, and lack of diverse habitats contribute to the low diversity of plant and animal species on the island. Nevertheless, San Nicolas Island supports a number of species endemic to the Channel Islands and / or the island itself, including at least 20 plants, 25 invertebrates, 1 reptile, 3 birds, and 2 mammals (U.S. Navy 2005).

5.1.1 Vegetation, Including Rare Natural Communities

San Nicolas Island exhibits generally sparse vegetation, which is mostly attributable to sheep (*Ovis aries*) ranching from the late 1850s to 1947, the island's arid climate, and high winds. The total flora is composed of approximately 270 species, subspecies, and varieties. However, half of these species are non-native, representing the largest proportion of introduced species on the Channel Islands. The predominant native plant community is coastal bluff scrub, characterized by giant coreopsis (*Coreopsis gigantea*), bush lupine (*Lupinus albifrons*), California sagebrush (*Artemisia californica*), buckwheat (*Eriogonum grande*), California box thorn (*Lycium californicum*), and coyote bush (*Baccharis pilularis*).

The CDFG has identified 3 rare natural communities on San Nicolas Island (CNDDB 2008). These are southern coastal bluff scrub, southern dune scrub, and southern foredune communities. Southern coastal bluff scrub, which is dominated by giant coreopsis and bush lupine, occurs in the lower half of Celery Canyon (northeast side of island). Southern dune scrub is dominated by bush lupine and silver beach bur

(*Ambrosia chamissonis*) and occurs over much of the western half and borders of the eastern half of the island. Southern foredunes is dominated by silver beach bur, bush lupine, sand verbena (*Abronia maritima*), and coast goldenbush (*Isocoma menziesii*) and occurs in 7 distinct locations along the shore of the island:

- along Tranquility Beach (northeast side of island),
- along Muscle Beach (northeast side of island),
- immediately west of Dutch Harbor (southeast side of island),
- immediately east of Elephant Seal Cove (south side of island),
- between Cormorant Rock and Elephant Seal Cove (southwest side of island),
- Vizcaino Point to west end of Tender Beach (northwest side of island), and
- immediately east of Thousand Springs (north side of island).

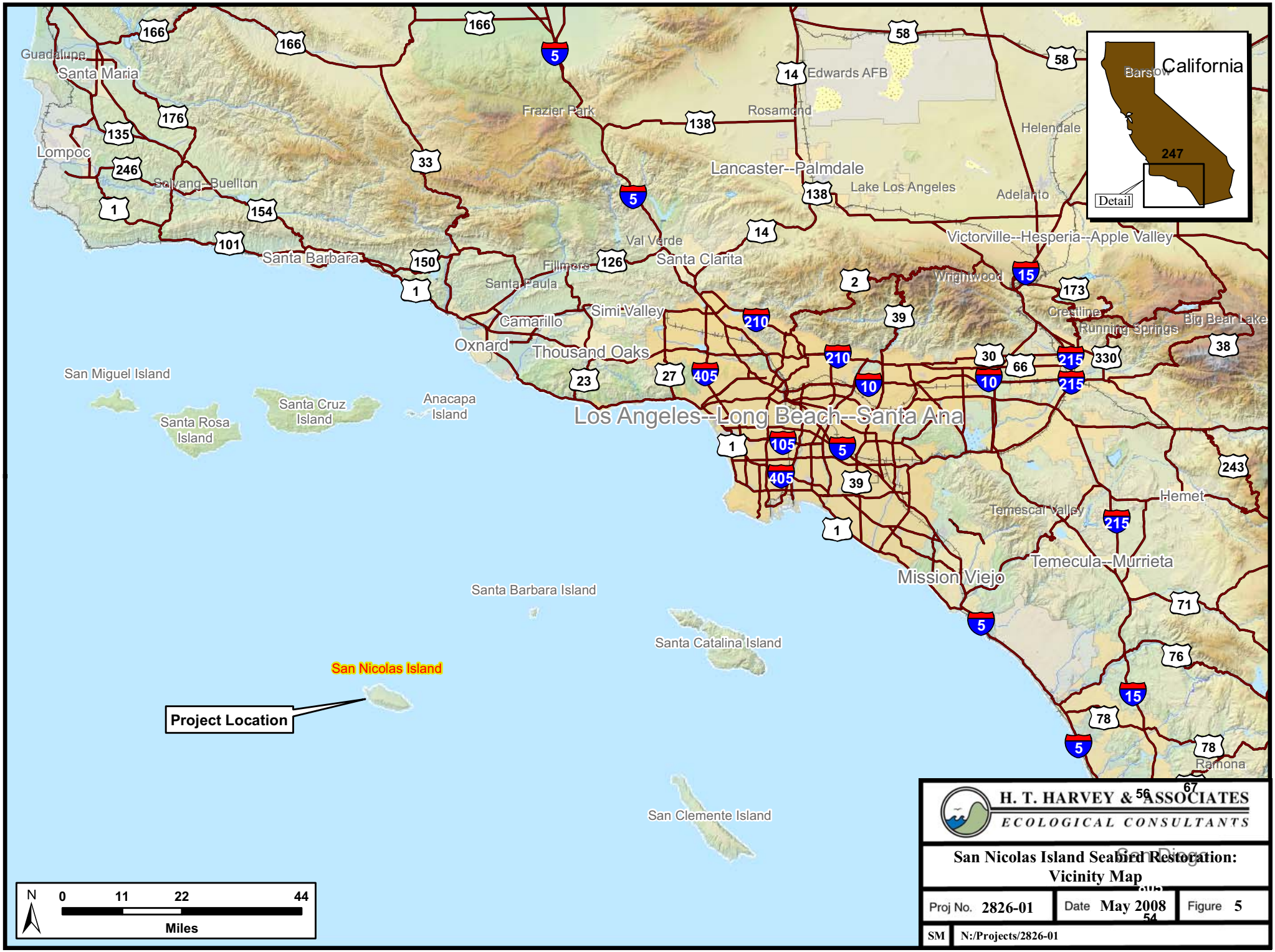
5.1.2 Special-status Plants

Special-status plants on San Nicolas Island include one state endangered, one state threatened, one state rare, and 5 considered rare, threatened, or endangered by the California Native Plant Society (CNPS; Table 3).

Table 3. Special-status plants on San Nicolas Island (CNDDB 2008).

Species Name	State Status	CNPS Status	Status on San Nicolas Island
San Nicolas Island buckwheat (*Eriogonum grande* var. *timorum*)	CE	1B	Common within coastal bluff scrub community; populations are stable or increasing and are not imminently threatened.
Beach spectaclepod (*Dithyrea maritima*)	CT	1B	Uncommon within sand dunes and sandy slopes; expanding marine mammal (seal and sea lion) populations are effecting some populations of this plant.
Trask's milk vetch (*Astragulus traskiae*)	CR	1B	Common within coastal bluff scrub and coastal dune plant communities; populations apparently stable and without imminent threats.
Aphanisma (*Aphanisma blitoides*)		1B	Uncommon among clumps of *Opuntia* in coastal scrub community; threats unknown.
South coast saltscale (*Atriplex pacifica*)		1B	Uncommon in coastal scrub, coastal bluff scrub, and playas; threats unknown.
Trask's cryptantha (*Cryptantha traskiae*)		1B	Uncommon on bare windswept cliffs; threats unknown.
Island green dudleya (*Dudleya virens* ssp. *insularis*)		1B	Common in suitable rocky soil habitat in coastal bluff scrub and coastal scrub communities; threats unknown.
San Nicolas Island lomatium (*Lomatium insulare*)		1B	Uncommon on sandy slopes of lower sea terraces.

(CE = California Endangered, CT = California Threatened, CR = California Rare, 1B = Rare, Threatened, or Endangered in California and elsewhere).



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San Nicolas Island Seabird Restoration: Vicinity Map

Proj No. 2826-01	Date May 2008	Figure 5
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5.1.3 Wildlife

San Nicolas Island supports a variety of wildlife including birds, mammals, and reptiles. There are 3 endemic land birds—a horned lark (*Eremophila alpestris insularis*), orange-crowned warbler (*Vermivora celata sordida*), and house finch (*Carpodacus mexicanus clementis*). Seabirds, including breeding colonies of Brandt's cormorants and western gulls, and shorebirds, including western snowy plovers and black oystercatchers (*Haematopus bachmani*) also breed on San Nicolas Island. The island also supports the endemic deer mouse and important marine mammal rookeries. Apart from feral cats, no other introduced mammals are known to be present on the island. Other introduced fauna include the chukar (*Alectoris chukar*), southern alligator lizard (*Elgaria multicarinata*), and side-blotched lizard (*Uta stansburiana*; Mahoney et al. 2003). Although the Proposed Action could result in beneficial effects to most wildlife species, those considered especially vulnerable are discussed below (this Section). Threatened and endangered wildlife species also are discussed below (Section 5.1.4). All data on wildlife populations were collected after cats were introduced to San Nicolas Island. Wildlife population sizes on the island in the absence of feral cats are therefore unknown.

5.1.3.1 Brandt's Cormorant

Brandt's cormorants breed along the Pacific coast from Alaska to Baja California. Historical records indicate that Brandt's cormorants have nested on San Nicolas Island since at least the late 1800s (McChesney 1997). Most documented nesting occurred at the west end of the island. Prior to the mid-1970s, a total of 600 to 800 pairs were estimated to breed on the island (McChesney 1997). This population subsequently declined in the mid-1970s to only 100 to 200 pairs. This decline is consistent with the widespread failure of cormorant nests throughout southern California due to DDT contamination (Gress et al. 1973). The Brandt's cormorant colony on San Nicolas Island then underwent dramatic increases from the late 1970s to the early 1990s. This was concurrent with Navy actions to control feral cats, which may have helped enable this increase in cormorant numbers (Kovach and Dow 1981). In 1991, San Nicolas Island supported the second largest Brandt's cormorant colony in the Channel Islands, with 5,089 breeding individuals (Carter et al. 1992). The size of the population on San Nicolas Island varies annually due to a variety of factors including human disturbance, changes in ocean conditions, and predation by island foxes and feral cats. Brandt's cormorants nest from April through August on cliffs, offshore islets, and on the ground. The current nesting areas on San Nicolas Island are Vizcaino Point, Dutch Harbor, and Cormorant Rock. Brandt's cormorants are vulnerable to disturbance during the breeding season. Adults flush from nests readily when approached by boats, low flying aircraft, motorized vehicles, or humans on foot. Once adults are away from the nests, western gulls are able to prey upon eggs and chicks. Repeated disturbance can cause permanent colony desertion.

5.1.3.2 Western Gull

The western gull breeds along the Pacific coast from British Columbia to Baja California. This limited geographic range, coupled with ongoing threats such as oil spills, makes this a species of conservation concern. Habitat availability is a major limiting factor in western gull populations (Pierotti and Annet 1995). San Nicolas Island provides important habitat for this species and supports one of the largest breeding colonies in southern California. The breeding season on San Nicolas Island extends from April through August. In 1991, the island population was estimated at 6,038 breeding individuals (Carter et al. 1992). Since then the main breeding colony has been noticeably reduced in size (G. Smith personal communication). Because western gulls nest on the ground, they are particularly susceptible to disturbance and predation.

5.1.3.3 California Sea Lion

The U.S. population of California sea lions (*Zalophus californianus*) extends from the U.S. / Mexico border north into Canada. Breeding areas of the sea lion are on islands in southern California, western Baja California, and the Gulf of California. They primarily use areas in central California to feed during the non-breeding season. Population estimates for the U.S. population of California sea lions, which are based on counts conducted in 2001 and extrapolations from the number of pups, range from a minimum of 138,881 to an average of 244,000 animals, with a current growth rate of 5.4% to 6.1% per year (Carretta et al. 2005). The California sea lion is not listed under the ESA and the U.S. population is not considered depleted under the Marine mammal Protection Act (MMPA).

California sea lions haul out at many sites on San Nicolas Island and are by far the most common pinniped on the island. Over the course of a year, up to 100,000 sea lions may use San Nicolas Island. Numbers of sea lions on the island increased by about 21% per year between 1983 and 1995 (NMFS 2003), and sea lions are now occupying areas that were not formerly used. Pupping occurs on the beaches of the island from mid-June to mid-July. Females nurse pups for about 8 days and then begin an alternating pattern of foraging at sea and attending and nursing pups on land, which lasts for about 8 months, and sometimes up to one year. California sea lions haul out on the island in large numbers during the molting period in September, and smaller numbers of females and juveniles haul out during the rest of the year.

5.1.3.4 Harbor Seal

Harbor seals (*Phoca vitulina*) are widely distributed in the North Atlantic and North Pacific. In California, approximately 400 to 500 harbor seal haul out sites are distributed along the mainland and on offshore islands, including intertidal sandbars, rocky shores, and beaches (Hanan 1996). Based on the most recent harbor seal counts (2002) and including a correction factor, the estimated population of harbor seals in California is 27,863 (Carretta et al. 2005), with an estimated minimum population of 25,720 for the California stock of harbor seals. Counts of harbor seals in California showed a rapid

increase from 1972 to 1990, but since 1990 there has been no net population growth along the mainland or the Channel Islands. The harbor seal is not listed under the ESA and the California stock is not considered depleted by the MMPA.

Harbor seals haul out at various sandy, cobble, and gravel beaches around San Nicolas Island, and pupping occurs in the beaches from late February to early April, with nursing of pups extending into May. Harbor seals may also haul out during molting periods in late spring, and smaller numbers haul out at other times of year. Harbor seal abundance increased on the island from the 1960s until 1981, but since then, the average counts have not changed significantly. From 1982 to 1994, numbers of harbor seals have fluctuated between 139 and 700 animals based on both peak ground counts and annual photographic surveys.

5.1.3.5 Northern Elephant Seal

Northern elephant seals (*Mirounga angustirostris*) breed and give birth in California and Baja California primarily on offshore islands, from December to March (Stewart et al. 1994). The California breeding stock, which includes the animals on San Nicolas Island, is now demographically separated from the Baja California population. Based on trends in pup counts, northern elephant seal colonies appeared to be increasing in California through 2001. The population size of northern elephant seals in California is estimated to be 101,000 animals, with a minimum population estimate of just over 60,000 (Carretta et al. 2005). The northern elephant seal is not listed under the ESA and the California population is not considered depleted under the MMPA.

Increasing numbers of elephant seals haul out at various sites around San Nicolas Island. Based on a pup count in 1995 that found 6,575 pups, researchers estimated that over 23,000 elephant seals might use the island each year (NMFS 2003). Pupping occurs on the beaches of San Nicolas Island from January to early February, with nursing of pups extending into March. Northern elephant seals also haul out during the molting periods in spring and summer, and smaller numbers haul out at other times of the year.

5.1.4 Threatened and Endangered Wildlife

Animals found on the island which are listed by the state (CDFG) and the federal government (USFWS) as threatened or endangered are described in more detail below. They include the federally and state threatened island night lizard, the federally and state endangered California brown pelican, the federally threatened western snowy plover, the state threatened San Nicolas island fox, the federally threatened southern sea otter, and the federally and state threatened Guadalupe fur seal (Table 4).

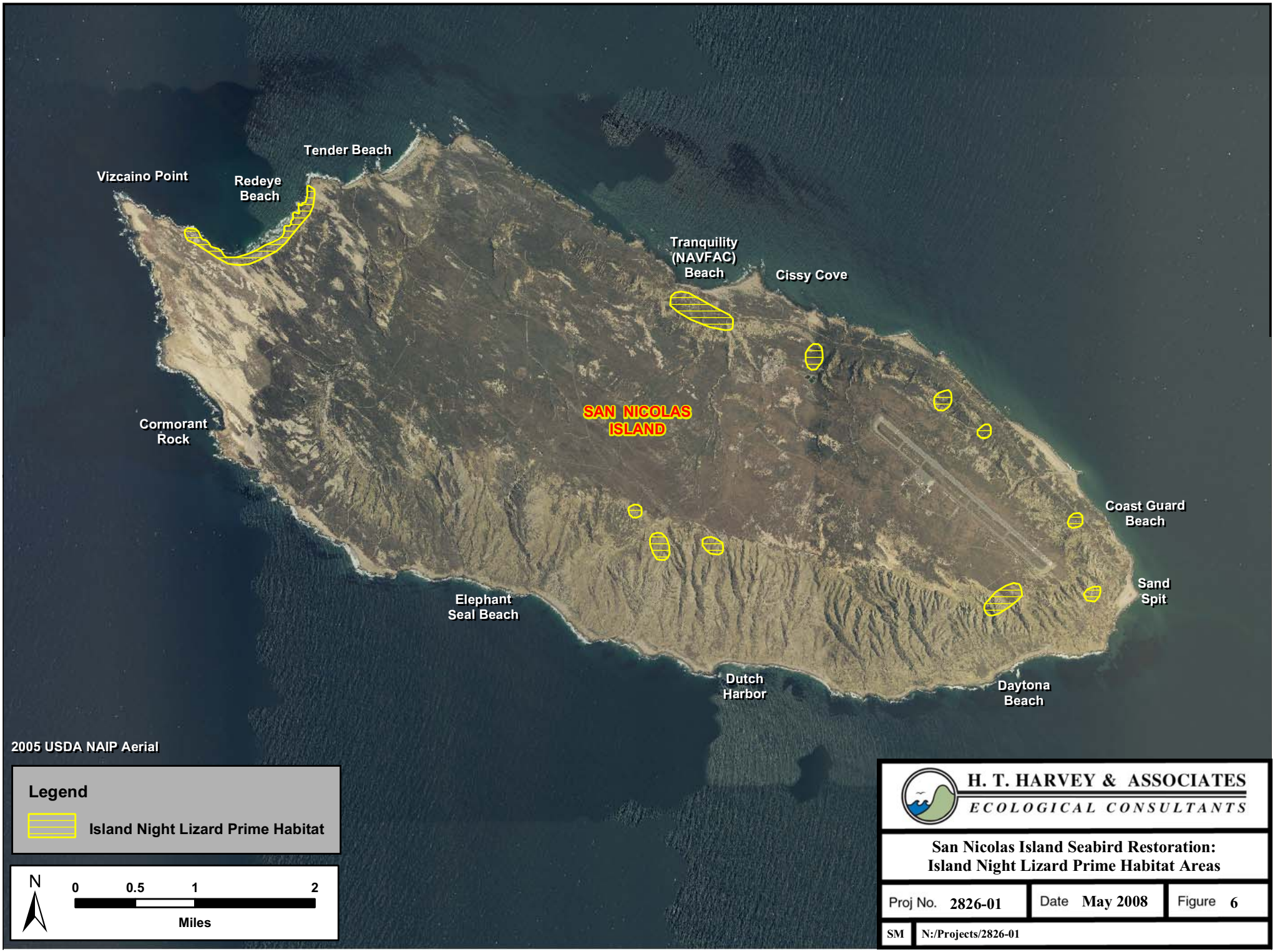
Table 4. Threatened and endangered wildlife on San Nicolas Island (CNDDB 2008).

Species Name	Status	Status on San Nicolas Island
Island night lizard (*Xantusia riversiana*)	FT ST	Common (~15,000 individuals) but patchily distributed resident, primarily over the eastern half of island where there is sufficient natural habitat.
California brown pelican (*Pelecanus occidentalis californicus*)	FE SE	Fairly common (≤ 1,000 individuals) year-round, non-breeding visitor, primarily along beaches and bluffs.
Western snowy plover (*Charadrius alexandrinus nivosus*)	FT	Uncommon (~75-100 individuals) year-round breeding resident on sandy beaches; highest concentration on NW edge of Red Eye Beach, W of Dutch Harbor to Daytona Beach and Sand Spit.
San Nicolas island fox (*Urocyon littoralis dickeyi*)	ST	Fairly common (~500 individuals) resident in terrestrial habitats over entire island.
Southern sea otter (*Enhydra lutris nereis*)	FT	Rare (≤ 40 individuals) year-round resident in nearshore marine environment.
Guadalupe fur seal (*Arctocephalus townsendi*)	FT ST	Several records along the southwest shore.

(FE = Federally Endangered, FT = Federally Threatened, SE = State Endangered, ST = State Threatened).

5.1.4.1 Island Night Lizard

The island night lizard is endemic to the Channel Islands, where it occurs on San Nicolas, Santa Barbara, and San Clemente islands. The island night lizard is the most morphologically distinct of the endemic vertebrates on the Channel Islands, indicating a long period of isolation from the mainland (Bezy et al. 1980). Island night lizards are sedentary and have small home ranges, averaging about 183 ft^2. They are most active at midday. The lizards breed in April, and young are born in September. Fellers et al. (1998) estimated the island night lizard population on San Nicolas Island to be about 15,300 lizards. Because of its restricted range and because populations were thought to have been reduced due to past farming and grazing, fire, and the introduction of non-native animals and plants, the island night lizard was listed as state threatened in 1967 and federally threatened in 1977. Island night lizards are generally distributed over the eastern half of San Nicolas Island, in areas where there is sufficient natural habitat (Figure 6). On the eastern part of the island they occur from the low beach terraces on the north and south sides to the highest elevations at the top of the mesa overlooking the southern escarpment. In contrast, island night lizards on the west side of the island are essentially restricted to cobble-driftwood near Red Eye Beach. The broad grasslands that cover much of the eastern mesa support few or no lizards. Mixed shrub communities, whether on the low marine terrace on the north and south sides of the island, in some canyons, or on top of the mesa, support moderate numbers of island night lizards.



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San Nicolas Island Seabird Restoration:
Island Night Lizard Prime Habitat Areas

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5.1.4.2 California Brown Pelican

The California brown pelican breeds on West Anacapa and Santa Barbara islands in southern California and on islands off Baja California and in the Gulf of California. In the late 1960s and early 1970s, the reproductive success of California brown pelicans plummeted, mainly due to the effects of DDT. The pelican was listed as federally endangered in 1970 and state endangered in 1971. The pelican is also identified as a Fully Protected species in California under Section 3511 of the Fish and Game Code. Pelicans made a strong recovery following the ban of DDT in 1972. They are now common along the California coast, and the USFWS is completing a 12-month status review to determine whether the pelican should be proposed for removal from the list of federally endangered species. Pelicans use San Nicolas Island for day and night roosting only, although they may have nested on the island historically (Rett 1947).

California brown pelicans roost along the shoreline of San Nicolas Island throughout the year (Figure 7). Their abundance varies seasonally and annually with oceanographic conditions and other factors. Numbers are lowest from February to May and highest from August through October, while intermediate levels occur in early summer and early winter (Briggs et al. 1981). Numbers at any one time rarely if ever exceed 1,000 individuals (P. Capitolo personal communication). Roosting birds are sensitive to disturbance, flushing readily when approached by boats, low flying aircraft, motorized vehicles, or humans on foot.

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San Nicolas Island Seabird Restoration: Brown Pelican Roosting Areas

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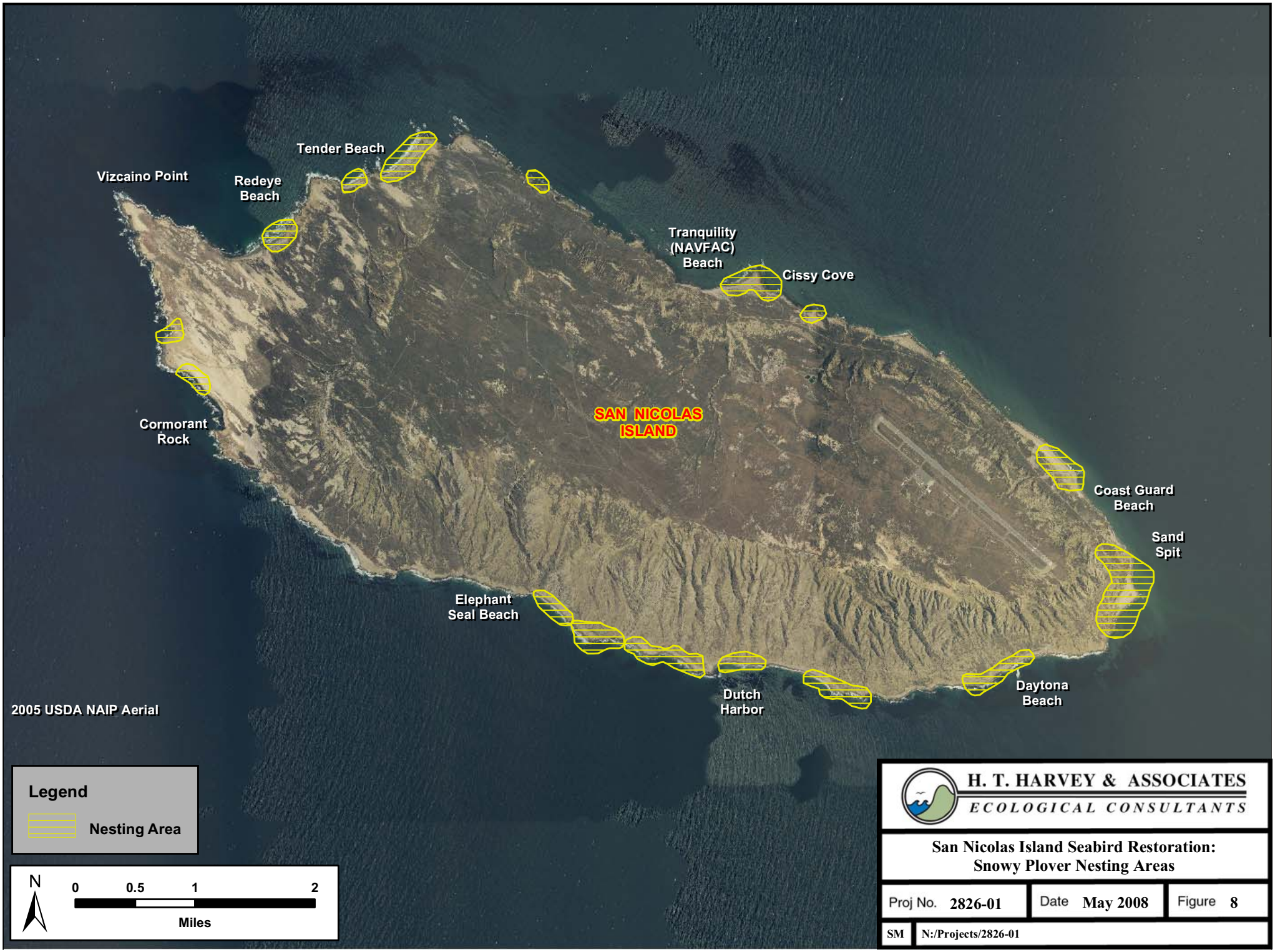
5.1.4.3 Western Snowy Plover

The Pacific coast population of the western snowy plover has declined due to many factors, including human disturbance, loss of habitat to urban development, introduction of beachgrass (*Ammophila* spp.) and other non-native species, and expanding native and feral predator populations. This population was listed as federally threatened in 1993.

Western snowy plovers occur on San Nicolas Island throughout the year, nesting on beaches from March through August (Figure 8). Population size is closely related to the movements of migrating individuals and success of the breeding population. Numbers are lowest at the beginning of the breeding season and increase in fall as wintering birds arrive. The breeding population, based on the most recent island-wide estimate, includes as many as 116 adults (USFWS 2001a). Areas of highest concentration are Tender Beach, Coast Guard Beach, west of Dutch Harbor to Daytona Beach, and Sand Spit (Figure 8).

5.1.4.4 Southern Sea Otter

The population of southern sea otters historically ranged from northern California or southern Oregon to approximately Punta Abreojos, Baja California (Wilson et al. 1991). Harvest of sea otters during the 1700s and 1800s reduced the species throughout its range. In 1974, the total California population was estimated to be about 50 animals (CDFG 1976). The small size and limited range of the sea otter population, along with the otter's vulnerability to mortality from oil spills, were the main factors that resulted in listing it as federally threatened in 1977. Between 1987 and 1990, the USFWS translocated 139 sea otters to San Nicolas Island. Currently (2008), a stable population of 30 to 40 adults is distributed in the nearshore waters primarily along the western and northern shoreline.



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San Nicolas Island Seabird Restoration: Snowy Plover Nesting Areas

Proj No. 2826-01	Date May 2008	Figure 8
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5.1.4.5 Guadalupe Fur Seal

Before the sealers of the 19th century nearly exterminated it, the Guadalupe fur seal was common on the Farallon Islands off the central California coast and south to the Mexican coast. The species was extirpated from California waters by 1825, with commercial sealing continuing in Mexican waters through 1894. After that, it was thought to be extinct, until a lone male was found on San Nicolas Island in the 1950s. An expedition from Scripps Institution of Oceanography discovered a small breeding colony on Guadalupe Island in 1954. Current populations are thought to number 200 to 500, mostly on islands off the Mexican coast. The species was listed as state threatened in 1971 and federally threatened in 1986. Guadalupe fur seals are uncommonly but regularly observed on the southwestern shore on San Nicolas Island. The seal's primary habitat consists of rocky areas at the base of high cliffs and in sea caves.

5.1.4.6 San Nicolas Island Fox

The island fox (*Urocyon littoralis*), which was listed as state threatened in 1971, is restricted to the Channel Islands, where an endemic subspecies occurs on all but 2 of the islands, Anacapa and Santa Barbara. San Nicolas Island foxes are omnivorous, foraging on insects, vegetation, mice, and seasonally available bird eggs. Island foxes are generally monogamous, and breed only once per year. Pairs are together frequently beginning in January; they mate in late February to early March, and pups are born from late April through early May. Litter size ranges from 1 to 5 pups, but 2 or 3 is average. Pups emerge from the den at about 1 month of age and undergo a period of extended parental care.

The population size of the San Nicolas Island fox has been highly variable (Section 2.4.3). More recently, the population has been relatively stable (Schmidt et al. 2007). However its insular nature, lack of resistance to canine distemper and other diseases, high densities, and low genetic variability increase the vulnerability of this subspecies (USFWS 2004). The fox population on San Nicolas Island has been monitored annually since 2000, using established trapping grids to allow trend analyses (Schmidt et al. 2007). Two of the fox grids maintain some of the highest densities ever recorded for island foxes on any of the Channel Islands (15.8–26.3 foxes/km^2; Schmidt et al. 2007). Based on capture histories and telemetry data, individual foxes can range widely across the island (D. Garcelon personal communication). Foxes or their sign have been observed in all of the island's habitats, including human occupied areas. The extrapolated population size estimate, based on data from the trapping grids, has averaged 461 ± 60.95 for the period from 2000 through 2006, with a low of 385 in 2001 and a high of 542 in 2006 (Schmidt et al. 2007). Of the 6 fox populations in the Channel Islands, only the San Nicolas Island and San Clemente Island fox populations are not listed as federally endangered. However, after a period of rapid population decline the other 4 populations are increasing in numbers and captive breeding efforts have been discontinued except on Santa Rosa Island. The San Nicolas Island fox population is not currently affected by factors that have caused other fox populations to decline, such as canine distemper disease and predation by golden eagles (*Aquila chrysaetos*; Clifford et al. 2006, Roemer et al. 2004,

Schmidt et al. 2007), but vehicular traffic incidents are a major source of mortality (Roemer et al. 2004). Feral cats also are a threat to island foxes, primarily due to competition for resources (U.S. Navy 2005).

5.2 CULTURAL AND HISTORIC RESOURCES

Cultural resources are locations of past human activity, occupation, or use. Cultural resources include prehistoric archaeological sites, historic archaeological sites, and historic structures and consist of artifacts, structures, and facilities made by people in the past. Prehistoric archaeological sites are places that contain the material remains of activities carried out by the native population of the area (Native Americans) prior to the arrival of Europeans in southern California. Artifacts found in prehistoric sites include flaked stone tools such as projectile points, knives, scrapers, and drills; ground stone tools such as manos, metates, mortars, and pestles for grinding seeds and nuts; and bone tools, such as awls. Prehistoric facilities and features include hearths, bedrock mortars, rockshelters, rock art, and burials.

Historic archaeological sites are places that contain the material remains of activities carried out by people during the period when written records were produced after the arrival of Europeans. Historic archaeological material usually consists of domestic refuse, such as bottles, cans, and ceramics, deposited either as roadside dumps or near structure foundations. Archaeological investigations of historic-period sites are usually supplemented by historical research using written records. Historic structures include houses, commercial structures, industrial facilities, and other structures and facilities that are more than 50 years old.

A total of 535 archaeological sites have been identified on San Nicolas Island, which are attributed to occupation by Native Americans for at least 7,000 years (Martz 2005). In 1835, the last dozen survivors of the original population were transported to the mainland, and today there are no known living descendents. Also present on the island are historical sites from early sheep ranching operations, sites of early Chinese and Anglo abalone fishers, and a few sites and structures from World War II. In addition, numerous shipwrecks dot the shoreline with hulks and scattered timbers.

5.2.1 Ethics and Values Related to Native and Introduced Wildlife

Ethics can be defined as the branch of philosophy dealing with values relating to human conduct, with respect to the rightness or wrongness of actions and the goodness and badness of motives and ends (Costello 1992). Individual perceptions of the ethics of predator control and eradication and the appropriateness of specific management techniques depend on the value system of the individual, and are highly variable (Schmidt 1992), but can be divided into some general categories (Kellert and Smith 2000, Kellert 1994, Table 5). An individual's values on wildlife may have components of various categories rather than being restricted to one viewpoint.

Table 5. Wildlife values.

Term	Definition
Aesthetic	Focus on the physical attractiveness and appeal of wildlife
Dominionistic	Focus on the mastery and control of wildlife
Ecologistic	Focus on the interrelationships between wildlife species and natural habitats
Humanistic	Focus on emotional affection and attachment to wildlife
Moralistic	Focus on moral and spiritual importance of wildlife
Naturalistic	Focus on direct experience and contact with wildlife
Negativistic	Focus on fear of and aversion to wildlife
Scientific	Focus on knowledge and study of wildlife
Utilitarian	Focus on material and practical benefits of wildlife

From Kellert and Smith (2000) and Kellert (1994).

Two philosophies on human relationships with animals are commonly considered relative to ethical perceptions of predator control and eradications. The first philosophy, Animal Rights, asserts that all animals, humans and nonhumans, are morally equal. Adherents to this philosophy believe that no use of animals (e.g., for research, food and fiber production, recreational uses such as hunting and trapping, zoological displays and animal damage management, etc.) should be considered acceptable unless that same action is morally acceptable when applied to humans (Schmidt 1989). The second philosophy, Animal Welfare, does not promote equal rights for humans and nonhumans, but focuses on reducing pain and suffering in animals. Advocates of this philosophy are not necessarily opposed to utilitarian uses of wildlife, but they are concerned with avoiding all unnecessary forms of animal suffering. However, the definition of what constitutes *unnecessary* is highly subjective (Schmidt 1989). In general, only a small portion of the U.S. population adheres to the Animals Rights philosophy, but most individuals are concerned about Animal Welfare.

5.2.1.2 Aesthetic Value of Native and Introduced Wildlife

Wildlife generally is regarded as a source of economic, recreational, and aesthetic benefits (Decker and Goff 1987), and the mere knowledge that wildlife exists is a positive benefit to many people. Aesthetics is the philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics is truly subjective, dependent on what an observer regards as beautiful. Wildlife populations provide a range of direct and indirect social and economic benefits (Decker and Goff 1987). Direct benefits are derived from a user's personal relationship or direct contact with wildlife and may include either consumptive (e.g., using or intending to use the animal such as in hunting or fishing) or non-consumptive use (e.g., observing or photographing animals) (Decker and Goff 1987). Indirect benefits, or indirect exercised values, arise without a human being in direct contact with an animal and are derived from experiences such as looking at pictures or videos of wildlife, reading about wildlife, or benefiting from activities or contributions of animals such as their use in research (Decker and Goff 1987). Two

forms of indirect benefits exist according to Decker and Goff (1987): bequest and pure existence. Bequest benefits arise from the belief that wildlife should exist for future generations to enjoy; pure existence benefits accrue from the knowledge that the animals exist in the human environment (Decker and Goff 1987) or that they contribute to the stability of natural ecosystems (Bishop 1987).

In the case of introduced wildlife (e.g., feral cats) on islands, some people may derive value from the knowledge that introduced wildlife exists on the island. Yet, other individuals may place higher value on the native wildlife and their role in the ecosystem. For these individuals the presence of damaging introduced wildlife impinges on their values of healthy populations of native wildlife and ecosystems. In the case of San Nicolas Island, which is closed to the public, most aesthetic benefits derived from introduced feral cats would be indirect since viewing these animals would be impossible except for the small number of people working on the island. Aesthetic benefits to individuals derived from flying native wildlife such as seabirds could include both indirect and direct since the seabirds can fly to areas where humans can view them and humans can enjoy the marine environment and ecosystem of which the seabirds are an integral part.

Another aspect of aesthetic appreciation for animals can be manifested in the feeling of loss or emotional trauma when there is knowledge that an animal has been killed. This sense of loss may be reduced if the death is considered humane (Section 5.2.1.3). Considering the situation of native wildlife and introduced animal control, this sense of loss can be felt by some individuals primarily for the death of the introduced animals. This is especially true when that type of animal is common as a pet. Other people may feel a strongest sense of loss due to the knowledge that native wildlife is being killed by the introduced animals, and this feeling may intensify with the knowledge that 1) this mortality is contributing to a decline in the population of this species and 2) that the death could be considered inhumane (Section 5.2.1.3). Most people with an aesthetic appreciation of animals in general are likely to feel a sense of loss from both the euthanasia of introduced animals and from the death of wildlife caused by the introduced animals, and thus these people are likely to have conflicting emotions regarding decisions on how and whether to undertake management actions to reduce or eliminate wildlife mortality from introduced animals.

5.2.1.3 Humaneness

The issue of humaneness, as it relates to the killing or capturing of wildlife is an important but very complex concept that can be interpreted in a variety of ways. Humaneness is a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. People concerned with animal welfare are concerned with minimizing animal suffering as much as possible, or eliminating unnecessary suffering. The determination of what is unnecessary suffering is subject to debate (Schmidt 1989). Nevertheless, there are well established guidelines developed by the AVMA that provide clear direction on how to maximize humaneness when euthanasia is performed (AVMA 2007). Furthermore, there are established Best

Management Practices for trapping in the United States that provide details on trap designs and trap sets that meet accepted criteria for animal welfare (Association of Fish and Wildlife Agencies 2006a, Association of Fish and Wildlife Agencies 2006b).

The challenge in coping with this issue is how to achieve the least amount of animal suffering with the constraints imposed by the ecological need and the current technology available. The project proponents are concerned about animal welfare and also believe that these activities would be conducted humanely and responsibly. To ensure the most professional handling of these issues and concerns, the project proponents would choose techniques with the goal of achieving the most humane program possible.

CHAPTER 6. ENVIRONMENTAL CONSEQUENCES

This section presents the environmental consequences of the Proposed Action and its alternatives, including the No Action alternative. Factors used to evaluate the significance of these consequences include (1) intensity of the effect (size or amount of effect), (2) geographic context of the effect, (3) duration and frequency of the effect, and (4) likelihood of the effect. Furthermore, activities that have potential to directly or indirectly diminish the numbers, reproduction, or distribution of any native species to a level that appreciably reduces the likelihood of its survival on San Nicolas Island are considered significant for purposes of this EA. For a summary of the environmental consequences by alternative, see Table 6.

6.1 BIOLOGICAL RESOURCES

6.1.1 Anticipated Effects of Eradicating Feral Cats on San Nicolas Island

Predicting the effects of feral cat eradication on San Nicolas Island is aided by case studies from other island eradication programs. However, the presence of the island fox adds a unique set of variables to this analysis. For example, feral cat and island fox diets overlap; feral cats are strict carnivores, while island foxes are omnivores and their diet also includes vegetation and fruit (Kovach and Dow 1981, Phillips et al. 2007). On San Clemente Island, diet studies of feral cats and the island fox demonstrated that feral cats prey upon vertebrates twice as often as the island fox does (Phillips et al. 2007). Species preyed on by feral cats are predicted to increase in abundance, at least initially, after the eradication of feral cats from San Nicolas Island. Because island foxes eat some of these same items, most notably the native deer mouse, foxes may benefit. This could be reflected in an overall increase in the island fox population or simply in the health of the population.

Feral cat eradication may also benefit native populations, such as the fox, that are susceptible to toxoplasmosis (Clifford et al. 2006, Garcelon et al. 1992). Toxoplasmosis is a disease caused by the parasite *Toxoplasma gondii.* It requires a feline host and is most commonly transmitted through contact with cat feces. Toxoplasmosis infection has recently become a significant source of mortality for the southern sea otter off the California coast (Conrad et al. 2005). In this case, otters are thought to acquire the

parasite from cat feces that are transported into fresh and marine waters via sewage systems or stormwater drainage and freshwater runoff (Conrad et al. 2005). Although the sharing of infectious agents between island foxes and feral cats appears minimal, canine distemper was recently detected in 2 feral cats on Santa Catalina Island (Clifford et al. 2006). Immunocompromised cats, those whose immune systems have been compromised by disease, are more susceptible to additional diseases that could be transferred to island foxes (Clifford et al. 2006).

Sea and shore birds that nest on San Nicolas Island are expected to directly benefit from feral cat eradication due to decreased predation rates. Seabird species that are likely to benefit from feral cat eradication and currently occur on the island are the California brown pelican, Brandt's cormorant and western gull. Both the gull and cormorant have been identified as feral cat prey on San Nicolas Island (Kovach and Dow 1981, McChesney 1997) and the pelican as cat prey on other islands (Anderson et al. 1989). Other species, such as Cassin's auklets, Xantus's murrelets, and storm-petrels may re-colonize the island. Because no data are available on seabird populations prior to cat introduction, it is not known for certain if these species occurred historically on San Nicolas Island; however the island is within their range, and these species occur on adjacent islands. Many shorebird species are likely also to benefit, most notably the threatened western snowy plover, which breeds on the island and is at risk from feral cat predation.

Eradicating feral cats from San Nicolas Island would have both short-term (direct) and long-term (indirect) effects to the island. The overall anticipated effect is a net benefit to the island ecosystem, in keeping with the overall policy in Section 101 of NEPA of preserving important natural aspects of our national heritage and maintaining an environment which supports diversity. Benefits would primarily be realized after the project is completed and the island has time to recover in the absence of feral cats. Such benefits are considered indirect effects, as defined by the Council on Environmental Quality (CEQ §1508.8). Short-term effects, also known as direct effects (CEQ §1508.8), can be both beneficial and adverse. The beneficial effects would primarily be the immediate reduction in mortality of feral cat prey items such as the endemic deer mouse, the island night lizard, nesting seabirds, and other species. The expected adverse effects are primarily short-term and are associated directly with the effort and activities during the eradication of feral cats from San Nicolas Island. These potential adverse effects are discussed later in this chapter.

6.1.2 Effects of the Proposed Action

6.1.2.1 Special-Status Plants and Rare Natural Communities

"Special-status" species are selected for protection because they are rare and / or subject to population and habitat declines. Special-status is a general term for species that are afforded varying levels of regulatory protection. The highest level of protection is given to threatened and endangered species; these are species that are formally listed or

proposed for listing as endangered or threatened under the ESA and / or the CESA. Rare natural communities are plant communities considered rare by the CDFG.

As described in Section 3.1.12.1, several conservation measures designed to avoid or minimize adverse effects to special-status plants and rare natural communities would be implemented as part of the Proposed Action. These include routing project activities around any special-status plants, avoiding rare natural communities, and avoiding or minimizing weed dispersal. As a result of implementing the measures in Section 3.1.12.1, the Proposed Action is not expected to result in significant adverse effects to special-status plants or rare natural communities.

6.1.2.2 Wildlife

This section discusses potential effects and permit requirements associated with wildlife not listed or proposed for listing under the CESA or ESA. Species listed or proposed for listing as threatened or endangered are discussed in Section 6.1.2.3. As described in Section 3.1.12.2, conservation measures designed to avoid or minimize adverse effects to common wildlife would be implemented as part of the Proposed Action. They include training dogs to avoid all but the target species, setting traps in areas away from nesting or roosting birds to avoid incidental captures, using lead-free non-toxic projectiles and primers, and maintaining a 300-ft buffer from marine mammals, a 500-ft buffer from roosting seabirds and shorebirds, and a 1,000-ft buffer from nesting seabirds and shorebirds. Therefore, implementation of the Proposed Action is not expected to reduce the numbers or ranges of common wildlife species. Instead, the Proposed Action is anticipated to result in indirect beneficial effects from the eradication of feral cats, which prey on native wildlife (Section 2.4).

6.1.2.3 Threatened and Endangered Species

<u>San Nicolas Island Fox</u>

The state threatened island fox is at risk of being captured by padded leg-hold live traps, which pose a risk of injury to paws and legs. These injuries are primarily caused by the weight of the trap, the motion of the animal as it tries to free itself from the trap, and chain swivels becoming immobilized by vegetation or other objects. Leg fractures, for example, typically are not caused by the trap jaws closing but from the animal struggling after capture (Seddon et al. 1999).

A field trial was conducted on San Nicolas Island in summer 2006 to determine the feasibility of using padded leg-hold traps to catch feral cats while having minimal effect on the native, smaller, island fox (Island Conservation 2007). Techniques were refined throughout the trial to minimize injury rates to foxes and allow them to recognize trap sets. Researchers demonstrated that fox captures decreased over time due to avoidance behavior and approached zero at the end of the trial. This minimized the effect on foxes while increasing the number of traps available to catch feral cats. During the 20-day trial, 14 feral cats were captured in 784 trap nights. Only 1 fox in 64 fox captures (41 total

foxes) sustained an injury that required veterinary intervention. All of the other animals were treated on site for any scrapes or other minor injuries and released. Three months after the trial, staff from the Institute for Wildlife Studies recaptured 20% of the original 41 foxes. They found no lingering injuries or other effects to the foxes from being restrained in the padded leg-hold live traps (Garcelon 2007). Thus, the trial and follow-up study demonstrated that feral cats could be captured, while foxes avoid traps after initial capture and, when caught, are at a low risk of injury. The few injuries that occur can be treated, and foxes can be released.

The island fox is also susceptible to potential adverse effects associated with increased off-road vehicle traffic on the island, increasing the risk of injury and mortality from potential collisions. However, all vehicles used during implementation of the Proposed Action would travel at or below the speed limit on established roads and at ≤ 15 mph off road, making collisions highly unlikely.

Finally, the presence of dogs would likely result in potential adverse effects to island foxes as a result of stress. Foxes are predicted to react to the presence of dogs by briefly altering their behavior even though the dogs would not chase or otherwise engage the foxes. This short-term behavioral effect, however, is not expected to substantially reduce this species' ability to forage, find cover, or reproduce. On Santa Cruz Island, where dogs were used to eradicate pigs, dogs covered the entire island repeatedly and therefore came in contact with foxes. There were no incidents of direct effects to foxes (no kills, etc.), and fox numbers increased over the period of pig removal (S. Morrison personal communication).

As described in Section 3.1.12.3, several conservation measures to avoid or minimize the potential adverse effects to the island fox would be implemented as part of the Proposed Action. These measures include using specially modified traps and trap placement to minimize fox captures and reduce the risk of injury when foxes are captured, using a trap monitoring system to minimize the time foxes spend in traps, and using dogs that are trained to avoid foxes. Nevertheless, the Proposed Action would result in incidental take of this state threatened species as a result of capturing foxes in leg-hold live traps. However, as discussed in Section 1.4.1.2, California state laws pertaining to state listed species do not apply on San Nicolas Island, and a take permit is therefore not required. Nevertheless, the project proponents would consult with the state biologists responsible for the island fox and involve them in decisions regarding actions that might affect the fox.

The risk associated with take of this state threatened species was analyzed during a field trial (Island Conservation 2007), and the conservation measures identified in the trial have been incorporated into the Proposed Action. As no fox deaths are anticipated and injuries are expected to be few and minor, the project would not diminish, either directly or indirectly, the species numbers, reproduction, or distribution to a level that appreciably reduces the likelihood of its survival on San Nicolas Island. Instead, the Proposed Action is anticipated to result indirectly in the long-term conservation of the island fox by eradicating feral cats, which compete with the island fox for food and habitat.

Other Threatened and Endangered Species

As described in Section 5.2.1, the island night lizard, California brown pelican, western snowy plover, southern sea otter, and Guadalupe fur seal have the potential to occur in the Proposed Action area or immediate vicinity. The potential effects of the Proposed Action on these species are described below.

Island Night Lizard

The federally and state threatened island night lizard is sensitive to disturbance. Conservation measures would be implemented as part of the Proposed Action to avoid adverse effects and take of this species (Section 3.1.12.4). The Proposed Action is not likely to adversely affect this species. Instead, the Proposed Action is anticipated to result indirectly in the long-term conservation of the island night lizard by eradicating feral cats, which prey on island night lizards.

California Brown Pelican and Western Snowy Plover

California brown pelicans roost along the shoreline of San Nicolas Island throughout the year (Figure 7). Roosting birds are sensitive to disturbance, flushing readily when approached by boats, low flying aircraft, motorized vehicles, or humans on foot. Disturbance to brown pelicans during implementation of the Proposed Action would be minimized or avoided by maintaining a 500-ft buffer from roosting birds at all times (Section 3.1.12.4). The Proposed Action, therefore, is not likely to adversely affect this federally and state endangered species. Instead, the Proposed Action may result indirectly in the long-term conservation of the species through the eradication of feral cats, which have been known to prey on brown pelicans (Section 2.1).

Western snowy plovers occur on San Nicolas Island throughout the year (Figure 8) and are sensitive to nest and habitat disturbance. Incubating birds often run from their nests at the approach of people or dogs, which can lead to increased clutch losses to blowing sand on windy days. Eggs can be trampled or crushed by humans, dogs, or motorized vehicles. Disturbance to western snowy plovers during implementation of the Proposed Action would be minimized or avoided by maintaining a 500-ft buffer from roosting birds and a 1,000-ft buffer from known nesting birds at all times (3.1.12.4). Furthermore, personnel on motorcycles would avoid riding on all beaches. Therefore, the Proposed Action is not likely to adversely affect this federally threatened species. Instead, the Proposed Action is anticipated to result indirectly in the long-term conservation of this federally threatened species through the eradication of feral cats, which prey on snowy plovers (Section 2.4.2).

Southern Sea Otter and Guadalupe Fur Seal

These species are unlikely to be encountered onshore during the implementation of the Proposed Action (Sections 5.2.1.4 and 5.2.1.5). In the event that they were encountered,

field personnel and dogs would maintain a 300-ft buffer from the animals at all times (Section 3.1.12.4). Therefore, the Proposed Action is not likely to adversely effect these threatened species. Instead, the Proposed Action may result indirectly in the long-term conservation of the southern sea otter through the eradication of feral cats, which are known to be a host for a disease (toxoplasmosis) that adversely affects sea otters (Section 6.1.1).

6.1.3 Effects of Alternative 2. Padded Leg-Hold Live Trapping Only

The potential effects of Alternative 2 would be similar to those described for the Proposed Action (Section 6.1.2). The main difference is that it may result in exposure of more island foxes and feral cats to traps because several seasons of trapping could be required (Section 4.2.2). Therefore, compared with the Proposed Action, Alternative 2 is expected to have greater risks of direct adverse effects to the island fox. Because some feral cats are expected to be trap-shy, this alternative is less likely than the Proposed Action to result in the eradication of feral cats and is therefore less likely to meet the purpose and need described in Chapter 1. Extending the time required to complete the project would also make this alternative more costly.

6.1.4 Effects of Alternative 3. Spotlight Hunting and Limited Leg-Hold Trapping

The potential effects of Alternative 3 would be similar to those described for the Proposed Action (Section 6.1.2). The main difference is that fewer island foxes would be exposed to traps initially. However, due to the limitations of spotlight hunting (Sections 3.13 and 4.23) and limited leg-hold trapping (Section 6.1.3), this alternative would be less efficient than the Proposed Action and could require several additional seasons of trapping. Alternative 3 may result in future exposure of as many or more island foxes and feral cats to traps than the Proposed Action. Therefore, compared with the Proposed Action, Alternative 3 would have an equal or greater potential to result in direct adverse effects to the island fox. Because of its inefficiency, this alternative is less likely than the Proposed Action to result in the eradication of feral cats from San Nicolas Island (Section 4.2.3) and is therefore less likely to meet the purpose and need of the project as described in Chapter 1. Extending the time required to complete the project would also make this alternative more costly.

6.1.5 Effects of Alternative 4. Hunting with Dogs and Limited Leg-Hold Trapping

The potential effects of Alternative 4 would be similar to those described for the Proposed Action (Section 6.1.2). The main difference is that fewer island foxes would be exposed to traps initially. However, because of the limitations of hunting with dogs (Section 4.2.4) and limited leg-hold trapping (Section 6.1.3) this alternative would be less efficient than the Proposed Action and could require several additional seasons of trapping. Alternative 4 may result in future exposure of as many or more island foxes and feral cats to traps than the Proposed Action. Therefore, compared with the Proposed Action, Alternative 4 would have an equal or greater potential to result in direct adverse effects to the island fox. Because of its inefficiency, this alternative is less likely than the

Proposed Action to result in the eradication of feral cats from San Nicolas Island and is therefore less likely to meet the purpose and need of the project as described in Chapter 1. Extending the time required to complete the project also makes this alternative more costly.

6.1.6 Effects of the No Action Alternative

Assuming intermittent feral cat control efforts continue under the No Action alternative, this alternative would likely result in the death of more feral cats over time than the Proposed Action or action alternatives. This is because the feral cat population would likely rebound between control efforts (Stoskopf and Nutter 2004), each of which might remove less than one third of the total population (Thompson 1997), and control would continue indefinitely. Furthermore, traps set for controlling the feral cat population may injure island foxes. Overall, the No Action alternative would result in continual adverse effects on the ecosystem of San Nicolas Island. Such effects would result from the continued presence of feral cats on the island and would include ongoing mortality of native fauna, including the federally and state threatened island night lizard, federally threatened western snowy plover, the endemic deer mouse, and breeding colonies of Brandt's cormorants and western gulls. These effects have the potential to diminish the numbers, reproduction, and / or distribution of many native wildlife species on San Nicolas Island.

6.2 CULTURAL AND HISTORIC RESOURCES

6.2.1 Effects of the Proposed Action and Action Alternatives

As described in Section 3.1.12.5, several conservation measures designed to avoid adverse effects to cultural and historic resources would be implemented as part of the Proposed Action. These measures involve consulting with the resident archaeologist to identify and avoid resources prior to all project activities. The Proposed Action and action alternatives, therefore, are unlikely to result in effects to cultural and historic resources.

6.2.2 Effects of the No Action Alternative

The No Action Alternative is unlikely to result in effects to cultural and historic resources, as the same conservation measures implemented as part of the Proposed Action and action alternatives are implemented for all ground disturbance activities on San Nicolas Island (Section 3.1.12.5).

6.3 ETHICS AND VALUES RELATED TO NATIVE AND INTRODUCED WILDLIFE

6.3.1 Effects of the Proposed Action and the Action Alternatives

Aesthetics

The effects of the Proposed Action and action alternatives on the aesthetic value of San Nicolas Island's environment would depend on the value system of affected individuals. The Proposed Action and action alternatives are likely to result in improved aesthetic appreciation of native wildlife both by those that are able to come in contact with the wildlife (i.e., seabirds at sea) and by those that derive aesthetic pleasure simply from the knowledge that the wildlife of San Nicolas Island exists safe from predation by feral cats. Conversely, the action alternatives may result in decreased aesthetic appreciation for those people that place substantial aesthetic value on the subsistence of feral cats on San Nicolas Island. However, individuals who place substantial value on the survival of non-native feral cats in the wild would still be able to view feral cats in countless locations in mainland southern California. Overall, eradication of feral cats from San Nicolas Island is likely to benefit the aesthetic value of the island's native wildlife and cannot be reasonably expected to significantly diminish the aesthetic value of the millions of non-native feral cats in the wild.

Humaneness

The effects of the Proposed Action and action alternatives would depend on individual perception of humane treatment. Nevertheless, the Proposed Action employs strict measures to minimize pain and suffering of feral cats that are euthanized. The project proponents have proposed extensive mitigation actions to minimize the effects of the Proposed Action to native wildlife, and Section 3.1.4 outlines how the project proponents would maximize the humane treatment of the feral cats on San Nicolas Island. Most people who extend their perception of humane treatment to the animals killed or maimed by feral cats on San Nicolas Island would find the Proposed Action and action alternatives preferable because once the project is complete, pain and suffering of native wildlife associated with predation by feral cats would be permanently alleviated. Some people may categorically oppose euthanasia and therefore would be opposed to the Proposed Action and action alternatives. However, the number of individual feral cats that would be affected by the Proposed Action and action alternatives cannot reasonably be considered significant compared to the large number of feral and non-feral cats euthanized every year in southern California. On balance, the Proposed Action and action alternatives will likely result in overall more humane wildlife management on San Nicolas Island.

6.3.2 Effects of the No Action Alternative

Aesthetics

The effects of the No Action alternative on aesthetics would depend on individual values. The continuing presence of feral cats on San Nicolas Island under this alternative would result in decreased aesthetic appreciation for those people concerned about wildlife and their role in the ecosystem. In the short term, the No Action alternative would likely be preferred by those concerned primarily with aesthetic appreciation of the feral cats on San Nicolas Island. However, given that current management practices on the island call for periodic control of feral cats, over time the No Action alternative would likely result in a greater number of feral cat deaths than the Proposed Action and action alternatives.

Humaneness

The effects of the No Action alternative would depend on individual perception of humane treatment. The No Action alternative would result in the ongoing death of native wildlife and periodic control of feral cats using many of the same techniques in the Proposed Action and action alternatives. Therefore, some people would prefer the No Action alternative because of the short-term decrease in number of feral cats killed, but over time the No Action alternative would result in a greater number of feral cats killed and could therefore be argued to be less humane.

6.4 CUMULATIVE EFFECTS

6.4.1 Introduction to Cumulative Effects

Cumulative effects, as defined by the CEQ (40 CFR 1508.7), are effects to the environment that result from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects may result from individually minor, but collectively significant, actions taking place over time.

6.4.2 Contribution of the Proposed Action and Action Alternatives to Cumulative Effects

6.4.2.1 Cumulative Effects on Special-Status Plants and Rare Natural Communities

Prior to Naval acquisition, decades of disturbance from grazing occurred over all of San Nicolas Island. Although sheep ranching and grazing have not occurred since 1943, these activities distributed invasive non-native plants throughout the island, which have proliferated and continue to degrade the island's natural plant communities today. However, the Navy's INRMP (U.S. Navy 2005) includes measures to manage these invasive species and prevent their spread. The Proposed Action and action alternatives would each conform to Navy ecosystem management policies and take specific measures

to prevent the spread of invasive plants during project activities. Neither the Proposed Action nor any action alternative would contribute to cumulative effects on special-status plants or rare natural plant communities on San Nicolas Island.

6.4.2.2 Cumulative Effects on Wildlife, Including Threatened and Endangered Species

Past ranching activities, including grazing by livestock as well as damage from other non-native species introduced to the island, had major effects on wildlife in the past. However, the Navy's current management of wildlife resources on the island has arrested some of these damaging effects. Present day activities on the island such as military readiness actions may have occasional localized effects on wildlife, including threatened and endangered species. However, the USFWS concluded in a 2001 Biological Opinion (USFWS 2001b) that military activities on San Nicolas Island would not jeopardize the survival of any of these species on the island. The minor effects to wildlife species, particularly the island fox, identified in this document would not likely have additive effects when considered in combination with other current activities on the island. Furthermore, the Proposed Action and action alternatives would follow all management guidelines outlined by the USFWS in their Biological Opinion as well as the Navy's INRMP (U.S. Navy 2005) and would include specific conservation measures (Chapter 3) that would make cumulative adverse effects to wildlife very unlikely.

Feral cat eradication as described in the Proposed Action and action alternatives would likely benefit many wildlife species on the island, including seabirds, island night lizards, deer mice, and other native animals. Successful feral cat eradication is anticipated to contribute to beneficial cumulative effects on the native wildlife of San Nicolas Island.

Seabird species in particular are likely to experience beneficial cumulative effects as a result of feral cat eradication on San Nicolas Island when considered in combination with other seabird restoration projects that have occurred recently or are planned for the near future in the southern California marine ecosystem. Examples of seabird restoration projects that may contribute to beneficial cumulative effects to seabirds include recent invasive mammal eradication projects on other islands in southern California and northwest Mexico and other ecosystem restoration projects funded from restoration settlements such as the Cape Mohican, M/T Command, and American Trader oil spill cases.

6.4.2.3 Cumulative Effects on Cultural and Historical Resources

Neither the Proposed Action nor the action alternatives are expected to have measurable cumulative effects on San Nicolas Island's historical and cultural resources.

6.4.2.4 Cumulative Effects on Ethics and Values Related to Native and Introduced Wildlife

Under the Navy's current resource management policies, feral cats are subject to intermittent control efforts, which would continue indefinitely as long as feral cats

remained on the island. Under the Proposed Action and action alternatives, feral cats would be eradicated using humane techniques in a single concerted effort, which would likely result in the deaths of fewer feral cats overall than indefinite control efforts. Furthermore, a successful project would spare thousands of native animals on San Nicolas Island from predation by feral cats. Neither the Proposed Action nor the action alternatives are expected to have significant cumulative effects on ethics and values related to native and introduced wildlife.

6.4.3 Contribution of the No Action Alternative to Cumulative Effects

6.4.3.1 Cumulative Effects on Special-Status Plants and Rare Natural Communities

Adoption of the No Action alternative is not expected to have measurable cumulative effects on special-status plants or rare natural communities on San Nicolas Island.

6.4.3.2 Cumulative Effects on Wildlife, Including Threatened and Endangered Species

The continued presence of feral cats on the island under the No Action alternative would continue to result in mortality of native fauna, including seabirds, the federally threatened island night lizard, federally threatened western snowy plover, and the endemic deer mouse. Current Navy resource management policies are largely beneficial to the island's wildlife. However, the western snowy plover population in California has continued to decline under current management programs, and the continued presence of feral cats on San Nicolas Island has the potential to contribute to further declines of the western snowy plover population in the future. Similar future declines are possible with other native wildlife on San Nicolas Island as well if the No Action alternative is adopted and feral cats are not eradicated.

6.4.3.3 Cumulative Effects on Cultural and Historical Resources

Adoption of the No Action alternative is not expected to have measurable cumulative effects on San Nicolas Island's cultural and historical resources.

6.4.3.4 Cumulative Effects on Animal Welfare

Assuming intermittent feral cat control efforts continue under the No Action alternative, this alternative would likely result in the euthanasia of more feral cats over time than the Proposed Action or action alternatives. This is because the feral cat population would likely rebound between control efforts, each of which might remove less than one third of the total population (Thomson 1997).

Table 6. Summary of Environmental Consequences by Alternative

Proposed Action	Alternative 2 (Padded Leg-Hold Live Trapping Only)	Alternative 3 (Spotlight Hunting and Limited Leg-hold Trapping)	Alternative 4 (Hunting with Dogs and Limited Leg-Hold Trapping)	Alternative 1 (No Action)
Special-Status Plants/Rare Natural Communities				
• No effects expected • Conservation measures in place: o Avoiding special-status plants o Avoiding rare natural communities when possible o Minimizing weed dispersal	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	Current trends would continue
Wildlife				
• Not expected to reduce the numbers or ranges of common wildlife species • Conservation measures in place: o Dogs trained not to react to wildlife o Avoiding bird roosting/nesting areas o Using non-toxic, lead-free munitions • Indirect beneficial effects to native wildlife in general (extent of beneficial effects is difficult to predict)	• Project likely to take substantially more time, but effects likely to be similar to Proposed Action • No dogs or hunting (not expected to change overall effects measurably) • Less certainty of feral cat eradication – decreases likelihood of indirect beneficial effects to native wildlife	• Project likely to take substantially more time, but effects likely to be similar to Proposed Action • No dogs (not expected to change overall impacts measurably) • Less certainty of feral cat eradication – decreases likelihood of indirect beneficial effects to native wildlife	• Project likely to take more time, but effects likely to be similar to Proposed Action • Less certainty of feral cat eradication – decreases likelihood of indirect beneficial effects to native wildlife	Current trends would continue, including major predation on endemic deer mouse

Proposed Action	Alternative 2 (Padded Leg-Hold Live Trapping Only)	Alternative 3 (Spotlight Hunting and Limited Leg-hold Trapping)	Alternative 4 (Hunting with Dogs and Limited Leg-Hold Trapping)	Alternative 1 (No Action)
Threatened and Endangered Species: Island Fox				
• Some foxes likely to sustain minor, non-life-threatening injuries from traps; life-threatening injuries very unlikely • On-island veterinary supervision during trapping activities • Vehicle strikes possible but very unlikely; vehicles will travel ≤ 25 mph • Temporary behavior alteration in presence of dogs likely; no perceptible long-term effects expected • Indirect beneficial effects (extent of beneficial effects is difficult to predict)	• Project likely to take substantially more time; more reliance on trapping; likely to result in more minor injuries to foxes than in Proposed Action (life-threatening injuries very unlikely) • No dogs or hunting (not expected to change overall effects measurably) • Less certainty of feral cat eradication – decreases likelihood of indirect beneficial effects to foxes	• Project likely to take substantially more time: fewer minor injuries to foxes initially, but injury rate likely similar to or greater than Proposed Action over course of project (life-threatening injuries very unlikely) • No dogs (not expected to change overall effects measurably) • Less certainty of feral cat eradication – decreases likelihood of indirect beneficial effects to foxes	• Project likely to take more time: fewer minor injuries to foxes initially, but injury rate likely similar to or greater than Proposed Action over course of project (life-threatening injuries very unlikely) • Less certainty of feral cat eradication – decreases likelihood of indirect beneficial effects to foxes	• Some foxes likely to sustain minor, non-life-threatening injuries from ongoing feral cat control efforts • Feral cats would continue to compete directly with foxes for resources
Threatened and Endangered **Species: Island Night Lizard**				
• Not likely to adversely effect • Conservation measures in place: o Personnel trained to identify & avoid night lizards o Trails routed to avoid night lizard habitat • Indirect beneficial effects	• Effects would be similar to Proposed Action • Less certainty of feral cat eradication – decreases likelihood of indirect beneficial effects to night lizards	• Effects would be similar to Proposed Action • Less certainty of feral cat eradication – decreases likelihood of indirect beneficial effects to night lizards	• Effects would be similar to Proposed Action • Less certainty of feral cat eradication – decreases likelihood of indirect beneficial effects to night lizards	Current predation by feral cats would continue

Proposed Action	Alternative 2 (Padded Leg-Hold Live Trapping Only)	Alternative 3 (Spotlight Hunting and Limited Leg-hold Trapping)	Alternative 4 (Hunting with Dogs and Limited Leg-Hold Trapping)	Alternative 1 (No Action)
expected (extent of beneficial effects is difficult to predict)				
Threatened and Endangered Species: California Brown Pelican & Western Snowy Plover				
• Not likely to adversely effect • Conservation measure in place: buffer zones around known nesting/roosting areas • Indirect beneficial effects expected (extent of beneficial effects is difficult to predict)	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	Suspected ongoing predation by feral cats would continue
Threatened and Endangered Species: Southern Sea Otter & Guadalupe Fur Seal				
• Not likely to adversely effect • Conservation measure in place: buffer zones maintained around any animals • Indirect beneficial effects possible for otters – removal of a vector for toxoplasmosis	• Effects would be similar to Proposed Action • Less certainty of feral cat eradication – decreases likelihood of eliminating cats as a toxoplasmosis vector	• Effects would be similar to Proposed Action • Less certainty of feral cat eradication – decreases likelihood of eliminating cats as a toxoplasmosis vector	• Effects would be similar to Proposed Action • Less certainty of feral cat eradication – decreases likelihood of eliminating cats as a toxoplasmosis vector	Risk of toxoplasmosis transmission from cats to otters would remain
Cultural/Historical Resources				
• No effects expected • Resident archeologist would be consulted prior to & during implementation as	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	Current trends would continue

Proposed Action	Alternative 2 (Padded Leg-Hold Live Trapping Only)	Alternative 3 (Spotlight Hunting and Limited Leg-hold Trapping)	Alternative 4 (Hunting with Dogs and Limited Leg-Hold Trapping)	Alternative 1 (No Action)
appropriate				
Ethics				
• No significant effects expected • Techniques designed to minimize suffering in feral cats as well as native wildlife • AVMA guidelines for euthanasia followed • On-island veterinary supervision during project implementation	Similar to Proposed Action	Similar to Proposed Action	Similar to Proposed Action	• Due to Navy's ongoing control efforts, more feral cats would likely be euthanized over time than in the Proposed Action • Native island species would continue to suffer from predation by feral cats, including non-fatal attacks and prolonged suffering of individual animals
Cumulative Effects				
• No adverse cumulative effects expected • In combination with current Navy management policy, similar recent & planned restoration projects in nearby habitat, cumulatively beneficial effects expected for many wildlife species on San Nicolas Island, particularly: o Seabirds o Mice o Foxes o Island night lizards	• If feral cat eradication is successful, cumulative effects expected to be similar to Proposed Action • If feral cat eradication is not successful, current negative effects of cats could contribute to adverse cumulative effects on wildlife	• If feral cat eradication is successful, cumulative effects expected to be similar to Proposed Action • If feral cat eradication is not successful, current negative impacts of cats could contribute to adverse cumulative effects on wildlife	• If feral cat eradication is successful, cumulative effects expected to be similar to Proposed Action • If feral cat eradication is not successful, current negative effects of cats could contribute to adverse cumulative effects on wildlife	• Current negative effects of feral cats could contribute to adverse cumulative effects on wildlife

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CHAPTER 9. AGENCIES, ORGANIZATIONS, AND PERSONS CONSULTED

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Integrated Island Fox Recovery Team, June 2007, Ventura, CA

CHAPTER 10. APPENDIX

Appendix 1. Dog Quarantine Protocol

San Nicolas Island Cat Eradication Project
Dog Holding / Quarantine Facility Proposal

All dogs involved in the San Nicolas Island (SNI) cat eradication project would be subject to strict quarantine protocols prior to and once on island. These protocols aim to safeguard the endemic island fox population against diseases and internal/external parasites that could be catastrophic to their population. This proposal incorporates the protocols established for quarantine of dogs used on Santa Cruz Island during the pig eradication. Comments on a draft of this document were also solicited from Institute for Wildlife Studies veterinarian Dr. Winston Vickers and have been incorporated into this protocol.

General protocol

Dogs will be implanted with Passive Integrated Transponder (PIT) tags for unique identification at least 6 months prior to the proposed movement to SNI; all certification papers, vaccination records, screen tests and treatment results will have this tag's unique 'ID' clearly indicated on them. Each dog will have a separate folder with its name, a recent photograph, its PIT number, sex, age and veterinary history including medications given, vaccination records, screen tests, and treatment results. Each dog's folder will be available for inspection at any time. All dogs used for this Project will remain current on vaccinations and endoparasite/ectoparasite preventatives as noted herein. If at any time a dog lapses in treatment, that dog will be removed from the Island and must comply, again, with the initial entry requirements prior to re-entry.

All dogs used on SNI will be sourced from the U.S. Project staff will care, feed, and handle the working dogs for the duration of the project, including during the quarantine period. Dogs will be removed from the island when no longer needed.

Training Requirements

All dogs brought to SNI will be cat specific dogs. Prior to their arrival on-island, dogs will be tested for showing any interest in foxes and other wildlife on the mainland. Any dogs showing interest will undergo aversion training and be retested. Any dogs that fail aversion training will not be taken to the island. While on island, any dogs showing aggression towards native wildlife will be removed immediately from the project.

Entry Requirements

(A) Pre-movement quarantine

All dogs destined for shipment will be placed in a quarantine facility for 30 days before transport to SNI. The purpose of this quarantine facility is to prevent infection of the dogs after they have been tested and treated for parasites and infectious diseases (see B and C below). The facility will be: 1) isolated from contact with other carnivores, and 2)

an all-in/all-out facility (no entry of new animals during the 30 days). If possible, the dogs should be individually housed and the substrate should be concrete or another surface that can be disinfected.

(B) Vaccination

1) All dogs will have a current vaccination for the following:

DHPP(LC)- Modified Live Virus Vaccines
- Canine distemper virus
- Canine infectious hepatitis (canine adenovirus)
- Canine parainfluenza virus
- Canine parvovirus
- Leptospirosis
- Coronavirus

Killed Virus Vaccines:
- Rabies
- *Bordetella* (kennel cough)

2) The entire vaccination series will be completed at least one month, but no more than six months, prior to the dog's arrival on the Island. This is because dogs vaccinated less than one month prior to transport may shed modified vaccine virus or viruses acquired through natural exposure before being protected by vaccines.

3) At least two weeks prior to the dog traveling to SNI, evidence of vaccination must be provided to the Navy's environmental personnel on SNI.

4) Dogs remaining on SNI will be vaccinated annually. When vaccinated with modified live virus vaccines dogs shall be held in quarantine for one month immediately following administration of the vaccines. This is because dogs may shed modified live virus vaccines which are a risk to the health of foxes.

(C) Parasites

1) Six months before being transported to SNI, all dogs must be negative for heartworms (*Dirofilaria immitis*) by DiroCheck® or SNAP® tests and be screened for microfiliaria. Dogs must then be placed on an appropriate heartworm preventative and kept on preventative treatments while on-island. Recommended preventative treatments are Heartgard Plus® or Interceptor®.

2) Prior to transport to the Island, all dogs must test negative for endoparasites. The requirement is three consecutive fecal samples tested for endoparasites using both zinc and sugar floatation methods. Dogs with positive fecal tests must be treated with appropriate anthelmintics and then re-tested until three consecutive fecal samples test negative. If dogs are not individually housed, then all contact animals must also be treated and retested.

3) During quarantine, all dogs must be checked for ectoparasites, including *Sarcoptes*, *Demodex* and *Otodectes* mites. If positive for any mite, the dogs must be appropriately treated and rechecked until negative. If dogs are not individually housed, all contact animals must also be treated and retested. Once negative for ectoparasites, the dogs must be placed on an appropriate preventative before being transported to the Island. Recommended preventative treatments are Interceptor® or Frontline®.

4) Dogs must be rechecked annually by the protocol in 2 above.

(D) Health Certificate

Within ten days of being transported to the Island, all dogs must be given a complete physical exam by a licensed veterinarian to confirm that they are in good general health and free of evidence of any infectious diseases. The examination must include confirmation of vaccination status, confirmation of negative heartworm, endoparasite, and ectoparasite tests (including ear mites) and a negative Lyme disease test.

(E) Post transport quarantine on SNI

Dogs will be kept in holding kennels on SNI for 3 weeks. Holding kennels on SNI will be at a location with a water line close by, and suitable substrate to allow drainage of wastes below the surface. Dogs will be housed individually and individual kennels will be 8' x 16' x 7' high with 2" chain link mesh. Kennels will adjoin each other as a single block. An elevated plywood sleeping platform will provide each dog with a sleeping area and allow dogs to stay dry while kennels are washed and disinfected. Kennels will be on a concrete pad with skirt to allow easy wash-down; drains will carry all waste water, feces and urine to an underground septic tank. Septic tank effluent will be discharged below ground via a seep system. No effluent will be discharged above-ground. Kennels will be roofed to provide shade and stop excess water passing through the septic tank during rains; rainwater run-off will go to storm-water drains if available, or be discharged outside the perimeter at an appropriate point. Kennels and waste water systems will all be within a perimeter fence at least 30' from the kennels. This perimeter fence will be of 1" mesh, 6' high and incorporate electrified strands of wire; a design type that has kept foxes out of captive breeding facilities on San Clemente Island. Personnel entering the compound will change into rubber boots kept inside the gate of the perimeter fence at a change station. These rubber boots will be used only for work inside the compound. This protocol aims to keep feces and mud from being taken on the bottom of boots outside the perimeter. A wash station with anti-bacterial handwash will be located immediately outside the kennels; personnel will wash here each time they leave the kennels. Dog food and equipment will be kept in a separate off-site storage area.

Transport crates (and any bowls or other equipment) used to move dogs to the island will be washed down with disinfectant in the holding kennels (waste water will go to septic tank as described above). Transport crates will remain within the facility and may be used later when removing dogs from the island. Alternatively, crates may be sent back to the mainland but will remain at the holding facility while not in transport. Crates will not be

used for daily dog transport on SNI and will be marked as "For dog transport only, potential contamination/disease risk to foxes".

Dogs will be required to pass a physical examination between days 17 and 21 by a licensed veterinarian prior to being released from quarantine and holding kennels on day 21.