Predecisional Environmental Assessment

Predator Damage Management To Protect the Federally Threatened Pacific Coast Population of the Western Snowy Plover

Oregon

Lead Agencies:

U.S. Department of Interior
Fish and Wildlife Service
Region 1

U.S. Department of Interior
Bureau of Land Management
Coos Bay District

U.S. Department of Agriculture
Siuslaw National Forest

Cooperating Agencies:

State of Oregon
Department of Fish and Wildlife

State of Oregon
Parks and Recreation Department

Prepared by Cooperating Agency:

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Wildlife Services

May 29, 2001

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List of Acronyms and Abbreviations Used in this Document

ACEC	Area of Critical Environmental Concern
APHIS	Animal and Plant Health Inspection Service (USDA agency)
BBS	Breeding Bird Survey
BLM	Bureau of Land Management (USDI agency)
BO	Biological Opinion
CBC	Christmas Bird Count
CEQ	President's Council on Environmental Quality
CFR	Code of Federal Regulations
COE	U.S. Army Corps of Engineers
DM	Department of the Interior's Departmental Manual
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
FY	Fiscal Year
GAO	U.S. Government Accounting Office
LRMP	Land and Resource Management Plan
MIS	Management Information System
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NRA	National Recreation Area
OAR	Oregon Administrative Rules
ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
OPRD	Oregon Parks and Recreation Department
ORS	Oregon Revised Statute
USFWS	United States Fish and Wildlife Service (USDI agency)
RMP	Resource Management Plan
TNC	The Nature Conservancy
T&E	Threatened and Endangered
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFS	United States Forest Service (USDA agency)
WS	Wildlife Services (USDA-APHIS program)

CHAPTER 1: PURPOSE AND NEED FOR ACTION

1.0 Introduction

The U.S. Fish and Wildlife Service (USFWS) published a rule, effective March 5, 1993, listing the Pacific coast population of the western snowy plover (*Charadrius alexandrinus nivosus*) (snowy plover or plover) as threatened under the Endangered Species Act of 1973, as amended (ESA) (USFWS 1993a). This plover is threatened throughout its range by loss and disturbance of habitat and nesting sites. The primary threats to the snowy plover are believed to be habitat degradation caused by human disturbance, urban development, introduced European beachgrass (*Ammophila spp.*), and predators (USFWS 1999). The Pacific coast breeding population of the snowy plover extends from the State of Washington to Baja California, Mexico, with the majority of breeding birds found in California. Wintering areas are primarily in coastal California and Mexico.

The Oregon Fish and Wildlife Commission listed the plover population as threatened in Oregon as threatened in 1975. This listing was reaffirmed under the Oregon Endangered Species Act in 1989. The Commission confirmed the species' status as threatened during a 1993 review. (ODFW) 1994).

1.1 Purpose

The purpose of the proposed project is to protect the Federally and State threatened snowy plover in Oregon from predation while measures to protect and restore habitat are ongoing. The Oregon snowy plover population requires immediate action. The purpose of this environmental assessment (EA) is to assess the environmental impacts of conducting a comprehensive predator damage management program to protect the Pacific coast population of snowy plover where predators threaten their survival and reproductive success.

Objectives

The primary objective of this proposal is to improve the effectiveness of predator damage management to protect snowy plovers from further declines from predation while recreation and habitat management efforts continue. To achieve success in reducing predation, the lead and cooperating agencies plan to:

1) expand assessment efforts to all plover breeding and nesting locations to determine the predator species responsible for predation; and

2) reduce predation where the predator species is known.

Snowy plover predators identified along the Oregon coast include American crows *(Corvus brachyrhychos)*, common ravens *(Corvus corax)*, California gulls (*Larus californicus*), red foxes *(Vulpes vulpes)*, raccoons (*Procyon lotor*), striped skunks (*Mephites mephites*), and black rats (*Rattus rattus*) (ODFW 1994). Secondary predators, or predators that are suspected but not confirmed, are included in the analysis because they may be taken if wildlife specialists determine that they are a threat that cannot effectively be controlled with non-lethal means. These include feral cats (*Felis domesticus*), coyotes (*Canis latrans*), mink (*Mustela vison*), opossum (*Didelphis virginiana*), weasels (*Mustela spp.*), gray fox (*Urocyon cinereoargenteus*), Norway rats (*Rattus norvegicus*), gulls (*Larus spp.*), deer mice (*Peromyscus maniculatus*) and raptors[1].

Decision to Be Made

The USFWS along with the U.S. Forest Service, Siuslaw National Forest (USFS) and the Bureau of Land Management, Coos Bay District (BLM) are lead agencies in this proposal. The ESA requires all Federal agencies to use their authorities to enhance the recovery of threatened and endangered (T&E) species, such as the snowy plover. The lead agencies together will address the following questions based on interdisciplinary analysis in the EA.

- How can the lead agencies and their cooperating agencies best respond to the need to protect snowy plovers from further population declines by predators?

- What will be the environmental effects from implementing various alternative strategies?

Besides the lead agencies, this proposal would require the participation of other agencies that have management authority and expertise related to this project. The Oregon Parks and Recreation Department (OPRD) is responsible for regulating activities on the ocean shore and managing beach parks where some of the snowy plovers are known to nest. The lead agencies, along with the ODFW and the U.S. Army Corps of Engineers (COE) are responsible for managing plover habitat. The ODFW has the authority to manage resident wildlife. The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service, Wildlife Services (APHIS-WS) program is authorized by Federal law to provide leadership and assistance in wildlife damage management. In addition, the lead agencies would continue to

[1]/ Only non-lethal damage management measures would be used on those raptors that are special status species, such as the American peregrine falcon.

use the expertise of The Oregon Natural Heritage Program to monitor snowy plover nesting success and distribution.

1.2 Need for Action

Historic records indicate that nesting snowy plovers were once more widely distributed. Nineteen nesting areas were reported in Oregon in 1974 (Oregon Coast Conservation and Development Commission 1974). Only seven of these areas were used in 1998 (Castelein et al. 1998). In Oregon, the 1999 breeding population was estimated at 95 or 96 individuals (Castelein et al. 2000). This is very similar to the 97 breeding plovers counted in 1998, down from 141 in 1997 (Castelein et al. 1997, 1998) but up from 72 in 1993 (Castelein et al. 2000).

The few remaining coastal nesting areas have high predation risks. Intervention through protection measures is needed to protect adults and young of the remaining coastal snowy plover population until their numbers and the distribution increase. In Oregon, predators have accounted for up to 68percent of nest losses (Wilson-Jacobs and Meslow 1984, Stern et al. 1991). Between 1990 and 2000, The Nature Conservancy (TNC 2000) found that predation accounted for 155 incidences of nest failures, or 45.7percent of all snowy plover nest failures along the Oregon Coast. The remaining losses were caused by weather (22.4percent), biological factors (17.1percent), unknown causes (12.7percent) and direct human disturbances (2.0percent) (TNC 2000). Biologists believe that some of the losses from unknown factors are probably the result of predation. Biologists also note that human disturbance and influences could indirectly be responsible for under recording unknown causes.

Documented causes of nest loss throughout the snowy plover's range include predation by American crows, common ravens, California gulls, foxes, raccoons, coyotes, feral cats, skunks, and black rats (ODFW 1994). Table 1 shows the number of predation events between 1990 and 2000 that caused nest failure, where predation was known to occur.

Between 1990 and 2000, corvids (ravens and crows) caused at least 64 nest failures in Oregon (Table 1). In many instances of nest predation, the predator species responsible were not determined. This proposal includes provisions to: 1) evaluate actual and potential plover losses caused by predators, 2) determine the species responsible, and 3) when to apply appropriate measures to prevent or minimize predation. Nest enclosures work well to protect eggs, however after the eggs hatch, the young leave the enclosures and become highly vulnerable to predation. The young are also difficult to track which makes documentation of predation difficult.

Table 1. Predators Causing Nest Failures of Snowy Plovers on the Oregon Coast 1990-2000 (TNC 2000)

Predator	Number of nest failures
corvid (crow or raven unknown)	24
crow	25
raven	15
gull	1
fox	1
raccoon	1
skunk	13
unknown mammal	5
unknown predator	62
adults predated (unknown predator)	8
total	155

The ODFW (1994) reports that there is a substantial amount of predation at coastal nesting areas in Oregon. Anderson and Main (1983) confirmed that 30percent of egg losses could be attributed to corvids. The impact of gull predation is also important (Warriner et al. 1986). Nesting gulls (largely opportunistic feeders) became more predatory at Leadbetter Point, Washington, when their nutritional requirements peak in May and June, which coincides with the plover breeding period (Widrig 1980). Ground predators including striped skunks (Page et al. 1983, Stern et al. 1990, Craig et al. 1992) and raccoons (ODFW 1994) also, have a substantial impact on plovers. On the Oregon coast, mammal predation risk has been exacerbated by greater ground cover from introduced beachgrass encroachment. Increased human use and associated activities (such as picnicking and camping), have generally favored gull and crow populations which have in turn increased predation risk to nesting plovers (ODFW 1994).

In California, red fox predation on snowy plovers was a major reason for the plovers decline on the central coast (USFWS 1993a), and is one of the major threats to the survival of the California least tern and light-footed clapper rail at the Seal Beach National Wildlife Refuge (USFWS and US Navy 1990). The USFWS concluded that red fox are a major factor in snowy plover chick losses in California, based on numerous studies and on comparisons between areas with and without red fox. By reducing the number of red fox in the vicinity of plover breeding areas, the reproductive success of plovers may be dramatically improved (USFWS 1993a).

Encroachment of introduced European beachgrass is a major concern because it has reduced plover nesting habitat and provided cover for predators (USFWS 1993a). Removal of beachgrass is a separate activity that is occurring and will continue regardless of any decision made on direct predator damage management. Habitat and recreation management are being handled separately by the land management agencies (see Section 1.7). Only trash management may need to be improved since accumulation of trash can attract predators.

1.3 Background

The western snowy plover is one of two subspecies of snowy plovers that occur in North America. In Oregon there are two distinct populations of western snowy plovers. The Pacific coast population includes both wintering and nesting individuals that occupy broad sandy beaches and adjacent dry flats from southern Washington to Baja, Mexico. The interior population breeds around alkaline lakes west of the Rocky Mountains and migrates to the coasts of California and Mexico to winter (ODFW 1994). It is the Pacific coast population that has been Federally listed as threatened and is the focus of this effort. The latter is not included in this analysis.

Many changes have occurred along the Oregon coast in recent decades. The establishment of European beachgrass has reduced natural dynamic beach and dune processes resulting in the elimination of much snowy plover habitat. Human developments of many types followed and human disturbance continues to increase. Crows, ravens, foxes and skunks have preyed on plover nests (ODFW 1994, TNC 2000). These combined factors contributed to the decline of the coastal sub-population (ODFW 1994).

To maintain snowy plover populations on the Oregon coast, concurrent actions were proposed to improve the habitat, reduce human disturbance, investigate methods of reducing predation, and undertake further research and surveys. Alleviating human disturbance and using predator exclosures at key breeding locales were the most immediate management tools at hand to assist

the low coastal populations. To enable recovery of the coastal population, habitat restoration that enhances both nesting and brood rearing is ongoing; habitat restoration reduces predator cover.

History of Snowy Plover Management

The USFWS, BLM, USFS, COE, ODFW, and OPRD have been working cooperatively along with TNC to manage snowy plover habitat, recreation impacts, and predation impacts on plovers since the early 1990s. Earlier efforts by ODFW and USFWS began in the early 1980s. Recovery efforts to deter predation have included: removing vegetation, erecting exclosures around plover nest sites, and removing non-native red fox at one site. However, predation will likely remain too high to recover the species.

The main efforts of snowy plover management, until 1994 (ODFW 1994), have been population surveys and research into nesting ecology, and control of off-road vehicles in nesting and foraging areas. Survey efforts began in 1972 (Hoffman 1972) and continue to present (Wickham 1981, Anderson and Main 1983, Wilson-Jacobs and Meslow 1984, Wollington 1984, Wilson-Jacobs and Dorsey 1985, Herman et al. 1988, Craig et al. 1992, Casler et al. 1993, ODFW 1994, Castelein et al. 2000).

The USFWS published management guidelines for the snowy plover for Washington, Oregon, California, and Nevada (USFWS 1984), listed the Pacific coast population as threatened in 1993 (USFWS 1993a), and designated critical habitat in 1999 (USFWS 1999). The USFWS is also preparing a Recovery Plan for the Pacific coast plover population with the assistance of the Western Snowy Plover Recovery Team. Management documents are in preparation or have been prepared for particular sites by the BLM, USFS, and OPRD. Many coastal habitat areas have been closed to vehicles in recent years by the OPRD (e.g., Coos Bay North Spit, Siltcoos and Sutton estuaries, and Tenmile Creek). In cooperation with USFS, BLM, and ODFW, OPRD has implemented temporary beach closures at known nesting sites since 1994 to protect the plovers from human disturbance.

1.4 Location and Scope of Analysis

Scattered reports from specific beaches prior to 1978 indicate that the Oregon coastal plover population was larger and more widely distributed. Breeding plovers historically were scattered along the sandy coastline and at river mouths (e.g., Salmon, Siuslaw, and Rogue).

Now most are concentrated in smaller groups at mouths of a few creeks and rivers and on dredged materials disposal sites.

This EA evaluates potential predator damage management that could occur at or around any or all active or potential breeding, nesting, or foraging sites along the Oregon coast. These currently include Sutton, Siltcoos, Overlook, Tahkenitch, Tenmile, Coos Bay North Spit, Bandon, New River, and Floras Lake. These sites are located on lands managed by the BLM, USFS, ODFW, OPRD, and COE, as well as some private lands. Current sites are located in Lane, Douglas, Coos, and Curry counties. Clatsop and Tillamook counties are also included in the scope of analysis because of new or historic nesting sites. For example, Bay Ocean Spit, a site managed by ODFW and COE in Tillamook County, is historic nesting site, and Necanicum Spit in Clatsop County may be a newly active site. Habitat in Lincoln county has also supported nesting and will be included in the analysis in case of future need. Figure 1 shows locations where snowy plovers currently nest or have recently nested.

This EA analyses various strategies (alternatives) and methods by which predator damage management could be carried out to protect the snowy plover from predation on and around nesting, breeding, foraging, and wintering grounds along the Oregon coast. The potential methods that may be used and the aspects of the human environment that could be affected are discussed in Chapters 2, 3 and 4. The primary predators included in the analysis include corvids (crows and ravens), red foxes, raccoons, and skunks. Secondary predators, or predators that are suspected, will be included in the analysis because they may be targeted if wildlife specialists determine that they threaten plovers. These include feral cats, coyotes, mink, opossum, weasels, gray fox, rats, raptors[2], gulls, and mice.

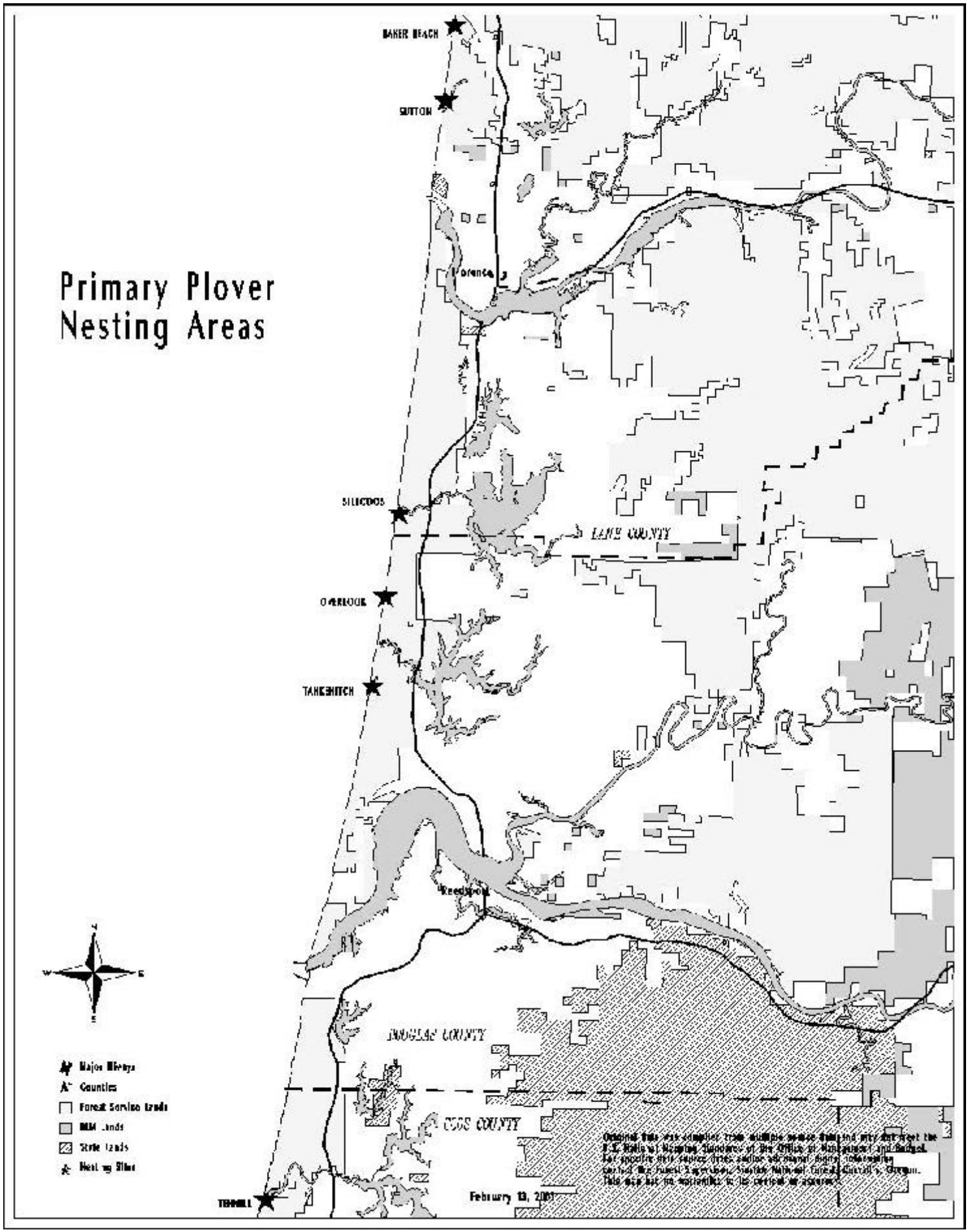
The need for action to protect the threatened snowy plover from predators will change as the population recovers. The pending recovery plan will determine snowy plover population levels and characteristics when protections of the ESA would no longer be necessary. Some level of predator damage management may be further needed for the foreseeable future to maintain plover populations at recovery goal numbers.

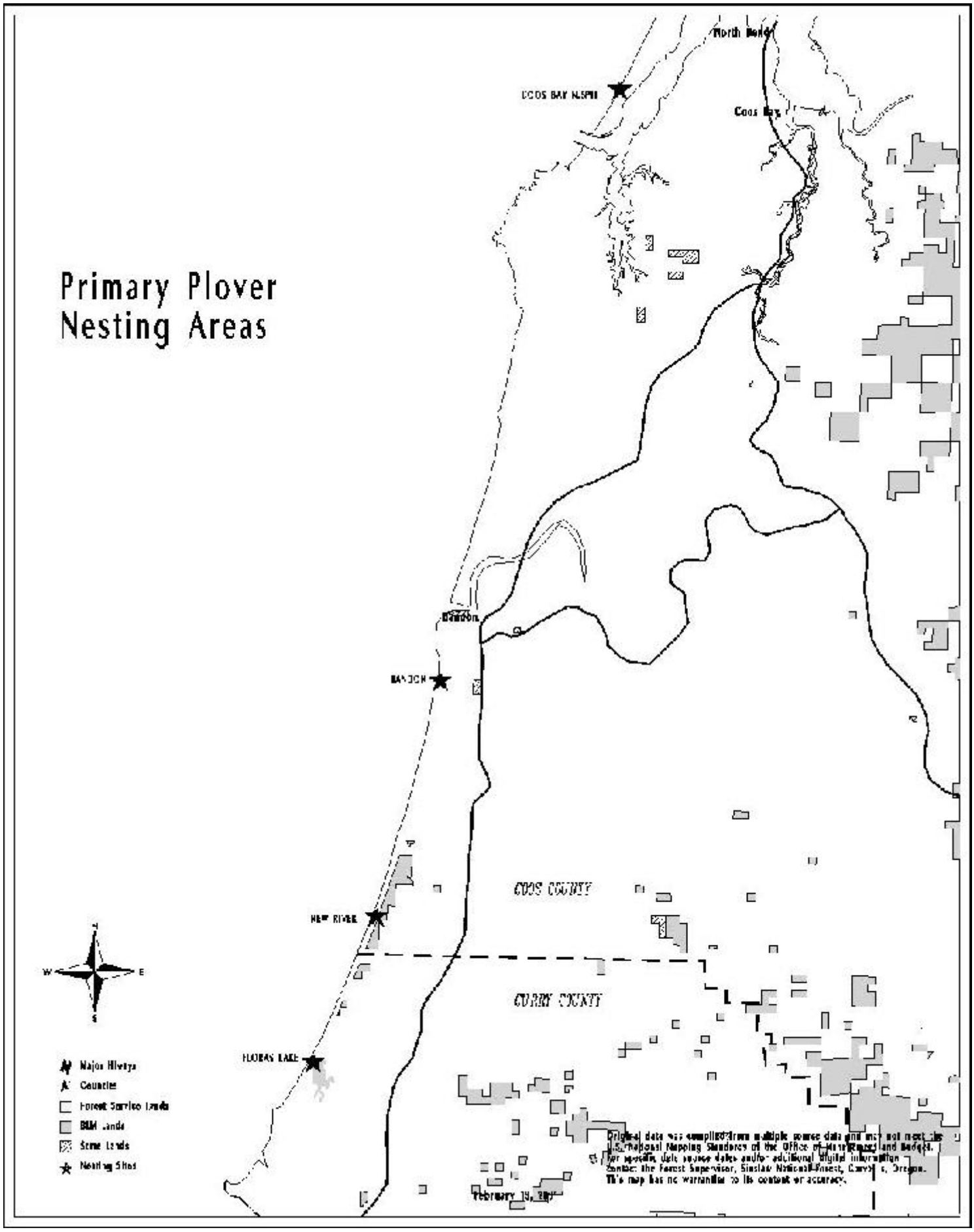
1.5 Related Snowy Plover Conservation Efforts

Some predator populations may have expanded due to habitat changes that favored them. The introduction of European beachgrass provides predators with more favorable habitat that

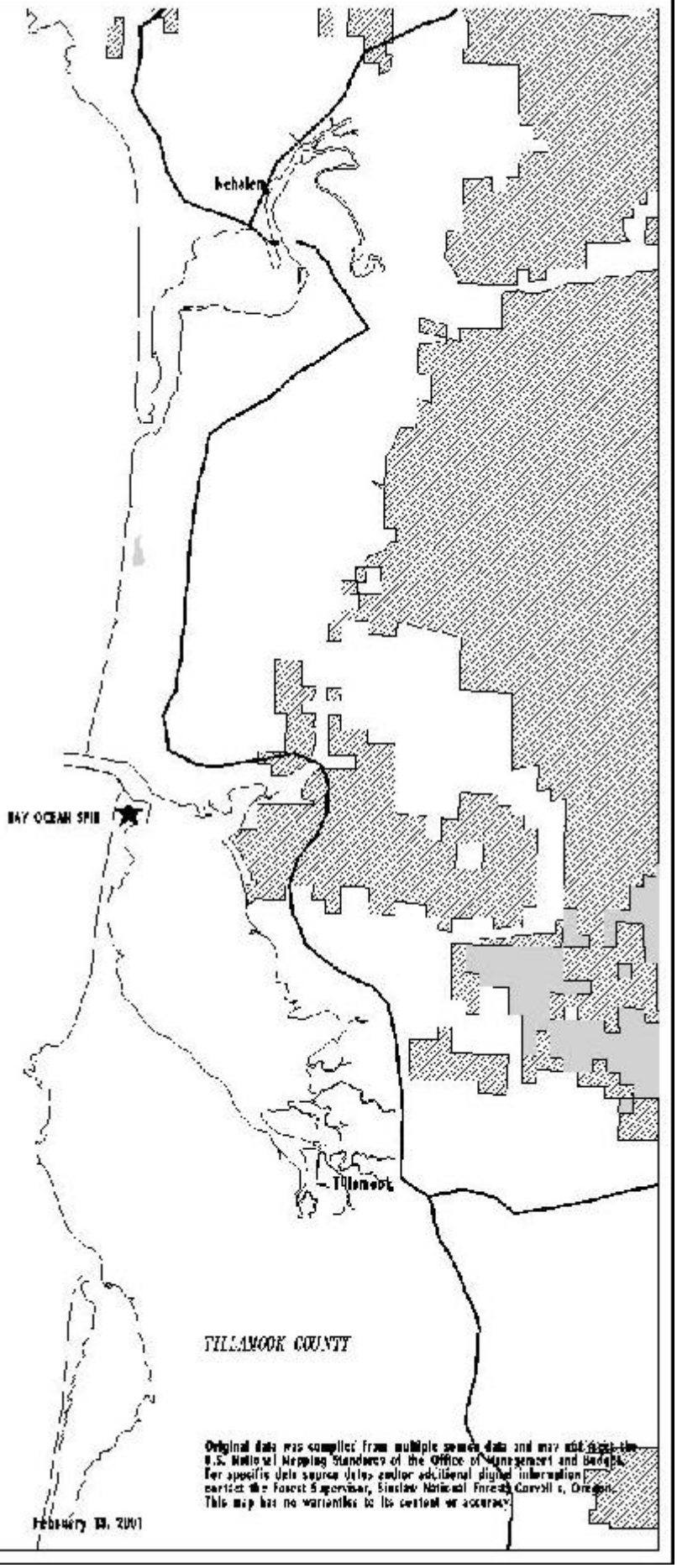
[2]/Only non-lethal damage management measures would be used on those raptors that are special status species, such as the American peregrine falcon.

previously was scarce. Therefore, land and resource management agencies have been removing beachgrass. Another plover recovery effort, recreation management, is conducted to protect breeding and nesting plovers from recreational impacts such as, vehicle use, direct human disturbance, dogs, horses, and other potential disturbances. Managing recreation in recovery areas will continue concurrently with predator damage management alternatives selected from this EA. Habitat improvement and recreation management are being handled by each of the land management agencies along with ODFW and OPRD, and are not part of the detailed analysis in this EA (see Related Environmental Documents in Section 1.7).

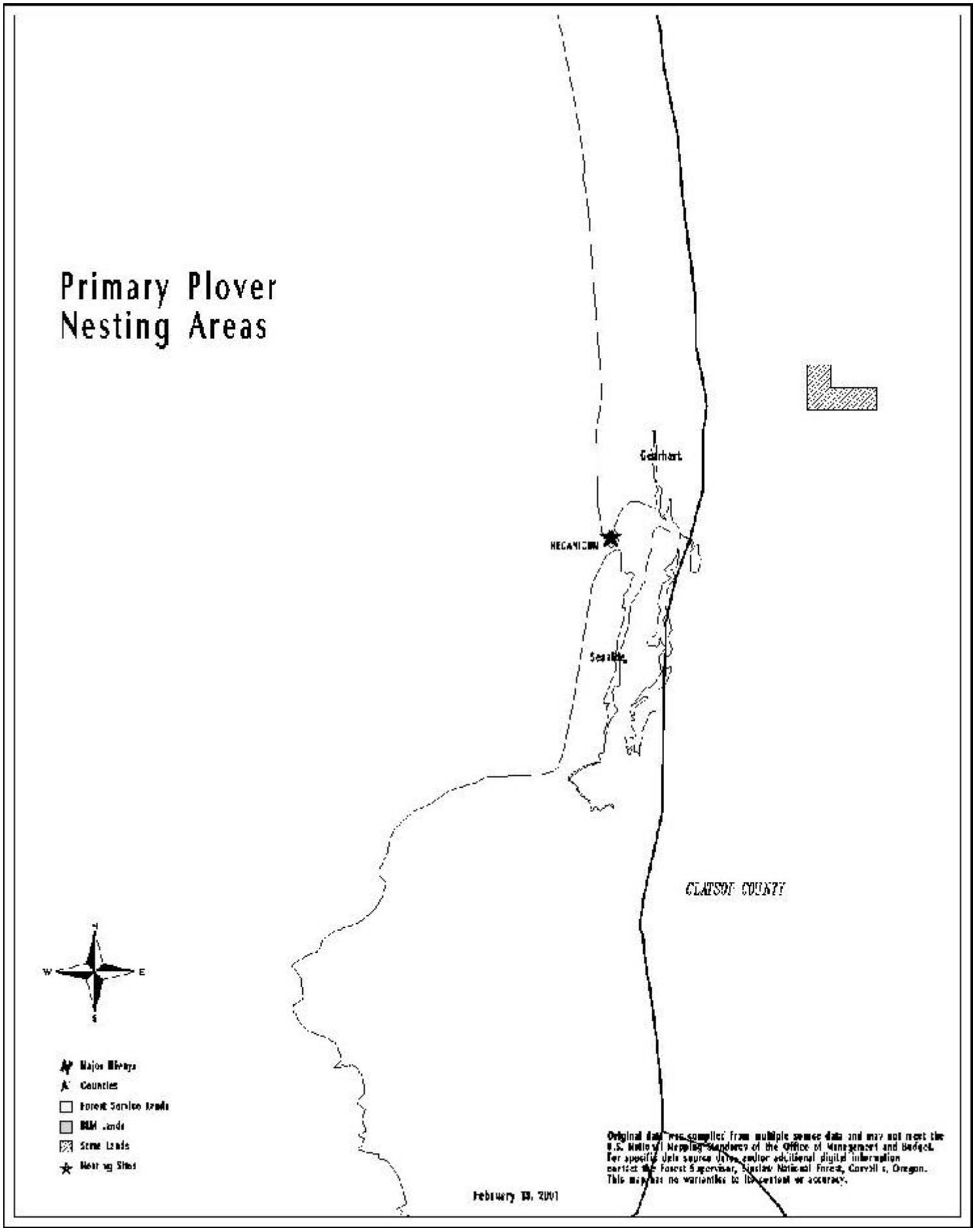

Primary Plover
Nesting Areas
BAKER BEACH
SUTTON
Florence
SILTCOOS
LANE COUNTY
OVERLOOK
TAHKENITCH
Reedsport
DOUGLAS COUNTY
COOS COUNTY
TENMILE
Major Rivers
Counties
Forest Service Lands
BLM Lands
State Lands
Nesting Sites
February 13, 2001


Primary Plover
Nesting Areas
North Bend
COOS BAY NSPH
Coos Bay
Bandon
BANDON
COOS COUNTY
NEW RIVER
CURRY COUNTY
FLORAS LAKE
Major Hiways
Counties
Forest Service Lands
BLM Lands
State Lands
Nesting Sites
February 19, 2007

Primary Plover Nesting Areas



Major Highways
Counties
Forest Service Lands
BLM Lands
State Lands
Nesting Sites


Primary Plover
Nesting Areas
Gearhart
HECANICUM
Seaside
CLATSOP COUNTY
N
W
E
S
Major Highways
Counties
Forest Service Lands
BLM Lands
State Lands
Nesting Sites
Original data was compiled from multiple source data and may not meet the U.S. National Mapping Standards of the Office of Management and Budget. For specific data source data, and/or additional digital information contact the Forest Supervisor, Siuslaw National Forest, Corvallis, Oregon. This map has no warranties to its content or accuracy.
February 13, 2001

The USFWS is preparing a Recovery Plan for the Pacific coast population of the western snowy plover. The Recovery Plan will provide objectives and specific recommendations to further enhance agency efforts and cooperation for snowy plover recovery. The USFWS anticipates publishing a draft of the Recovery Plan and requesting public review and comment in 2001. The recovery plan will incorporate predator damage management and other recovery efforts in a comprehensive multi-agency plan.

1.6 Summary of Public Involvement Efforts

Public participation in the National Environmental Policy Act (NEPA) process for this proposal was conducted consistent with the lead agencies' NEPA procedures. The public involvement and notification process is threefold:

1) Issues related to the proposed action were identified during interagency meetings and through a public outreach process. The public outreach included an information gathering phase wherein potentially interested groups or individuals were contacted (representing conservation groups, local citizens and citizen groups, land owners, land managers, technical experts, Tribal representatives, and government officials). Legal notices were posted in local newspapers covering the proposed project area. Legal notices inviting public participation in the development of the EA were published in the *Oregonian* (Oct. 18 and 19, 2000), *Siuslaw News* (Oct. 18 and 21, 2000), *Headlight Herald* (Oct. 18, 2000) and *The World* (Oct. 19 and 20). More than 150 letters describing the proposal and preliminary issues and alternatives and inviting public comment were sent to the public via FedEx® or US Postal Service (Oct. 18, 2000). A two week comment period was provided for initial public input. Five letters were received from groups and individuals interested in providing input for the development of this EA. The letters received were considered in this analysis and substantive and relevant information was incorporated into this document.

2) Legal notices were published during the week of May 28, 2001 in the Siuslaw News, Headlight Herald, Oregonian, the World, Corvallis Gazette, News Times, Cannon Beach Gazette, the Daily Astorian, and the Register Guard soliciting comments on this EA during a 30-day public comment period. All groups or individuals expressing interest during the public involvement periods were sent a copy of this predecisional EA for review and comment. All comments that are received by the due date (Monday, July 2, 2001) will be considered prior to making a decision.

3) After all public comments have been evaluated and considered, the lead agencies expect to finalize the EA and release a decision. Groups and individuals submitting comments will receive a notice of the decision.

1.7 Related Environmental Documents

USDI, The USFWS Final Rule (1993). 50 Code of Federal Regulations (CFR) Part 17, Federal Register March 5, 1993. The final rule determining the threatened status of the Pacific coast population of the western snowy plover was published in the Federal Register on March 5, 1993. The complete rule is contained in Appendix A.

USDI, The USFWS Final Rule (1999). 50 Code of Federal Regulations (CFR) Part 17, Federal Register December 7, 1999. This final rule designated critical habitat for the Pacific coast population of the western snowy plover.

USDI, BLM, Coos Bay District. Final New River Area of Critical Environmental Concern (ACEC) Management Plan, May 1995. This plan provides multiple resource management guidelines, including recovery of western snowy plover, for the New River ACEC.

USDI, BLM, Coos Bay District. Coos Bay Shorelands Final Management Plan, September 1995. Provides guidance for snowy plover recovery at the Coos Bay Shorelands.

ODFW Draft Predator Management Policy. The draft predator management policy provides guidance for procedures required before implementation of predator management, special situations that may warrant predator management, and guidance for cooperation with predator management actions by other agencies. Any action implemented as the result of this analysis will conform with the ODFW draft or final predator management policy.

APHIS-WS EA for Wildlife Damage Management in the Northwest and Roseburg Districts. The APHIS-WS Roseburg and Northwest District offices prepared EAs for ongoing predator damage management programs in southwestern and northwestern Oregon (including counties in the analysis area of this EA) (USDA 1995, USDA 1997b). General discussions about impacts on predator populations, APHIS-WS responsibilities, guidance, decision-making procedures, and restrictions for various management tools apply to this EA, and therefore are incorporated by reference. Local and cumulative impacts were assessed for red and gray fox, raccoon, striped and spotted skunk, raven, and other predators to reduce predation.

ADC Programmatic Environmental Impact Statement (EIS). APHIS-WS (formerly called Animal Damage Control) issued a Final EIS on the national APHIS-WS program (USDA 1997a, revised). Pertinent and current information available in the EIS has been incorporated by reference into this EA.

National Forest Land and Resource Management Plans (LRMPs). The National Forest Management Act requires that each National Forest prepare a LRMP for guiding long range management and direction. The decisions made from this document will be consistent with the Siuslaw National Forest LRMP. The Siuslaw National Forest LRMP contains standards and guidelines developed in accordance with recommendations from USFWS's management guidelines and ODFW's management plan for the snowy plover. Any decisions resulting form this EA would conform with the standards and guidelines set forth in the Siuslaw National Forest LRMP.

Siuslaw National Forest Record of Decision and Final EIS - Dunes Management Plan, Oregon Dunes National Recreation Area (NRA), July 1994. The Record of Decision defines the selected alternative approving the Oregon Dunes NRA Management Plan. The EIS that evaluated the plan was developed under the National Forest Management Act and its associated implementing regulations, and satisfied the requirements of the NEPA of 1969, and Council of Environmental Quality (CEQ) regulations. The Dunes Plan provides the USFS with direction for management emphasis and guidelines including snowy plover habitat management. Any decisions resulting from the analysis in this EA must conform with management decisions set forth in the Record of Decision for the Dunes Management Plan. The Record of Decision adopted the preferred alternative which would reduce public use in snowy plover breeding habitat. This was intended, in part, to reduce predation on plovers in closed areas because some predators are attracted by edible refuse left by humans. The proposed alternative adopted a staged approach to reduce human disturbance to critical nesting, foraging and wintering snowy plover habitat, by stating:

> *Education and voluntary compliance will be the first step, and actions will become increasingly restrictive (if necessary) to eventually include mandatory closure and perhaps removal of developed access and facilities. These actions will be focused primarily around Tenmile, Tahkenitch, and Siltcoos estuaries.*

Master Memorandum of Understanding (MOU) between the APHIS and the USFS. The MOU specifies that all animal damage management programs on National Forest System lands be coordinated with appropriate state and Federal agencies prior to implementation of programs. APHIS-WS shall develop and update animal damage management work plans annually in cooperation with the USFS and other appropriate agencies. Human safety zones

and other areas where mitigation or restrictions may be needed to comply with LRMPs will be identified.

BLM Resource Management Plan (RMP). The BLM currently uses RMPs to guide management on lands it administers. Any decisions made as a result of this EA process will be consistent with guidance in the Coos Bay District Record of Decision and RMP, May 1995.

Master MOU between APHIS and BLM. The MOU specifies that all animal damage management programs on BLM lands will be coordinated with appropriate state and Federal agencies prior to implementation of the programs. APHIS-WS shall develop and update animal damage management work plans annually in cooperation with the BLM and other appropriate agencies. Human safety zones and other areas where mitigation or restrictions may be needed to comply with RMPs will be identified.

ODFW-Final Oregon Conservation Program for the Western Snowy Plover, March 1994. This document was approved by ODFW as a recovery plan for snowy plovers under the Oregon ESA. The Oregon Snowy Plover Conservation Program contains specific information on snowy plovers and their habitats, proposes a variety of actions to protect this species and recommends acquisition of additional information to direct and refine actions to maintain and recover their subpopulations in Oregon.

USFWS, Region 1, Portland, Oregon, in cooperation with the Pacific Coast Western Snowy Plover Recovery Team, Western Snowy Plover Pacific Coast Population Recovery Plan (in Preparation). The recovery plan is currently under development. When it is finalized, the plan will provide recommended recovery actions for the threatened Pacific coast population of the western snowy plover in California, Oregon and Washington. The ultimate and primary objective of a recovery plan is to remove the species from the List of Endangered and Threatened Wildlife and Plants. The plan will include recovery criteria, which may affect the objectives of this EA by providing more specific guidelines. If the final recovery plan presents objectives or recommended actions related to predator damage management that differ substantially from this EA, this EA may require modification.

1.8 Authority and Compliance

Based on agency relationships, missions, and legislative mandates, the USFWS, BLM, and USFS are the "lead agencies" and "decision makers" for this EA, and therefore responsible for the EA's scope, content, and outcome. As cooperating agencies, the ODFW, OPRD, and

APHIS-WS provided input to this EA and will provide advice and recommendations to the lead agencies on when, where, and how predator damage management could be conducted.

1.8.1 Authority of Federal and State agencies in wildlife damage management and endangered species protection

USFWS. The USFWS is charged with implementation and enforcement of the ESA of 1973, as amended and with developing recovery plans for listed species. The USFWS cooperated with the USFS, BLM, COE, APHIS-WS, ODFW, and OPRD by recommending measures to promote the recovery of T&E species. The USFWS also makes recommendations to avoid or minimize take of T&E species. The term "take" is defined by the ESA (section 3(19)) as " harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct." The terms "harass" and "harm" have been further defined by USFWS regulations (50 CFR section 17.3) as: 1) harass is the intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering; 2) harm is an act which actually kills or injures wildlife. Such acts may include significant habitat modification or degradation when it actually kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering.

APHIS-WS. APHIS-WS is subject to the ESA which requires Federal agencies to use their authorities to conserve T&E species. The primary statutory authorities for the APHIS-WS program are the Animal Damage Control Act of 1931, and the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988 which authorize APHIS-WS to reduce damage caused by wildlife, in cooperation with other agencies.

ODFW. The ODFW has the responsibility to manage all protected and classified wildlife in Oregon, regardless of the land class on which the animals are found (Oregon Revised Statues (ORS) 496.012, 496.118). ODFW is also authorized to cooperate with APHIS-WS and the Oregon Department of Agriculture (ODA) for controlling predatory animals (ORS 610.020). Oregon State law allows a landowner or lawful occupant to take any red fox that is causing damage without first obtaining a permit from ODFW (ORS 610.105). The law, however, does require the landowner to notify ODFW of the methods used, and species and number of animals taken.

USFS and BLM. The USFS and BLM have the responsibility to manage Federal lands under their jurisdiction for multiple uses including livestock grazing, timber production, recreation, and wildlife habitat, while recognizing the state's authority to manage wildlife. Both the USFS and BLM recognize the importance of managing wildlife damage on lands and resources under their jurisdiction, as integrated with their multiple use responsibilities.

USFS. The USFS is subject to the ESA which requires Federal agencies to use their authorities to conserve T&E species. Under the Animal Damage Control Act of 1931, as amended, (7 U.S.C. 426-426c), the USFS and APHIS-WS, along with the USFWS and state agencies, cooperate to reduce wildlife damage on National Forest System lands to protect T&E species.

BLM. The BLM is subject to the ESA which requires Federal agencies to use their authorities to conserve T&E species. Under the Animal Damage Control Act of 1931, as amended, (7 U.S.C. 426-426c), BLM and APHIS-WS, along with the USFWS and state agencies, cooperate to manage animal damage on BLM lands to protect T&E species.

COE. The COE is subject to the ESA which requires Federal agencies to use their authorities to conserve T&E species. In the proposed project, the COE agrees to cooperate with the USFWS, and cooperating agencies if necessary, to reduce predation on snowy plovers.

OPRD. The OPRD administers the 1967 Beach Bill which designated Oregon's beaches as a State recreation area. Under statutory authority, OPRD has jurisdiction on the ocean shore and manages public use of Oregon's 362 miles of shoreline. OPRD regulates the following activities on the ocean shore: improvements, alterations, cables, and pipelines: natural product removal; motor vehicle access/use and public recreational use.

1.8.2 Compliance with Federal laws

Several Federal laws regulate wildlife damage management. The USFWS, BLM, USFS, COE, and APHIS-WS comply with these laws, and consult and cooperate with other agencies as appropriate. The following Federal laws are relevant to the actions considered in this EA:

NEPA. Environmental documents pursuant to NEPA must be completed before actions can be implemented. NEPA requires that Federal actions be evaluated for environmental impacts, that these impacts be considered by the decision maker(s) prior to implementation, and that the public be informed.

This EA has been prepared in compliance with NEPA (42 USC Section 4231, et seq.,); the President's CEQ Regulations, 40 CFR Section 1500 - 1508; Forest Service Handbook 1909.15 - Environmental Policy and Procedures Handbook, Forest Service Handbook 1909.15 - Environmental Policy and Procedures Handbook, Chapter 40 - Environmental Assessment and Related Documents; BLM Handbook H 1790-1 National Environmental Policy Act Handbook; and Department of the Interior's Departmental Manual (DM) for NEPA compliance, Fish and Wildlife Service (516 DM 6).

ESA. It is Federal policy, under the ESA, that all Federal agencies shall seek to conserve endangered and threatened species and shall utilize their authorities in furtherance of the purposes of the ESA (Sec.2(c)). Section 7 consultations with the USFWS are conducted to use the expertise of the USFWS to ensure that "any action authorized, funded, or carried out by such an agency . . . is not likely to jeopardize the continued existence of any endangered or threatened species. Each agency shall use the best scientific and commercial data available" (Sec.7(a)(2))

The USFWS will complete consultation pursuant to Section 7 of the ESA regarding the effects of predator damage management on the Pacific coast population of the western snowy plover and other Federally listed species in the area. The full results of the evaluation will be contained in the final EA. Related compliance is discussed under Chapter 4, Environmental Consequences.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). FIFRA requires the registration, classification, and regulation of all pesticides used in the United States. The Environmental Protection Agency (EPA) is responsible for implementing and enforcing FIFRA. All chemical methods integrated into any selected program as implemented by APHIS-WS or other cooperating agencies must be registered with and regulated by the EPA and the ODA, and used in compliance with labeling procedures and requirements.

Migratory Bird Treaty Act. The Migratory Bird Treaty Act provides the USFWS regulatory authority to protect species of birds that migrate outside the United States. Individuals of these species that do not migrate outside of the United States are also

protected. All cooperating agencies coordinate with the USFWS on migratory bird issues. If any migratory birds are found to be preying on plovers, the agencies would request a permit from USFWS under the Migratory Bird Treaty Act to "take" these species, if lethal control is determined to be necessary. A depredation order for crows "*...when found committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in a manner as to constitute a health hazard*" is not required (50 CFR 21.43). The USFWS Office of Migratory Bird Management, Pacific Regional Office, requires notification prior to use of chemical substances for control of migratory birds.

USFS Organic Act, Multiple-Use Sustained-Yield Act, Federal Land Policy and Management Act, and the National Forest Management Act. These statutes provide the USFS with direction to rely upon its expertise to manage the lands under its in a manner deemed to best meet the purposes Congress has delineated, including providing for the long-term sustainability of all of the forests' many natural resources, including the diversity of species that inhabit them. They call for interdisciplinary planning, coordinated among agencies, and based on the best available science.

Animal Damage Control Act and the Rural Development, Agriculture, and Related Agencies Appropriations Act. The Acts authorize and direct APHIS-WS to reduce damage caused by wildlife in cooperation with other agencies.

BLM and USFS receive additional direction through biological opinions (BO) issued by USFWS pertaining to management of plover nesting areas on their lands.

Coastal Zone Management Act of 1972. All Federally conducted or supported activities directly affecting the coastal zone must be undertaken in a manner consistent to the maximum extent practicable with approved State coastal management programs.

Protection of Children from Environmental Health and Safety Risks (EO13045). Children may suffer disproportionately from environmental health and safety risks for many reasons. Predator damage management as proposed in this EA would only involve legally available and approved damage management methods in situations or under circumstances where it is highly unlikely that children would be adversely affected. Therefore, implementation of the proposed action would not increase environmental health or safety risks to children.

Invasive Species (EO 13112). The Invasive Species Executive Order directs Federal agencies to use their programs and authorities to prevent the spread or to

control populations of invasive species that cause economic or environmental harm, or harm to human health.

Migratory Birds (EO 13186). EO 13186 directs Federal agencies to use their programs and authorities to enter into a Memorandum of Understanding with the USFWS outlining how the agency will promote conservation of migratory birds. Other activities called fro include incorporating bird conservation considerations into agency planning, including NEPA analyses, reporting annually on the level of take of migratory birds, and generally promoting the conservation of migratory birds without compromising the agency mission.

1.8.3 Oregon State laws

ODFW - Wildlife Policy (ORS 496.012). It is the policy of the State of Oregon that wildlife be managed to prevent serious depletion of any indigenous species and to provide the optimum recreational and aesthetic benefits for present and future generations of the State. Included in this wildlife policy is maintaining all species of wildlife at optimum levels.

Oregon Administrative Rules (OAR) for Park Areas and Ocean Shore State Recreation Areas (OAR 736-10-0055 and OAR-736-21-0100 and 0110). OARs prohibit harassment, trapping, hunting or shooting of wildlife and the discharge of firearms in Oregon State Parks and anywhere on the ocean shore. Any such Federal activity necessary to implement predator damage management to protect the snowy plover would require a Miscellaneous Use Permit for Nontraditional Park Activities from OPRD.

ORS 390.660 Regulation of Use of Lands Adjoining the Ocean Shores. The Statute directs OPRD to protect, maintain, and promulgate rules governing the use of ocean shore.

CHAPTER 2: DESCRIPTION OF ALTERNATIVES

2.1 Alternative 1 - Proposed Action - Integrated Predator Damage Management

The proposed action would implement an integrated predator damage management program that first identifies individuals or groups of plover predators. After identification, the most effective, selective, and humane tools available would be used to deter or remove the species that threaten nesting, breeding, or foraging snowy plovers. Predator damage management is based on interagency relationships, which require close coordination and cooperation because of overlapping authorities and legal mandates. The lead agencies, in consultation with ODFW and OPRD, may request that APHIS-WS conduct direct damage management to protect the snowy plovers. The lead agencies may also take action themselves. Upon positive determination of the predator species that threaten plovers in each case, the following tools would be available:

Non-lethal tools could include any or all of the following depending upon the circumstances: increased or improved trash management, relocation of live trapped animals; aversive methods that harass or deter predators such as pyrotechnics, electronic calls, repellants, or effigies; or electrified or non-electrified exclusionary nest site fencing and electric wired perches (Table 2). Beachgrass removal to improve plover habitat is underway but is not part of this analysis.

Lethal tools could include any or all of the following depending upon field circumstances: shooting; euthanasia in conjunction with cage traps, padded-jaw, leg-hold traps (soft-catch), or nets; snares; denning; DRC-1339 (avicide); egg oiling; snap traps; or zinc phosphide bait (rodenticide) (Table 2).

Damage management would be directed toward individual problem red foxes, ravens, crows, skunks, and raccoons. ODFW (1994) has also identified California gulls and black rats responsible for predation on Oregon coast snowy plovers. Feral cats, coyotes, mink, opossum, weasels, gray fox, rats and mice, gulls, or raptors that are found to pose a threat to plovers could also be targeted with lethal and/or non-lethal methods.

Table 2. Available Management Methods for Proposed Action

Control Method	Fox	Raccoon	Striped Skunk	Opossum	Feral cat	Mink/ Weasel	Coyote	Mice/ Rats	Raven /Crow	Gull	Raptor
Non-lethal methods											
Electric wired perches									✔	✔	✔
Plover nest exclosures	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔
Feral cat management education					✔						
Trash mgmt./ clean-up	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Methiocarb (egg bait)[3]									✔	✔	
Hazing - pyrotechnics, exploders									✔	✔	✔
Distress - alarm calls							✔		✔	✔	✔
Patrolling, visual or auditory effigies									✔	✔	✔
Live trap and relocation[4]	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

[3]/ These are conditioning agents that make birds sick resulting in their avoidance of areas with treated baits.

[4]/ Feral cats may be live trapped and transported to nearby animal shelters for adoption or euthanasia. Relocation of other species must be approved by ODFW. ODFW does not generally favor relocation because it does not consider relocation to be humane, and because of concerns with parasites and disease.

Control Method	Fox	Raccoon	Striped Skunk	Opossum	Feral cat	Mink/ Weasel	Coyote	Mice/ Rats	Raven /Crow	Gull	Raptor
Lethal Control Methods[5]											
Leg-hold traps	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔
Snap traps								✔			
Cage traps (and euthanasia)	✔	✔	✔	✔	✔	✔					
Neck/body snares	✔	✔	✔	✔	✔		✔				
Foot snares	✔	✔									✔
Destroy nests or eggs, or egg oiling									✔	✔	
DRC-1339 (avicide)									✔	✔	
Zinc phosphide								✔			
Shooting	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Denning (gas cartridge	✔ Red fox						✔				

Each of the damage management methods listed in Table 2 is described in detail in Appendix B. Animals that are trapped live and intended to be killed are euthanized by either lethal injection (sodium phenobarbital), shooting, or CO or CO_2 gas. *While the methods proposed in Table 2 are all methods that could be used, not all of the methods would be likely to be used in*

[5]/ Only non-lethal damage control measures would be used on those raptors found to threaten plovers and that are rare special status species, such as the American peregrine falcon.

each site where work could occur, since different circumstances would render some tools more appropriate than others. See the discussion below under "Decision Model (Slate et al. 1992) (Figure 2) and "Work Plans" which describe how appropriate methods would be identified in a work plan prior to any work being done.

The proposed action would employ wildlife specialists that use sign, sightings, and specialized methods to locate, study, deter, or capture and dispatch or release the target predators. Predators would be removed if the wildlife specialist in the field determines, on a case-by-case basis, that the predator is a threat to snowy plovers. If any traps, snares, or toxicants are used, conspicuous, bilingual warning signs alerting people to the presence of traps and snares would be placed at major access points.

Work Plans

Before any wildlife damage management is conducted pursuant to this proposal, Agreements for Control Work Plans or other comparable documents would be developed by the lead and cooperating agencies as appropriate. Wildlife damage management activities would only be conducted after the agreements, work plans or other comparable documents are developed. No lethal wildlife damage management would be conducted in areas during periods known to receive intense human use, or those with legal or policy restrictions that preclude the proposed activities. Work plans developed as a result of this EA would be renewed annually, or when work is requested, and must be consistent with the NEPA decision resulting from this EA.

Work Plans will describe the wildlife damage management that would occur. During the planning process plans and maps would be prepared which describe and delineate where wildlife damage management would be conducted, which species would be targeted, the methods to be used, and mitigation that would be applied.

Use of a Decision Model for Implementing Damage Management

The Decision Model (Slate et al. 1992) is adopted from the APHIS-WS decision making process which is a standardized procedure for evaluating and responding to damage complaints.

After consultation with the lead and cooperating agencies, the agency implementing the action would use a formalized Decision Model (Slate et al. 1992) (Figure 2) to determine the site-specific procedure for individual actions, in accordance with guidelines described in this EA. The Decision Model is used to determine the most appropriate implementation strategy to resolve predator damage.

Agency personnel would evaluate the appropriateness of strategies, and methods are evaluated in the context of their availability (legal and administrative) and suitability based on biological, economic and social considerations. Following this evaluation, the methods deemed to be practical for the situation from the basis of a management strategy. After the management strategy has been implemented, monitoring is conducted and evaluation continues to assess the effectiveness of the strategy. If the strategy is effective, the need for management is ended in that particular case, records are kept and reported to the appropriate wildlife management agencies. This proposal would implement safe and practical methods for the prevention and control of damage caused by predators, based on local problem analysis, environmental and social factors, and the informed judgement of trained personnel.

An effective program requires that site specific consideration of the many variables listed above be given to allow the wildlife specialist to select and implement the most appropriate technique to resolve each unique damage situation. Flexibility in the management approach is important because of the high variability found in the natural environment.

In selecting management techniques for specific damage situations, consideration is given to:

- magnitude of the threat;
- geographic extent of threat;
- time of year;
- life cycle of the snowy plover;
- vulnerability to each predator species;
- other land uses (such as proximity to recreational or residential areas);
- feasibility of implementation of the various allowed techniques;
- movement patterns and life cycle of the predator;
- status of target and non-target species (such as protected or endangered);
- local environmental conditions such as terrain, vegetation, and weather;
- presence of people and their pets;

- presence of trash that could attract predators;
- potential legal restrictions such as availability of tools or management methods;
- humaneness of the available options[6]; and
- costs of control options (the cost of control in this proposal may be a secondary concern because of overriding environmental and legal considerations).

Monitoring

Since 1990, the Oregon Natural Heritage program of TNC has completed intensive surveys for snowy plovers at nesting areas between Florence and Bandon/Floras Lake.

Program monitoring. The lead agencies, as needed, in coordination with the cooperating agencies, would monitor any program that results from this EA and report those results annually. The impacts discussed in this EA would be monitored and used in two ways:

1) determine if any additional information that arises subsequent to the NEPA decision would trigger the need for additional NEPA analysis compliance. The lead agencies would review program results and the EA annually, or as needed, to ensure that the need for action, issues identified, alternatives, regulatory framework, and environmental consequences are consistent with this EA.

2) if work plans for different plover sites need modification based on the findings of the program's effects on plover or other environmental issues. APHIS-WS, in coordination with ODFW and the land management agencies, would monitor impacts on target predator populations through its Management Information System (MIS) database, when APHIS-WS is involved in direct damage management. The MIS information would be used to assess the localized and cumulative impacts of the program on predator populations. Monitoring of the effectiveness of the actions would be done by the land management agencies in coordination

[6]/ The lead and cooperating agencies regard humane methods of predator damage management (including the use of lethal methods where allowed) to be those that cause the least pain, suffering, or injury to individual animals under the circumstances. Predator damage management would be accomplished only to the extent necessary to meet defined objectives, such as, aiding plover recovery by reducing predation.

with USFWS and APHIS-WS to determine if the program is benefitting plovers or if changes are needed. The lead agencies would use the results of monitoring to develop site specific work plans (annually or as needed) for plover sites, in cooperation with USFWS, ODFW, OPRD and APHIS-WS.

2.2 Alternative 2 - Current Program (No Action Alternative)

This alternative would not change the status quo. No action, in this case, means limited Federal action, which is consistent with the CEQ's definition and requirement for a "no action" alternative. This alternative consists of efforts that are now being made such as erecting nest exclosures to protect nesting plovers and their eggs, some predation assessment and assessing plover distribution and nesting successes. Trash management activities include removal and beach cleanup. An experimental predator removal program was implemented for one season in 1999, but would not continue under the current program. No predators would be removed under this alternative. Removing beachgrass to reduce cover for predators will be ongoing but is not within the scope of this analysis. This alternative also includes monitoring the effectiveness of current predator damage management efforts. Under the "no action alternative", the Federal lead and cooperating agencies would not take any *additional* action to prevent predation on snowy plovers over the current effort.

2.3 Alternative 3 - Non-lethal Predation Damage Management Methods Only

This alternative would allow only non-lethal methods to prevent or deter predation. Any or all of the non-lethal efforts listed under the proposed action could be used (Table 2).

Alternative 3 was developed to address concerns for the welfare of individual animals. Although individual animals may be harassed or relocated, they would not be killed. The site-specific decision-making process is similar to Alternative 1; and only non-lethal methods would be considered and applied. Evaluating potential and actual predation events, and monitoring the effectiveness of predator damage management would also be included in this alternative.

2.4 Alternative 4 - Non-lethal Predation Damage Management Methods Before Lethal Damage Management Methods

This alternative would require that non-lethal methods be used first, and lethal methods only be used if non-lethal methods were tried and found to be ineffective or not practical. Any or all of the non-lethal methods listed under the proposed action alternative could be used, and in theory, any or all of the lethal methods could also be used after non-lethal methods were tried.

The site-specific decision-making process discussed under Alternative 1 would be used with the condition that non-lethal methods would always be used as a first priority regardless of effectiveness. Evaluating predator threats and monitoring the effectiveness and impacts of predator damage management efforts would also be included in this alternative.

CHAPTER 3 - ISSUES IMPORTANT TO THE ANALYSIS OF IMPACTS

3.1 Issues Driving the Analysis

The EA emphasizes relevant issues as they relate to specific areas whenever possible; however, many issues generally apply wherever wildlife damage and resulting management occur, and are treated as such. The USFWS, BLM, and USFS, and the cooperating agencies, determined through interagency consultation and through the initial public involvement that the following issues should be considered in the decision making process for this EA to help compare the impacts of the various alternatives management strategies:

- How effective might the various alternatives be in protecting the snowy plover from predation? How do they compare in meeting the objectives of the proposal? What is the anticipated response of plover populations to the different predator damage management alternatives?

- What would be the impacts on predator populations? How would the management strategies affect local or regional populations of red fox, ravens, crows and other predators?

- What potential non-target affects could occur by implementing the various alternatives? Would any of the strategies adversely affect human safety or pets?

- How do the public and technical experts perceive the humaneness of the various lethal and non-lethal methods?

- What would be the affects of conducting predator damage management on recreational opportunities.

- What would be the direct, indirect, cumulative impacts of the proposal?

3.2 Issues Not Analyzed in Detail with Rationale

- **Impacts on aesthetic values of wildlife** - Predator damage management to protect the snowy plover would have little impact on the public's opportunity to view wildlife because most plover sites are remotely located and if accessible,

the public is discouraged from accessing them to avoid disturbing plovers. In addition, compared to their populations, very few individual predators would be removed. In the long term, predator damage management efforts, if effective in preventing predation and the resultant plover declines, may enhance the chances for the public to view plovers.

! **Impacts on biodiversity** - No wildlife damage management would be conducted to eradicate native or indigenous wildlife populations, or exotic (introduced) species. The impacts on biodiversity from predator damage management have been determined not to be significant nationwide, Statewide, or in Western Oregon (USDA 1995, 1997a revised, 1997b). The number of individual animals that may be taken is a small number of the total population as analyzed in Chapter 4.

! **Impacts on minority and low income persons or populations (Environmental Justice and Executive Order 12898**) - EO 12898 requires Federal agencies to make Environmental Justice part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of Federal programs, policies and activities on minority and low-income persons or populations. All of the BLM, USFS, USFWS and APHIS-WS activities are evaluated for their impact on the human environment and compliance with EO 12898 to ensure Environmental Justice. Because there are no minority or low-income populations within the proposed project areas, and because the management methods proposed would not pose significant risk to humans or their environment, it is not anticipated that the proposed action would result in any adverse or disproportionate environmental impacts to minority and low-income persons or populations.

! **Mesopredator release** (in the absence of large predators, smaller predators such as foxes, raccoons and skunks, can become more abundant, thus increasing predation on plovers). While the phenomena of mesopredator release has been documented in the absence of larger predators, this phenomena would not likely result from the proposed predator damage management efforts. Only a minor portion of the predator population would be removed, to protect plovers, and immigration and natural reproduction contribute to repopulation of areas where predators have been removed.

! **Other resources** - The actions discussed in this EA involve minimal ground disturbance or construction, other than erecting nest exclosures. Therefore, the

following resource values are either not affected, or are not expected to be significantly affected by any of the alternatives analyzed: soils, geology, minerals, water quality/quantity, flood plains, wetlands, air quality, prime and unique farmlands, aquatic resources, vegetation, or cultural resources. There are no significant irreversible or irretrievable commitments of resources. These resources will not be analyzed further.

3.3 Evaluation Methodology

Each major issue will be evaluated under each alternative and the direct, indirect and cumulative impacts will be estimated where applicable. NEPA describes the elements that determine whether or not an impact is "significant." Significance is dependent upon the context and intensity of the impact. The following factors were considered to evaluate the significance of the impacts on target predator populations in this EA that relate to context and intensity (adapted from USDA (1995) for this proposal)

- **magnitude of the impact** (size, number, or relative amount of impact) (intensity) - The "magnitude" analysis for this EA follows the process described in USDA (1995). Magnitude is defined in USDA (1995) as ". . . a measure of the number of animals killed in relation to their abundance." Quantitative analysis is used wherever possible as it is more rigorous and is based on allowable harvest levels and the best available population estimates. Qualitative analysis is based on population trends and modeling. Magnitude may be determined either quantitatively or qualitatively;

- **duration and frequency of the impact** (temporary, seasonal impact, year round or ongoing) (intensity);

- **likelihood of the impact** (intensity);

- **geographic extent** (limited to the immediate project area(s), coastal counties, the State of Oregon or beyond) (context); and

- the **legal status** of a species that may be removed, or **conformance with regulations and policies** that protect the resource in question (context).

The target species were selected because they are snowy plover predators that could be removed or deterred to help protect plovers from further decline due to predation. The analysis in Chapter 4 uses the lowest density estimates for target predator species populations (where high and low population density estimates are provided in the text) to arrive at the most conservative impact estimate.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

Chapter 4 provides information needed for making informed decisions on the predator damage management objectives identified in Chapter 1. This chapter uses the issues identified in Chapter 3 as the evaluation criteria. Each of the issues will be analyzed for its environmental consequences under each alternative.

Cumulative impacts are discussed in relationship to each of the key species analyzed in this EA and at the end of this chapter. The smallest unit of analysis for cumulative impacts on target species is the county level. Thus, coastal counties were used as the "analysis area." Indirect impacts are discussed in the environmental consequences section where applicable.

Impacts on predator populations are analyzed so that a potential "worst case scenario" is presented for the number of predators that may be removed annually. The highest estimated "take" was determined from an estimated range of predators or predator sign observed without the use of additional non-lethal methods at each site. The high estimated "take" was then calculated from the lowest density population estimate that was provided. The estimated adverse effect was calculated this way to err on the conservative side, or to show what the highest impact might be on predator populations, even though this impact is not likely. *For the foreseeable future, the actual impact would probably be lower than what is estimated in this EA for several reasons*:

- it is not likely that all sites would be worked each year because of resource or other limitations;
- fewer predators may be removed than the highest estimate that was used;
- non-lethal methods would likely reduce the need to lethally remove as many predators, for example, improving trash management would likely reduce the number of corvids attracted to a site; and
- the population densities in the coastal counties analysis area may be higher than the lowest density estimates that are used to estimate impact.

Monitoring plans, as discussed under Section 2.1, would be a component of any alternative that might be selected. Monitoring would allow for assessment of the impacts of any implemented alternative. In this way, the effects of the program on plovers, predator species, and any other new or existing environmental issues would be reviewed for consistency with this assessment, and re-evaluated if necessary. Additional predator damage management work, including site evaluations, would provide agency experts more precise information on the number and threats of predators and their effects on plovers. The information would be used to continue or modify the selected alternative.

4.1 Alternative 1 - Proposed Action - Integrated Predator Damage Management

4.1.1 Impact of predator damage management on the target species populations

4.1.1.1 American crows

Crows were responsible for 25 known nest failures of Oregon coast snowy plovers between 1990 and 2000 (TNC 2000). In addition, unknown corvids (a group that includes crows and ravens) caused an additional 24 nest failures, and crows may also have caused some of the 62 other unknown predation incidents (TNC 2000) during that time. Crows are considered to be a threat to plover eggs.

About crows

American crows are distributed north to south from the Yukon Territory, Canada, to Baja California, Mexico and are found from the west coast to the east coast (Johnston 1961). According to the North American Breeding Bird Survey (BBS), the American crow population in Oregon has increased at a rate of 1.5 percent per year from 1966 to 1999, and 2.2 percent per year from 1980 to 1999 (Sauer et al. 2000). Crow populations are healthy enough, and the problems they cause great enough, that the USFWS has established a standing depredation order for use by the public. Under this "order" (50 CFR 21.43), no Federal permit is required by anyone to remove crows if they are committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance.

Impact on crow populations

With the increasing population of crows, it is expected that crow predation on plovers will increase. Considering their population trend and abundance in Oregon, crow numbers would be expected to continue to increase despite the removal of the estimated 20 to 105 crows under the proposed action. Both ODFW and USFWS concur that removing crows to protect snowy plovers would have little or no effect on the crow population. Trash management activities would include installing predator proof receptacles, improved pickup where needed, and educational efforts to encourage people to remove trash. Increased and improved trash management should help to reduce corvid attraction to plover breeding areas, and thus help minimize the number of crows

that might need to be removed. Non-lethal methods would have little or no effect on the crow population, but would disperse crows to other areas..

4.1.1.2 Common ravens

Ravens were responsible for 15 known nest failures of Oregon coast snowy plover between 1990 and 2000 (TNC 2000). In addition, unknown corvids (a group that includes crows and ravens) caused an additional 24 nest failures, and ravens could also be responsible for some of the 62 incidences of unknown predation (TNC 2000). Ravens are considered to be a threat to plover eggs, chicks and adults.

About ravens

The common raven is widely distributed throughout the Holarctic Regions of the world including Europe, Asia, North America, and extends well into Central America (Goodwin 1986). Ravens generally are a resident species but some wandering and local migration occurs with immature and non-breeding birds (Goodwin 1986). Immature birds, which have left their parents, form flocks with non-breeding adults; these flocks tend to roam and are loose-knit and straggling (Goodwin 1986). The raven is an omnivorous species known to feed on carrion, crops, eggs and birds, small mammals, amphibians, reptiles, fish, and insects (Nelson 1934).

According to the North American BBS, the raven population in Oregon has increased at a rate of 1.4 percent per year from 1966 to 1999, and 3.9 percent per year from 1980 to 1999 (Sauer et al. 2000).

The number of ravens in Oregon and the coastal counties can only be estimated from other research and census studies. Stiehl (1978) reported raven nesting densities in the Harney Basin of Oregon at one pair/16.2 mi^2. Stiehl (1978) marked 266 ravens during this study and reported individuals as far away as 173 miles from the study area, indicating considerable mobility in the population. Stiehl (1978) also reported that raven densities vary seasonally, peaking in the winter. Knight and Call (1981) summarized a number of studies on common raven territories and home ranges in the west. Nesting territories ranged in size from 3.62 mi^2 to 15.7 mi^2 in Wyoming and Oregon and home ranges varied from 2.53 mi^2 to 3 - 6 mi^2 in Utah and Oregon. Linz et al. (1990) found nest densities of one/1.7 mi^2 in their Camp Pendleton, California study. Raven home ranges overlap considerably and it is believed that a reasonable density estimate of breeding birds in the southwest Oregon is one

raven/3 mi^2 (USDA 1995). If we use this lowest density estimate for coastal counties, we arrive at an estimated population of 5,419 ravens in our project analysis area (Table 3).

Impacts on raven populations

Ravens are a protected species under the Migratory Bird Treaty Act and can only be taken by permit from the USFWS. The cooperating agencies are not aware of any "other take" of ravens. APHIS-WS did not remove any ravens in the project area for depredation in FY 1999. Under the proposed action, the lead and cooperating agencies estimate that between18 and 95 ravens could be removed annually to protect plovers. The results of this potential impact on the raven population are presented in Table 3.

Table 3. Impact on Raven Population

County	Plover project estimated take	Other take*	Total take	Estimated population	Plover project take percent of population	Cumulative take percent of population
Clatsop	0	0	0	281	0	0
Tillamook	0 - 5	0	0 - 5	375	0 - 1.3	0 - 1.3
Lincoln	0	0	0	331	0	0
Lane	4 - 20	0	4 - 20	1540	0.3 - 1.3	0.3 - 1.3
Douglas	4 - 20	0	4 - 20	1690	0.2 - 1.2	0.2 - 1.2
Coos	8 - 40	0	8 - 40	653	1.2 - 6.1	1.2 - 6.1
Curry	2 - 10	0	2 - 10	549	0.4 - 1.8	0.4 - 1.8
Total	18 - 95	0	18 - 95	5419	0.3 - 1.8	0.3 - 1.8

*No depredation take recorded by APHIS-WS during FY 1999.

According to the data presented in Table 3, removing ravens to protect plovers (using a worst case scenario of lowest population density), would not impact the raven population in the project analysis area since the raven population is increasing at a greater rate. Additionally trash management activities should help reduce attractants to ravens and consequently the number of ravens in the project area. This may reduce the need to remove ravens. Non-lethal methods

would have little or no effect on the raven population, but would disperse ravens to other areas.

4.1.1.3 Foxes (red and gray fox)

Foxes were responsible for one known incidence of nest failure of snowy plovers on the Oregon coast sites between 1990 and 2000. However, abundant red fox sign has been observed around nest sites at the New River site, and APHIS-WS personnel identified fox tracks chasing plovers at a time when a fledgling plover disappeared. APHIS-WS continued to observe fox sign around nest exclosures after foxes were removed, indicating that not all depredating foxes were removed from that site (S. Thomas, APHIS-WS, pers. comm. 2000). Fox sign has been observed at some other plover nesting sites on the Oregon coast (S. Thomas and J. Brent, APHIS-WS, 2000 pers. comm.). This may indicate that red foxes may be responsible for predation in some of the 62 incidences of nest failures that were reported over the last ten years by TNC (2000). Foxes are considered to be a threat during any stage of the plover's life cycle.

About red foxes

Red foxes are the most common and well-known species in the genus *Vulpes* and are the most widely distributed nonspecific predator in the world (Voigt 1987). Red foxes are not native to the Oregon coast (Verts and Carraway 1998). Foxes are regarded as nuisance predators in many regions, preying on wildlife and livestock, and have become notorious in many areas of the world as carriers of diseases (Ables 1969, Andrews et al. 1973, Richards 1974, Tabel et al. 1974, Tullar et al. 1976, Pils and Martin 1978, Sargeant 1978, Voigt 1987, Allen and Sargeant 1993). Because of its interest to humans, the red fox has been the subject of much study during the last 20 years. Investigations have revealed that red foxes are extremely adaptive with much diversity in their behavior and habitats. Voigt and Earle (1983) showed that red foxes avoided coyotes but coexisted in the same area and habitats.

The density of red fox populations is difficult to determine because of the species secretive and elusive nature. However, the red fox has a high reproductive rate and dispersal capacity similar to coyotes, and is capable of withstanding high mortality within the population (Allen and Sargeant 1993, Voigt 1987, Voigt and MacDonald 1984, Harris 1979, Pils and Martin 1978, Storm et al. 1976, Andrews et al. 1973, Phillips and Mech 1970). Storm et al. (1976) stated that 95 percent of the females (43.6 percent were less than 1

year old) bred successfully in a population in Illinois and Iowa. Rowlands and Parkes (1935) and Creed (1960) reported that male red fox breed in their first year. Litter sizes averaged about 4.7 for 13 research studies and litters with as many as 14 and 17 offspring have been reported (Storm et al. 1976, Voigt 1987). Ables (1969) and Sheldon (1950) reported that more than one female was observed at the den and suggest that red fox have "helpers" at the den, a phenomena observed in coyotes and other canids. Reported red fox population densities have been as high as over 50/mi^2 (Harris 1977, MacDonald and Newdick 1982, Harris and Rayner 1986) where food was abundant; Ontario population densities are estimated at 2.6 animals/mi^2 (Voigt 1987), and Sargeant (1972) reported 1 fox den/3 mi^2.

Red fox dispersal serves to replace and equalize fox densities over large areas and over a wide range of population densities. Annual harvests in localized areas in one or more years will likely have little impact on the overall population in subsequent years, but may reduce localized predation (Allen and Sargeant 1993). Phillips (1970) says that fox populations are resilient and in order for fox control operations by trapping to be successful, pressure on the population must be almost continuous. Phillips (1970) and Voigt (1987) further state that habitat destruction that reduces prey numbers, water, and cover will impact fox populations to a greater extent than a short-term over harvest.

In 1980, ODFW estimated that there was 10,716 mi^2 of red fox habitat statewide with a population of about 20,300 animals, and an average density of 1.9 red fox/mi^2 of habitat (USDA 1995). The APHIS-WS southwest District was estimated to have 6,571 mi^2 of habitat[7] and a population of about 7,600 animals; the average density for the District was 1.2 red fox/mi^2 of habitat. The lower density estimate will be used to determine potential fox densities in coastal counties (Table 4).

Impact on red fox populations

USDA (1997 revised) determined the allowable harvest level for red fox to be 70 percent of the total population. Based on site assessments, from 46 to 95 red foxes could be removed prior to and during plover breeding, nesting and fledging (Table 4, Impacts on Red Fox Population). This represents less than two percent of the population, when added to other forms of known mortality (cumulative impact). This is negligible when compared with the established 70

[7]/Potential fox habitat in each county (Clatsop - 50 percent, Tillamook - 67 percent, Lincoln 50 percent, Lane - 45 percent, Douglas - 50 percent, Coos - 80 percent, and Curry - 33 percent , as estimated by APHIS-WS).

percent allowable harvest level for red foxes. Non-lethal methods would have little or no effect on the fox population.

Table 4. Impacts on Red Fox Population

County	Plover project estimated take	Other take*	Total take	Estimated population	Plover project percent of population	Cumulative take - percent of population
Clatsop	1 - 5	0	1 - 5	506	0.2 - 1.0	0.19 - 0.99
Tillamook	0	0	0	904	0	0
Lincoln	0	0	0	595	0	0
Lane	0	27	0	2,494	0	1.0
Douglas	0	45	0	3,042	0	1.5
Coos	30 - 65	17	47 - 82	1,564	1.9 - 4.2	3.0 - 5.2
Curry	15 - 25	0	15 - 25	652	2.3 - 3.8	2.3 - 3.8
Total	46 - 95	89	135 - 184	9,757	0.5 - 1.0	1.4 - 1.9

*Other take includes fur harvest (ODFW Fur Harvest 1999-2000) and depredation take (APHIS-WS MIS FY 1999).

About gray fox

Gray foxes were responsible for one known incidence of nest failure on snowy plovers on the Oregon coast snowy sites between 1990 and 2000. However, gray fox sign has been observed around some plover nest sites on the Oregon coast (S. Thomas and J. Brent, APHIS-WS 2000 pers. comm.). Gray foxes may be responsible for some of the 62 incidences of nest failures over the last ten years from unknown predators (TNC 2000).

Gray foxes inhabit brushy and wooded areas, and have omnivorous feeding habits, eating birds, rabbits, eggs, insects, carrion, fleshy fruits, and grains. Gray foxes reach reproductive maturity at about 1 year of age and litters average four pups after a 2-month gestation period (Nowak and Paradiso, 1983). Their densities can range between 3.1 and 5.4/mi^2 (Trapp 1978). Gray foxes have been reported to live up to 15 years, but annual mortality may be as high as 60 percent (Seton 1929, Lord 1961). In 1980, ODFW estimated

6,429 mi^2 of gray fox habitat in Oregon with a population of about 14,600 animals and an average density of 2.3 gray fox/mi^2 of habitat. Gray fox habitat information in coastal counties is not available, therefore, no quantitative population estimates can be made for this analysis. Gray fox observations during other survey work, and from conflicts with humans, showed an increase starting in 1994. These indicators remain at a level above the previous years, suggesting that gray foxes are at a cyclical population high (J. Toman, ODFW 2001 pers. comm.).

Impact on gray fox populations

The estimated impact from removing gray foxes to protect plovers would add few individuals to the cumulative mortality (Table 5). Non-lethal methods would have little or no effect on the fox population.

Table 5. Impact on Gray Fox Population

County	Plover project estimated take	Other take*	Total take
Clatsop	0	0	0
Tillamook	1 - 5	0	1 - 5
Lincoln	0	0	0
Lane	4 - 20	44	48 - 64
Douglas	4 - 20	20	24 - 40
Coos	2 - 10	2	4 - 12
Curry	0	20	20
Total	11 - 55	86	97 - 141

*Other take includes fur harvest (ODFW Fur Harvest 1999-2000) and depredation take (APHIS-WS Management Information System FY 1999).

4.1.1.4 Raccoon

Raccoons were only responsible for one known incidence of nest failure on snowy plovers on Oregon coast snowy plover sites between 1990 and 2000. However, additional instances may have occurred at some of the 62 reported cases of nest failures over the last ten years from unknown predators (TNC

2000). Raccoon habitat and/or sign was observed at many of the plover nest sites (S. Thomas and J. Brent, APHIS-WS 2000 pers. comm.), and thus raccoons are suspected to be responsible for some of the unknown predation. Raccoons are considered to be a threat to plovers during all life stages, but especially to eggs and chicks prior to fledging. Raccoons can prey on adult birds that are setting on nests during the night (S. Thomas, APHIS-WS 2000 pers. comm.).

About raccoons

The raccoon is a member of the family *Procyonidae* that includes ringtails and coatis in North America. Raccoons are one of the most omnivorous of animals, feeding on carrion, garbage, birds, eggs, mammals, insects, crayfish, mussels, other invertebrates, a wide variety of grains, various fruits, other plant materials, and most or all foods prepared for human or animal consumption (Sanderson 1987).

Sanderson (1987) stated that absolute population densities of raccoons are difficult if not impossible to determine because of the difficulty in knowing what percent of the population has been counted or estimated, and the additional difficulty of knowing how big an area the raccoons are using. Twichell and Dill (1949) reported one of the highest densities, with 100 raccoons removed from a winter tree den area on 101 acres of a waterfowl refuge in Missouri during winter. Other studies have found raccoon densities that ranged from 9.3/mi^2 to 80/mi^2 (Yeager and Rennels 1943, Urban 1970, Sonenshine and Winslow 1972, Hoffman and Gottschang 1977, Rivest and Bergeron 1981).

Impact on raccoon populations

ODFW believes that raccoon populations are cyclic in Oregon and numbers can change considerably from one year to the next due to factors such as distemper and other diseases (USDA 1995). As a result, any population estimate would be for a given point in time and population levels could change rapidly if a disease outbreak occurs. No statewide population estimate was made for raccoons in 1980 as was done for other furbearers. In 1993, ODFW censussed raccoon populations for southwest Oregon, but not statewide, and estimated the population at 88,500 animals, a density of 51.9/mi^2 (USDA 1995). If this density is used to estimate the population in coastal counties, the raccoon population would be almost 827,000.

The allowable harvest level for raccoons found in USDA (1997 revised) was established at 49-59 percent of the total population. Based on plover nesting site evaluations, between about 100 and 205 raccoons could be removed prior to and during plover breeding and nesting (Table 6). When fur harvest and depredation take by APHIS-WS are totaled, the total take (cumulative impact) could be about 2,600 raccoons, or less than one percent of the population. This is negligible compared to the 49-59 percent allowable harvest established for raccoons (USDA 1997 revised). Nonlethal methods would have little or no effect on the raccoon population.

Table 6. Impact on Raccoon Population

County	Plover project estimated take	Other take*	Total take	Estimated population	Plover project percent of population	Cumulative take - percent of population
Clatsop	0	121	121	43,752	0	0.28
Tillamook	0	192	192	58,388	0	0.33
Lincoln	0	88	88	51,485	0	0.17
Lane	24 - 50	520	544 - 570	239,778	0.01 - 0.02	0.23 - 0.24
Douglas	24 - 50	436	460 - 486	263,185	0.01 - 0.02	0.17 - 0.18
Coos	42 - 85	998	1040 - 1083	84,545	0.05 - 0.10	1.2 - 1.3
Curry	10 - 20	39	49 - 59	85,531	0.01 - 0.02	0.06 - 0.07
Total	100 - 205	2394	2494 - 2599	826,664	0.01 - 0.02	0.30 - 0.31

*Other take includes fur harvest (ODFW Fur Harvest 1999-2000) and depredation take from (USDA-APHIS-WS Management Information System FY 1999).

4.1.1.5 Skunks (striped and spotted skunks)

Striped and spotted skunk impacts are considered in this analysis. TNC (2000) reported that skunks were responsible for 13 known incidences of nest failure on Oregon coastal snowy plover nesting sites. Skunks primarily cause odor problems around homes, transmit diseases such as rabies to humans and

domestic animals, and prey on poultry. Skunks are considered to be a threat to plovers during all life stages, but especially to eggs and chicks prior to fledging. Skunks can prey on adult birds that are setting on nests during the night (S. Thomas, APHIS-WS 2000 pers. comm.).

About striped skunks

The striped skunk is the most common member of the *Mustelidae* family. Striped skunks have increased their geographical range in North America with the clearing of forests, however there is no well-defined land type that can be classified as skunk habitat (Rosatte 1987). Striped skunks are capable of living in a variety of environments, including agricultural lands and in urban areas.

The home range of striped skunks is not sharply defined over space and time, but is altered to accommodate life history requirements such as raising young, winter denning, feeding activities, and dispersal (Rosatte 1987). Home ranges reported in the literature averaged between 0.85 and 1.9/mi^2 for striped skunks in rural areas (Houseknecht 1971, Storm 1972, Bjorge et al. 1981, Rosaette and Gunson 1984). The range of striped skunk densities reported in the literature was from 0.85 to 67/mi^2 (Jones 1939, Ferris and Andrews 1967, Verts 1967, Lynch 1972, Bjorge et al. 1981). Many factors may contribute to the widely differing population densities. Type of habitat, food availability, disease, season of the year, and geographic area are only but a few of the reasons (Storm and Tzilkowski 1982).

Impact on striped skunk populations

Using the density ranges from the literature, the striped skunk population in coastal counties is estimated to be from 13,600 to more than 1,067,000 (Table 7). Based on plover nesting site evaluations, between about 30 and 100 striped skunks could be removed prior to and during the plover breeding and nesting period. When added to other take (furharvest and WS take), about 115 to 179 skunks could be removed from the population each year. This would be a cumulative impact of approximately one percent of the low population density estimated in coastal counties.

About spotted skunks

The geographical range of the western spotted skunk extends from central Mexico through the western United States to British Columbia (Rosatte 1987).

They prefer open lowlands but are equally at home in mountainous country and in a variety of habitats including farmyards, wastelands and

Table 7. Impact on Striped Skunk Population

County	Plover project estimated take	Other take*	Total take	Estimated population (low - high)	Plover project percent of low population	Cumulative take - percent of low population
Clatsop	0	0	0	717 - 56,481	0	0
Tillamook	0	8	8	956 - 75,375	0	0.8
Lincoln	0	0	0	843 - 66,464	0	0
Lane	4 - 20	23	27 - 43	3,927 - 309,540	0.1 - 0.5	0.7 - 1.1
Douglas	4 - 20	32	36 - 52	4,310 - 339,757	0.1 - 0.5	0.8 - 1.2
Coos	20 - 46	10	30 - 56	1,385 - 109,143	1.4 - 3.3	2.2 - 4.0
Curry	6 - 12	8	14 - 20	1,401 - 110,416	0.4 - 0.9	1.0 - 1.4
Total	34 - 98	81	115 - 179	13,569 - 1,067,176	0.2 - 0.7	0.8 - 1.3

*Other take includes fur harvest (ODFW Fur Harvest 1999-2000) and depredation take (USDA-APHIS-WS Management Information System FY 1999)

chaparral (Orr 1943, Baker and Baker 1975). Few studies have been published on the home range, population density and mortality of spotted skunks. Crabb (1948), however, found that the western spotted skunk in Iowa occupied a home range of about 160 acres at densities of 5.7/mi^2. He also stated that spotted skunks are nomadic, traveling up to 3 mi/night, do not occupy a home range, and do not defend a territory.

Impacts on spotted skunk populations

There are no ODFW population estimates for spotted skunks. "Other take" included 176 spotted skunks removed by fur harvest trapping and hunting (ODFW 1999-2000 Fur Harvest). Few or no spotted skunks are expected to be taken under the proposed action. Wildlife biologists believe that "the current

take" is not impacting the spotted skunk population when compared to the total population. The magnitude of impact is considered low (USDA 1995). Non-lethal methods would have little or no effect on the spotted skunk population.

4.1.1.6. Impact on other predators

Other predator species are suspected of preying on Oregon coast snowy plovers but such predation has not been confirmed. At this time, the lead and cooperating agencies believe that the following species should be included in the analysis of impacts since there is a potential that they may be adversely affecting plovers. The impact on each of these species is expected to be minor, since they are not known to be primary predators of Oregon coast snowy plovers. Removal of any species would first be based on field analysis to determine if they are a threat. Non-lethal methods would have little or no effect on other predator populations.

Feral domestic cats

Worldwide, after habitat destruction, cats may be involved in the extinction of more bird species than any other cause. In the United States, cats are contributing to the endangerment of populations of birds such as least terns, piping plovers, and loggerhead shrikes (Coleman et al. 1997). A domestic cat's desire to hunt is not suppressed by adequate supplemental food, so that even when fed regularly by people, they still pose a threat to birds and mammals due to a strong motivation to hunt (Adamec 1976). Feral cats have altered ecosystems and depleted populations of indigenous lizards and birds on mainlands and islands throughout the world (Fitzgerald 1988, Eason and Frampton 1991). Fitzgerald (1988) and Jones (1989) summarize information on feral cats with respect to diet and conclude that cats are opportunistic generalists in their selection of prey items. Remains of mammals are usually present in 50 to 90 percent of cat guts and scat, and on islands, bird remains were present in 51 percent (Fitzgerald 1988). Cats are considered to be a threat to plover chicks and adults.

Fitzgerald, (1988) estimated that roughly 20-30 percent of free-ranging cats' kills are birds. In a 1992 University of Wisconsin study, researchers' estimate of the number of birds killed annually by free-ranging cats in rural Wisconsin was between 7.8 and 219 million (Coleman and Temple 1995). Coleman et al. (1997) estimate the total number of pet and free-ranging domestic cats in the

U.S. as probably more than 100 million. We do not have figures for Oregon, but feral cats are known to exist at some plover nesting areas.

Eradication of cats from some small New Zealand islands has allowed their native bird populations to increase in number (Veitch 1985) and increased the potential to use such islands for relocation/reintroduction of endangered and indigenous animals. Bloomer and Bester (1991) removed cats from Marion Island and showed that night hunting decreased the density of cats based on a catch per unit-of-effort. They also reported that no adult group was particularly vulnerable, however, removal efforts reduced the number of females and litters per female per year, thus reducing fecundity, the most efficient way in which to reduce an animal population (Remfry 1981).

Impact on feral cat populations

Removing feral cats may be done where cats are found at plover breeding, nesting, and foraging sites. Cat removal would be conducted to remove potential plover predators and return plover habitat to a more natural state. No State law protects feral cats.

Cats would be removed by using cage traps (live trapped), and either released to county or local animal shelters, or euthanized on site, or they may be removed with leg-hold traps, snares, or shooting, depending upon local county ordinances. When live trapped and released to local shelters, cats may be adopted out as pets or may be euthanized. It is more likely that feral cats would ultimately be euthanized because of their wild habits and temperament.

Millions of cats are destroyed annually in the United States by humane groups and animal shelters. Considering the high reproductive rates (6 to 30 kittens annually per female) (Fitzwater 1994), their non-native status, and the undesirable effects that feral cats have on local ecosystems, the proposed project would not contribute an undesirable effect on the natural environment. Feral cat removal would likely benefit the natural ecosystem since they are an exotic species. Removing a limited number of individual cats to protect plovers would not alter cats' population status. BLM has entered into an agreement with a local animal shelter to remove feral cats on the North Spit of Coos Bay. The cats are offered for adoption.

Under all alternatives, feral cat removal would likely have the indirect benefit of reducing predation on other species, including mice and other native birds,

however, it would not be expected to be substantial since few cats would be removed.

About raptors

Raptors are considered to be a potential threat to plover chicks and adults. The red-tailed hawk is one of the most widespread and commonly observed birds of prey in North America (Preston and Beane 1993). Unlike many other raptors in North America, red tailed hawk populations have increased over much of their range due to fragmentation of forest into small woodlots and increases in woodland edge (Preston and Beane 1993). Red-tailed hawks occupy a wide variety of open to semi-open habitats and breeding populations are most dense in the foothills of California and in central U.S. (Preston and Beane 1993). Red-tailed hawks are versatile, opportunistic predators with many prey items (Palmer 1988, Preston and Beane 1993). Red-tailed hawks generally forage in open habitats inhabited by lagomorphs, rodents, birds and reptiles (Preston and Beane 1993). Red-tailed hawks usually search for prey from elevated perches (Preston and Beane 1993) and consequently, they commonly occupy areas that provide a relative abundance of potential perching sites (i.e., nest trees).

Breeding populations of red-tails have increased during the period 1965 to 1979 in nearly all regions of North America (Preston and Beane 1993) and similarly North American Christmas Bird Count (CBC) data show more than a 33 percent increase in winter populations between the early 1970s and 1980s (Preston and Beane 1993).

Under the proposed action, red-tailed hawks that are considered an immediate threat to plovers would be removed on a case-by-case basis, and only during the nesting season and until plovers have fledged. Removing several red-tailed hawks per year would not be expected to adversely affect the populations due to the fact that such removals will occur only in isolated circumstances.

About other raptors

Other raptors may be removed under limited circumstances on a case-by-case basis, but removal would be monitored and coordinated with the USFWS to ensure that no adverse impacts on any raptor species. Program monitoring would reveal more information on the extent of threats that raptors pose on plovers. As plover numbers increase and the plover population stabilizes, removal of raptors would decrease allowing for a more natural interaction

between plovers and raptors. Lacking precise population data for raptors, the lead agencies may begin a monitoring program to ensure that any impacts on the raptor populations could be assessed. Any take would be closely monitored and coordinated with USFWS. Raptor damage management would be minimal because of the limited locations and predation threat. Surveying and monitoring may be included in the selected alternative because of a lack of quantifiable data available on raptor populations. Special status species would not be managed by lethal means.

Rodents

The sailing ships of European explorers provided a vehicle for black rats to spread rapidly to six continents and thousand of islands (Clark 1981). Black rats can occupy all available vegetated habitats, from desert scrub to lush montane forests (Clark 1981). They commonly nest in trees and black rats (Atkinson 1985) can potentially prey upon almost any bird's nest. Black rats are omnivorous with plant foods comprising an average of 80 percent of sampled stomach contents, however, animal food occurred in at least 81 percent of the rats examined on the Galapagos Islands (Clark 1981).

The Norway rat (*Rattus norvegicus*), also called house rat, sewer rat, warf rat, brown rat, and gray rat, was also introduced into North America by sailing ships from Europe (Timm 1994). Norway rats have not specifically been identified as predators of Oregon coast plovers, however they can prey on bird eggs and are not ruled out, and they may be targeted if found near plover nesting sites.

The predominantly nocturnal habits of rats make both their identification and observation of their predatory behavior difficult, and the incidence of rat predation is probably higher than realized (Atkinson 1985). Clark (1981) stated that introduced black rats are likely to have many severe effects on the Galapagos flora and fauna, and that even infrequent predation on vertebrates by black rats could have a significant impact. As pointed out by Bourne (1981) and Moors and Atkinson (1984), even a low frequency of rat predation can have a severe effect if, for other reasons, there are few birds. Applicability to mainland avian species is not confirmed.

Rats have been linked to the extinction or decline of several avian species on islands through egg and nestling predation (Daniel 1973, Innes 1979, Atkinson 1985). Black rats are known to be severe predators on young tortoises and are suspected of destroying most eggs and young of the dark-rumped petrel on

Santa Cruz Island, Galapagos Islands (Harris 1970). In Puerto Rico, Rodriquez-Vidal (1959) reported that four of 16 nests of the endangered Puerto Rican parrot (*Amazona vittata*) had eggs destroyed by black rats. Rats have been linked to 23 declines in island bird populations (Atkinson 1985).

In addition to direct predation, rats may sometimes exert indirect effects on island bird populations as competitors for food (Sugihara 1997) and as prey to larger predators (Atkinson 1985). Predators may then maintain higher populations than would otherwise be possible, and predation on birds increases (Fitzgerald 1988, Atkinson 1985).

Cruz and Cruz (1987) conducted a rat removal program to reduce predation on dark-rumped petrels and concluded that the program was successful in reducing rodent predation and protecting the petrel. They reported no nest losses due to rat predation since the rat removal program was initiated.

Rodents are considered to be a potential threat to plover eggs and newly hatched chicks. The proposed program would remove rats and deer mice around plover nesting areas. Rats are exotic and not protected. Deer mice are not protected. Because control would only be focused on limited areas, a low intensity impact is expected.

Black rats (Marsh 1994) and Norway rats (Timm 1994) are not protected by law and can be controlled any time with mechanical or chemical methods. Deer mice are native, nongame mammals, and are not protected under Oregon law. Control is allowed when necessary. As with all pesticides, rodenticides must be registered by authorities and used in accordance with label directions.

Rats and mice would be controlled using zinc phosphide in tamper resistant bait stations or burrows, live-capture cage traps or plover-proof snap traps. Rats and mice would be removed around plover nests to the maximum extent possible, prior to and during the plover breeding season at plover nesting sites that have been active within the past year.

It is difficult to estimate the number of rodents that could be taken under this alternative, but the overall impacts on rodent populations would not be significant since rodents would only be targeted at active plover nesting areas if rodent sign is identified.

Coyotes

Although coyotes have been known to prey on all plover life stages, they would only be targeted if field investigations indicate they pose a direct and immediate threat to specific plovers, chicks, or nests. Under the proposed action, about 15 to 70 coyotes could be removed, if they are found to be a threat to plovers. APHIS-WS estimated that total take of coyotes in 1998, which included furharvest from hunting and trapping and depredation take, amounted to three percent of the population in northwest Oregon and nine percent in southwest Oregon (unpublished monitoring reports of environmental assessments on predator damage management, APHIS-WS). It is not expected that taking coyotes to protect plovers would add notably to the cumulative take of coyotes. Take is expected to remain well below the established USDA (1995a) 70 percent allowable harvest for coyote. Cumulative mortality of coyotes from coastal counties included 775 coyotes taken from hunting, trapping, and depredation (ODFW 1999-2000 hunting and trapping and USDA MIS for FY 1999). Negligible impacts on the coyote population are expected as a result of plover protection.

Gulls - California gulls

Gulls are considered to be a potential threat to plover eggs and chicks. According to the North American BBS, the California gull population in Oregon has increased at a rate of 2.6 percent per year from 1966 to 1999, and decreased four percent per year from 1980 to 1999 (Sauer et al. 2000). Nest exclosures would continue to be the primary method for reducing gull predation at plover nest sites. Monitoring would determine if additional methods should be used, or if nest exclosures should be modified. Any gull that would be targeted for lethal removal under the proposed action would be taken under permit issued by the USFWS.

Mink and weasels

Mink have not been identified as plover predators in the project area, but if they are found at active nests, they may be removed since they are known bird predators (Eagle and Whitman 1987). Mink are considered to be a potential threat to plover eggs and chicks. Lead and cooperating agencies estimate that up to 40 mink and weasels may be removed to protect plovers annually. Twenty-one mink were taken by private fur harvest efforts in the coastal counties in Oregon during the 1999-2000 fur harvest season (ODFW 2000). ODFW does not have an estimated mink population, but the trend in harvest data could indicate the population is increasing. When added to other forms of

harvest, taking mink to protect plovers would not notably impact the population.

Weasels are suspected in plover predation (Oregon Natural Heritage Program, public involvement). Few weasels are expected to be removed under the proposed program, and only if they are found to be immediately need active nests, since they are considered to be a threat to plover eggs and chicks. ODFW (2000) reports that two weasels were harvested in the counties encompassing the proposed project during the 1999-2000 fur harvest season. The ODFW does not have population estimates for long and short tailed weasels. However, few weasels are expected to be removed and no impact to the population would occur from the proposed action.

Opossum

Opossums are not native to the western United States, however populations have been established in Oregon. Population estimates for opossum are not available, but the opossum population trend in Oregon is thought to be increasing (USDA 1997a, revised). Opossum are considered to be a potential threat to plover eggs and chicks, but can prey on nesting adult birds (S. Thomas, APHIS-WS 2000 pers. comm.). However, few opossum are expected to be removed under the proposed program. Opossum are not native to the western United States. During the 1999-2000 fur harvest season, private harvest removed 149 opossum from coastal counties. The lead and cooperating agencies estimate that 10 to 65 opossum would be added to the cumulative mortality, and that it would not affect the overall population trend of opossum.

4.1.2. Non-target impacts

The philosophy behind integrated wildlife damage management is to implement effective management techniques, while minimizing the potentially harmful effects to humans, target and non-target species, and the environment. The methods that may be used under the Proposed Action (Alternative 1) are selective for target species. Mitigation in standard operating procedures (Appendix C) and wildlife damage management methods (Appendix B) describe limitations on activities that contribute to program safety and reduce the likelihood that non target animals or humans would be affected.

Under Alternative 1, APHIS-WS could use shooting, DRC-1339, pyrotechnics, traps, snares, zinc phosphide, nest and egg destruction, and denning. A formal risk assessment of APHIS-WS methods, including those proposed for use in this EA,

concluded low risks to humans (USDA 1997 revised, Appendix P). This assessment included potential risks to APHIS-WS employees, the public, and non-target animals. While some of the materials and methods used by APHIS-WS have the potential to represent a threat to health and safety if used improperly, problems associated with their mis-use have rarely occurred, and the greatest risk is to the user.

Impacts on non-target animals and humans are expected to be extremely low for several reasons: lethal management methods proposed for use are highly target specific, and this specificity is enhanced by employing experienced wildlife specialists skilled in effective placement and use of these tools; wildlife specialists look for target animal sign (tracks, scat, trails and other signs) that show where target animals occur in relation to plover sites, then set equipment such as traps or snares according to where and when target animals are likely to enter a very specific area. When soft-catch traps are used to capture predators, they are equipped with a pan-tension device that excludes animals of lighter weight than the targeted animal. Shooting is highly target specific and does not pose a risk to non-target animals when conducted by wildlife specialists trained in firearm use and to identify target and non-target species.

The APHIS-WS program has a record of non-target take of less than one percent of target take in each of its Districts that encompass coastal counties (APHIS-WS, unpublished Monitoring Reports, 2000). In 1999, APHIS-WS caught one turkey vulture in a padded leg-hold trap while removing plover predators at a New River nesting site. The vulture was the only non-target animal caught, and it was released unharmed.

There is a possibility that free-roaming dogs may be captured by leg-hold traps and snares. Although plover nesting areas are marked off-limits to humans and their pets and signs dictate that dogs must be on leash, these restrictions are sometimes not followed and are difficult to enforce. As with human use, if dogs are expected to be in the area proposed for predator damage management, the use of tools would be adapted to the particular risk to dogs. Most nesting sites are remotely located with little chance of encounter by humans or their pets. In cases where humans or pets could encounter equipment, personnel setting equipment can use cage traps for some species, or may set equipment at night, and keep it covered during the day to reduce the chance of affecting people or domestic dogs. In addition, equipment in areas where the public may have access (although unauthorized), will be checked daily, to reduce the risk to any non-target animal that may encounter equipment.

All capture and removal methods allow for positive identification of target species. The toxicant, DRC-1339, proposed for use for corvids and gulls, would be used in accordance with EPA label requirements (Appendix D) to minimize both primary and

secondary hazards to non-target animals. Snap traps, if used for mice or rats, would be housed to prevent the take of non-target species, including plovers.

Records would be kept on all target and non-target animals removed by method. Those records would be used to assist in routine monitoring of the effects of the program. Little or no non-target effects are expected from implementing this proposal.

Under all alternatives, predator removal, especially non-native predators such as feral cats, rats, and red foxes, could indirectly benefit other native birds, however, it would not be expected to be substantial since few predators would be removed when compared to their overall populations.

Threatened and Endangered Species

At the population level, the lead and cooperating agencies expect that reducing predation would benefit plovers by removing some of the threats that have contributed to keeping numbers low, thus the plovers may be allowed to recruit at more natural levels with increased nest success, and juvenile and adult survival. Predator damage management is expected to enhance other ongoing management, such as recreation management and habitat improvements, to increase benefits to plovers.

Predator damage management activities are proposed to occur in and around plover nesting areas. It is possible that implementation of some of the proposed predator damage management measures may affect the plovers using these habitats. For example, the presence of APHIS-WS personnel in the immediate vicinity of plovers and their nests may result in disturbance that disrupts plover incubation, brood rearing, or foraging. Pyrotechnics and other auditory or visual aversive measures could also disturb nesting and brooding plovers and their chicks. All efforts would be made to avoid these types of impacts. However, there may be situations in which predator damage management measures could not proceed without some level of disturbance to plovers. In such cases, APHIS-WS, USFWS, ODFW, and the appropriate land management agency would confer to determine:

- What measures can be taken to minimize any unavoidable impacts, and
- If the benefits to plovers from implementing the necessary predator management measures outweigh the associated impacts to plovers.

Implementation of predator damage management measures would only proceed when the expected net effect is beneficial to plovers.

At the current plover population level, the lead and cooperating agencies expect that reducing predation would benefit plovers by removing some of the threats that have contributed to keeping numbers low. Thus, plovers may be able to recruit individuals into the population at more natural levels with increased nest success, and juvenile and adult survival. Predator damage management is expected to enhance other ongoing management, such as recreation management and habitat improvements, to increase benefits to plovers.

Bald eagles and brown pelicans, Federally listed as threatened and endangered respectively, also use habitats in the vicinity of the proposed project. Pyrotechnics or other auditory or visual aversive measures could disturb eagles hunting along the beach, eagles perched in nearby trees, and pelicans loafing on adjacent beaches. Since these species are easy to detect and identify, these types of impacts can be avoided

The USFWS will complete consultation pursuant to section 7 of the ESA to evaluate the potential impacts on Federally listed T&E species. The USFWS's biological opinion (BO) will be contained in the final EA. Terms and conditions of the BO that would minimize harm to T&E species will be built into this alternative if selected.

4.1.3 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, in part, is a person's perception of harm or pain inflicted on an animal, and people may perceive the humaneness of an action differently. Some individuals and groups are opposed to some predator damage management actions. APHIS-WS personnel are experienced and professional in their use of management methods so that they are as humane as possible. Professional predator damage management activities are said to be more humane than nature because they result in less suffering. However, people concerned with animal welfare are concerned with minimizing animal suffering as much as possible, or eliminating unnecessary suffering. The interpretation of what is unnecessary suffering is the point to debate (Schmidt, 1989). The lead and cooperating agencies have determined that predator damage management is necessary to prevent further decline of the threatened snowy plover.

In a national survey conducted by an independent research firm in 1997, 68 percent of all respondents, and 60 percent of cat owning respondents, felt that stray cats should be humanely removed from areas set aside for wildlife (American Bird Conservancy 2000).

Animal welfare organizations are concerned that some methods used to reduce wildlife damage and manage wildlife populations, in general, expose animals to unnecessary pain and suffering. Research suggests that with some methods, such as restraint in leg-hold traps, changes in blood chemistry of trapped animals indicate stress. Blood measurements indicated similar changes in foxes that had been chased by dogs for about five minutes as those restrained in traps (USDA 1997a, revised). However, such research has not yet progressed to the development of objective, quantitative measurements of pain or stress for use in evaluating humaneness.

The decision-making process involves tradeoffs between the above aspect of humaneness, and the responsibility of federal agencies under the ESA to protect a T&E species from further decline. An objective analysis of this issue must consider not only the welfare of a wild animal caught in a leg-hold trap, snare or killed by shooting, but also the welfare of the plover that may be killed if the actions are not being taken. The challenge in coping with this issue is how to achieve the least amount of animal suffering with the constraints imposed by current technology. To insure the most professional handling of these issues and concerns, APHIS-WS has numerous policies giving direction toward the achievement of the most humane wildlife damage management program possible (Appendix C, Mitigation in Standard Operating Procedures).

APHIS-WS and the National Wildlife Research Center have improved the selectivity of management devices through research and development of pan-tension devices, break-away snares, and chemical immobilization/euthanasia procedures. Research continues to improve the selectivity and humaneness of management devices. Pain and suffering are minimized, avoided, or mitigated by using methods considered more humane than other legally available methods. For example: 1) Shooting an animal in a cage trap is a method of quick kill and may be considered humane by some, 2) Where traps are proposed, padded jawed leg-hold traps that minimize trauma and with fitted pan-tension devices avoid capturing smaller animals would be used, 3) Traps are checked regularly to remove predators that could suffer if not euthanized, 4) Where shooting from a distance is necessary, personnel are instructed to shoot only when they have a clear view and can make a "clean kill."[8] 5) Where toxicants are proposed, only EPA registered toxicants would be used.

The lead and cooperating agencies' criteria for selection among alternatives is to employ the most humane methods possible in controlling individual predatory animals. The lead and cooperating agencies regard humane methods of predator damage

[8]/ Lead and cooperating agency employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within three months of their appointment and a refresher course every three years afterwards (WS Directive 2.615).

management (including the use of lethal methods) to be those that cause the least pain, suffering, or injury to individual animals under the circumstances and that predator damage management be accomplished only to the extent necessary to meet defined objectives, such as in this instance, aiding plover recovery by reducing predation. Because this alternative is determined to be the most effective in preventing predation on plovers, it can also be considered more humane for the plovers.

Selectivity of wildlife damage management methods is related to the issue of humaneness in that greater selectivity results in less perceived suffering of non-target animals. The selectivity of each method is based, in part, on the skill and discretion of the wildlife specialist applying such methods, and also on specific measures and modifications designed to reduce or minimize non-target captures.

The lead and cooperating agencies support the most humane, selective, and effective damage management techniques, and would continue to incorporate advances into program activities. Field wildlife specialists employed to identity and reduce plover predation would be experienced professionals, highly skilled in the use of management methods and committed to minimizing pain and suffering.

4.1.4 Effectiveness

The effectiveness of the program can be defined in terms of plover losses potentially reduced or prevented. Effectiveness can be further defined by how well wildlife specialists identify the species causing a problem and then stop or reduce the damage to an acceptable level. The specialist must be able to complete wildlife damage management expeditiously, within limitations to minimize harm to non-target animals and the environment, and in the lawful use of each method, while at the same time, using methods as humanely as possible within the limitations of current technology. The U.S. Government Accounting Office (GAO) (1990) concluded that APHIS-WS, while not impacting target predator populations or the environment including the public, was overall effective in preventing and reducing wildlife damage. Many of the details on effectiveness were discussed in the USDA (1997a, revised) where integrated wildlife damage management was concluded to be the most effective.

The effectiveness of the methods, given that they are used by trained professionals, will affect the overall effectiveness of each alternative. Table 8 provides a description of the effectiveness and limitations of each major category of methods that could be used for the primary target species. Relative effectiveness of each method is provided on a scale of zero to five, where five is the most effective method and zero the least.

Table 8. Summary of Effectiveness of Selected Management Methods

Effectiveness 0 = no effectiveness, 5 = most effective

Primary Species	Relative Effectiveness	Method
		Nest Exclosure
Corvid	3-4	Some predation occurred through exclosures[9]. Have been effective in reducing nest predation by corvids with modifications (Castelein 2000). No protection of plovers outside of exclosures. May provide perches for birds, thus acting as attractant. Other limitations due to maintenance, cost, remote sites, and electric fencing in saline environment (USFWS 1993b).
Fox	3	Fox can burrow under fencing, therefore, fences must be set into substrate. May deter fox, however, red fox may focus on exclosures and prey on adults as they come and go from exclosures (J. Warriner, pers. comm. as cited in USFWS 1993b). No protection of plovers outside of exclosures[10]. Other limitations as above.
Skunk/ Raccoon	3	No protection of plovers outside of exclosures, limitations as above.
		Auditory Aversion
Corvid	2	Birds have been shown to acclimate to adverse sounds and this method may not be effective in the long-term. It may have a deleterious effect on plovers.
Fox	2	Experimental data collected on San Clemente Island indicates that fox will tolerate loud sounds if food is available (USDA 1998).
Skunk/ Raccoon	2	Limited effectiveness (Boggess,1994, Knight 1994).
		Olfactory Aversion
Corvid	0	No known scent deterrents that have proven effective. None are registered (USDA 1998).
Fox	0	No known scent deterrents that have proven effective. None are registered (USDA 1998).
Skunk/ Raccoon	0	None are registered (Boggess 1994, Knight 1994).

9/ The effectiveness of using nest exclosures around plover nests has been studied by ODFW (1994) and Castelein, et al. 2000). The exclosures were designed and erected to keep avian and mammalian predators away from nests with clutches. In one study year, 1993, 83 percent or 25 out of 30 exclosed nests were successful, compared to 33 percent or 3 out of 9 unexclosed nests. The exclosures were successful in protecting eggs from predation so that an average of one chick per successful nest hatched, thus providing a boost to the existing population. Obviously, the exclosures do not protect fledglings or adults away from the nests.

10/ USFWS (1993a) found that exclosures protected nests but failed to enhance fledging since snowy plover chicks leave the nest within hours after they hatch.

		Taste Aversion
Corvid	2	Ravens are known to avoid a food source if it makes them ill. Would require that the predator associates illness with plover eggs. If this method worked, it would only protect eggs, not chicks or adults. Methiocarb treated eggs may have some application an aversive agent (Avery 1995).
Fox	1	Effectiveness is unknown. Would need to ensure that the predator associates illness with consuming eggs. Would not protect chicks or adults. Not registered.
Skunk/ Raccoon	1	None registered (Boggess, Knight 1994).
		Relocation
Corvid	0	Relocation of ravens and crows is neither practical nor desirable. Homing abilities would prevent success.
Fox	NA	Relocation is inadvisable due to disease, parasites, and nuisance (Craven et al. 1998), not favored by ODFW.
Skunk/ Raccoon	NA	Relocation in inadvisable due to disease, parasites, and nuisance (Craven et al. 1998). Relocation is not favored by ODFW.
		Poison
Corvid	0-5	DRC-1339 has proved effective in reducing the number of ravens and crows prior to the breeding season. Limitations for use in recreation areas
Fox	0	No predicides would be practical under project field conditions.
Skunk/ Raccoon	0	No toxicants are registered for skunks or raccoons (Boggess 1994, Knight 1994).
		Trapping and Euthanasia
Corvid	1	These predators may be trapped by a variety of methods. However, trapping would be labor intensive and birds would learn to avoid traps.
Fox	0-5	Padded jaw leg-hold traps are one of the most effective tools in capturing problem wildlife. Snares would also be an effective tool used in limited applications. Fox readily enter cage traps. Cage traps may be less feasible in remote locations. Cage traps preferred in high use areas if traps are used. Leg-hold traps and snares would not be used in high recreational use areas where humans and their pets could encounter them.
Skunk/ Raccoon	0-5	Cage traps, leg-hold traps and snares are very effective and widely used in controlling skunks and raccoons (Boggess 1994, Knight 1994). Cage traps may have some limitations in remote locations. Leg-hold traps and snares would not be used in high recreational use areas where humans and their pets would be likely to encounter them.
		Shooting
Corvid	3-4	Shooting of avian predators is target specific and effective when personnel are on site. Limited due to personnel abilities to remain on site. Limitations in recreation areas.

Fox	3-4	Shooting is an effective and selective technique when personnel are on site. Limited due to personnel abilities to remain on site. Limitations in recreation areas.
Skunk/ Raccoon	3-4	Shooting is very effective and selective when personnel are on site (Boggess 1994, Knight 1994). Limited due to personnel abilities to remain on site. Limited in recreation areas.

Other methods that could be used include destroying eggs of predators, patrolling or using effigies, and denning. Egg destruction may not reduce immediate predation but is intended to prevent population growth. This method is done manually and only practical during a relatively short time interval and requires skill to properly identify the eggs and hatchlings of target species. Patrolling is limited by personnel. Denning can reduce fox, skunk, and coyote predation by reducing food requirements of predators. The management methods that may be used under the proposed action provide the wildlife specialist with the most flexibility to use methods that are determined, on a case-by-case basis, to be the most effective. The effectiveness of the proposed action would be dependent upon numerous factors such as the skill of the specialists, and cooperation of the affected agencies and project personnel. Some factors that may influence effectiveness cannot be predicted, such as weather, predator movement patterns, and snowy plover locations. Overall, the effectiveness of the proposed action alternative would be rated as the highest of the alternatives, because it allows for the most options and flexibility.

4.1.5 Impacts on recreation

Plover nesting areas are generally posted off limits to recreationists during the nesting season (March 15 through Sept. 15). Plovers currently nest at several sites on the Siuslaw National Forest within the Dunes NRA: Sutton, Siltcoos, Overlook, Tahkenitch and Tenmile Creek (Figure 1). Public recreational use is relatively high in some of these areas. BLM recreation sites include Coos North Spit, and New River ACEC.

Applying the Decision Model (Slate et al. 1992) (Figure 2), and during the development of work plans, the USFS, BLM, and cooperating agencies would give consideration to public use patterns and the time of year when predator damage management would be proposed. Where people are likely to be exposed to methods that would be used to protect plovers, preference would be given to non-lethal and non-invasive methods. Lethal tools may be omitted in recreation areas to minimize the potential of affecting members of the public and their pets. Leg-hold traps or snares, or spotlight shooting may be considered for use at night if the public does not have access during those times. In this case, tools would be removed or covered during hours of public use. In high use areas, predator damage management may occur in late winter prior to plover nesting, if this is determined effective. With the arrival of visitors, emphasis would be placed on education and using tools that would not harm the public.

Although this could reduce the effectiveness, human safety is a very high priority for all of the agencies concerned.

Description of recreational use and predator damage management actions

Following is a brief description of recreational use at the Dunes NRA, and BLM sites, with potential mitigation that could be used to avoid harm to humans and their pets. Final work plans would be developed prior to any direct predator damage management that might occur (see Section 2.1 describing Proposed Action which includes the development of work plans and use of the Decision Model (Slate et al. 1992) to select appropriate methods.

Siltcoos: This recreation area receives approximately 232,000 visitors each year, with 70 percent of visitation occurring from May through September. Day use recreational activities and overnight use of campgrounds would preclude the use of most lethal methods, day and night. Non-invasive and non-lethal methods would be used when the public is on site. Preferred methods would include nest exclosures and sight aversion to deter avian predators, limited cage trapping to remove foxes, skunks, and raccoons, only if they are found to be an excessive threat, and increased educational efforts. Trash management to remove attractants is a vital component of management in recreational areas. Padded-jaw leg-hold traps, shooting, toxicants, and pyrotechnics would not be used during periods of high recreational use, Labor Day through Memorial Day, but are not necessarily limited to that time period if users arrive at other times, or residents frequent the area. Calling and shooting, and using traps, snares and toxicants may be used in some limited situations prior to plover nesting and prior to arrival of summer recreationists. Conspicuous bilingual warning signs would be posted at all access sites when lethal methods are used.

Sutton and Overlook: Sutton recreation area receives approximately 75,000 visitors each year, and Overlook beach area receives approximately 70,000 visitors each year. Eighty percent of use occurs between May and September. Sutton and Overlook are day use areas only.

Tahkenithch and Tenmile Creek: are also located in the Dunes NRA, but these areas are remote enough that recreation would not be a major concern. Still, if signs of human use are present, application of the Decision Model (Slate et al 1992) would preclude methods that could harm humans or their pets.

Coos North Spit: managed by BLM, receives relatively low to moderate use at approximately 26,000 visitors each year with the majority of visitation occurring from

May through September. Recreation activities include primarily fishing, clamming, off-highway vehicle riding, surfing and horseback riding. Recreational use on the North Spit occurs during the day. Night use occurs only intermittently. Plover nests in this area are remote enough that recreation would not be a major concern. Still, if signs of human use are present, application of the Decision Model (Slate et al. 1992) would preclude methods that could harm humans or their pets.

New River ACEC: managed by BLM, receives variable recreational use. The ACEC is adjacent to Boice Cope County Park and Floras Lake, where beach use is relatively high from May through September. Visitor numbers are only available for campers at Boice Cope. Annually, 7,371 campers stay at this campground, and many others use this location for day use activities. The rest of the area is fairly inaccessible and therefore receives low use. Windsurfers often access the beach at Floras Lake. Other activities include horseback riding, hiking, hunting and fishing. The area is closed to off-highway vehicles. Little recreational activity takes place at night in the ACEC.

Day use recreational activities and overnight use of campgrounds at Floras Lake would preclude the use of most lethal methods, day and night. Non-invasive and non-lethal methods would be used when the public is on site. Preferred methods would include nest exclosures and sight aversion to deter avian predators, limited cage trapping to remove foxes, skunks, or raccoons and increased educational efforts. Trash management to remove attractants is a vital component of management in recreational areas. Padded-jaw leg-hold traps, shooting, toxicants, and pyrotechnics would not be used during periods of high use, which are normally from Labor Day through Memorial Day, but are not necessarily limited to that time period if users are present at other times, or residents frequent the area. Calling and shooting, and using traps, snares and toxicants, may be used in some limited situations prior to plover nesting and prior to arrival of summer recreationists. Conspicuous bilingual warning signs would be posted at all access sites where lethal methods would be used. Plover nests in other portions of the ACEC are remote enough that recreation would not be a major concern. Still, if signs of human use are present, application of the Decision Model (Slate et al. 1992) would preclude methods that could harm humans or their pets.

Effects on recreation

Impacts on recreationists would be primarily visual in nature. Some visitors may view plover nest exclosures, avian predator sight deterrents, and educational or warning signs. These visual impacts, temporary in nature, would occur in limited areas near plover nest sites, and are small in magnitude compared to the total recreation area available for their use. The public is not likely to encounter lethal methods, and auditory deterrents would not be used in high recreational use areas. Local residents

would be advised of any proposed direct control so that they are aware of the specific activities prior to implementation. Some recreationists and residents may benefit through education and with the knowledge that efforts are being made to protect snowy plover from predation. Because of the limited areas where plovers nest compared with the total area available for public use, exposure to the public is expected to be minimal and temporary. As plovers expand nesting areas, exposure may increase relative to the number of nesting sites requiring protection.

Because this proposal would use non invasive or non-lethal methods in high use areas, visual impacts would be minor, and predator damage management would not contribute to beach closures, cumulative impacts on recreational activities is expected to be low.

Potential impacts on pets and human safety is discussed under Section 4.1.2, Non-target Impacts.

4.2 Alternative 2 - Current Program (No Action Alternative)

4.2.1 Impact of predator damage management on the target species populations

4.2.1.1 American crows

Impact on crow populations

With the increasing crow population, it is expected that problems associated with crows would increase. Under the current program, crows are deterred with plover nest exclosures but are not removed lethally. Trash management was also improved at a number of sites to remove attractants. Considering their population trend and abundance in Oregon, it is expected that the crow population and the population trend would continue to increase. The current program would have no effect on the crow population, since none would be removed.

4.2.1.2 Common ravens

Impact on raven populations

Ravens are deterred with plover nest exclosures and would not be lethally removed under this alternative. Therefore, there would be no impact on the population.

4.2.1.3 Fox

Impact on red fox populations

Under the current program, no foxes would be removed. During the experimental predator removal program in 1999, 17 red fox were removed from plover nesting sites in Coos Bay (USDA 2000). This rate of fox removal had a negligible effect on the fox population, because fox reproduce and recruit into areas where removal occurred. Only nest exclosures and trash management would be used to reduce predation on snowy plovers.

Impact on gray fox populations

No gray foxes would be removed under the current program alternative.

4.2.1.4 Raccoon

Impact on Raccoon populations

Thirteen raccoons were removed as part of the experimental program in 1999 (USDA 2000). When added to total "other take" in coastal counties (fur harvest and depredation take by APHIS-WS), the total take was 855 raccoons, or 0.1 percent of the estimated population. This is negligible compared with the 40 percent allowable harvest (USDA 1997a revised). Under the current program only nest exclosures and trash management would be used to reduce predation on snowy plovers.

4.2.1.5 Skunk

Impact on striped skunk populations

The experimental program removed six skunks in 1999 (USDA 2000). When added to total other take (fur harvest and depredation take), only 36 skunks were removed from the population. This is negligible and less than the

proposed action. Under the current program only nest exclosures and trash management would be used to reduce predation on snowy plovers.

Impacts on spotted skunks

No spotted skunks are expected to be taken under the current program alternative.

4.2.1.6. Impacts on other predators

No population impacts would occur on coyotes, gulls, mink, weasels, opossum, mice, rats, or raptors under the current program because none would be removed.

Feral cats

Impacts on feral cats

The current program may remove several feral cats annually. Cats could be killed on site, or relocated to shelters where they may be adopted, but most would likely be euthanized. In 1999, two feral cats were removed during a experimental program to protect plovers. This alternative would remove fewer cats than the other three alternatives.

4.2.2 Non-target impacts

Analysis of recent data (USDA 2000) reveals that the experimental predator damage management program had negligible impacts on non-target species. In 1999, APHIS-WS caught one turkey vulture in a padded-jaw leg-hold trap while removing plover predators at a Coos Bay nesting site. The vulture was the only non-target animal caught, and it was released unharmed.

Non-target impacts from the current program alternative would not be expected since only nest exclosures would be used. Humans and pets would not be affected.

Threatened and endangered species

Current predator damage management measures are limited to placement of exclosures around plover nests. The Oregon Natural Heritage Program places these exclosures as part of an ongoing monitoring and nest protection program. Oregon Natural Heritage Program's activities are authorized by the USFWS through a Section 10(a)(1)(A) Recovery Permit. Disturbance to incubating plovers is unavoidable during exclosure construction. In consideration of the expertise of the plover biologists erecting the exclosures, the measures taken to minimize adverse impacts to plovers and their nests, and the higher hatch rates of exclosed versus unexclosed nests, the USFWS has determined that the net result is beneficial to plovers. However, as discussed in 1.2 (Need for Action), other forms of predation not addressed by nest exclosures continue to limit recruitment into the population and adult survival. Continuing the current program will not help nest success, recruitment, and fledgling and adult survival to reach more natural levels.

The current program has no effect on other T&E species.

4.2.3 Humaneness

The current program is probably considered by some people to be more humane to target species than the proposed action because lethal damage management would not be used. (The experimental predator removal component used in 1999 would not be continued.) Some people would consider this alternative (Alternative 2) to be less humane for plovers since it would afford less protection from predators.

4.2.4 Effectiveness

The current program alternative is not expected to be as effective as the proposed action since it limits available methods to nest exclosures. Habitat improvements and trash management would continue, as under all of the alternatives, but is not within the scope of analysis of this EA. Thus, effective methods for reducing predation from some species and protecting plovers away from nest exclosures would not be available under this alternative. Integrated wildlife damage management was determined to be the most effective in resolving predation by USDA (1997a revised). This alternative also does not allow predator damage management in all areas with nesting plovers, and would not expand intensive site investigation to better determine species responsible for preying on plovers.

4.2.5 Impacts on recreation

Under the current program, no additional predator damage management over current nest exclosures, recreation and trash management would occur. Therefore, this alternative would not affect current recreational use patterns, or contribute to adverse cumulative impacts.

4.3 Alternative 3 - Non-lethal Control Only

4.3.1 Impact of predator damage management on the target species populations

Any or all of the non-lethal management methods listed in Table 2 could be used under this alternative.

4.3.1.1. American crows

Impact on crow populations

With the increasing crow population, it is expected that problems associated with crows would increase. Under the non-lethal methods only alterative, crows would be deterred with plover nest exclosures, hazing methods, effigies, and trash management. They would not be removed lethally, therefore, this alternative would have no impact on the crow population.

4.3.1.2 Common ravens

Impact on raven populations

Ravens would be controlled with the same methods as crows. No ravens would be lethally removed from the population under this alternative, therefore no impacts to raven populations would occur.

4.3.1.3 Fox

Impact on red fox populations

Red fox predation on nesting plovers would be controlled with nest exclosures. No red fox would be lethally removed under this alternative, thus there would be no impact on red fox populations.

Impact on gray fox populations

Gray fox predation would be managed the same way as red fox predation. Therefore no impacts on gray fox would occur under this alternative.

4.3.1.4 Raccoon

Impact on raccoons populations

There would be no impact on the raccoon population since none would be removed. Nest exclosures may deter raccoons from nesting plovers.

4.3.1.5 Skunk

Impact on skunk populations

No skunks would be removed under this alternative, and therefore there would be no impacts on skunk populations from this alternative

4.3.1.6. Impacts on other predators

Other potential predators of plovers include coyotes, gulls, mink, weasels, opossum, mice, rats, and raptors. There would be no impact to any of these species since none would be removed.

Feral cats

The Federal lead and cooperating agencies would not destroy any feral cats. Feral cats could be live trapped and relocated to humane groups or shelters. If willing groups or shelters are found, this could reduce the feral cat population to the same level as the proposed action. Hopefully, some feral cats could be adopted, however, most would probably be euthanized since feral cats are numerous and difficult to adopt due to their wild nature, and since other cats needing homes are usually abundant. This alternative could essentially have the same impact on feral cats as the proposed action alternative.

4.3.2. Non target impacts

Implementation of some non-lethal damage management methods would occur near plover nesting areas and some non-target animals may be disturbed. The disturbances would be minimal and most species would acclimate to the disturbance rather quickly. Therefore, the non-lethal methods only alternative would have no impact on non target species.

Threatened and endangered species

Implementation of some non-lethal predator management measures could occur in and around plover nesting areas and thus may disturb plovers using these habitats. As discussed with respect to the proposed action, APHIS-WS, USFWS, ODFW, and the appropriate land management agency will confer to determine what measures can be taken to minimize impacts to plovers and if the benefits of implementation would outweigh any unavoidable adverse effects to plovers. Implementation of the predator management measures available under this alternative would only proceed when the expected net effect is beneficial to plovers.

Because this alternative would constrain the tools available for predator damage management, it is not anticipated to be as effective as the proposed action. As a result, this alternative is not expected to provide the same degree of improvement in plover recruitment and survival as the proposed action. Pyrotechnics or other auditory or visual aversive measures could disturb eagles hunting along the beach, eagles perched in nearby trees, and pelicans loafing on adjacent beaches. Since these species are easy to detect and identify, these types of impacts can be avoided. Terms and conditions of the biological opinion that would minimize harm to T&E species would be built into this alternative if selected.

4.3.3 Humaneness

This alternative is often considered to be the most humane and preferred by some groups and individuals who advocate animal rights. Most people would probably agree that non-lethal damage management is preferable to killing an individual animal if it accomplishes the goals intended.

Under this alternative, feral cats could be removed live and provided to animal shelters or humane groups for adoption. The cooperating agencies would not destroy cats, however, the cats ultimate fate would be up to the shelter or group receiving the cats, and their ability to find homes for the feral cats. It is likely that most of these cats would ultimately be destroyed. Relocating and holding feral cats that will

ultimately be euthanized would add unnecessary stress to those cats and could be considered less humane than immediate lethal control on site.

In a national survey conducted by an independent research firm in 1997, 68 percent of all respondents, and 60 percent of cat owning respondents, felt that stray cats should be humanely removed from areas set aside for wildlife (American Bird Conservancy 2000).

4.3.4 Effectiveness

This alternative has some effectiveness, especially for nesting plovers if nest exclosures were erected around all nests. However, it would be the least effective of all alternatives since it does little to protect plovers outside of nest exclosures. Trash and habitat management would continue, and would provide some benefit by reducing attractants and cover for predators.

The effectiveness of this alternative in protecting the snowy plovers from potential predation would be lower than the current program, since it would at best temporarily deter predators from predation but would not remove their threat. The effectiveness in protecting plovers from predators would depend entirely upon nest exclosures and other non-lethal methods as presented in Table 8. Relocating feral cats would be as effective as euthanizing them on site since they would be removed from the local population.

4.3.5 - Impacts on recreation

Impacts on recreation under the Non-lethal Methods Only Alternative would be similar to the proposed action where public use would affect the methods that would be used. Cage traps, would not be used if the intent were to euthanize trapped animals. Like the proposed action, impacts would be visual in nature with the use of nest exclosures around nests, some use of visual avian predator deterrents, and educational or warning signs in limited areas around plover nest sites. The public would not encounter lethal methods since they would not be allowed under this alternative. Auditory deterrents would not be used in high recreational use areas due to the potential to disturb users. Local residents would be advised of proposed damage management methods that could affect them. Some recreationists and residents may benefit through education and with the knowledge that efforts are being made to protect the snowy plover from predation. Because of the limited areas where plovers nest compared with the total area available for public use, exposure to the public is expected to be minimal. As plovers expand nesting areas, exposure may increase relative to the number of nesting sites.

Mitigation to avoid impacts on human safety are built into the proposed action through use of the Decision Model (Slate et al. 1992) (Figure 2), and work plans would detail specific methods. Safety concerns and limitations for use are detailed in Appendix B, Wildlife Damage Management Methods. It is not anticipated that any adverse cumulative impacts would result to recreational users from implementing this alternative.

4.4 Alternative 4 - Non-lethal Control Before Lethal Control

4.4.1 Impact of predator damage management on the target species populations

The impact on target species populations under this alternative would be similar, (the same or slightly less), to the proposed action. Under the proposed action, prior to applying any management method, the wildlife specialist considers which strategy, whether lethal or non-lethal, or a combination thereof, would be the most effective and appropriate in each situation to prevent damage. Non-lethal damage management is always selected if the specialist believes it will be effective. Based on their expertise, they can determine which types of damage management methods are most effective and appropriate for preventing damage. If a determination is made to use lethal methods first, or in combination with non-lethal methods, it is because they believe that non-lethal control would not in itself be sufficient for resolution. Thus, if they are *required* to use non-lethal control first (as in alternative 4), but would not have otherwise made that choice, then it will likely be followed by lethal control, and the effect on the predators would be similar to the proposed action. In summary, the effects on target species would be similar to the proposed action alternative because non-lethal control is always given first consideration under the proposed action.

4.4.1.1 American crows

Impact on crow population

The non-lethal methods first alternative would be expected to have similar impacts on the crow population as the proposed action alternative for the reasons described under Section 4.4.1

4.4.1.2 Common ravens

Impact on raven populations

The non-lethal methods first alternative would be expected to have similar impacts on the raven population as the proposed action alternative for the reason described under Section 4.4.1.

4.4.1.3 Fox

Impact on red fox populations

The non-lethal methods first alternative would be expected to have similar impacts on the red fox population as the proposed action alternative for the reasons described under Section 4.4.1.

Gray fox

Impact on gray fox populations

The non-lethal methods first alternative would be expected to have similar impacts on the gray fox population as the proposed action alternative for the reasons described under Section 4.4.1.

4.4.1.4 Raccoon

Impact on raccoon populations

The non-lethal methods first alternative would be expected to have similar impacts on the raccoon population as the proposed action alternative for the reasons described under Section 4.4.1.

4.4.1.5 Skunk

Impact on skunk populations

The non-lethal methods first alternative would be expected to have similar impacts on the skunk population as the proposed action alternative for the reasons described under Section 4.4.1.

4.4.1.6. Impacts on other predators

Impacts on other predators would be expected to be similar or slightly less than those under the proposed action for the reasons described under Section 4.4.1.

Feral cats

The impact on the local feral cat population would be expected to be similar to the proposed action and the non-lethal only alternative because cats would be either provided to animal shelters and/or destroyed on site, thus effectively "removing" them from the project area.

4.4.2 Non target impacts

Impacts on non-target animals could theoretically be less than the proposed action. In reality, non-target impacts would be similar to the proposed action, because lethal methods would only be used if they were considered necessary because non-lethal methods were determined ineffective.

Threatened and Endangered Species

Selection of this alternative would result in the same types of disturbance to plovers as would the proposed action. These impacts and the approach that would be taken to ensure the net effect would be beneficial to plovers are discussed in more detail in section 4.1.2. Because this alternative is not expected to be as effective as the proposed action, the expected benefits to plovers are not as great as anticipated for the proposed action.

This alternative is expected to have the same impacts on bald eagles and brown pelicans as would the proposed action and discussed in section 4.1.2. Terms and conditions of the BO that would minimize harm to T&E species would be built into this alternative if selected.

4.4.3 Humaneness

This alternative was proposed by animal advocate groups to improve the humaneness of the proposed action by exhausting non-lethal methods before lethal methods could be used. The intent is to protect the welfare of individual animals and minimize lethal damage management to only those instances where it is determined to be absolutely necessary.

Under the proposed action, non-lethal methods would be *considered* first, and used if, when, and where professional, experienced wildlife specialists believe they would be effective. Thus, the real difference between the non-lethal control methods first alternative and the proposed action can actually be an added component of non-lethal damage management of some type. This alternative could be considered to be slightly more humane if the non-lethal method is effective when it may not have otherwise been selected. The lead and cooperating agencies consider this alternative to be slightly less humane due to its probability of increasing the amount of control actions necessary to resolve each damage situation.

4.4.4 Effectiveness

Under this alternative, non-lethal methods would be required to be used first, regardless of effectiveness. Reduced effectiveness would add extra effort, time, and expense in cases where lethal control is believed to be warranted as a first step. This reduced efficiency could preclude predator damage work in other areas to protect plovers. Predation may be higher than the proposed action alternative due to the time required to try non-lethal methods. For these reasons, this alternative would be less effective than the proposed action, and more effective than the non-lethal only program.

4.4.5 Impacts on recreation

Impacts on recreation under the non-lethal before lethal methods alternative are expected to be similar to the proposed action alternative since methods used would likely be similar. Applying the Decision Model (Slate et al. 1992) (Figure 2), during the development of work plans, USFS, BLM, and cooperating agencies would give consideration to the public use patterns and times of year at which predator damage management might be proposed. Where people are likely to be exposed to any methods that might be used to protect plovers, preference would be given to non-lethal, non-invasive methods, and lethal methods may be omitted altogether to minimize the potential of affecting members of the public and their pets. Leg-hold traps or snares, or spotlight shooting may be considered for use at night if the public does not have access during those times, and if non-lethal methods that were applied first were not effective in reducing threats of predation. In this case, tools would be removed or covered during hours of public use. In high recreational use areas, predator damage management may occur in late winter months prior to plover nesting, if this is determined effective (depending upon the predators that are present). With the arrival of visitors, emphasis would be placed on education and using methods that would not harm the public. Although this could reduce the effectiveness of predator damage management, human safety is a very high priority

for all of the agencies concerned. As under the proposed action, work plans indicating the specific methods that could be used at each site would be developed prior to any predator damage management that might occur (see Section 2.1 Proposed Action which includes the development of work plans and use of the Decision Model (Slate et al. 1992) to select appropriate methods).

Like the proposed action, a minor impact on recreation is expected to occur from the non-lethal before lethal alternative. It would be primarily visual in nature with the use of nest exclosures around nests, some use of visual avian predator deterrents, and educational or warning signs in limited areas around plover nest sites. The public is not likely to encounter lethal methods if they are used, and auditory deterrents would not be used in high use areas. Local residents would be advised of any proposed direct control so that they will be aware of the specific activities prior to implementation. Some recreationists and residents may benefit through education and with the knowledge that efforts are being made to protect the snowy plover from predation. Because of the limited areas where plovers nest compared with the total area available for public use, exposure to the public is expected to be minimal. As plovers expand nesting areas, exposure may increase relative to the number of nesting sites.

Mitigation to avoid impacts on human safety are built into this alternative through use of the Decision Model (Slate et al. 1992) (Figure 2) and development of site specific work plans. Safety concerns and limitations for use are detailed in Appendix B, Wildlife Damage Management Methods. Potential impacts on pets is discussed under Section 4.4.2, Non-target impacts. Cumulative impacts would be similar to the proposed action alternative.

4.5 Cumulative Impacts

Cumulative impacts on target species were discussed under the environmental consequences sections for each species. The worst case scenarios as discussed in this EA, would contribute to low cumulative impacts on species populations. Non-target impacts are expected to be low to none.

The cumulative effects on plovers would be most beneficial under the proposed action alternative since it rated highest for effectiveness in protecting plovers. All of the alternatives would enhance other measures already place to protect plovers (habitat management, trash collection and education). These other measures are expected to continue in the foreseeable future.

The cumulative effects on plovers and other T&E species will be assessed in more detail in the USFWS BO which will be issued following receipt of public comments on the public draft EA. All measures to minimize harm to plovers, bald eagles and brown pelicans would be adopted into the final decision and are expected to result in low or no negative effects on these species. Some harassment to plovers may occur from implementing predator control since the work would be done in plover habitat. The USFWS anticipates that no harm would be done to T&E species.

Predator damage management activities would not contribute to beach closures. Predator damage management could be considered negative by some recreationists, however the actions would be temporary and isolated. Recreationists may benefit from predator damage management by an awareness of and education in plover management activities, and by an enhanced potential to see plovers if the various management actions are successful in promoting population growth and stabilization. For these reasons, the cumulative effects on recreation are expected to be low.

4.6 Summary and Conclusions

Table 9 presents the conclusions drawn from the analysis. The effectiveness of the alternatives, given no significant impact in any of the other evaluation criteria, is probably the most important evaluation criteria (issue) in this assessment because greater effectiveness means greater protection to the snowy plover. The effectiveness of any of the alternatives would determine the likelihood that the alternative would help to prevent further decline of the snowy plover, while other measures are ongoing to recover the species.

Table 9. Summary of Impacts

Issue	Proposed Action (Alt. 1)	No Action (Alt. 2)	Non-lethal Control Only (Alt. 3)	Non-lethal Before Lethal (Alt. 4)
Red fox	Removal of low numbers of individuals would have negligible effects on the population.	No impact on fox population.	No impacts on fox population.	Removal of low numbers of individuals would have negligible effects on the population.
Corvids	Removal of low numbers of individuals would have negligible effects on the population.	No impacts on corvid populations.	No impacts on corvid populations.	Removal of low numbers of individuals would have negligible effects on the population.

Issue	Proposed Action (Alt. 1)	No Action (Alt. 2)	Non-lethal Control Only (Alt. 3)	Non-lethal Before Lethal (Alt. 4)
Raccoon/ Skunk	Removal of low numbers of individuals would have negligible effects on the population.	No impacts on raccoon and skunk populations.	No impacts on raccoon and skunk populations.	Removal of low numbers of individuals would have negligible effects on the population.
Other Predators (feral cats, raptors, rodents, coyotes, mink, weasels)	Removal of low numbers of individuals would have negligible effects on the population	No impacts on other predators.	Feral cats removal would have similar effects as Alt. 1 and 4 if willing recipient shelters could be located. No impact on other predator populations.	Removal of low numbers of individuals would have negligible effects on the population.
Effectiveness	Most effective alternative in protecting snowy plover from predators due to flexibility to use lethal and non-lethal methods where necessary.	May not be sufficient to prevent further decline. No protection for plovers away from nest exclosures.	Low effectiveness in protecting birds away from nest and where non-lethal methods alone are not adequate. May not be sufficient to prevent further decline, but probably more effective than Alt. 2.	Likely to be effective in protecting plovers in some situations. Limitations may allow more predation than Alt. 1. More effective than alternatives 2 & 3.
Non-target Species	Low impacts on non-target species	No impacts on non-target species	No impacts on non-target species.	Low impacts on non-target species
T&E Species[11]	Most likely to benefit snowy plover by enhancing recruitment and adult survival. Impacts on brown pelicans and bald eagles would be avoided or minimized through procedures built into the program.	Minimal benefits to plovers, but maintaining current hatch rates. Impacts on brown pelicans and bald eagles would be minimized through procedures built into the program.	Some benefit to plovers where non-lethal methods are effective. Impacts on brown pelicans and bald eagles would be minimized through procedures built into the program.	Would likely benefit plover by enhancing recruitment and adult survival to some degree. Impacts on brown pelicans and bald eagles would be minimized through procedures built into the program.

[11]/ Terms and conditions of the biological opinion that would minimize harm to T&E species would be built into any alternative that may be selected.

Issue	Proposed Action (Alt. 1)	No Action (Alt. 2)	Non-lethal Control Only (Alt. 3)	Non-lethal Before Lethal (Alt. 4)
Humaneness	Some people opposed to capture and killing of any wildlife. Methods used to minimize pain and suffering while maximizing effectiveness	This alternative may be considered humane by some people since no lethal control is used. Since this alternative would be the least effective in protecting plovers, if is not desirable for plovers.	Some consider this preferable. Most would agree Alt. 3 is preferable if effective. Feral cats may be subject to undue stress if not adopted.	Some may consider this more humane than Alt. 1. Lead and cooperating agencies consider this to be somewhat less humane than Alt. 1.
Recreation	Would have minor visual impact on some recreationists in high use areas such as at Dunes NRA BLM sites.	No impact on recreationists over current use of nest exclosures.	Impacts similar to proposed action since lethal or invasive methods would be minimized or not used in high use areas.	Impacts similar to proposed action
Cumulative	Low	Low	Low	Low

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Federal Register Notice
Determination of Threatened Status of the Pacific Coast Population of the Western Snowy Plover March 5, 1993

DEPARTMENT OF THE INTERIOR (DOI)
United States Fish and Wildlife Service (FWS)
50 CFR Part 17
Final Rule: Endangered and Threatened Wildlife and Plants;
Determination of Threatened Status for the Pacific Coast Population of
the Western Snowy Plover / RIN 1018-AB73
Contact: Karen Miller, 916-978-4866
Effective Date: 04/05/93
Rules and Regulations
(FEDREGISTER 58 FR 12864 03/05/93; 1431 lines.)
Item Key: 5285
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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018-AB 73

Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Pacific Coast Population of the Western Snowy Plover

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The U.S. Fish and Wildlife Service (Service) determines threatened status for the Pacific coast population of the western snowy plover (Charadrius alexandrinus nivosus), pursuant to the Endangered Species Act of 1973, as amended (Act). The Pacific coast breeding population of the western snowy plover extends from the State of Washington to Baja California, Mexico, with the majority of breeding birds found in California. These plovers winter primarily in coastal California and Mexico. The coastal population of the western snowy plover is threatened throughout its range by loss and disturbance of nesting sites. The final decision on determination of critical habitat is postponed in accordance with section 4(b)(6)(C)(ii) of the Act. This rule implements the Federal protection and recovery provisions afforded by the Act for this species.

EFFECTIVE DATE: April 5, 1993.

ADDRESSES: The complete file for this rule is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, 2800 Cottage Way, room E-1803, Sacramento, CA 95825-1846.

FOR FURTHER INFORMATION CONTACT: Karen J. Miller, at the above address

(916-978-4866).
SUPPLEMENTARY INFORMATION:

Background

Taxonomy

The snowy plover is a small, pale colored shorebird with dark patches on either side of the upper breast. The species was first described in 1758 by Linnaeus (American Ornithologists' Union 1957). Twelve subspecies of the snowy plover occur worldwide (Rittinghaus 1961 in Jacobs 1986).

Two subspecies of the snowy plover are recognized in North America (American Ornithologists' Union 1957). Those are the western snowy plover (Charadrius alexandrinus nivosus) and the Cuban snowy plover (C. a. tenuirostris). According to the American Ornithologists' Union (1957), the western snowy plover breeds on the Pacific coast from southern Washington to southern Baja California, Mexico, and in interior areas of Oregon, California, Nevada, Utah, New Mexico, Colorado, Kansas, Oklahoma and north-central Texas, as well as coastal areas of extreme southern Texas, and possibly extreme northeastern Mexico. Although previously observed only as a migrant in Arizona, small numbers have bred there in recent years (Monson and Phillips 1981, Davis and Russell 1984 in Page et al. 1991). The Cuban snowy plover breeds along the Gulf coast from Louisiana to western Florida and south through the Caribbean. The subspecific status of populations breeding east of the Rocky Mountains has been questioned (Johnsgard 1981, Jacobs 1986). These populations are considered to belong more appropriately to the subspecies tenuirostris.

The Pacific coast population of the western snowy plover is defined as those individuals that nest adjacent to or near tidal waters, and includes all nesting colonies on the mainland coast, peninsulas, offshore islands, adjacent bays, and estuaries.

The Pacific coast population of the western snowy plover is genetically isolated from western snowy plovers breeding in the interior (Gary Page, Point Reyes Bird Observatory, pers. comm., 1990). Intensive banding and monitoring studies have documented only two instances of intermixing between coastal and interior populations. First, a single banded female hatched at Monterey Bay was observed nesting the following year at Mono Lake, California (Gary Page, in litt., 1989). This one observation was among 1,730 plovers observed at the interior site. Second, a late summer nesting plover at Monterey was observed the following year nesting at a Central Valley site (Gary Page, pers. comm., 1992). Three snowy plovers banded as chicks on the California coast were observed at interior Oregon breeding sites during the breeding season in 1990 (Stern et al. 1991a). No nesting, however, was documented. Conversely, no plovers banded at interior sites in Oregon, California, and Utah (1,434 birds) have been observed breeding at any coastal site (Stern et al. 1990a; Gary Page, pers comm.). In addition, snowy plovers tend to be site faithful, with the majority of birds returning to the same nesting location in subsequent years (Warriner et al. 1986).

Life History

The Pacific coast population of the western snowy plover breeds primarily on coastal beaches from southern Washington to southern Baja California, Mexico. Nesting habitat is unstable and ephemeral as a result of unconsolidated soil characteristics influenced by high winds, storms, wave action, and colonization by plants. Other less common nesting habitat includes salt pans, coastal dredged spoil disposal sites, dry salt ponds, and salt pond levees (Widrig 1980, Wilson 1980, Page and Stenzel 1981). Sand spits, dune-backed beaches, unvegatated beach strands, open areas around estuaries, and beaches at river mouths are the preferred coastal habitats for nesting (Stenzel et al. 1981, Wilson 1980).

Based on the most recent surveys, a total of 28 snowy plover breeding sites or areas currently occur on the Pacific Coast of the United States. Two sites occur in southern Washington -- one at Leadbetter Point, in Willapa Bay (Widrig 1980), and the other at Damon Point, in Grays Harbor (Anthony 1985). In Oregon, nesting birds were recorded in 6 locations in 1990 with 3 sites (Bayocean Spit, North Spit Coos Bay and spoils, and Bandon State Park-Floras Lake) supporting 81 percent of the total coastal nesting population (Oregon Department of Fish and Wildlife, unpubl. data, 1991). A total of 20 plover breeding areas currently occur in coastal California (Page et al. 1991). Eight areas support 78 percent of the California coastal breeding population: San Francisco Bay, Monterey Bay, Morro Bay, the Callendar-Mussel Rock Dunes area, the Point Sal to Point Conception area, the Oxnard lowland, Santa Rosa Island, and San Nicolas Island (Page et al. 1991).

Snowy plovers breed in loose colonies with the number of adults at coastal breeding sites ranging from 2 to 318 (Page and Stenzel 1981; Oregon Department of Fish and Wildlife 1990; Eric Cummins, Washington Department of Wildlife, pers. comm., 1991; James Atkinson, U.S. Fish and Wildlife Service, pers. comm., 1991). On the Pacific coast, larger concentrations of breeding birds occur in the south than in the north, suggesting that the center of the plovers' coastal distribution lies closer to the southern boundary of California (Page and Stenzel 1981). The Center of Scientific Investigation and Higher Education in Ensenada, Baja California, Mexico, observed snowy plovers distributed across 28 sites in Baja California in May, 1991. A total of 314 pairs were counted. The birds were concentrated at six coastal lakes (Dra. Graciela De La Graza Garcia, Director General of Conservation Ecology and Natural Resources, United States of Mexico, in litt., 1992). The Mexican government also reported a small number of sightings of snowy plovers on the mainland coast of Sinaloa in April 1992 (Dra. Graciela De La Graza Garcia, in litt., 1992).

Nest sites typically occur in flat, open areas with sandy or saline substrates; vegetation and driftwood are usually sparse or absent (Widrig 1980, Wilson 1980, Stenzel et al. 1981). The majority of snowy plovers are site-faithful, returning to the same breeding site in subsequent breeding seasons. Birds often nest in exactly the same locations as the previous year (Warriner et al. 1986).

The breeding season of the coastal population of the western snowy plover extends from mid March through mid September. Nest initiation

and egg laying occurs from mid March through mid July (Wilson 1980, Warriner et al. 1986). The usual clutch size is three eggs. Incubation averages 27 days (Warriner et al. 1986). Both sexes incubate the eggs.

Plover chicks are precocial, leaving the nest within hours after hatching to search for food. Fledging (reaching flying age) requires an average of 31 days (Warriner et al. 1986). Broods rarely remain in the nesting territory until fledging (Warriner et al. 1986, Stern et al. 1990b).

Snowy plovers will renest after loss of a clutch or brood (Wilson 1980, Warriner et al. 1986). Double brooding and polygamy (i.e., the female successfully hatches more than one brood in a nesting season with different mates) have been observed in coastal California (Warriner et al. 1986) and also may occur in Oregon (Jacobs 1986). After loss of a clutch or brood or successful hatching of a nest, plovers may renest in the same colony site or move, sometimes up to several hundred miles, to other colony sites to nest (Gary Page, pers. comm., 1991; Warriner et al. 1986).

Widely varying nest success (percentage of nests hatching at least one egg) and reproductive success (number of young fledged per female, pair, or nest) are reported in the literature. Nest success ranges from 0 to 80 percent for coastal snowy plovers (Widrig 1980, Wilson 1980, Saul 1982, Wilson-Jacobs and Dorsey 1985, Wickham unpubl. data in Jacobs 1986, Warriner et al. 1986). Instances of low nest success have been attributed to a variety of factors, including predation, human disturbance, and inclement weather conditions. Reproductive success ranges from 0.05 to 2.40 young fledged per female, pair, or nest (Page et al. 1977, Widrig 1980, Wilson 1980, Saul 1982, Warriner et al. 1986, Page 1988). Page et al. (1977) estimated that snowy plovers must fledge 0.8 young per female to maintain a stable population. Reproductive success falls far short of this threshold at many nesting sites (Widrig 1980, Wilson 1980, Warriner et al. 1986, Page 1988, Page 1990).

The coastal population of the western snowy plover consists of both resident and migratory birds. Some birds winter in the same areas used for breeding (Warriner et al. 1986, Wilson-Jacobs, pers. comm. in Page et al. 1986). Other birds migrate either north or south to wintering areas (Warriner et al. 1986). Plovers occasionally winter in southern coastal Washington (Brittell et al. 1976). An average of 68 plovers may winter in Oregon, primarily on 3 beach segments (Oregon Department of Fish and Wildlife 1990 and in litt., 1992). The majority of birds, however, winter south of Bodega Bay, California (Page et al. 1986). Wintering plovers occur in widely scattered locations on both coasts of Baja California and significant numbers have been observed on the mainland coast of Mexico at least as far south as San Blas, Nayarit (Page et al. 1986). Many interior birds west of the Rocky Mountains winter on the Pacific coast (page et al. 1986, Stern et al. 1988). Birds winter in habitats similar to those used during the nesting season.

Snowy plovers forage on invertebrates in the wet sand and amongst surf-cast kelp within the intertidal zone; in dry, sandy areas above the high tide; on salt pans; spoil sites; and along the edges of salt marshes and salt ponds. Little quantitative information is available on food habits (Reeder 1951).

Poor reproductive success, resulting from human disturbance, predation, and inclement weather, combined with permanent or long-term loss of nesting habitat to encroachment of introduced European beachgrass (Ammophila arenaria) and urban development has led to a decline in active nesting colonies, as well as an overall decline in the breeding and wintering population of the western snowy plover along the Pacific coast of the United States.

Previous Service Action

On March 24, 1988, the Service received a petition from Dr. J.P. Myers of the National Audubon Society to list the Pacific coast population of the western snowy plover as a threatened species under the Act. On November 14, 1988, the Service published a 90-day petition finding (53 FR 45788) that substantial information had been presented indicating the requested action may be warranted. At that time, the Service acknowledged that questions pertaining to the demarcation of the subspecies and significance of interchange between coastal and interior stocks of the subspecies remained to be answered. Public comments were requested on the status of the coastal population of the western snowy plover. A status review of the entire subspecies had been in progress since the Service's December 30, 1982, Vertebrate Notice of Review (47 FR 58454). In that notice, as in subsequent notices of review (September 18, 1985 (50 FR 37958); January 6, 1989 (54 FR 554)), the western snowy plover was included as a category 2 candidate. Category 2 candidates are species for which information now in possession of the Service indicates that proposing to list as endangered or threatened is possibly appropriate, but for which conclusive data on biological vulnerability and threat are not currently available to support proposed rules. The public comment period on the petition was closed on July 11, 1989 (54 FR 26811, June 26, 1989). The Service completed a status report on the western snowy plover in September 1989. Based on the best scientific and commercial data available and other comments submitted during the status review, the Service made a 12-month petition finding on June 25, 1990, that the petitioned action was warranted but precluded by other pending listing actions, in accordance with section 4(b)(3)(B)(iii) of the Act. On January 14, 1992 (57 FR 1443), the Service published a proposal to list the coastal population of the western snowy plover as a threatened species. With publication of this final rule, the Service now determines the Pacific coast population of the western snowy plover to be a threatened species.

Summary of Comments and Recommendations

In the January 14, 1992, proposed rule (57 FR 1443) and associated notifications, all interested parties were requested to submit factual reports or information that might contribute to development of a final listing decision. Appropriate State agencies, county and city governments, Federal agencies, scientific organizations, and other interested parties were contacted and requested to comment. Newspaper notices were published in the Register Guard, News Times, Daily Astorian, The Oregonian, The Courier, Seaside Signal, The World, Columbia Press, Statesman-Journal, and Headlight Herald on January 30, 1992, the San Francisco Chronicle and Sun Jose Mercury News on

February 3, 1992, the Oakland Tribune and Times-Standard on February 4, 1992, the Willapa Harbor Herald on February 5, 1992, the Daily World and Fort Bragg Advocate-News on February 6, 1992, the Triplicate and Chinook Observer on February 11, 1992, and the North Coast News on February 12, 1992, all of which invited public comment.

On March 2, 1992, the Service received a written request for a public hearing from Mr. John Thomas, Jr., a private citizen residing in Monmouth, Oregon. As a result, the Service published a notice of public hearing on August 3, 1992 (57 FR 34100), and reopened the comment period until August 31, 1992. Newspaper notices of the public hearing were published in the Daily Olympian, The Oregonian, the San Francisco Chronicle, and the Los Angeles Times on August 3, 1992, all of which invited general public comment. A public hearing was conducted at the Hatfield Marine Science Center in Newport, Oregon on August 18, 1992. Testimony was taken from 6 p.m. to 7:25 p.m. Six individuals testified at the hearing.

During the comment periods, the Service received 96 comments (i.e., letters and oral testimony) from 80 individuals or agencies. Of the 58 commenters that stated a position, 45 (78 percent) supported listing and 13 (22 percent) did not.

Support for the listing was expressed by one Federal agency, five State agencies, two local agencies, and 37 other interested parties. Of the State agencies responding favorably, the Washington Department of Wildlife, Oregon Department of Fish and Wildlife, and California Department of Parks and Recreation indicated strong support for listing. The Oregon Parks and Recreation Department indicated support for the listing with protection of public access rights. The California Department of Fish and Game indicated a shared interest with the Service in protecting the western snowy plover. Fifteen respondents, including the Oregon Department of Fish and Wildlife, expressed their support for endangered rather than threatened status. The Service also received two informal petitions containing 62 signatures favoring listing of the Pacific coast population of the western snowy plover. The Mexican government expressed an interest in obtaining information that would aid protection of the species in Baja California, Mexico.

Opposition to the listing was expressed by one State assemblyman, three local agencies, and nine other interested parties. Of those respondents indicating no position on the listing, many expressed concern regarding the impact of listing.

Several commenters provided additional information on the threats facing the species. Some agencies provided information on existing actions that are currently underway to help protect the species. These comments have been incorporated into the final rule. A number of commenters suggested particular strategies to help recover the species, commented on the benefits and problems associated with various recovery techniques, made recommendations for the establishment of a recovery team, or generally provided comments on ways to manage the species. Many agencies and organizations requested participation in recovery actions. These comments will be useful to the Service during the recovery planning process and will be fully considered at that time.

Written comments and oral statements obtained during the public hearing and comment periods are combined in the following discussion. Opposing comments and other comments questioning the rule can be placed in 10 general groups based on content. These categories of comment, and the Service's response to each, are listed below.

Issue 1: Critical Habitat

Comment: Several commenters were concerned about the designation of critical habitat. Eight commenters were concerned that critical habitat would not be designated and urged the Service to move forward in this endeavor. One private landowner asked that her property be included as critical habitat. Several commenters felt that enough information is presently available to designate critical habitat. These commenters believed that by stating that critical habitat is not presently determinable, the Service is attempting to exempt itself from the designation of critical habitat. The California Department of Parks and Recreation supported designation of critical habitat and stated that this designation would enable the Department to more effectively control levels of recreation use and removal of exotic plants and animals. Other agencies supporting designation of critical habitat included the Oregon Department of Fish and Wildlife, Washington Department of Wildlife, and the Portland and Seattle Districts of the Corps of Engineers.

Conversely, two respondents recommended against designation of critical habitat, with one in favor of critical habitat designation only on Federal lands.

Service Response: Section 4(a)(3) of the Act requires, to the maximum extent prudent and determinable, that the Secretary designate critical habitat at the time a species is determined to be threatened or endangered. Critical habitat for the coastal population of the western snowy plover is not determinable at this time primarily because additional information is needed to analyze nesting habitat, wintering habitat, and the economic effects of a critical habitat designation. However, when a "not determinable" finding is made under section 4(b)(6)(C)(ii), the Service must to the maximum extent prudent within 2 years of the publication date of the proposed rule designate critical habitat. Any proposal to designate critical habitat would be published in the Federal Register including maps and legal descriptions of all areas included in the proposal, and would solicit public comments. The potential economic impacts of critical habitat designation would be evaluated during preparation of the required economic analysis.

While the Service continues to evaluate the appropriateness of designating critical habitat, it will use some of the information provided in response to the proposed rule regarding potential areas of critical habitat. The Service will solicit information from the public on any proposed designation of critical habitat.

Critical habitat, as defined by section 3 of the Act, includes all specific areas occupied by the species at the time of its listing that are essential to its conservation. Areas not presently occupied by the species also may be designated as critical habitat if such areas are essential for the conservation of the species. Substantial habitat for

the coastal population of the western snowy plover occurs on State and private lands, particularly in California, where the majority of the nesting population exists. In addition to Federal lands, State, municipal and privately-owned land may be designated as critical habitat, if such designation would benefit the species.

Comment: Several commenters provided information on factors to consider in the designation of critical habitat, such as the spatial arrangement of areas to be designated, size of the areas, and target number of birds to be included in such areas.

Service Response: These comments have been noted and will be considered in the Service's determination on the designation of critical habitat for the species.

Comment: Several commenters provided predictions on the effect of critical habitat designation on the economy, including economic impacts to Coos Bay, Oregon, the San Francisco Bay area, and the activities of the Oregon Department of Transportation. In addition, specific areas were requested to be exempt from critical habitat designation.

Service Response: The Service will fully consider these comments in any designation of critical habitat and in preparation of the accompanying economic analysis.

Issue 2: National Environmental Policy Act

Comment: One commenter stated that the designation of critical habitat and the proposal to list the Pacific coast population of the western snowy plover may fall within the purview of the National Environmental Policy Act (NEPA). This commenter stated that if an environmental analysis had been conducted on the proposal to list the plover, much of the information necessary for the designation of critical habitat would have already been assembled.

Service Response: For the reasons set out in the NEPA section of this document, the Service takes the position that rules issued pursuant to section 4(a) of the Endangered Species Act do not require preparation of an Environmental Assessment or Environmental Impact Statement (EIS). The decision in Pacific Legal Foundation v. Andrus, 657 F.2d 829 (6th Circuit 1981) held that as a matter of law an EIS is not required for listings under the Act. The decision noted that preparing EISs on listing actions would not further the goals of NEPA or the Endangered Species Act.

Issue 3: Economic Effects of Listing

Comment: Several commenters expressed concern about an adverse effect on the economy of listing the Pacific coast population of the western snowy plover, including the effects of the listing on tourism and military training exercises. One commenter recommended that the Service do an economic analysis of the impact of listing the snowy plover as threatened. Several commenters expressed the opinion that people are more important than wildlife. One commenter stated that proposed solutions to protect the snowy plover should not include

broad prescriptions against all industrial development. The Portland District of the Corps of Engineers stated that the costs to that agency of listing the species likely would be minimal unless the Corps was directed to develop and fund new nesting areas.

In contrast, one commenter stated that listing of the plover would have a positive effect on the economy. This commenter cited a proposed residential development in Oregon where the developers propose to preserve an area for snowy plovers. The developers have viewed formation of a plover habitat area as a purchasing incentive for homeowners.

Service Response: Under section 4(b)(1)(A) of the Act, a listing determination must be based solely on the best scientific and commercial data available. The legislative history of this provision clearly states the intent of Congress to "ensure' that listing decisions are "* * * based solely on biological criteria and to prevent nonbiological considerations from affecting such decisions * * *" H.R. Rep. No. 97-835, 97th Cong., 2d Sess. 19 (1982). As further stated in the legislative history, "* * * economic considerations have no relevance to determinations regarding the status of species * * *" Id. at 20. Because the Service is specifically precluded from considering economic impacts, either positive or negative, in a listing determination, the Service is not responding to comments concerning possible economic consequences of listing the Pacific coast population of the western snowy plover. The Service, however, would be required to prepare an economic analysis in association with designation of critical habitat.

The Service will consider all existing regulatory mechanisms during the recovery planning process, and will consider a range of options in the preparation of a recovery strategy for the species. Comments on the approaches to habitat and species protection will be evaluated at that time.

Comment: Several commenters expressed concern that listing of the coastal population of the western snowy plover would prevent the construction or implementation of various projects. One commenter stated that the listing would hinder the safe operation, maintenance, and development of new facilities at an international airport governed by State and Federal regulation. The commenter requested that the Service consider an exemption procedure for federally-regulated airports. Another commenter stated that Federal agencies should prepare section 7 consultations on actions that would inhibit the continued operation of spoil disposal operations and salt manufacturing because these activities support significant populations of the snowy plover.

Service Response: Section 7 of the Act requires Federal agencies to insure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service. If the Service determines, through formal consultation, that a Federal action is likely to jeopardize the continued existence of a listed species, reasonable and prudent alternatives are provided by the Service.

Under section 7(g) of the Act, an applicant for a Federal permit or license can apply to the Secretary of the Interior for an exemption for an agency action if, after consultation with the Service, it is determined that the agency's action would violate section 7(a)(2) of the Act. Exemption procedures are outlined in section 7(g) through 7(p) of the Act.

The airport in question has supported in recent years a nesting colony of the federally endangered California least tern (Sterna antillarum brownii). Snowy plovers nest in the same area occupied by least terns. The airport has been successful in maintaining and safely operating its facilities despite the presence of an endangered species on the airport. If the Service determined, after consultation, that an action involving the subject airport would be likely to jeopardize the continued existence of the snowy plover and that there was no reasonable and prudent alternative to such action, the Federal agency responsible for regulating the airport's activities could apply for an exemption under section 7(g) of the Act.

Issue 4: Alternate Listing Status Recommended

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0*0*0* Comment: Several commenters recommended that the coastal population of the western snowy plover be listed as endangered rather than threatened, primarily because of precipitous declines in the population on the Oregon coast.

Service Response: The Service recognizes that the nesting population of snowy plovers has declined severely on the Oregon and Washington coasts. The majority of the population, however, nests in California where the decline in number of nesting birds has been less dramatic. New data received from the Mexican government during the comment period indicate that a significant number of plovers (about 314 pairs) nest on the Pacific coast of Baja California, Mexico. In addition, the approximate 17 percent population decline documented for the United States coastal population between 1977 and 1989 (Page et al. 1991) indicates that the current rate of decline in this population does not suggest the likelihood of extinction within the foreseeable future. For these reasons, the Service maintains that threatened status is warranted for the Pacific coast population of the western snowy plover.

Issue 5: Insufficiency of Scientific Data

Comment: Several commenters stated that the evidence was insufficient to prove that the Pacific coast population of the western snowy plover is distinct from interior western snowy plovers. One commenter requested information on interior population numbers and questioned the Service's authority to designate populations as threatened or endangered species.

Service Response: As stated above in the "Background" section of this rule, evidence of intermixing of coastal and interior populations is limited to two documented instances of banded snowy plovers from the coastal population breeding at interior sites (Gary Page, in litt., 1989, Gary Page, pers. comm., 1992). These observations were among over 1,700 birds observed at interior sites in California and

Nevada. More importantly, no banded snowy plovers of the larger interior population have been recorded nesting on the coast (Stern et al. 1990a, Gary Page, pers. comm., 1992). Based on these data, the Service has determined that the Pacific coast population of the western snowy plover is distinct from interior populations.

The Service completed a status review on the western snowy plover in 1989. Based on this status report, the Service determined that listing of the interior population of the western snowy plover is possibly appropriate; however, conclusive data on biological vulnerability and threat are not currently available to support a proposed rule. The interior population was designated as a category 2 candidate in the November 21, 1991, Animal Notice of Review (56 FR 58804).

Under section 3 of the Act, a "species" is defined as "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." Therefore, the Act allows for listing a population of a vertebrate species.

Comment: Several commenters stated that insufficient data were available to warrant listing the coastal population of the western snowy plover as a threatened species. Several commenters indicated that listing of the snowy plover was being done for political, rather than biological reasons.

Service Response: Section 4(b)(1)(A) of the Act, requires that a listing determination be based on the best scientific and commercial data available. The Service bases its determination on data collected over a period of 10 or more years by the Point Reyes Bird Observatory, the Oregon Department of Fish and Wildlife, the Washington Department of Wildlife, and other competent researchers. All data indicate a downward trend in the nesting population and number of nesting sites on the coast. The Service maintains that sufficient data are available to warrant listing the Pacific coast population of the western snowy plover as a threatened species.

Comment: One commenter stated that there is no scientific proof that European beachgrass or horseback riding has had any deleterious effect upon the coastal snowy plover population.

Service Response: European beachgrass, which is found at 50 percent of California snowy plover breeding sites and all of the Oregon and Washington breeding sites, eliminates potential snowy plover nesting habitat. The plant reduces the amount of unvegetated area above the surf line, the area where snowy plovers prefer to nest. As examples, at Willapa National Wildlife Refuge in Washington State, the Service documented between 1984 and 1990 invasion of European beachgrass into former snowy plover nesting areas (James Atkinson, pers. comm., 1992). A decline in the plover breeding population also occurred over this time period. In Oregon, at the Siuslaw National Forest, the U.S. Forest Service reports that European beachgrass has eliminated some of the historically open sand spits where snowy plovers formerly nested or wintered. Remaining birds are forced to use a greatly reduced habitat base (Robert D. Nelson, U.S. Forest Service, in litt., 1992). At the Pajaro River mouth in California, an ongoing decline in the breeding population of snowy plovers coincides with expansion of

European beachgrass at this site (David Dixon, California Department of Parks and Recreation in litt., 1991). The Oregon Department of Fish and Wildlife (in litt., 1992) considers European beachgrass to be the primary reason for the decline of snowy plovers on the Oregon coast, with human disturbance a secondary factor in remaining habitat.

Interactions between nesting snowy plovers and horseback riders have been documented at Baker Beach, Oregon, by Woolington (1985), at Salinas River State Beach, California, by Page (1988), and at Morro Bay and Calendar-Mussel Rock Dunes, California, by Philip Persons (Point Reyes Bird Observatory, in litt., 1992). Continuous passage of horseback riders through nesting areas results in direct loss of nests or indirect loss from plovers repeatedly being flushed from their nests.

Issue 6: Species and Habitat Management

Comment: Two commenters stated that the Service should allow natural selection to take place and not interfere with nature's principle of survival of the fittest.

Service Response: The decline of the Pacific coast population of the snowy plover is largely due to unnatural events, such as the human-caused introduction of European beachgrass and the non-native red fox. Other successful predators are attracted to coastal beaches by trash left behind by recreationists. A species may not be able to adapt to modifications in its habitat caused by human-related activities. Adaptation is an evolutionary process requiring considerable time. To follow the principle of "survival of the fittest" and allow threatened or endangered species to go extinct would be contrary to the intent of Congress as stated in the purposes of the Act.

Comment: Several commenters stated that the snowy plover is opportunistic in finding breeding sites, and, therefore, there is no reason to believe that the population of the species will not move to better breeding sites as the environment changes from location to location.

Service Response: Data on the coastal population of the western snowy plover suggest that most birds are site faithful, returning to the same breeding site in subsequent years. In California, the lack of major storms during the recent five-year drought has resulted in an increase in potential dune-backed nesting habitat for plovers on several State beaches. This available habitat, however, has not been explored in all cases (Henry R. Agonia, California Department of Parks and Recreation, in litt., 1991). These data contradict the assertion that coastal nesting birds are opportunistic in locating nesting sites. In addition, because of the constant increase in human-related activities on Pacific coast beaches and the unchecked advancement of European beachgrass on many beaches, it is unlikely that snowy plovers displaced from one breeding site will be able to find suitable nesting sites at other locations.

Comment: One commenter advised that if predators prove to be the primary problem for plovers at Coos Bay, preservation efforts might be more wisely undertaken at nesting areas adjacent to less populated areas.

Service Response: The Coos Bay nesting colony on the North Spit is the largest remaining nesting colony in the State of Oregon. Predators are recognized as a significant factor in the reduced nesting success of plovers at this site. In response to this threat, the Oregon Department of Fish and Wildlife has been conducting nest enclosures experiments and has found these measures significantly increased nesting success. Because this nesting site is the largest in Oregon and is responding favorably to management, it would be inadvisable at h)
0*0*0*this time to abandon this site in favor of applying management techniques only at nesting sites in less populated areas.

Comment: Many commenters provided advice on how snowy plover nesting areas should be managed, including prohibition or effective and enforceable regulation of foot, horseback, and vehicular traffic, control of cats and dogs, exclusion of researchers, creation of buffer areas adjacent to human activity centers, continuing education, use of nesting enclosures, predator control, beachgrass control and eradication using mechanical techniques and herbicides, removal of stabilization structures, careful placement of dredged spoils, garbage removal, and regular monitoring of bird numbers and distribution. Some of these comments suggested that the above management actions should be undertaken instead of listing the species. One commenter believed that barring vehicle traffic alone, as has been done at many beaches, is not enough to protect snowy plovers.

In contrast, one commenter was concerned that the above management actions were unnatural and did not follow proven science or the tenet of natural selection. Another commenter was concerned that other wildlife would be adversely impacted by management actions to protect snowy plovers.

Service Response: The Service will fully consider these as well as other possible management approaches when consultation and recovery actions are undertaken for the snowy plover. The Service considers the decline in the coastal population of the snowy plover to be primarily related to unnatured factors, including the introduction of non-native vegetation and predators. When a species declines to the point of threatened or endangered status as a result of man-made factors, intensified management is scientifically warranted to reverse this unnatural population decline. The Service recognizes that localized populations of more common wildlife species may decline to a minor degree as a result of actions taken to protect the snowy plover.

Comment: One commenter felt that implementation of a cooperative predator control program in the San Francisco Bay area would be more effective in protecting the snowy plover than listing the species as threatened or endangered. The commenter felt that listing the species would destroy this cooperative spirit and not protect the species.

Service Response: The San Francisco Bay area supports the largest remaining nesting population of snowy plovers in coastal California. Despite the importance of this nesting region, and despite the lack of legal status for the snowy plover, no cooperative predator control programs have been launched to protect this species. Conversely, a cooperative predator control program is currently underway to protect the federally listed endangered California clapper rail (Rallus

longirostris obsoletus) in the San Francisco Bay area. Based on this experience, the Service's believes that listed species are more likely to be the recipients of cooperative protection ventures than species that are not listed.

Issue 7: Take Regulations

Comment: One commenter recommended that the Service concurrently developed and promulgate regulations are provided in the Act to define "take" of the species.

Service Response: The Service is considering the need to develop a precise definition of "take" for the Pacific coast population of the western snowy plover.

Comment: One commenter suggested that all the Federal land on the west coast be reserved for snowy plovers, and that State, local and privately-owned land be exempt.

Service Response: The Endangered Species Act applies to all people and all lands regardless of ownership. Under section 9 of the Act, the prohibition against "take" of listed species is not based on land ownership. The requirements for Federal agencies under section 7 of the Act are discussed under Issue 3 and under the Available Conservation Measures section of this rule. Under section 10(a) of the Act, private landowners may apply for an incidential take permit and develop a habitat conservation plan for projects that take listed species incidental to otherwise lawful activities. An incidental take permit constitutes an exception to the prohibition against taking. Details of the procedures involved in applying for a section 10(a) permit may be found in 50 CFR 17.32(b). Federal land comprises 34 percent of snowy plover habitat in California, and 50 percent of plover habitat in Oregon and Washington. Because the majority of the nesting plover population occurs in California, protection of only 34 percent of the species' nesting habitat would not provide adequate protection for the coastal population of the western snowy plover.

Issue 8: Sequence of Listing Actions

Comment: Three commenters questioned why the northern spotted owl (Strix occidentalis caurina) and the marbled murrelet (Brachyramphus marmoratus marmoratus) were listed prior to the western snowy plover when the plover population is smaller than either of these species.

Service Response: The Service was petitioned to list the northern spotted owl in January, 1987, and the marbled murrelet in January, 1988. Both petitions preceded the petition to list the Pacific coast population of the western snowy plover.

In summary, no information was received indicating that the species is more widespread or under lesser threat than was previously thought.

Summary of Factors Affecting the Species

After a thorough review and consideration of all information available, the Service has determined that the Pacific coast

population of the western snowy plover should be classified as a threatened species. Procedures found at section 4 of the Act (16 U.S.C. 1533) and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act were followed. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1). These factors and their application to the Pacific coast population of the western snowy plover (Charadrius alexandrinus nivosus) are as follows:

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Historic records indicate that nesting western snowy plovers were once more widely distributed in coastal California, Oregon, and Washington than they are currently. In coastal California, snowy plovers bred at 53 locations prior to 1970 (Page and Stenzel 1981). Since that time, no evidence of breeding birds has been found at 33 of these 53 sites, representing a 62 percent decline in breeding sites (Page and Stenzel 1981). The greatest losses of breeding habitat were in southern California, within the central portion of the snowy plover's coastal breeding range. In Oregon, snowy plovers historically nested at 29 locations on the coast (Charles Bruce, Oregon Department of Fish and Wildlife, pers. comm., 1991). In 1990, only six nesting colonies remained, representing a 79 percent decline in active breeding sites. In Washington, snowy plovers formerly nested in at least five sites on the coast (Eric Cummins, pers. comm., 1991). Today only two colony sites remain active, representing, at minimum, a 60 percent decline in breeding sites.

In addition to loss of nesting sites, the plover breeding population in California, Oregon, and Washington has declined 17 percent between 1977 and 1989 (Page et al. 1991). Declines in the breeding population have been specifically documented in Oregon and California. Breeding season surveys of the Oregon coast from 1978 to 1992 show that the number of adult snowy plovers has declined significantly at an average annual rate of about 5 percent (calculated from Oregon Department of Fish and Wildlife data). The number of adults has declined from a high of 139 adults in 1981 to a low of 30 adults in 1992 (Oregon Department of Fish and Wildlife 1990, Charles Bruce, pers. comm., 1991, Randy Fisher, Oregon Department of Fish and Wildlife, in litt., 1992). If the current trend continues, breeding snowy plovers could disappear from coastal Oregon by 1999. In 1981, the coastal California breeding population of snowy plovers was estimated to be 1,565 adults (Page and Stenzel 1981). In 1989, surveys revealed 1,386 plovers (Page et al. 1991), an 11 percent decline in the breeding population. The population decline in California may be greater than indicated; the 1989 survey results are considered more reliable than the earlier estimates, which may have underestimated the overall population size (Gary Page, pers. comm., 1991).

Although there are no historic data for Washington, it is doubtful that the snowy plover breeding population in Washington was ever very large (Brittell et al. 1976). However, loss of nesting sites in this State probably has resulted in a reduction in overall population size. In recent years, fewer than 30 birds have nested on the southern coast of Washington (James Atkinson, pers. comm., 1990; Eric Cummins, pers. comm., 1991). In 1991, there was only one successful brood detected in

the State (Tom Juelson, Washington Department of Wildlife, in litt., 1992).

Survey data also indicate a decline in wintering snowy plovers, particularly in southern California. The number of snowy plovers observed during Christmas Bird Counts from 1962 to 1984 significantly decreased in southern California despite an increase in observer participation in the counts (Page et al. 1986). This observed decline was not accompanied by a significant loss of wintering habitat over the same time period (Page et al. 1986).

The most important form of habitat loss to coastal breeding snowy plovers has been encroachment of European beachgrass (Ammophila arenaria). This non-native plant was introduced to the west coast around 1898 to stabilize dunes (Wiedemann 1987). Since then it has spread up and down the coast and now is found from British Columbia to southern California (Ventura County). European beachgrass is currently a major dune plant at about 50 percent of California breeding sites and all of those in Oregon and Washington (J.P. Myers, National Audubon Society, in litt., 1988). Stabilizing sand dunes with European beachgrass has reduced the amount of unvegetated area above the tideline, decreased the width of the beach, and increased its slope. These changes have reduced the amount of potential snowy plover nesting habitat on many beaches and may hamper brood movements. The beachgrass community also provides habitat for snowy plover predators which historically would have been largely precluded by the lack of cover in the dune community. In addition, the presence of beachgrass may adversely affect plover food supplies. The abundance and diversity of sand dune arthropods are markedly depressed in areas dominated by European beachgrass (Slobodchikoff and Doyen 1977).

Urban development also has contributed significantly to the loss of snowy plover breeding sites. The construction of residential and industrial developments, and recreational facilities, including placement of access roads, parking lots, summer homes, and supportive services, have permanently eliminated valuable nesting habitat on beaches in southern Washington (Brittell et al. 1976), Oregon (Oregon Department of Fish and Wildlife 1990), and California (Page and Stenzel 1981). Snowy plover use of man-made habitat, such as salt evaporators and dredged spoil sites, apparently has not compensated for loss or degradation of habitat in other areas (Page and Stenzel 1981).

Sand mining operations at numerous locations in California also may be eliminating potential snowy plover habitat by interrupting buildup of the sand profile (David Dixon, in litt., 1991). Stabilization efforts also may interrupt this process, resulting in beach erosion and loss of plover nesting habitat.

In the habitat remaining for snowy plover nesting, human activity (e.g., walking, jogging, running pets, horseback riding, off-road vehicle use, and beach raking) is a key factor in the ongoing decline in snowy plover coastal breeding sites and breeding populations in California, Oregon, and Washington. Snowy plovers also are subjected to similar high levels of human disturbance at nesting sites in Baja California, Mexico (Barbara Massey, Proesteros, pers. comm., 1990; Daniel Anderson, University of California, Davis, pers. comm., 1990). With 81 percent of the Oregon snowy plover population supported at

three of six remaining nesting sites and 78 percent of the California population breeding in eight areas, loss of just a few of these sites could dramatically reduce the coastal plover population.

In all of Los Angeles County and parts of Orange County, California, entire beaches are raked on a daily to weekly basis to remove trash and tidal debris. Even if human activity was low on these beaches, grooming activities completely preclude the possibility of successful nesting attempts (Stenzel et al. 1981). Plover food availability on raked beaches also may be depressed for both breeding and wintering birds, because surf-cast kelp and associated invertebrates are removed and the upper centimeter of the sand substrate is disturbed (J.P. Myers, in litt., 1988).

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Egg collecting has been observed at several California nesting colonies (Stenzel et al. 1981, Warriner et al. 1986). The significance of this factor on nesting success is unknown.

C. Disease or Predation

Western snowy plover eggs, chicks, and adults are taken by a variety of avian and mammalian predators. These losses, particularly to avian predators, are exacerbated by human disturbances. Of the many predators, American crows (Corvus brachyrhynchos), ravens (C. corax), and red fox (Vulpes vulpes) have had a significantly adverse effect on reproductive success at several colony sites. Because crows and ravens, in particular, thrive in urban/agricultural areas, present day coastal populations of these species are probably greater than historic populations. Accumulations of trash at beaches attracts these as well as other predators, including striped skunks (Mephitis mephitis), gulls (Larus sp.), and raccoons (Procyon lotor) (Stern et al. 1990b, Hogan 1991). At nesting sites on the Oregon coast, nest losses of up to 68 percent have been attributed to crows and ravens (Wilson-Jacobs and Meslow 1984, Stern et al. 1991b). Ravens were also significant predators at a Point Reyes breeding site, destroying 67 to 69 percent of the clutches in 1988 to 1989 (Page 1988, 1990). In recent years, concern has increased regarding loss of snowy plover nests to the introduced eastern red fox. The fox apparently now occurs throughout a significant portion of coastal California, including the Monterey Bay area (John and Jane Warriner, point Reyes Bird Observatory, in litt., 1989), San Francisco Bay (Leora Feeney, Biological Field Services, pers. comm., 1991), Orange County, (Gary Page, in litt., 1988), and Ventura, Los Angeles, and Santa Barbara Counties (Ronald Jurek, California Department of Fish and Game, pers. comm., 1992). At the Marina breeding site in Monterey Bay, red fox destroyed 45 percent of the nests in 1988 (Page 1988). This predator was also the likely cause of nest failures at least three other breeding sites in Monterey Bay in 1989 to 1990 (Page 1990). In the Salinas River area, the number of chicks fledged between 1984 and 1989 was reduced by 75 percent as red fox expanded into the area (John and Jane Warriner, in litt., 1989).

Although predation represents an important mortality factor at

several colony sites, the significance of predation on the overall coastal population of the snowy plover is unknown. Nevertheless, this factor remains an issue of concern, particularly as it relates to the non-native red fox, which represents a severe and spreading threat to nesting snowy plovers.

D. The Inadequacy of Existing Regulatory Mechanisms

The western snowy plover is protected by the Federal Migratory Bird Treaty Act (16 U.S.C. 703 et seq.) and by State law as a nongame species. The plover's breeding habitat, however, receives only limited protection from these laws; e.g., Migratory Bird Treaty Act prohibition against taking "nests." 16 U.S.C. 703.

In the State of Washington, the western snowy plover was listed as an endangered species in 1981 by the Wildlife Commission. This designation, however, does not provide for consultation between the Department of Wildlife and other State agencies regarding impacts of proposed projects on the snowy plover. Preparation of a recovery plan for the snowy plover is required by 1995 under State law. A recovery plan for the snowy plover, however, has not yet been developed. There are also no penalties imposed under Washington law for take of endangered species habitat. At the Damon Point site, the Department of Wildlife has entered into an agreement with other agencies to provide some protection for nesting plovers.

In Oregon, the plover was listed as a threatened species in 1975. The Oregon Threatened and Endangered Species Act of 1987 requires other State agencies to consult with the Department of Fish and Wildlife. The State Act, however, does not provide adequate protection for either the birds or their habitat. A management and recovery plan for the snowy plover in Oregon is currently being developed (Oregon Department of Fish and Wildlife 1990, Martin Nugent, Oregon Department of Fish and Wildlife, pers. comm., 1992). Although protective measures are being implemented on an experimental basis at some nesting sites (Charles Bruce, pers. comm., 1990) and many beaches have been closed to vehicles, a comprehensive conservation program has yet to be implemented in this State. At Coos Bay, an estuary management plan requires no net loss of plover habitat in conjunction with industrial development of the North Spit. In 1993, the Oregon Fish and Wildlife Commission will consider upgrading the snowy plover to endangered status.

In California, where the majority of nesting occurs, the snowy plover is classified as a "Species of Special Concern" (Remsen 1978). This designation provides no special, legally mandated protection. Vehicle closures have been effective in protecting nesting snowy plovers on some State beaches (W. David Shuford, Point Reyes Bird Observatory, in litt., 1989, Henry R. Agonia, California Department of Parks and Recreation, in litt., 1991), but have been ineffective at other beaches because of a lack of enforcement (P. Persons, in litt., 1992). Aside from the Migratory Bird Treaty Act, snowy plovers have no protection status in Mexico.

Section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act are the primary Federal laws that could provide some protection of nesting and wintering habitat of the western snowy plover that is determined by the U.S. Army Corps of Engineers (Corps)

to be wetlands or historic navigable waters of the United States. These laws, however, would apply to only a small fraction of the nesting and wintering areas of the western snowy plover on the Pacific coast.

In 1985, the Nongame Program of the Service prepared management guidelines for the western snowy plover (Fish and Wildlife Service 1985), which included strategies to reduce human disturbance at nesting sites, and prevent structural alternation of breeding habitat. Some management actions have been carried out since publication of the guidelines, but major strategies have yet to be implemented.

E. Other Natural or Man-made Factors Affecting its Continued Existence

Human activity, as mentioned previously, is a key factor in the ongoing decline in snowy plover coastal breeding sites and breeding populations. The nesting season of the western snowy plover (mid-March to mid-September) coincides with the season of greatest human use on beaches of the west coast (Memorial Day through Labor Day). Human activities of particular detriment to nesting snowy plovers include unintentional disturbance and trampling of eggs and chicks by people (Stenzel et al. 1981, Warriner et al. 1986, P. Persons, in litt., 1992); off-road vehicle use (Widrig 1980, Stenzel et al. 1981, Anthony 1985, Warriner et al. 1986, Page 1988, Philip Persons, in litt., 1992); horse-back riding (Woolington 1985, Page 1988, Philip Persons, in litt., 1992); and beach raking (Stenzel et al. 1981). Page et al. (1977) found that snowy plovers were disturbed more than twice as often by such human activities than all other natural causes combined.

Intensive beach use by humans results in abandonment of nesting sites or reductions in nesting density or nesting success. In southern California where human activity on beaches is extensive, plover nesting is restricted to managed preserves. The reduction in the number of nesting plovers at South Beach on the Oregon coast may have been related to opening of a new State park adjacent to the beach (Wilson 1980). Nipomo Dunes beach in southern California, which receives high human use, including significant off-road vehicle activity, supported one-fifth the density of plover nests as occurred at Point Purisima beach, within Vandenberg Air Force Base (closed to public use) (Stenzel et al. 1981). This relationship held true even though nesting habitat at Nipomo Dunes was of higher quality than that at Point Purisima. Hatching success was found to be much lower on Zmudowski State Beach in Monterey County, California, than on an undisturbed salt pan just 1 kilometer (km) away (Warriners, unpubl. data in Page and Stenzel 1981).

In the few instances where human intrusion into snowy plover nesting areas has been precluded either through area closures or by natural events, nesting success has improved. The average number of young fledglings per nesting pair increased from 0.75 to 2.00 after the nesting site at Leadbetter Point, Washington, was closed to human activities (Saul 1982). Similarly, vehicle closure on a portion of Pismo Beach, California, led to an eight-fold increase in the nesting plover population (W. David Shuford, Point Reyes Bird Observatory, in litt., 1989). Fledgling success increased 16 percent at Moss Landing Beach, California, after beach access was virtually eliminated by the 1989 earthquake (Page 1990).

When beach visitors travel through plover nesting areas, plovers flush repeatedly. Incubating plovers at Point Reyes left their nests in response to human activity 65 to 78 percent of the time when disturbances occurred within 100 meters (m) or less of nests (Page et al. 1977). Dogs intimidated plovers even more, with plovers flushing more frequently and remaining off their nests significantly longer when disturbed by people with dogs versus people without dogs (Page et al. 1977).

Prolonged absences from the nest and the subsequent longer incubation period increase the likelihood of nest failures by prolonging exposure of eggs and nesting birds to predators (Page et al. 1983) and other detrimental factors. Human disturbance also may increase exposure of eggs or chicks to inclement weather. In an attempt to avoid intruders, adult snowy plovers have been observed leaving chicks wet and unattended in the rain (Wilson 1980) and allowing wind blown sand to bury their eggs (Charles Bruce, pers. comm., 1991). Prolonged absences from the nest on sunny days may result in overheating of the eggs.

Researchers also have frequently observed chicks running long distances along beaches as they were unintentionally "herded" by people using the beach (Philip Persons, in litt., 1992). High levels of human disturbance may increase chick mortality by altering chick behavior. Frequently disturbed piping plover chicks fed less often and at a reduced rate (Fleming et al. 1988). Fewer chicks survived to 17 days in areas heavily disturbed by humans.

In addition to indirect effects, direct losses of chicks and adults also result form human activities. In the Monterey Bay area, two makes were found run over on their nests (J.P. Myers, in litt., 1988). Chicks and adults are particularly vulnerable because of their habit of crouching in depressions, such as tire tracks or footprints. Vehicle tracks have been noted in nesting areas at a number of beaches, including Damon Point (Anthony 1985) and Leadbetter point (Widrig 1980) in Washington; New River (Wickham 1981) and Coos Bay (Oregon Department of Fish and Wildlife 1990) in Oregon; and Point Reyes (Page 1988), the Pajaro River mouth (Warriner et al. 1986), Morro Bay and Calendar-Mussel Rock Dunes (Philip Persons, in litt., 1992) in California. The Mexican government reported observing all terrain vehicle tracks in 15 of 28 breeding sites in Baja California, Mexico (Dra. Graciela De La Graza Garcia, in litt., 1992). On military bases, such as Camp Pendleton in California, plovers are directly and indirectly affected by military training exercises on the beach (Loren Hays, U.S. Fish and Wildlife Service, pers. comm., 1991).

Because the majority of snowy plover nesting sites occur in unstable sandy substrates, nest losses caused by weather-related natural phenomena commonly occur. Events such as extreme high tides (Wilson 1980, Stenzel et al. 1981, Warriner et al. 1986, Page 1988), river flooding (Stenzel et al. 1981), and heavy rain (Wilson 1980, Warriner et al. 1986, Page 1988) have been reported to destroy or wash away individual nests as well as entire colony sites. Wind driven sand contributes to nest failure by burying eggs (Wilson 1980, Stenzel et al. 1981, Warriner et al. 1986). The percentage of total nest losses attributed to weather-related phenomenon has varied from 15 to 38 percent (Wilson 1980, Warriner et al. 1986, Page 1988). Although

natural phenomena contribute significantly to nest failures at some plover breeding sites, the significance of this factor on the overall coastal breeding population is unknown.

Artificial measures have been taken at several nesting sites to improve snowy plover nesting success. In 1991, the California Department of Parks and Recreation and the Service conducted plover nest enclosure studies on National Wildlife Refuge and State property in the Monterey area. Hatching success of plover nests in enclosures was 81 percent as compared to 28 percent for unprotected nests. (Richard G. Rayburn, California Department of Parks and Recreation, in litt., 1992, Elaine Harding-Smith, U.S. Fish and Wildlife Service, pers. comm., 1992). Use of nest enclosures at Coos Bay North Spit resulted in up to 88 percent nesting success, compared to as low as 9 percent success for unprotected nests (Stern et al. 1991b, Randy Fisher, in litt., 1992).

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by the Pacific coast population of the western snowy plover in determining to make this final rule. Based on this evaluation, the preferred action is to list the Pacific coast population of the western snowy plover (Charadrius alexandrinus nivosus) as threatened. This population of the western snowy plover is threatened by loss and modification of nesting habitat resulting from encroachment of European beachgrass, extensive human recreational use of nesting areas, and human development of the coast. Predation, which is often exacerbated by human disturbance, poses a significant threat to a number of nesting colonies. Although only two western snowy plover nesting sites remain in Washington, and population declines in Oregon have been dramatic in recent years, the Service has decided to list the Pacific coast population of the western snowy plover as threatened. This decision is based on the fact that the center of the breeding range of this population is in California where numbers of breeding birds are greater and have not declined as dramatically. However, numerous unchecked threats and an ongoing, rangewide population decline indicate that the coastal population of the western snowy plover is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Critical habitat is not determinable at this time for reasons discussed in the "Critical Habitat" section of this rule.

Critical Habitat

Section 4(a)(3) of the Act, as amended, requires that, to the maximum extent prudent and determinable, the Secretary designate critical habitat concurrently with determining a species to be endangered or threatened. The Service finds that critical habitat is not presently determinable for the Pacific coast population of the western snowy plover. The Service's regulations (50 CFR 424.12(a)(2)) state that critical habitat is not determinable if information sufficient to perform required analyses of the impacts of the designation is lacking or if the biological needs of the species are not sufficiently known to permit identification of an area of critical habitat. Critical habitat is defined as "specific areas within the geographical area currently occupied by a species * * * on which are found those physical or biological features essential to the

conservation of the species and that may require special management considerations or protection * * *" (50 CFR 424.02(d)).

When prompt listing of a species is essential to its conservation, but sufficient information to perform required analyses of the impacts of the critical habitat designation is lacking, the Service may go forward with a final listing decision without designating critical habitat. In the case of the snowy plover, nesting birds (especially in Oregon and Washington) need immediate protection from take. A critical habitat determination, to the maximum extent prudent, must then be completed not later than 2 years from publication of the proposed rule. The Service is continuing to gather information to be used in these analyses.

The Service has received additional information specific to potential areas of snowy plover critical habitat. A study by Stern et al. (1990b) indicates that plover broods at several Oregon sites remain relatively close to nesting areas. Additional information is being sought from snowy plover experts, particularly in California, where many of the colony sites have not been studied as extensively.

The relative importance of specific wintering habitat sites to maintenance of the coastal population of the subspecies also may represent an additional consideration.

In addition, to analyze the economic impacts of a critical habitat designation, the Service must obtain information about the costs of such a designation over and above the costs associated with listing. The Service must have information on the possible increased costs associated with restrictions of public access to specific nesting or wintering areas, and associated secondary effects on recreational concessionaires, commercial fisheries, and industrial and residential development. Such information will be gathered by coordinating with the appropriate agencies and individuals.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Endangered Species Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain activities. Recognition through listing encourages and results in conservation actions by Federal, State, and private agencies, groups, and individuals. The Endangered Species Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. The protection required of Federal agencies and the prohibitions against taking and harm are discussed, in part, below.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(2) of the Act requires Federal agencies to insure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species or to destroy or adversely modify its critical habitat. If a Federal action

may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service.

Federal agencies that may be involved as a result of this listing are the Service, Bureau of Land Management, National Park Service, U.S. Forest Service, Federal Aviation Administration, and the Departments of the Army (including the Corps of Engineers (Corps)), Navy, and Air Force. In California, approximately 34 percent of the breeding plover population occurs on Federal lands (J.P. Myers, in litt., 1988). At least 50 percent of breeding habitat is under Federal agency jurisdiction in Oregon (J.P. Myers, in litt., 1988). In Washington, the breeding site at Leadbetter Point is within a National Wildlife Refuge.

On most Federal land containing active breeding sites, few measures have been implemented specifically to protect snowy plovers. In a few areas in California, including the Marine Corps Base at Camp Pendleton, plovers have benefitted somewhat from protective measures taken for the endangered California least tern (Sterna antillarum brownii). At Vandenberg Air Force Base in southern California, beaches are closed to all foot and vehicular traffic during the California least tern nesting season (Donna Brewer, U.S. Fish and Wildlife Service, pers. comm., 1991). Dogs and cattle have been restricted from some beaches at Point Reyes National Seashore (Gary Page, pers. comm., 1991), and some beaches on Federal land in Oregon have been closed to vehicles to protect plovers and other wildlife (Charles Bruce, pers. comm., 1991). Leadbetter Point in Washington (Fish and Wildlife Service), a 5-acre spoil disposal site in Coos Bay (Bureau of Land Management), and a 25-acre spoil disposal site in Coos Bay (Corps of Engineers) are the only nesting sites where human access is restricted specifically for plover nesting. At the Siuslaw National Forest, the Forest Service has established Forest-wide standards and guidelines for the snowy plover. These guidelines include area closures through signing, public education, prohibitions against loss or degradation of habitat, provisions for habitat enhancement, and monitoring. Most other nesting areas on Federal land, with the exception of military bases, have unrestricted human access all year. In Oregon, the Corps of Engineers is proposing two projects to create or improve plover nesting habitat using dredged spoils. Access improvements for recreational purposes are ongoing at several beaches on Federal land. At Coos Bay, Oregon, where the largest coastal Oregon plover colony occurs, several recreational facilities, including off-road vehicle access and campgrounds are proposed on Bureau of Land Management land (Bureau of Land Management 1989). The Bureau of Land Management at Coos Bay also is considering a proposed land exchange that would involve moving a snowy plover nesting site to a new location created with dredged spoils.

Because human disturbance is a primary factor affecting snowy plover reproductive success, any of the above mentioned Federal agencies would be required to consult with the Service if any action they fund, authorize, or carry out may affect the coastal population of the western snowy plover.

As discussed above, some western snowy plover nesting and wintering habitat may be regulated by the Corps of Engineers under section 10 of the Rivers and Harbors Act and section 404 of the Clean Water Act. If a proposed project may affect the western snowy plover, the Corps

would be required to consult with the Service under section 7 of the Act.

The Act and implementing regulations found at 50 CFR 17.31 set forth a series of general prohibitions and exceptions that apply to all threatened wildlife not covered by a special rule. These prohibitions, in part, make it illegal for any person subject to the jurisdiction of the United States to take (including harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt any such conduct), import or export, transport in interstate or foreign commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any listed species. It also is illegal to possess, sell deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to agents of the Service and State conservation agencies.

Permits may be issued to carry out otherwise prohibited activities involving threatened wildlife species under certain circumstances. Regulations governing permits are at 50 CFR 17.32. Such permits are available for scientific purposes, to enhance the propagation or survival of the species, and/or for incidental take in connection with otherwise lawful activities. For threatened species, there are also permits for zoological exhibition, educational purposes, or special purposes consistent with the purposes of the Act.

The Service will review the Pacific coast population of the western snowy plover to determine whether it should be placed upon the Annex of the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere, which is implemented through section 8(A)(e) of the Act, and whether it should be considered for other appropriate international agreements.

National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment or Environmental Impact Statement, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the Federal Register on October 25, 1983 (48 FR 49244).

References Cited

A complete list of all references cited herein is available upon request from the Field Supervisor, Sacramento Field Office, U.S. Fish and Wildlife Service, 2800 Cottage Way, Room E-1803, Sacramento, California 95825-1846.

Authors

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$65:$%$?$%List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, and Transportation.

Regulation Promulgation

Accordingly, part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, is amended as set forth below:

PART 17 -- [AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361-1407; 16 U.S.C. 1531-1544; 16 U.S.C. 4201-4245; Pub. L. 99-625, 100 Stat. 3500, unless otherwise noted.

2. Amend Sec. 17.11(h) by adding the following, in alphabetical order under Birds, to the List of Endangered and Threatened Wildlife:

Sec. 17.11 -- Endangered and threatened wildlife

* * * * *

(h) * * *

Birds

Species
Common name Plover, Western snowy
Scientific name Charadrius alexandrinus nivosus
Historic range U.S.A. (CA, OR, WA, NV, AZ, UT, CO, NM, TX, OK, KS); Mexico
Vertebrate population where endangered or threatened U.S.A. (CA, OR, WA); Mexico (BC) (Within 50 miles of the Pacific coast)
Status T
When listed 493
Critical habitat NA
Special rules NA

Dated: February 26, 1993.

Richard N. Smith,

Acting Director, U.S. Fish and Wildlife Service.

[FR Doc. 93-5086 Filed 3-4-93; 8:45 am]

BILLING CODE 4310-55-M

Predator Damage Management Methods

Predator Damage Management Methods Available for Use. A variety of methods are used by APHIS-WS personnel in predator damage management. APHIS-WS employ three general strategies to reduce wildlife damage: resource management, physical exclusion, and wildlife management. Each of these approaches is a general strategy or recommendation for addressing predator damage situations. Most predator damage management methods have recognized strengths and weaknesses relative to each damage situation. APHIS-WS personnel can determine for each unique situation what method or combination of methods is most appropriate and effective using the WS Decision Model (Slate et al. 1992) .

All predator damage management methods have limitations which are defined by the circumstances associated with individual wildlife damage problems. APHIS-WS considers a wide range of limitations as they apply the decision making process to determine what method(s) to use to resolve each damage problem (USDA 1997a, revised). Examples of limitations which must be considered and criteria to evaluate various methods are presented in USDA (1997a, revised, Appendix N) and in the following discussions.

Resource Management. Resource management includes a variety of practices that may be used by resource managers or owners to reduce the potential for predator damage. Implementation of these practices is appropriate when the potential for or actual damage can be reduced without significantly increasing a resource manager owner's costs or diminishing a person's ability to manage resources pursuant to their goals.

Habitat Management. Just as habitat management is an integral part of other wildlife management programs, it also plays an important role in predator damage management. The type, quality, and quantity of habitat is directly related to the animals attracted to an area and what the habitat can support. Therefore, habitat can be managed so that it does not produce or attract certain species or it repels them. Limitations of habitat management as a method of controlling wildlife damage are determined by the characteristics of the species involved, the nature of the damage, economic feasibility, and other factors. Removing non native beach grass to discourage predators is an integral part of past, present, and future plover recovery efforts.

Physical Exclusion. Physical exclusion methods restrict the access of wildlife to resources. Nest exclosures are used to protect nesting plovers from predation. The exclosures must encompass the sides and top of the structure, and be burried into the sand to help prevent burrowing, climbing and flying predators from entering the exclosures. These methods provide a means of appropriate and effective prevention of damage in some situations.

Wildlife Management. Reducing wildlife damage is achieved with many different techniques. The objective of this approach is to alter the behavior or population of the target animal, thereby eliminating or reducing the potential for loss or damage.

Frightening Devices. Frightening devices include distress calls, pyrotechnics, propane cannons, flags, and reflective tape. The success of frightening methods depends on the animal's fear of and subsequent aversion to the stimuli. Once animals become habituated to a stimulus, they often resume their damaging activities. Persistent efforts are usually required to consistently apply

frightening techniques and to vary them sufficiently to prolong their effectiveness. In many situations animals frightened from one location become a problem at another. Some frightening devices may have negative effects on non-target wildlife, including T&E species. Frightening devices will probably have severe limitations in protecting plovers since they may affect plovers as much as the target species. The use of some frightening devices and techniques in urban and suburban environments may be considered aesthetically displeasing such as netting over trees or a nuisance by some persons such as the noise from propane cannons. The continued success of these methods frequently requires reinforcement by limited shooting (see shooting).

Pyrotechnics. Pyrotechnics consist of a variety of noise making devices in the form of fireworks. Double shotgun shells, known as shell-crackers or scare cartridges, are 12-gauge shotgun shells containing a firecracker that is projected up to 75 yards before exploding. Noise bombs, whistle bombs, racket bombs, and rocket bombs are fired from 15 millimeter flare pistols. They are used similarly to shell-crackers, but are projected for shorter distances. Noise bombs (also called bird bombs) are firecrackers that travel about 75 feet before exploding. Whistle bombs are similar to noise bombs, but whistle in flight and do not explode. They produce a noticeable response because of the trail of smoke and fire, as well as the whistling sound. Racket bombs make a screaming noise in flight and do not explode. Rocket bombs are similar to noise bombs but may travel up to 150 yards before exploding. These pyrotechnics are often used to frighten birds away from crops, roosting locations, or runways. The shells are fired so that they explode in front of, or underneath, flocks of birds attempting to enter crop fields, roosts, or the air operating area at an airport. The purpose is to produce an explosion between the birds and their objective. Birds already in a crop field or at an airport can be frightened away, but it is extremely difficult to disperse birds that have already settled in a roost.

A variety of other pyrotechnic devices, including firecrackers, rockets, and Roman candles, are used for dispersing animals. The discharge of pyrotechnics may be inappropriate and prohibited in some area such as urban and suburban communities. Pyrotechnic projectiles can start fires, ricochet off buildings, pose traffic hazards, cause some dogs to bark incessantly, and injure and annoy people. Pyrotechnics may cause fear or alarm in urban areas as the sound of discharge sometimes resembles gunfire.

Propane Exploders. Propane exploders operate on propane gas and are designed to produce loud explosions at controlled intervals. They are strategically located (elevated above the vegetation, if possible, and hidden) in areas of high wildlife use to frighten wildlife from the problem site. Because animals are known to habituate to sounds, exploders must be moved frequently and used in conjunction with other scare devices or reinforced with lethal methods. Exploders can be left in an area after dispersal is complete to discourage animals from returning. However, propane exploders are generally inappropriate for use in urban areas due to the repeated loud explosions which many people consider an unacceptable nuisance.

Scarecrows. Since personnel is often limited, the use of scarecrows can be effective when people are not present at a field. The human effigy is still one of the best scarecrows available. These work best with eyes on both sides of the head and dressed in clothes

similar to the clothes worn by people that are harassing the birds. Other scarecrows are available such as "scare-eye" balloons. As with other techniques, scarecrows work best when the number is varied, a variety of scarecrows are used, and they are moved often.

Flagging. Flags may have limited effectiveness in frightening birds. Anecdotal reports indicate black flagging may be effective at repelling some birds.

Bioacoustics. Distress and alarm calls of various animals have been used singly and in conjunction with other scaring devices to successfully scare or harass animals. Many of these sounds are available on records and tapes. Calls should be played back to the animals from either fixed or mobile equipment in the immediate or surrounding area of the problem. Animals react differently to distress calls; their use depends on the species and the problem. Calls may be played for short (few second) bursts, for longer periods, or even continually, depending on the severity of damage and relative effectiveness of different treatment or "playing" times.

Chemical Repellents. Chemical repellents are compounds that prevent the consumption of food items or use of an area. They operate by producing an undesirable taste, odor, feel, or behavior pattern. Effective and practical chemical repellents should be: nonhazardous to wildlife; nontoxic to plants, seeds, and humans; resistant to weathering; easily applied; reasonably priced; and capable of providing good repellent qualities. The reaction of different animals to a single chemical formulation varies, and for any species there may be variations in repellency between different habitat types. Development of chemical repellents is expensive and cost prohibitive in many situations. Chemical repellents are strictly regulated, and suitable repellents are not available for many wildlife species or wildlife damage situations. Naphthalene (moth balls) has proven to be ineffective as a bird repellent (Dolbeer et al. 1988).

Aversive Agents. Methiocarb, active ingredient in Mesurol, can be useful as an aversive conditioning agent, used in eggs, in reducing raven predation of colonial waterbirds (Avery et al. 1995). Mesurol is an aversive conditioning egg treatment registered with the EPA to reduce predation on the eggs of protected, threatened or endangered species. Mesurol is only available for use under APHIS-WS program supervision (see product label, Appendix D). After prebaiting, a limited number of treated eggs would be distributed within the nesting colony. To reduce risk to humans, non-target animals and pets, a blind would be established during treated egg baiting periods so treated egg sites can be observed. In addition, eggs would be wired to the ground so they can not be removed from the site, and thus would be consumed on site. Treated eggs would be removed from bait sites when the observer is not present. When used according to label directions, methiocarb will not pose unreasonable risks or adverse effects to humans or the environment (USEPA 1994, Mesurol Label Appendix D).

Take Methods.

Chemical Immobilizing and Euthanizing Agents. Most APHIS-WS Specialists in Oregon are trained and certified to use drugs for capturing or euthanizing wildlife. Drugs such as sodium phenobarbital derivatives are used for euthanasia. Most drugs, an exception is alpha-chloralose, fall under restricted-use categories and must be used under

the appropriate license from the U.S. Department of Justice, Drug Enforcement Agency. The drugs used by APHIS-WS are approved by a Drug Committee panel.

Euthanasia. Captured animals may be euthanized. The euthanasia method used is dependent on whether the animal is going to be processed for human consumption. Animals that are not going to be consumed can be euthanized with a sodium phenobarbital solution such as Beuthanasia-D® or other appropriate method such as cervical dislocation, decapitation, a shot to the brain, or asphyxiation. CO_2 is sometimes used to euthanize animals which are captured in live traps and when relocation is not a feasible option.

Relocation. Most damaging species are common and numerous throughout Oregon, so they are rarely, if ever, relocated because habitats in other areas are generally already occupied. Relocation of damaging species to other areas following live capture generally would not be biologically sound, effective nor cost-effective. Relocation of wildlife often involves stress to the relocated animal, poor survival rates, and difficulties in adapting to new locations or habitats. Relocation of target animals involved in conflicts is usually not recommended according to State wildlife policy.

Leg-hold traps are used to capture animals such as coyotes, bobcats, fox, mink, raccoon and skunk. These traps are the most effective, versatile and widely used tool available to APHIS-WS for capturing many species. Traps placed in the travel lanes of the target animal, using location rather than attractants, are known as "blind sets." More frequently, traps are placed as "baited" or "scented" sets. These trap sets use an attractant consisting of the animal's preferred food or some other lure such as fetid meat, urine, or musk to attract the animal into the trap.

In some situations, a carcass or large piece of meat (i.e., a draw station) may be used to attract target animals to an area where traps are set. In this approach, single or multiple trap sets are placed at least 30 feet from the draw station. APHIS-WS program policy prohibits placement of traps or snares within 30 feet of a draw station to prevent the capture of non-target scavenging birds. There are only two exceptions to this policy. One is when setting leg-hold traps to capture cougars returning to a kill. In these cases the weight of the target animal allows pan-tension adjustments which preclude the taking of small non-target animals. The second exception is when leg-hold traps are set next to carcasses used to capture raptors under permit with the USFWS.

Two primary advantages of the leg-hold trap are that they can be set under a wide variety of conditions, and that pan-tension devices can be used to prevent smaller animals from springing the trap, thus allowing a degree of selectivity not available with many other methods. Effective trap placement by trained personnel greatly contributes to the leg-hold trap's selectivity. Another advantage of leg-hold traps is that the live-capture of animals permits release if warranted.

Disadvantages of using leg-hold traps include the difficulty of keeping them in operation during rain, snow, or freezing weather. In addition, they lack selectivity where non-

target species are of similar size to target species and are abundant. The selectivity of leg-hold traps is an important issue and has been shown to be a function of how they are used. The type of set and attractant used significantly influences both capture efficiency and the risk of catching non-target animals. The use of leg-hold traps in the APHIS-WS program is costly due to the amount of manpower and time involved; however, the technique is indispensable in selectively resolving many animal damage situations.

APHIS-WS program guidelines require warning signs to be posted in the vicinity of control operations. Placement is generally confined to areas not visible to or frequently visited by the public. APHIS-WS personnel are the most vulnerable to hazard exposures (USDA 1997a, revised).

Snares. Snares, made of cable, are among the oldest existing wildlife damage management tools. Snares can be used to catch most species. They offer the advantage of being much lighter than leg-hold traps and are not as affected by inclement weather.

Snares are used wherever a target animal moves through a restricted lane of travel (i.e., "crawls" under fences, trails through vegetation, den entrances, etc.). When an animal moves forward into the snare loop, the noose tightens and the animal is held.

Snares can be set as either lethal or live-capture devices. Snares set to capture an animal around the neck can be a lethal use of the device, whereas snares positioned to capture the animal around the body or leg can be a live-capture method. Careful attention to details in placement of snares and the use of slide stops can also allow for the live-capture of neck-snared animals.

The catch pole snare is used to capture or handle problem animals. Catch poles are primarily used to remove live animals from traps without injury to the animal or danger to the APHIS-WS Specialist.

Human safety hazards associated with snares are similar to leg-hold traps. Risks are minimized by limiting or avoiding use where the public may be exposed, and by program guidelines that require warning signs to be posted in the vicinity of control operations (USDA 1997a, revised).

Cage Traps. Cage traps are frequently used to capture skunks, raccoons, cougars, and black bears. Cage traps can also be used to capture coyote pups, fox, and dogs. Cage traps capture the animal by mechanical closure of the entry way via the animals actuation of a triggering device. Cage traps commonly used or recommended by APHIS-WS to capture skunks and raccoons are drop-door wire box traps. Live traps are generally baited with food items as attractants.

The use of cage traps allows the release of captured non-target animals or target animals that are to be relocated. Cage traps are frequently recommended to private individuals for capturing skunks and raccoons or used operationally by APHIS-WS personnel in

situations where other methods may not be as safe. These devices pose minimal risk to the humans, pets, or non-target animals, and are easily monitored and maintained. However, some animals fight to escape from cage traps and become injured. However, live traps, as applied and used by APHIS-WS pose no danger to pets or the public and if a pet is accidentally captured in such traps, it can be released unharmed.

Shooting Birds. Shooting is more effective as a dispersal technique than as a way to reduce bird densities when large number of birds are present. Shooting is a very individual specific method and is normally used to remove a single offending bird. Shooting to supplement harassment typically enhances the effectiveness of harassment techniques and can help prevent bird habituation to hazing methods (Kadlec 1968). In situations where the feeding instinct is strong, most birds quickly adapt to scaring and harassment efforts unless the control program is periodically supplemented by shooting. Shooting can be relatively expensive because of the staff hours sometimes required (USDA 1997a, revised). It is selective for target species and may be used in conjunction with decoys and calling. Shooting with shotguns, air rifles, or rim and center fire rifles is sometimes used to manage bird damage when lethal methods are determined to be appropriate. The birds are killed as quickly and humanely as possible. APHIS-WS personnel follow all firearm safety precautions when conducting bird damage management and comply with all laws and regulations governing firearms use. Also see "Shooting Mammals" for human safety consideration.

Firearm use is very sensitive and a public concern from general safety issues relating to the public to misuse. To ensure safe use and awareness, APHIS-WS employees who use firearms to conduct official duties are required to attend an approved firearms safety and use training program within 3 months of their appointment and a refresher course every 3 years afterwards (WS Directive 2.615). WS employees who carry firearms as a condition of employment, are required to sign a form certifying that they meet the criteria as stated in the *Lautenberg Amendment* which prohibits firearm possession by anyone who has been convicted of a misdemeanor crime of domestic violence.

Shooting mammals. Shooting is selective for the target species but is relatively expensive due to the staff hours required. Shooting is, nevertheless, an essential wildlife damage management method. Removal of one or two problem animals can quickly stop extensive damage. Predator calling is an integral part of ground hunting. Trap-wise predators, while difficult to trap, are often vulnerable to calling. Shooting can be selective for offending individuals and has the advantage that it can be applied in specific damage situations.

The primary human health and safety hazard associated with shooting is related to firearms handling by the user, making APHIS-WS personnel the most vulnerable. Human health and safety risks are minimized by program safety practices which include: extensive training and experience in safe and effective firearms use; frequent employee evaluations; and use of firearms only at safe distances from human habitations or other activities, and in safe directions only (USDA 1997a, revised).

Egg, Nest, and Hatchling Removal and Destruction. Egg and nest destruction is used mainly to reduce or limit the growth of a nesting population in a specific area through limiting reproduction of offspring or removal of nest to other locations. Egg and nest destruction is practiced by manual removal of the eggs or nest. This method is practical only during a relatively short time interval and requires skill to properly identify the eggs and hatchlings of target species.

Denning. Denning is the practice of seeking out the dens of depredating coyotes or red fox and eliminating the young, adults, or both to stop ongoing predation or prevent further depredations. The usefulness of denning as a damage management method is proven, however since locating dens is difficult and time consuming, and den usage is restricted to about 2 to 3 months of the year, its use is limited to specific, appropriate situations that must be determined by a specialist.

Coyote and red fox depredations often increase in the spring and early summer due to the increased food requirements of rearing and feeding young. Removal of pups will often stop depredations even when the adults are not removed. When the adults are removed and the den site is known, the pups are killed to prevent their starvation. The pups are euthanized in the den with a registered fumigant. Denning is highly selective for the target species responsible for damage. Den hunting for adult coyotes and fox is often combined with other activities (i.e., calling and shooting, etc.).

Den fumigants, also called gas cartridges, are fumigants, or gases, used to manage wildlife. They are highly effective but are expensive and labor intensive to use. In the APHIS-WS program, fumigants are only used in predator dens. The APHIS-WS program manufactures and uses den cartridges specifically formulated for this purpose. These cartridges are hand placed in the active den, and the entrance is tightly sealed with soil. The burning cartridge causes death from a combination of oxygen depletion and carbon monoxide poisoning.

Chemical Toxicants. All chemicals used by APHIS-WS are registered under FIFRA (administered by EPA and ODA) or by the Food and Drug Administration. APHIS-WS personnel that use chemical methods are certified as pesticide applicators by ODA and are required to adhere to all certification requirements set forth in FIFRA and Oregon pesticide regulations. Chemicals are only used on private, public, or Tribal property sites with authorization from the property owner or manager.

DRC-1339. DRC-1339 is a slow acting avicide that is registered with the EPA for use on a number of species (e.g. ravens, crows, pigeons, gulls, blackbirds, and starlings), on various bait carriers, such as grain, meat baits, sandwich bread, and cull french fries. DRC-1339 is only available for use under APHIS-WS program supervision. Under project conditions, DRC-1339 is available for use according to label directions for corvids and gulls (see product label, Appendix D). DRC-1339 was developed as an avicide because of its differential toxicity to mammals. DRC-1339 is highly toxic to sensitive species but only slightly toxic to non-sensitive birds, predatory birds, and mammals. Most bird species that are responsible for damage, including starlings,

blackbirds, pigeons, crows, magpies, and ravens are highly sensitive to DRC-1339. Many other bird species such as raptors, sparrows, and eagles are classified as non-sensitive. Numerous studies show that DRC-1339 poses minimal risk of primary poisoning to non-target and T&E species (USDA 1997 revised). Secondary poisoning has not been observed with DRC-1339 treated baits. This can be attributed to relatively low toxicity to species that might scavenge on birds killed by DRC-1339 and its tendency to be almost completely metabolized in the target birds which leaves little residue to be ingested by scavengers. Secondary hazards of DRC-1339 are almost non-existent. DRC-1339 acts in a humane manner producing a quiet and apparently painless death.

DRC-1339 is unstable in the environment and degrades rapidly when exposed to sunlight, heat, or ultra violet radiation. DRC-1339 is highly soluble in water, but does not hydrolyze, and degradation occurs rapidly in water. DRC-1339 tightly binds to soil and has low mobility. The half life is about 25 hours, which means it is nearly 100 percent broken down within a week, and identified metabolites (i.e. degradation chemicals) have low toxicity. Aquatic and invertebrate toxicity is low (USDA 1997 revised). USDA (1997 revised, Appendix P) contains a thorough discussion and risk assessment of DRC-1339. That assessment concluded that no adverse effects are expected from use of DRC-1339.

Zinc Phosphide. Zinc phosphide pellets (2 percent) may be used only by certified applicators, or persons under their direct supervision, for Norway rats, roof rats, and house mice (see product label, Appendix D). In the project area, the bait must be placed in tamper resistant bait stations or in burrows, since non-target hazards exist to any granivorous birds or mammals that occur in areas where zinc phosphide grain bait is applied (USDA 1997a, revised). The Aleutian Canada goose would potentially be affected by zinc phosphide if allowed to consume treated grains. Zinc phosphide poses little secondary risk to non-target wildlife since it breaks down rapidly in the digestive tract of affected animals. Domestic dogs and cats are more susceptible than other animals (USDA 1997a, revised).

Mitigation in Standard Operating Procedures

Mitigation measures are any features of an action that serve to prevent, reduce, or compensate for impacts that otherwise might result from that action. The current APHIS-WS program, nationwide and in Oregon, uses many such mitigation measures and these are discussed in detail in Chapter 5 of (USDA (1997a, revised). The key mitigating measures incorporated into all alternatives, including Alternative 2 (No Action), as appropriate, and considered APHIS-WS Standard Operating Procedures (SOP) include:

- Technical Assistance and education is stressed in each control program so that property and resource managers can learn ways to avoid attracting nuisance animals, and so that the public might be more willing to cooperate with recovery efforts.
- Non-lethal capture methods such as cage traps are predominantly used where the public might be exposed (near houses or high use recreation areas) so that any non-target animals such as pets may be released unharmed.
- Conspicuous, bilingual warning signs alerting people to the presence of leg-hold traps, and snares are placed at major access points when they are set in the field.
- All APHIS-WS Specialists who use restricted chemicals and immobilization or euthanasia drugs are trained and certified by program personnel or other experts in the safe and effective use of these materials.
- Research continues to improve the selectivity and humaneness of management devices.
- Padded-jaw leg-hold traps are used help reduce physical injury to target and non-target species.
- Traps are checked daily or more frequently and covered on weekends or removed to minimize stress and injury to trapped animals.
- Feral cats are provided to local animal control authorities according to county ordinances for shelter adoption or euthanization.
- All pesticides that may be used would be registered with EPA and ODA. EPA approved label directions are followed by APHIS-WS employees.
- The APHIS-WS Decision Model (Slate et al. 1992) is designed to identify effective wildlife damage management strategies and their impacts.
- APHIS-WS employees that use pesticides are trained to use each specific material and are certified for the use of pesticides under EPA and ODA approved programs.
- APHIS-WS employees who use pesticides participate in continuing education programs to keep abreast of developments and to maintain their certifications.

- APHIS-WS consulted with the USFWS regarding the nationwide program and has implemented all reasonable and prudent alternatives to protect T&E species. APHIS-WS has adopted all reasonable and prudent alternatives applicable to the program.

- The USFWS will issue a BO for the Pacific coast western snowy plover predator damage management program. The full text will be included in the final EA. All terms and conditions stipulated in the BO shall be incorporated into the selected alternative to minimize harm to threatened and endangered species.

- Currently, no work is proposed on Tribal lands. If plover recovery work becomes necessary on or adjacent to tribal lands, the lead agencies would consult with the Tribal leadership to identify and resolve any issues of concern to the Tribes.

- Wildlife damage management activities are directed towards resolving problems by taking action against individual problem animals, or local populations.

- APHIS-WS take is monitored by considering total animals removed and estimated population numbers or population trends of key species. These data are used to assess cumulative affects so as to maintain the magnitude of harvest below the level that would impact the viability of a population.

- The lead and cooperating agencies have cooperated in the development of this EA and will continue to closely coordinate activities to implement any resulting decision from this EA. In this way, management agencies are fully informed and involved in identifying and resolving any potential program impacts.

- The APHIS-WS program is conducted under Cooperative Agreements and MOUs. National MOUs with the BLM and USFS delineate expectations for wildlife damage management on public lands administered by these agencies. APHIS-WS work plans are developed with BLM and USFS offices to detail the activity, target species, and mitigation measures to be implemented where wildlife damage management is needed.

- All pesticide use approval authority on National Forest Service lands resides with the Forest Service, including uses proposed by other Federal agencies (Forest Service Manual 2152)

APPENDIX D

Pesticide Labels