FINAL
RESTORATION PLAN
and
ENVIRONMENTAL ASSESSMENT
for the
AUGUST 24, 1998
TESORO HAWAII OIL SPILL
(OAHU AND KAUAI, HAWAII)

Prepared by:
The Natural Resource Trustees
for the Tesoro Oil Spill, Hawaii

U.S. Department of Commerce
National Oceanic and Atmospheric Administration

U.S. Department of the Interior
U.S. Fish and Wildlife Service

State of Hawaii
Department of Health
Department of Land and Natural Resources

NOVEMBER 2000

FACT SHEET

Final Restoration Plan and Environmental Assessment for the August 24, 1998 Tesoro Hawaii Oil Spill (Oahu and Kauai, Hawaii)

Lead Agency for RP/EA: National Oceanic and Atmospheric Administration

Cooperating Agencies: U.S. Fish and Wildlife Service (U.S. Department of the Interior)
Hawaii Department of Health
Hawaii Department of Land and Natural Resources

Abstract: This Final Restoration Plan and Environmental Assessment (Final RP/EA) has been prepared by the State and Federal Natural Resource Trustees to address restoration of natural resources and resource services injured in the August 24, 1998 Tesoro Hawaii Oil Spill (Oahu and Kauai, Hawaii).

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1.0 INTRODUCTION

1.0 INTRODUCTION: PURPOSE OF AND NEED FOR RESTORATION

1.1 INTRODUCTION

The purpose of this document is to provide summarized information regarding the affected environment, natural resource injury determinations and natural resource restoration projects resulting from the August 24, 1998 Tesoro Hawaii Corporation's (Tesoro) oil spill (Oahu and Kauai, Hawaii). This document also serves, in part, as the agencies' compliance with the National Environmental Policy Act (NEPA) and the State of Hawaii equivalent (*see* Section 5 for additional information). The public may review and provide comments on the planned restoration activities.

On August 24, 1998, there was a hose failure at Tesoro's single-point mooring located offshore of Barbers Point, near Honolulu, Oahu, Hawaii (USCG 1998a). The mooring is a floating buoy used to transfer crude oil and refined products between ships and the refinery onshore. Bunker fuel was being piped into the *Oversea New York*, a tank vessel that was also delivering crude oil to the Tesoro storage facility onshore. A sheen was reported at approximately 2000 hours. At the time, Tesoro estimated the spill at 10 barrels or 420 gallons. The United States Coast Guard (USCG), the State of Hawaii Department of Health (DOH), and Tesoro responded to the spill and mobilized cleanup efforts. After recovery of the visible oil in the general vicinity of the offshore single-point mooring, the Unified Command demobilized the spill response because of the inability to find any more recoverable oil.

However, beginning on or about September 5, 1998, tarballs and dead oiled birds began to come ashore on the northeastern shore of Kauai, over 100 miles from Tesoro's single point mooring off Barbers Point. On September 11, 1998, the USCG matched, through chemical analysis, the tarballs and oiled dead birds from Kauai with the oil from the Tesoro spill on Oahu. The oil was reported to be coming ashore at Kauai's Barking Sands, Polihale, Nukoli, Fujii, and Kipu Kai beaches (*see* Section 3.3). Based on these additional reports and mass balance calculations, Tesoro officials estimated that up to117 barrels of bunker oil (approximately 4,914 gallons) may have been spilled as a result of the August 24, 1998 hose failure. The USCG, Tesoro and various oil spill response contractors conducted the cleanup on Kauai.

This oil spill is referred to in this Final Restoration Plan and Environmental Assessment (Final RP/EA) document as the "Incident." Tesoro is the Responsible Party for this Incident.

Oiling of shoreline, intertidal and subtidal areas potentially affected a variety of natural resources, including:

- seabirds and their habitat, including some threatened and endangered species under the Endangered Species Act (ESA);
- Hawaiian monk seals (*Monachus schauinslandi*)(=*Ilio holo i ha uaua*) and their habitat, a species listed as endangered under the ESA;
- intertidal and subtidal habitat and biota in those habitats such as invertebrates, algal communities, and opihi (*Cellana* sp.), which is a commercially and culturally valuable species; and
- beaches and associated recreational and subsistence activities (*see* Section 3).

Immediate cleanup measures following the Incident were undertaken at the direction of a Unified Command which included the USCG, DOH and Tesoro. Cleanup measures on Kauai included removing tarballs from shoreline areas, combing and sifting the shoreline for pellets of oil, and scrubbing oiled boulders. The responders did not use dispersants or any chemical cleaning agents. Oiled birds were cleaned and rehabilitated at facilities on Kauai, Maui, and Oahu. Birds were also released from sites on each of these islands. The Pollution Reports (called "polreps"), prepared by the USCG's Marine Safety Office in Honolulu, summarize and describe the chronology of events in 1998 associated with response and cleanup activities during the Incident (USCG 1998a). These reports are part of the administrative record for this spill.

1.2 NATURAL RESOURCE TRUSTEES AND AUTHORITIES

Both federal and State of Hawaii laws establish liability for natural resource damages to compensate the public for the injury, destruction, and loss of such resources and/or their services resulting from oil spills.

This Final RP/EA has been prepared jointly by the U.S. Department of the Interior (DOI), the U.S. Fish and Wildlife Service (USFWS), an agency of the DOI; the U.S. Department of Commerce, represented by the National Oceanic and Atmospheric Administration (NOAA); and the State of Hawaii, represented by the DOH and the Department of Land and Natural Resources (DLNR). Collectively these agencies are referred to as the "Trustees" or "Natural Resource Trustees."

Each of these agencies acts as a Natural Resource Trustee pursuant to the Oil Pollution Act of 1990 (OPA) (33 USC §§ 2701 *et seq.*), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR § 300.600), for natural resources injured by the Incident. Executive Order (EO) 12777 designates the federal Trustees for oil spills while the Governor of Hawaii designates the State Trustees for oil spills in Hawaii. As a designated Trustee, each agency is authorized to act on behalf of the public under state and/or federal law to assess and recover natural resource damages and to plan and implement actions to restore natural resources and resource services injured or lost as the result of a discharge of oil. The Trustees designated the USFWS as Lead Administrative Trustee (LAT)(15 CFR § 990.14(a)).

The State of Hawaii acts under the authority of its Environmental Response Law (Haw. Rev. Stat., Title 10, Ch. 128D). This authority is in addition to any liability which may arise under federal law.

1.3 OVERVIEW OF OIL POLLUTION ACT OF 1990 REQUIREMENTS

Under OPA, Trustees can recover the cost of restoring, rehabilitating, replacing or acquiring the equivalent of the injured natural resources ("primary restoration"); the diminution in value of those injured natural resources pending restoration ("compensatory restoration"); and reasonable assessment costs.

Before initiating a natural resource damage assessment (NRDA), the Trustees must determine that an incident has occurred; the incident is not from a public vessel; the incident is not from an onshore facility subject to the Trans-Alaska Pipeline Authority Act; the incident is not permitted under federal, state or local law; and public trust natural resources and/or services may have been injured as a result of the incident.

Natural resources are defined as "land, fish, wildlife, biota, air, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the United States, any State or local government or Indian tribe" (15 CFR § 990.30). Injury is defined as "an observable or measurable adverse change in a natural resource or impairment of a natural resource service" (15 CFR § 990.30). As described in the OPA regulations, a NRDA consists of three phases -- preassessment, restoration planning, and restoration implementation.

Based on information collected during the preassessment phase, the Trustees make a preliminary determination as to whether natural resources and/or services have been injured and/or are likely to be injured by the release. Through coordination with response agencies (*e.g.*, the USCG), the Trustees next determine whether the oil spill response actions will eliminate the injury or the threat of injury to natural resources. If injuries are expected to continue and feasible restoration alternatives exist to address such injuries, the Trustees may proceed with the restoration planning phase. Restoration planning also may be necessary if injuries are not expected to continue or endure but are nevertheless suspected to have resulted in interim losses of natural resources and/or services from the date of the incident until the date of recovery.

The purpose of the restoration planning phase is to evaluate the potential injuries to natural resources and services and to use that information to determine the need for and scale of associated restoration actions. This phase provides the link between injury and restoration and has two basic components -- injury assessment and restoration selection. The goal of injury assessment is to determine the nature and extent of injuries to natural resources and services thus providing a factual basis for evaluating the need for, type of, and scale of restoration actions. As the injury assessment is being completed, the

Trustees develop a plan for restoring the injured natural resources and services. The Trustees must identify a reasonable range of restoration alternatives, evaluate and select the preferred alternative(s), develop a draft restoration plan presenting the alternative(s) to the public, solicit public comment on the draft restoration plan, and incorporate comments into a final restoration plan.

During the restoration implementation phase, the draft restoration plan is presented to the Responsible Party to implement or to fund the Trustees' costs for assessing damages and implementing the restoration plan. This provides the opportunity for settlement of damage claims without litigation. Should the Responsible Party decline to settle, OPA authorizes Trustees to bring a civil action against Responsible Parties for damages or to seek reimbursement from the USCG's Oil Spill Liability Trust Fund.

Trustees may settle claims for natural resource damages under OPA at any time during the damage assessment process, provided that the settlement is adequate in the judgment of the Trustees to satisfy the goals of OPA and is fair, reasonable, and in the public interest, with particular consideration of the adequacy of the settlement to restore, replace, rehabilitate or acquire the equivalent of the injured natural resources and services. Sums recovered in settlement of such claims, other than reimbursement of Trustees' costs, may only be expended in accordance with a restoration plan, which may be set forth in whole or part in a consent decree or other settlement agreement, which is made available for public review.

1.4 COORDINATION WITH THE RESPONSIBLE PARTY

The OPA regulations direct the Trustees to invite the Responsible Party to participate in the damage assessment and restoration process. Although the Responsible Party may contribute to the process in many ways, final authority to make determinations regarding injury and restoration rests solely with the Trustees.

To facilitate the NRDA for this Incident, the Trustees and Tesoro executed the "Joint Cooperative Natural Resources Damage Assessment Agreement for the Tesoro/Hawaii SPM Oil Spill" (Cooperative Agreement), effective November 13, 1998. In the Cooperative Agreement, the Trustees and Tesoro agreed to conduct a phased approach focusing on injury determination and quantification using technical working groups (TWGs) composed of Trustee and Tesoro representatives. A Trustee representative headed each TWG. The Trustees and Tesoro established four TWGs for the following injury categories: seabirds, marine environment (opihi), marine mammals (Hawaiian monk seal), and human use. Tesoro agreed to fund the activities of the TWGs and all cooperative studies and to reimburse the Trustees for reasonable damage assessment costs.

While the injury determination and quantification phases were underway, the Trustees and Tesoro recognized the difficult scientific challenges presented by this spill and decided to

expedite the process. They acknowledged that time delays in planning and contracting for several studies made those studies impractical. Other studies would span a multi-year time period and it was uncertain whether the additional information that might be gained from those studies would justify the increased costs of assessment or that the results would increase the precision and accuracy of the injury assessment. The Trustees and Tesoro agreed that the time and money would be better spent identifying and scaling restoration projects that would be conservative enough to address the potential injuries. The Trustees and Tesoro believe that the restoration projects proposed in this Draft RP/EA are designed to provide more than sufficient restoration value because, in large part, there was no cost effective, reliable scientific approach which would define with accuracy the injuries resulting from the spill. By expediting the process, the Trustees and Tesoro could minimize assessment costs and proceed with restoration of injured resources and services sooner, in an effective and efficient manner.

Although an expedited procedure such as this saves time and money by avoiding a potentially lengthy assessment process, it also requires the Trustees and the Responsible Party to accept a level of uncertainty concerning the nature and extent of injuries and the amount of restoration necessary to address the injuries. The Trustees, however, believed that it was in the public's interest to focus on the planning and implementation of restoration projects in lieu of undertaking full assessment-type studies. This approach is consistent with that used by the Trustees in the 1996 Chevron pipeline spill into Waiau Stream and Pearl Harbor.

The Trustees and Tesoro have produced documents that have been shared with each other in an attempt to present known or potential injuries or losses of natural resources and services and to identify candidate assessment strategies. Coordination between the Trustees and Tesoro helped to reduce duplication of studies, increase the cost-effectiveness of the assessment process, increase sharing of information, and decrease the likelihood of litigation. The Trustees sought input from Tesoro and considered such information, when provided, throughout the NRDA process.

1.5 PUBLIC PARTICIPATION

Public review of the Draft RP/EA is considered an integral component to the restoration planning process. Through the public review process, the Trustees seek public comment on the approaches used to define and estimate natural resource injuries and the projects being proposed to restore injured natural resources or replace services provided by those resources. The Draft RP/EA provided the public with information about the nature and extent of the natural resource injuries identified and the restoration alternatives evaluated.

Following public notice on June 7, 2000 (*Honolulu Advertiser, Garden Island*), the Draft RP/EA was made available to the public for a comment period ending July 10, 2000. The Draft RP/EA was made available to the public in three ways: in electronic form for viewing and downloading on the world wide web (www.darcnw.noaa.gov/tesoro.htm), as part of the

publicly-available Administrative Record, and in hard copy by request. In addition, a public meeting was held on June 21, 2000 at the Kapaa Public Library, Kapaa, Kauai, Hawaii to present the Draft RP/EA to the public and invite public comment. Appendix A.3 provides a brief summary of the public meeting discussions. The Trustees' responses to the two written comments received during the public comment period can be found at Appendix A.4.

Public review of the Draft RP/EA is consistent with all federal and state laws and regulations that apply to the NRDA process, including Section 1006 of OPA, the OPA regulations (15 CFR Part 990), NEPA, as amended (42 USC §§ 4371 *et seq.*), and its implementing regulations (40 CFR Parts 1500-1508). Comments received during the public comment period were considered by the Trustees in preparing the Final RP/EA.

After an analysis of the public comments on the Draft RP/EA, the Trustees determined that the Restoration Plan could be adopted as a final Plan without modifications to the proposed projects. The Adoption Resolution is provided at Appendix A.5. A Finding of No Significant Impact (FONSI) determination was made by the federal Trustee agencies (Appendix A.6).

1.6 ADMINISTRATIVE RECORD

The Trustees have compiled an administrative record which contains documents considered by the Trustees as they have planned and implemented the NRDA and addressed restoration and compensation issues and decisions. The administrative record is available for public review at the public repository listed below and at a NOAA website --www.darcnw.noaa.gov/tesoro.htm. The administrative record index is provided in *Appendix A.2 of this Final RP/EA.*

The administrative record facilitates public participation in the NRDA process and will be available for use in future administrative or judicial reviews of the Trustees' actions to the extent provided by federal or state law. Additional information and documents, including public comments received on the Draft RP/EA, the Final RP/EA, and other related restoration planning documents, will become a part of the administrative record and will be submitted to the public repository upon their completion.

The documents comprising the administrative record can be viewed at the following location:

U.S. Fish and Wildlife Service
Department of the Interior
300 Ala Moana Boulevard, Room 3-108
Honolulu, HI 96850
Phone: (808) 541-3441
Hours: Monday - Friday: 8:00 am - 4:00 pm

Please call the telephone number above to arrange for an appointment.

1.7 SUMMARY OF THE NATURAL RESOURCE DAMAGE CLAIM

The NRDA damage claim for the Incident encompasses compensatory restoration actions for potential injuries to the following natural resources and services:

- intertidal and subtidal habitat and biota in those habitats,
- endangered Hawaiian monk seals,
- seabirds, and
- loss of subsistence and recreational activities or services.

The proposed compensatory restoration actions include:

- conduct predator control and habitat enhancement activities for seabirds potentially affected by the spill;
- remove fishing nets from shoreline, adjacent intertidal and subtidal areas in the general area impacted by the spill along the coast of Kauai to address potential injuries to these habitats and biota in those habitats and reduce the likelihood of monk seal entanglement in stranded nets/debris; and
- contribute to funding beach cleanup activities to compensate for lost or diminished human use during the oil spill and subsequent cleanup operations.

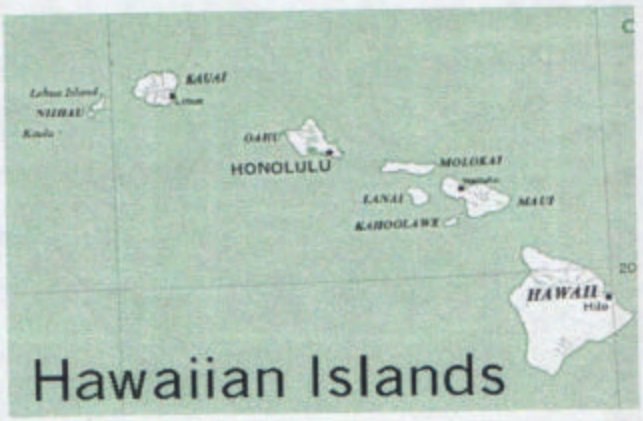
2.0

ENVIRONMENT

2.0 AFFECTED ENVIRONMENT

The purpose of this section is to provide a general description of the environment which encompasses the geographic area where the spill occurred and where restoration will be implemented. Although many species and geographic areas are mentioned in this section, those species, habitats and services potentially injured by the spill are discussed specifically in the following section. Much of the information contained in this section is from the Final Environmental Impact Statement/Management Plan for the Hawaiian Islands Humpback Whale National Marine Sanctuary (NOAA 1997). Additional information on Oahu's natural resources and habitat can be found in the Final Restoration Plan for the May 14, 1996 Chevron Pipeline Oil Spill in Waiau Stream and Pearl Harbor, Oahu, Hawaii (Pearl Harbor Natural Resource Trustees 1999). Most of the discussion below focuses on Kauai, the island most heavily impacted by the Tesoro spill. Although there is some limited discussion about Oahu, the island where the offshore spill occurred, the only other island that was lightly impacted, and cleaned, was Niihau.

2.1 PHYSICAL AND BIOLOGICAL ENVIRONMENT



The islands of Oahu and Kauai are part of the Hawaiian Archipelago which consists of eight major islands with 124 islets, reefs and shoals extending 1,490 nautical miles on a southeast-northwest axis. Kauai and the City and County of Honolulu are two of the four counties of Hawaii.

Gradual accretion of basaltic lava flows and ejecta formed the Hawaiian Islands over the last few million years. Coral reefs and numerous bays typically surround the islands. More than half of the islands of Oahu and Kauai are fringed by coral reefs. The reefs are typically wide, shallow platforms in subtidal areas. There are sandy beaches along the shoreline of all of the islands, but these beaches are best developed on Kauai, the oldest of the main islands. The eastern shoreline of Kauai, the area most heavily oiled, consists primarily of exposed rocky shores and naturally occurring vertical seawalls with fine-grained to gravel beaches. At Ahukini, large shallow tide pools dominate the flat part of the basalt bench.

The Hawaiian Islands are located on the northern edge of the tropics. However, cool ocean currents and persistent northeasterly tradewinds result in a subtropical climate. The average wind velocity is between ten and twenty knots. There are occasional kona or southerly winds which can bring storm events. The climate is characterized by abundant rainfall. Ocean temperatures range from 21° to 29°C.

Due to isolation and a northerly geographic setting which results in relatively low water temperatures for a tropical environment, the shallow Hawaiian marine fauna is lower in species diversity than other tropical areas of the Pacific. Nevertheless, there are about 450 species of inshore fish, 40 species of corals, about 1,000 species of mollusks, approximately 243 species of polychaete, and around 200 species of Bryozoa (aquatic colonial animals). Many of these are the types of species potentially affected by the Incident.

Certain species of Cetacea (whales and dolphins) also frequent the waters around the Hawaiian Islands. Common throughout the islands are Pacific bottlenose dolphins (*Tursiops gilli)*, spinner dolphins *(Stenella longirostris)*, spotted dolphins *(Stenella attenuata)* and humpback whales *(Megaptera novaeangliae)*. During a 1993 aerial survey, spotted dolphins and a sperm whale *(Physeter macrocephalus)* were documented off northeast Kauai, and a pilot whale *(Globicephala macrorhynchus)* was observed in the Kauai channel between Kauai and Oahu. The same survey recorded spotted dolphins on the western and southern sides of Oahu.

Of particular concern as a result of this oil spill are Kauai and Oahu's resource-rich nesting and rearing habitats for a variety of endemic, indigenous, migratory and introduced sea and shore birds and mammals. Many of these species are listed as endangered or threatened under both federal and/or state laws, including the Hawaiian monk seal, one of only two native mammals in the Hawaiian Islands. *See* Section 2.2 below. *See also* the discussion in Section 2.4 concerning resources of the natural wildlife refuges on Kauai.

Seabird colonies potentially impacted by the Incident include the two largest and most diverse seabird colonies located on islands offshore of the main Hawaiian Islands -- Ka'ula Rock and Moku Manu. These two sites represent the only breeding places in the main Hawaiian Islands for black-footed albatross (*Diomedea immutabilis*), brown boobies (*Sula leucogaster plotus*), masked boobies (*Sula dactylatra personata*), great frigatebirds (*Fregata minor*), blue-grey noddies (*Fregata minor*), Christmas shearwaters (*Puffinus nativitatis*), and gray-backed terns (*Sterna lunata*). These islands also support large populations of the ten other species of seabirds breeding on the offshore islands around the main islands. While oil was not observed on the beaches or during surveys of the seabird colonies conducted 47 and 85 days post-spill on Ka'ula Rock and Moku Manu, the birds in these colonies forage in the areas where oil was observed and were likely impacted. During the Incident, 21 oiled brown boobies were recovered. These birds only breed on Ka'ula Rock and Moku Manu indicating that these colonies were impacted by the Incident. In addition to the offshore islands, the main Hawaiian Islands also support significant seabird colonies. The island of Kauai supports the highest density of seabird species, possibly due to the absence of mongoose (*Herpestes auropunctatus*) on that island.

2.2 ENDANGERED AND THREATENED SPECIES

Several federally- and state-listed seabirds are found in and around Kauai and Oahu. The core of the populations of the endangered Hawaiian dark-rumped petrel (*Pterodroma phaeopygia sandwichensis*) and the threatened Newell's shearwater (*Puffinus auricularis newelli*) are on Kauai where these birds breed at high elevation sites in the interior of the island. Breeding populations of Newell's shearwaters and Hawaiian dark-rumped petrels on Kauai have been estimated at 14,600 pairs and 1,600 pairs, respectively (Ainley *et. al.* 1995, 1997). However, recent studies have shown a mean decline of 60% across all monitoring sites for these species (Day and Cooper 1999). The band-rumped storm petrel (*Oceanodroma castro*) is listed as endangered by the State of Hawaii and is a candidate species for federal listing. The white tern (*Gygis alba rothschildi*) is listed as threatened by the state. All of these species forage in the channel between Kauai and Oahu and congregate in the waters surrounding Kauai.

The federally- and state-listed threatened Pacific green sea turtle (*C. mydas*) historically nested on beaches throughout the Hawaiian Islands. Today the main nesting area is French Frigate Shoals in the Northwest Hawaiian Islands. However, green sea turtles have been known to nest in the sandy bays along the coast of Kilauea Point and other areas around the southeast coast of Kauai. Green sea turtles, which feed on sea grasses and algae, have been commonly observed in Oahu and Kauai (Naughton pers. comm.).

The federally-listed, endangered Hawaiian monk seal (*M. schauinslandi*) is extremely vulnerable to human disturbance on pupping and haul out beaches, by entanglement in fishing gear, and by shark predation. Breeding populations occur almost exclusively in the Northwest Hawaiian Islands, although births were observed on Kauai in 1988 and on Oahu in 1991. During the time period from 1984 through 1993, there were a number of Hawaiian monk seal observations in the main islands, primarily around Oahu and Kauai. There is resident population of Hawaiian monk seals at Kipu Kai, an area consisting of approximately three and a half miles of coastline on the southeastern shore of Kauai. The total size of the population using the Kauai-Niihau Island Area is estimated to be 16 to 30 seals (Don Heacock, DLNR, pers. comm.).

The humpback whale *(M. novaeangliae)*, a federally-listed endangered marine mammal, has been sighted in the Hawaiian Islands since the 1840's. The humpback whale occurs in both coastal and open ocean waters throughout the Hawaiian Islands, one of its wintering areas. While wintering, the humpback whale gives birth and may mate in this area as well. A 1990 survey indicated increased sightings around Kauai, although overall density of pods is much less than in some other areas of Hawaii.

2.3 HISTORIC AND CULTURAL RESOURCES

Hawaiians have used the ocean for fishing, trade, transportation, communication, religious practices and aquaculture. Aquaculture is an important historic use of the marine environment. Historic evidence suggests that fishponds were introduced on Oahu before the 13th century, and by the 14th century, fishponds were being developed throughout the Hawaiian Islands. It is estimated that Hawaiians constructed 178 fishponds on Oahu and 50 on Kauai. By the latter half of the 19th century, Hawaiians abandoned many fishponds as their population declined and food consumption patterns changed. Some of these fishponds can still be found on Oahu and Kauai, including the Menehune Fishpond, a national historic site located near the Huleia NWR on the southeastern side of Kauai.

Hawaiian culture viewed mankind as being in harmony with nature. Many of Hawaii's myths and legends relate to the ocean. In some stories, Hawaiian deities are appeased by sacrifices of fish, eels or other sea creatures. Altars (known as koa) associated with these practices are found on all of the major Hawaiian Islands. Some are still in use today.

The Island of Kauai is rich in native Hawaiian cultural history and is dotted with traces of the remains of the temples of the royal families. The historic Kilauea Lighthouse is also located on the northeastern shore of Kauai, at the Kilauea Point NWR.

One of the resources used for subsistence and cultural purposes on Kauai is the opihi *(Cellena sp.)*. Opihi is the Hawaiian name for a species of limpets which are gastropod molluscs with flattened, cone-shaped shells about one inch in diameter. On Kauai, opihi is found on coralline algae and/or where there is a constant wave splash (Kay 1979). Because opihi are found on rocky areas which may be steep and/or slippery and dangerous to those gathering the limpet, Hawaiians call opihi the fish of death (*hei'a make*). Midden material

from archaeological sites reveals that 30%, on average, of the windward middens is opihi shells while only 5% of the material in leeward middens is opihi shells. Besides harvesting opihi, subsistence fishermen also gather Limu (seaweed).

2.4 PROTECTED AREAS

Kauai is home to forest reserves, sanctuaries, refuges, and parks, including the Mokuaeae State Seabird Sanctuary to the north; the Moloaa and Kealia Forest Reserves on the northeastern portion of the island; the Nounou and Kalepa Forest Reserves on the eastern portion; the Huleia, Hanalei and Kilauea Point NWRs; and the Menehune Fishpond. Three other forest reserves are found in the interior of Kauai -- Lihue-Koloa, Halelea, and Na Pali-Kona. These reserves and refuges offer protected habitat for a number of natural resources. These areas serve as feeding, foraging, resting and nesting habitat for species of federal- and state-endangered endemic waterbirds and seabirds and 25 other species of federally-protected migratory birds including shorebirds and waterbirds.

USFWS refuges have three management goals:

1. to support the recovery and perpetuation of federally-listed endangered and threatened species especially endangered Hawaiian waterbirds;
2. to provide adequate water quality to maximize habitat size and value for migrant, endangered and resident waterbirds; and
3. to provide opportunities for quality wildlife-dependent recreation, education and research to enhance public appreciation, understanding and enjoyment of Refuge wildlife and habitats. (USFWS, undated).

The three USFWS refuges on Kauai are described briefly below.

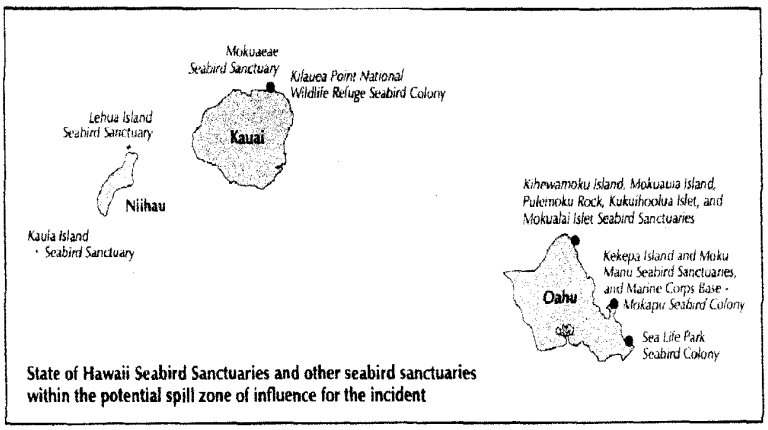
Hanalei NWR: This refuge consists of 917 acres of river bottomland, taro farms, and wooded slopes in the Hanalei River Valley on the northern coast of Kauai. It was established to protect the endangered Hawaiian duck, the Hawaiian gallinule, the Hawaiian coot and the Hawaiian stilt. The refuge also provides habitat for waterfowl and migratory shorebirds. Although closed to public use, visitors can observe the wildlife from along Ohiki Road which begins at the west end of Hanalei River Bridge; from an overlook one and a half miles east of Hanalei or six and a half miles west of Kilauea on Highway 56.

Huleia NWR: Located on the southeastern side of Kauai, this refuge is 238 acres of seasonally flooded river bottom land, the Huleia River estuary and the wooded slopes of Huleia River Valley. Like the Hanalei NWR, this refuge protects the

endangered Hawaiian duck, the Hawaiian gallinule, the Hawaiian coot and the Hawaiian stilt. The refuge is closed to the public, but it can be seen from the Menehune Fishpond Overlook.

Kilauea Point NWR: Located one mile north of Kilauea, this refuge contains 31 acres of cliffs and headlands jutting up to 200 feet above the surf. The refuge provides habitat for the endangered Hawaiian goose and is home to the historic Kilauea Lighthouse. The grounds have been landscaped using native coastal plants. There is a variety of wildlife in and around the refuge. This refuge was established to preserve and enhance seabird nesting colonies on into the future. Red-footed boobies nest in trees. Shearwaters nest in burrows in the soil of Kilauea Point overlooking the ocean. Great frigatebirds, brown boobies, red-tailed and white-tailed tropic birds, and Laysan albatrosses can be seen from the Point as well as green sea turtles, humpback whales and dolphins. The refuge is open to the public. (USFWS, undated).

The majority of seabird nesting colonies are located on the islands, islets, and rocks offshore of the main Hawaiian Islands. Many of these offshore islands are part of the Hawaii State Seabird Sanctuaries. These sanctuaries protect seabirds, migrating shorebirds, and native coastal vegetation. Seabird colonies also exist on the main Hawaiian Islands and several of these areas have been protected, such as the seabird colony at the Kilauea Point NWR.



State of Hawaii Seabird Sanctuaries and other seabird sanctuaries within the potential spill zone of influence for the incident

Information about the Pearl Harbor NWR on Oahu can be found in the Final Restoration Plan for the May 14, 1996 Chevron Pipeline Oil Spill in Waiau Stream and Pearl Harbor, Oahu, Hawaii (Pearl Harbor Natural Resource Trustees 1999).

In 1992, Congress designated the Hawaiian Islands Humpback Whale National Marine Sanctuary, Title II, subtitle C of the Oceans Act of 1992, P.L. 102-587. The purpose of the sanctuary is to protect humpback whales and their habitat and to educate and interpret for the public the relationship of humpback whales to the marine environment of the Hawaiian Islands. This designation complements other federal authorities which protect the humpback whale. The boundaries of the sanctuary are quite extensive and include the

shoreline out to the 100-fathom isobath depth contour around Kilauea Point on Kauai and portions of north and south Oahu. The State of Hawaii has designated the humpback whale as the state marine mammal.

2.5 HUMAN USE SERVICES

The estimated resident population of Hawaii in 1992 was approximately 1,160,000 people with 75% living on Oahu. Kauai's population is approximately 55,000 people, congregating in large part in the areas around Lihue and Kapaa. The major ethnic groups on Oahu and Kauai are Caucasian, Japanese, mixed/part Hawaiian, mixed/non-Hawaiian and Filipino.

Tourism dominates the Hawaiian economy. Oahu is the primary tourist destination followed by Maui County, Hawaii (Big Island) and Kauai. Tourism and agriculture are the principal industries on Kauai. Tourism activities include swimming, beach walking, wave watching, snorkeling, windsurfing, fishing, and other water-related recreational past-times. Bird watching and hiking are also favorite tourism activities.

In-season and with a valid license, hunting is permitted on public lands in Kauai for game mammals and game birds. Game animals include feral pigs, feral goats and the black-tail deer. Game birds include ring-neck pheasant, Erckel's francolin partridge, Chukar francolin partridge, Indian black francolin partridge, grey francolin, Japanese quail, lace-necked dove and barred dove (DNLR undated). Residents as well participate in these same activities.

Fishing is an important economic and recreational activity. Surveys indicate that 19-35% of residents fish and that 74% of personal boats are used primarily for fishing. In 1991-1992 there were over 4,000 small craft mooring facilities on Oahu and slightly over 100 on Kauai.

Important harbor areas include Honolulu, Barbers Point and Kewalo on Oahu and Port Allen and Nawiliwili on the east and south shore of Kauai. Two offshore oil moorings, located off Barbers Point, Oahu, serve the oil refineries in Campbell Industrial Park.

Diving and swimming are popular pastimes. Hawaii has approximately 310 miles of sandy beach. Two other water-related sports have roots in Hawaiian culture. Surfing was important in ancient Hawaiian culture and is a popular activity today. Like other water-related sports in Hawaii, surfing is a year-round activity. Hawaiian outrigger canoe racing was also an important cultural tradition. In 1990, there were six outrigger canoe racing associations consisting of 62 clubs. Although not rooted in the culture or history of Hawaii, kayaking is becoming an increasingly popular sport. The largest share of kayak tour revenue comes from Kauai.

Hawaii is important for national defense purposes due to its strategic location. The U.S. Army, Navy, Air Force and Marines all have extensive personnel and equipment based in Hawaii. One such base is the Pacific Missile Range Facility located at Barking Sands off the west coast of Kauai. This facility is used year-round for air, surface and subsurface training. Another facility, on Oahu, is the Pearl Harbor Naval Base, the Navy's largest and most strategic island base in the Pacific. It extends over more than 12,600 acres of land and water and serves as the headquarters for more than 70 commands including the U.S. Pacific Fleet Commander.

3.0

INJURY

3.0 INJURY DETERMINATION AND QUANTIFICATION

3.1 SUMMARY OF PREASSESSMENT ACTIVITIES

Three threshold requirements identified in OPA must be met before restoration planning can proceed: injuries have resulted, or are likely to result, from the incident; response actions have not adequately addressed, or are not expected to address, the injuries resulting from the incident; and feasible primary and/or compensatory restoration actions exist to address the potential injuries.

The Trustees and Tesoro collected information during the preassessment phase for the Incident. This information satisfies the three criteria listed above and confirms the need for restoration planning to address spill impacts.

Resources and services potentially impacted by the discharged oil included:

- intertidal and subtidal habitats and the biota in those habitats,
- endangered and threatened marine species, including Hawaiian monk seals and green sea turtles,
- seabirds, and
- lost human use of subsistence and recreational activities.

Below is a more detailed discussion on specific assessments undertaken for the natural resources at risk.

3.2 ASSESSMENT APPROACH

The goal of injury assessment under OPA is to determine the nature and extent of injuries to natural resources and services which will provide a basis for evaluating the need for, type, and scale of restoration actions. The assessment process occurs in two stages -- injury determination and then injury quantification.

Injury determination begins with the identification and selection of potential injuries to investigate. In accordance with the OPA regulations, the Trustees considered several factors when making this determination, including, but not limited to, the following:

- the natural resources and services of concern;
- the evidence indicating exposure, pathway, and injury;
- the mechanism by which injury occurred;
- the type, degree, and spatial and temporal extent of injury;
- the adverse change or impairment that constitutes injury;
- available assessment procedures and their time and cost requirements;
- the potential natural recovery period; and
- the kinds of restoration actions that are feasible.

The list of potential injuries investigated for the Incident is provided in Table 1. As indicated in this table, the Trustees evaluated four injury categories. The Trustees selected these categories based on observations made and data collected during the preassessment phase and input from state and federal officials, Tesoro representatives and academic and other experts knowledgeable about the affected environment.

For each category of potentially injured resources, the Trustees determined the probability of exposure to oil from the Tesoro spill, the likelihood of injury, and the nature of the potential injury. This process is discussed in more detail below for each category of potentially injured resources. The assessment methodologies used for the Incident are summarized in Table 1.

Table 1. Potentially Injured Resources and Associated Assessment Methods

Potentially Injured Resources	*Assessment Methodologies*
Intertidal and Subtidal Biota	site investigations sampling and chemical analysis consultation with experts relevant scientific literature
Marine Mammal	site investigations ground and aerial surveys consultation with experts relevant scientific literature
Seabirds	site investigations ground and aerial surveys computer modeling consultation with experts relevant scientific literature
Lost Human Use	site investigations interviews relevant economic literature

In selecting appropriate assessment procedures, the Trustees considered:

- the range of procedures available under § 990.27(b) of the OPA regulations;
- the time and cost required to implement the procedures;
- the potential nature, degree, and spatial and temporal extent of the injury;
- the potential restoration actions considered for the injury;
- the relevance and adequacy of information generated by the procedures to meet information requirements of restoration planning; and
- the input/suggestions of Tesoro.

Because the Trustees and Tesoro agreed that their goal was to implement restoration as quickly as possible, the Trustees and Tesoro did not pursue expensive, multi-year injury studies. Instead, they generally used simplified, cost-effective procedures to document exposure and potential injuries to natural resources and services. Accordingly, depending on the injury category, the Trustees and Tesoro relied on site investigations, surveys, sampling and relevant scientific and economic literature. They also consulted with academic and other experts. This approach is consistent with damage assessments under OPA.

Using these procedures, the Trustees determined, as described above, that the following resources were exposed to the oil and that injury may have occurred in the following four categories: intertidal and subtidal biota, endangered and threatened marine species, seabirds, and human use services.

3.3 PATHWAY OF OIL

On August 24, 1998, a hose failure at Tesoro's single-point mooring located offshore of Barbers Point, Oahu released up to 117 barrels[1] of intermediate fuel oil (IFO 380). The USCG, DOH, and Tesoro responded to the spill and mobilized cleanup efforts. After recovery of the visible oil in the general vicinity of the offshore single-point mooring, the United Command demobilized the spill response because of the inability to find any more recoverable oil.

Approximately two weeks later, tarballs and oiled birds began to appear on the northeastern shore of Kauai, more than 100 miles from the location of the original spill. The USCG matched the tarballs and oiled birds with the oil from the Tesoro spill on Oahu. The following description of the extent of oiling is taken from Shoreline Cleanup Assessment Team (SCAT)[2] data

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[1] This is approximately 4,914 gallons of oil.

[2] SCATs evaluate shoreline oil conditions during a spill and provide data and/or advice to spill response organizations. SCAT data do not necessarily provide a comprehensive overview of all areas impacted or potentially impacted by a spill. Rather, these data are representative of conditions on a specific day and at a certain location(s).

and information releases of the USCG Honolulu Area Unified Command (USCG 1998a, 1998b). These documents can be found in the administrative record.

Small tarballs washed ashore at Barking Sands on the west side of Kauai on a section of beach estimated to be 45 meters long and at Polihale Beach. Tarballs appeared at Kilauea Bay on the northern shore of Kauai and on the Island of Niihau, located to the southwest of Kauai. The remainder of the observed oiling occurred at various locations on the eastern side of Kauai, predominantly in several natural collection areas along a 31-kilometer stretch from Kipu Kai to just north of Kealia.

Within that 31-kilometer shoreline, Kipu Kai and Ahukini were the heaviest oiled areas. At Kipu Kai, SCAT reports indicated a 250-meter long, heavily oiled section of a boulder beach and a more lightly oiled sandy beach just north of the boulder beach. The oiled boulder beach had a thin coating of weathered oil on many rocks with fresher oil underneath some rocks. At Ahukini, the SCAT report described a 160-meter supratidal basalt bench as having a 70% covering of oil. The SCAT report noted some pooling of oil in this area as well. The Trustees have not attempted to determine the pathway by which the oil moved from Barber's Point, Oahu, to these various other locations. Wind and currents, over a two-week period, apparently moved the oil substantial distances and may have dispersed it widely.

3.4 POTENTIALLY AFFECTED NATURAL RESOURCES AND RESOURCE SERVICES

This section discusses four categories of natural resources and resource services potentially injured as the result of the Incident: intertidal and subtidal biota, threatened and endangered marine species, seabirds, and human use services.

3.4.1 Intertidal and Subtidal Biota

The intertidal habitat is defined as the shoreline area which is inundated by sea water during high tide cycles and then exposed to the air during low tide cycles. For a given tidal range, gently sloping sandy beaches have a wider band of intertidal habitat which can be subjected to oiling than areas of vertical, shoreline cliffs. Subtidal habitat is bottom areas which are perpetually submerged by water.

Species of concern in the intertidal and subtidal habitats include opihi, helmet urchin *(Colobocentrotus atrata)*, nerites (snails) *(Nerita picea, et al., n. polita)*, species of Drupes (*Thaidid sp.)*, rock crab (*Grapsus tenuicrustatus)*, sand crabs, ghost crabs, other crustaceans, cowrys, algae (limu), polychaetes, anemones, and flatworms. Other species also utilize these habitats such as fish, shore birds, seabirds, marine mammals and sea turtles. Several of these species are discussed below in separate subsections.

The Trustees decided to use opihi as the representative species for evaluating intertidal and shallow subtidal injury. Opihi are indigenous to intertidal and shallow subtidal rocky shores in Hawaii. They feed by scraping food items off rocky surfaces. Opihi are a commercially and culturally valuable resource. Opihi are also gathered by subsistence and recreational fishermen. In Hawaii, opihi are a delicacy in great demand.

Routes of hydrocarbon exposure for opihi include absorption from water, dermal contact, and ingestion through feeding on oil-coated rocks. There appear to be no studies regarding the susceptibility of opihi to oiling. However, studies have reported mortality of molluscs, including limpets, after major oil spills (*e.g.,* Exxon Valdez, Houghton, *et al.* 1993, 1997; Sea Empress, Moore, *et al.* 1997). In smaller spills, the extent of mortality appears to be dependent on the amount, toxicity and persistence of oil at different levels of the intertidal zone (*e.g.,* Bahia las Minas, Cubit and Connor 1993). Oiling may cause sublethal impacts on molluscs such as changes in growth rates (Farrington 1988; Stromgren 1987; Stromgren *et al.* 1986; Stekoll, *et al.* 1980; Gilfillan and Vandermeulen 1978; Thomas 1978), size-specific body weight (Cubit 1984; Thomas 1978), fecundity (Sole, *et al.* 1996; Widdows *et al.* 1990; Leavitt *et al.* 1990; Farrington 1988; Capuzzo 1987) and recruitment (Garrity and Levings 1990; Smith and Hackney 1989; Johnson 1988; Capuzzo 1987; Sindermann 1982). Other potential injuries to opihi from the oil spill include mortality related to cleanup activities (crushing or detaching opihi from rocks) and a decrease in the palatability of the limpet.

Based on these potential injuries, the Trustees considered a number of studies designed to determine population reduction, body burden of spill-derived oil, size-specific body weight, size-specific individual growth rates, reproductive output and recruitment. The Trustees and Tesoro began work on one of the studies -- body burden of spill-derived oil. The Trustees and Tesoro focused on the two areas most heavily oiled.

Samples gathered by the Trustees and Tesoro at the oiled boulder areas of Kipu Kai had total polycyclic aromatic hydrocarbon (PAH) concentrations ranging from 140 to 410 parts per million (ppm). This range of concentrations was higher than background levels. Several tissue samples had no detectable PAH's. A second round of representative sampling from the same location at a later point in time suggested that the impacts were not persistent.[3] The Trustees did not initiate a third round of sampling due to the passage of time from the initial exposure of the opihi to the oil. The Trustees also decided not to pursue additional work related to opihi. The Trustees believed that some of their proposed studies would be difficult to conduct so long after the spill and that others would be time-consuming, expensive,and likely inconclusive. It was also concluded that such studies would not provide a level of information justifying the additional expense and the delay in restoration implementation.

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[3] Some samples from the second round of testing at Ahukini proved inconclusive because the samples had been collected from an unoiled, rather than an oiled, section of Ahukini.

The Trustees concluded that injury to opihi, the representative species for intertidal and shallow subtidal biota, may have occurred. This conclusion is based on three factors. First, there was Tesoro oil in certain intertidal and shallow subtidal areas on the eastern shore of Kauai. Second, the initial sampling and subsequent chemical analyses show PAH concentrations in some opihi tissues. Third, information from scientific literature suggests that sublethal impacts to molluscs, including limpets, occur from hydrocarbon exposure.

3.4.2 Threatened and Endangered Marine Species

The threatened Pacific green sea turtle is frequently seen around Kauai and has been known to nest on the island. The Tesoro spill oiled many areas that provide green sea turtle nesting habitat. During the preassessment stage, a USFWS representative sighted a live, green sea turtle which appeared to be oiled (S. Henry, USFWS, pers. comm.). The Trustees could not confirm whether the turtle was oiled by the Tesoro spill as they were not able to capture the turtle. The Trustees did not confirm or observe any other oiled turtles. Because of the lack on data indicating exposure of green sea turtles and the fact that federal and state biologists did not expect any nesting by green sea turtles in the impacted area to occur in 1998, the Trustees did not pursue any further injury investigations for green sea turtles.

The Trustees focused more attention on investigating potential injury to the endangered Hawaiian monk seal. Although the majority of Hawaiian monk seals reside in the Northwest Hawaiian Islands, there is a small population of approximately 16-30 individuals in the Kauai-Niihau Island area. Little is known about the sex ratio, foraging areas, individual behavior or population trends of this population. Six or seven of these monk seals haul up frequently on the beaches of Kipu Kai (Shaw 1999).

Little is known about the effect of oiling on Hawaiian monk seals. There is some knowledge, however, related to pinniped exposure to oil which is informative. Direct contact with oil can cause skin lesions and secondary burns due to the heating of oil on the skin. The major concern is the toxic effect of oil on internal organs, especially those with mucous membranes. Signs of injury to these systems include, but are not limited to, bleeding from mouth, lungs or intestines, signs of respiratory infection and signs of "intoxication" such as severe lethargy and dullness. Pinnipeds with oil-related injuries also may exhibit behavior changes such as hauling out more frequently than usual (Shaw 1999).

Between September 15 and September 22, 1998, SCAT teams observed nine Hawaiian monk seals in the Kipu Kai area. Two appeared to be oiled. However, because of the protected status of the monk seals, the Trustees did not attempt to obtain confirming samples from the animals. Trustees and Tesoro observed another oiled monk seal on September 23, 1998. These observations were made over a number of days. Thus, it is possible that some of the same monk seals may have been observed more than once, and that there were not nine individual monk seals in the area during this time period.

When the Trustees began designing a study to investigate potential injury to the Hawaiian monk seals, they determined that the null hypothesis (*i.e.*, no injury as a result of the spill) was not the appropriate starting point due to the lack of information about the Kauai-Niihau Island population. Instead, the Trustees designed a study to assess the observable effects of the Tesoro spill on the Hawaiian monk seal population at Kipu Kai. Because Hawaiian monk seals are known to move five to twenty-five miles in a single day around Kauai, the Trustees specified that the study would be conducted for the entire Island of Kauai.

The Trustees and Tesoro participated in three island-wide surveys to locate and assess the physical condition of the monk seals. The first occurred between October 5 and October 12, 1998; the second between October 19 and October 30, 1998; and the third on February 26, 1999. The Trustees used the same protocols for the first two surveys. For details, *see* Kipu Kai Monk Seal Monitoring Progress Report (Shaw 1999) in the administrative record. Due to the protected status of the monk seals and to avoid disturbing the animals, observations were made using binoculars or a spotting scope. Because the observers were some distance from the monk seals, the assessment of the oiling status of individual animals could not be confirmed.

Trustees observed three Hawaiian monk seals during the first survey. The first monk seal (KK01) appeared relatively normal. The second (KK02), which may have been oiled, had its entire oral mucosa coated with a red, blood-like fluid. This animal also acted agitated.[4] The third monk seal (KW01) appeared less than 10% oiled and acted normally.

The Trustees observed the first (KK01) and third (KW01) monk seals again during the second survey. The first (KK01) again appeared normal. The other (KW01) appeared normal initially, but later during the survey showed signs and behavior consistent with an upper respiratory tract infection. Such infection could be an effect of the oil, but neither the infection nor the presence of oil could be confirmed. Although the Trustees did not resight the other monk seal (KK02) from the first survey, they did observe two additional monk seals during this second survey. One (KK03) appeared possibly 1-5% oiled and relatively normal although it did exhibit some "gagging" behavior.[5] The other monk seal (KW02) appeared possibly oiled, but seemed unaffected. Based on the results of these surveys, the Trustees were most concerned about two monk seals -- KK02 and KW01.

Because of the unusual signs in three of the Hawaiian monk seals and the absence of one seal after the first survey, the Trustees decided and Tesoro agreed to conduct an additional island-wide survey on February 26, 1999. This third survey used a helicopter

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[4] Many etiologies can result in blood coating the oral mucosa. Oiling, while not the most likely explanation, cannot be ruled out. Based on anecdotal reports, this monk seal had exhibited agitated behavior prior to the spill.

[5] Biologists have observed gagging behavior in the field in unoiled areas. However, exposure to oil can cause gastric, esophagael and duodenal ulceration.

to locate the seals and a four-wheel drive vehicle to observe haul out areas. The aerial survey located eight Hawaiian monk seals. The ground team was able to assess five of these animals. All appeared unoiled and healthy. None of these animals had been observed during the first two surveys.

The Trustees concluded that it was impossible to draw any definite conclusions concerning injury based on the data gathered during these three surveys. The Trustees remained concerned that none of the monk seals observed during the first two surveys had been re-sighted during the third survey. Likewise, the health status of the two monk seals of most concern to the Trustees (KK02 and KW01) remained unknown. Based on the potential exposure of some of the monk seals to Tesoro's oil and some signs of abnormal physical conditions of those individuals, the Trustees could not conclude that the Hawaiian monk seals either suffered or did not suffer adverse effects from exposure to the oil.

3.4.3 Seabirds

The Trustees initiated oiled wildlife response and natural resource injury assessment activities for seabirds on September 5, 1998 when an observation of an oiled seabird was reported to staff at the Kilauea Point NWR, Kauai. A Seabird TWG, composed of Trustees and Tesoro representatives, was formed to develop injury assessment studies and to determine impacts to seabirds from the spill. This TWG strived to obtain consensus on injury quantification and assessment activities. A chronology of assessment activities carried out to estimate seabird injury is presented in Table 2. Seabird recovery and rehabilitation activities were concluded on November 19, 1998 when the USCG determined the response phase of the spill was completed.

Seabirds that have been oiled typically arrive on shore in two ways (Helm, USFWS, pers. comm.; this Incident). Those that are severely incapacitated or dead wash in, while others that are still capable of flight usually return to their colonies or land elsewhere along the shore. During this spill, oiled seabirds were recovered over a period of 49 days, from August 28 to October 15, 1998, by private citizens or by personnel from a number of public agencies or private companies. For example, the International Bird Rescue Research Center (IBRRC) was contracted by Tesoro to conduct oiled wildlife response activities from September 8 to October 24, 1998 (Elliott and Sangiacomo 1999).

During the spill response, 54 seabirds were collected as potential evidence of injury. Sample analysis determined that some of the recovered birds were either not oiled by the Incident or results were inconclusive. Birds which were not oiled by the Incident included a brown booby collected on Kauai, a masked booby collected on Laysan Island, a petrel collected on Lanai, and a red-footed booby collected from the Kaneohe Marine Corps Base on Oahu. Thirty-three live birds, assumed to be oiled, were found along the shoreline or captured in the colonies during the oiled wildlife response phase of the spill. These birds were transported to rehabilitation facilities and 19 birds were cleaned, banded, and released (Elliot and Sangiacomo 1999).

Table 2. Chronology of assessment activities for seabird injuries in the Incident.	
Date	***Activity***
08/24/98	Oil spill reported to USCG and State of Hawaii; initiation of oil spill response activities.
08/28/98	Sea Life Park colony, Oahu, personnel report oiled bird to the USCG and State of Hawaii
08/28 - 09/08/98	Five additional oiled seabirds observed at Sea Life Park colony, Oahu
09/05/98	Oiled seabirds discovered on Kauai beaches; Trustees notified of spill; initiation of spill response activities on Kauai, oiled wildlife response, and NRDA activities.
09/18/98	SCAT teams begin surveying Kauai beaches
09/21/98	Survey for oiled wedge-tailed shearwaters at Kilauea Point NWR
09/25/98	Survey for oiled seabird survey at Lehua Rock colony
09/29-30/98	Survey for oiled red-footed boobies at Kilauea Point NWR
10/06/98	Survey for oiled red-footed boobies at Mokapu Point, Kaneohe, Oahu
10/06-08/98	Aerial seabird surveys in the Kauai Channel
10/07/98	Survey for oiled wedge-tailed shearwaters at Kaena Point, Oahu
10/09/98	Survey for oiled seabirds at Moku Manu Island, Oahu
10/12/98	Shoreline surveys for oiled seabirds on Manana, Kaohikaipu, Mokuluas, and Popoia Islands, Oahu
10/15/98	Final two oiled red-footed boobies collected at Kilauea Point NWR
11/16-17/98	Survey for oiled seabirds at Ka'ula Rock colony
11/19/98	Response phase of spill concluded by USCG

Because some oiled seabirds likely were capable of returning to their breeding colonies, the Working Group undertook surveys of as many colonies as possible on Oahu, Kauai, Lehua, and Ka'ula Islands (Table 3). Surface and shrub nesting species, such as boobies, were visually checked for signs of oiling. Burrow nesting species, such as shearwaters, were sampled by reaching into burrows, removing birds and examining them for oil. Records were kept of the number of birds counted and whether or not they were visibly oiled. Due to logistical and coordination problems, many of these surveys occurred well after the oil was spilled which greatly reduced the likelihood that oiled birds would be detected or recovered. Oiled birds were first reported four days after the spill on Oahu. On September 5, 1998, 13 days after the Incident occurred, oiled birds began appearing on Kauai. Following notification, the Trustees initiated injury assessment studies to determine impacts on seabird colonies. Of the eight colonies surveyed, two colonies

Table 3. Results of seabird colony surveys following the Incident.

Colony	*Days Post-Spill*	*Species*	*No. Birds Checked*	*No. Birds Oiled*	*Percent Oiled (%)*
Sea Life Park, Oahu	4-15	Red-footed booby	23	6	26
Kilauea Point, Kauai	28	Wedge-tailed shearwater	399	0	0
Lehua Rock	32	Red-footed booby Red-tailed tropicbird Great frigatebird	200 4 2	0 0 0	0
Kilauea Point, Kauai	37-38	Red-footed booby	1150	58	5
Mokapu Point, Oahu*	44	Red-footed booby	1326	9	0.7
Kaena Point, Oahu	45	Wedge-tailed shearwater	40	0	0
Moku Manu, Oahu	47	Red-footed booby Masked booby Brown booby Wedge-tailed shearwater (chicks)	60 10 6 200	0 0 0 0	0
Ka'ula Rock	85	Brown booby Masked booby Red-footed booby Great frigatebird Red-tailed tropicbird White-tailed tropicbird Wedge-tailed shearwater	47 113 871 538 6 1 126	0 0 0 0 0 0 0	0

* Trustee and Tesoro representatives observed nine oiled birds during the colony survey (Duffield 1998). It is unclear if these birds were oiled by the Incident since a separate analysis of birds samples collected from Mokapu Point indicated the oil from these samples did not match the Incident.

contained documented oiled birds. Within these two colonies, the number and percentage of oiled birds was as follows: six oiled out of 23 (26%) 4 to 15 days post-spill and 58 oiled out of 1,150 (5%) 37 to 38 days post-spill. No oiled birds were observed in colonies beyond 38 days post-spill.

Oil was only observed on the conspicuous red-footed boobies during the colony surveys. The proportion of oiled seabirds found in any particular colony survey declined as more time elapsed from the spill. Red-footed boobies were observed oiled in the colonies from 4 to 38 days post spill. In the interim, some of the oiled birds had undoubtedly died and been scavenged, died and sank at sea, or washed up on unsurveyed beaches. These types of losses have been noted in numerous studies (Bibby and Lloyd 1977; Burger 1991; Ford *et al.* 1996; Piatt *et al.* 1990). Lightly oiled birds also likely preened the oil from their plumage. It is noteworthy that a very small colony of red-footed boobies at Sea Life Park,

Oahu, observed within the first two weeks of the spill, exhibited 26% oiling. Given the delay in surveying seabird colonies, these percentages reflect an accurate assessment of the birds observed over an extended time frame and they may, or may not, reflect the percentage of oiled birds in the total population.

In addition to colony surveys, aerial surveys were flown on October 6-8, 1998 to record distribution and density of seabirds in the waters surrounding Ka'ula, Niihau, Kauai, and western Oahu (Ford 1998). Figure 1 shows survey tracks flown in the potential oil exposure area. The aerial surveys of bird distribution at sea showed varying seabird density in the potential oil exposure area. Ambiguity and conflicting information about the actual trajectory of the oil made it difficult to apply these data to models designed to estimate the number of seabirds potentially exposed to the oil.

Assessing injury to seabirds from an oil spill in the Hawaiian Islands is complicated by a number of factors. First, the probability that an oiled seabird will be deposited on shore is low due to limited shoreline area relative to open ocean. This problem is further complicated by the complex current and wind patterns in the vicinity of the Islands. Second, a portion of the existing coastline is inaccessible to search effort due to land ownership patterns and geology. General recovery rates for oiled birds on shorelines range between 20 to 25% or less (Burger 1991; RPI International, Inc. 1988). And third, the breeding and foraging behaviors of tropical seabirds increases the possibility that these birds could encounter oil and that oiled birds may not be observed or recovered.

Hawaiian seabirds exhibit a broad range of roosting and breeding behaviors which make it difficult to assess injury. For example, some species nest or roost conspicuously in aggregated groups on shrubs or low lying trees in readily accessible areas while other species nest in widely dispersed burrows in high altitude rainforests at inaccessible or very poorly known sites. Logistical concerns also affected injury quantification since a sizeable proportion of the conspicuous species nest on offshore islands that were difficult or impossible to reach during the month following the spill.

In contrast to their roosting and breeding behavior, the foraging behavior of Hawaiian seabirds is very uniform and can be characterized as pelagic foraging most commonly in association with subsurface predators such as yellowfin and skipjack tuna (*Thunnus albacares* and *Katsuwonus pelamis*) (Ashmole and Ashmole 1967; Au and Pitman 1986). Like the tuna they associate with, these birds are highly mobile and they exhibit prodigious abilities to fly long distances to forage (*e.g.*, up to 522 km for sooty terns) (Ballance *et al.* 1997; Flint 1991). Regardless of prey-capture technique (surface seizing, plunging, pursuit plunging, dipping, or pattering) the birds all come in contact with water and, therefore, with any oil floating on or suspended near the water surface.

Seabird prey, and therefore seabirds, are particularly attracted to eddies, fronts, and drift lines. These areas tend to concentrate debris and floating oil thereby increasing the

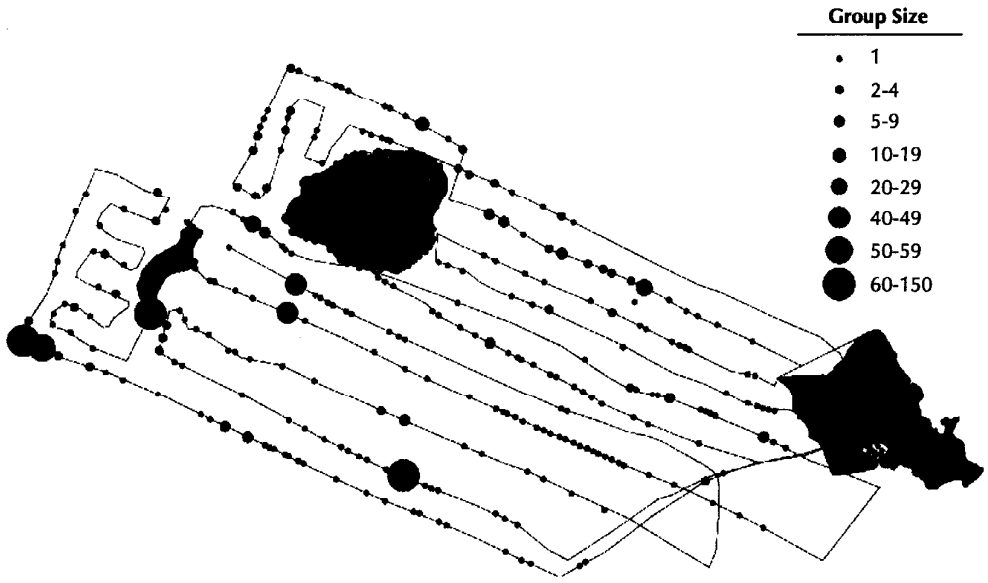

Figure 1.
Aerial surveys of the abundance and distribution of seabirds on October 6, 7, and 8, 1998 within the potential oil exposure area for the incident

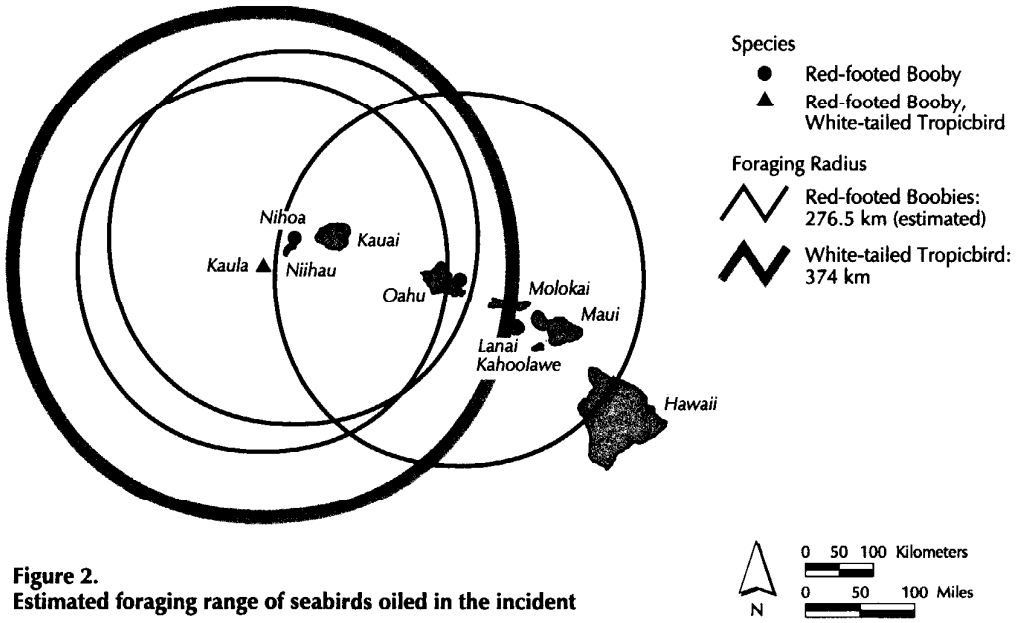

Figure 2.
Estimated foraging range of seabirds oiled in the incident

likelihood that seabirds will encounter oil and that oiled birds may not be observed or recovered. After analyzing the foraging radii of Hawaiian seabirds, the Trustees determined that the potential oil exposure area for this Incident potentially affected seabird colonies on Oahu and all surrounding islets, Kauai and all surrounding islets, Niihau, Lehua, and Ka'ula Rock. Figure 2 presents the estimated foraging radii for a representative sample of species known to have been oiled and establishes an area in which these birds were potentially exposed to the oil (hereafter referred to as the potential oil exposure area). Species expected to have been affected by the spill include those observed oiled and those species observed in the potential oil exposure area during ground or aerial surveys.

The number and species of birds estimated to have been present in late August/early September 1998 in the potential oil exposure area is shown in Table 4. Population estimates of breeding and non-breeding individuals of each species in the potential oil exposure area were derived from counts and estimates completed as closely as possible to the spill date. Population estimates for seabirds can be highly variable because not all species or colonies are surveyed in a given year, breeding areas are not always known or accessible, and burrow nesting species, which return to their colonies at night, are difficult to accurately count.

The Trustees believe it is most likely that seabirds were exposed to oil under the following circumstances. Since most tropical seabirds spend far less time sitting on the surface of the water than do arctic and temperate seabirds, they are less likely to come in contact with the oil during typical resting periods. However, several of the seabirds (petrels and shearwaters) on the Hawaiian Islands typically congregate on the water just offshore of their roosting and nesting colonies each evening before returning to the colony (Ainley *et al.* 1997; Ainley, pers. comm.; Flint, pers. comm.). In addition, there is anecdotal evidence that some of these species may even be attracted to floating oil due to its potential as a fish aggregating agent or due to its appearance on the water (Fefer 1984). Thus, although these seabirds may not have encountered oil over the entirety of their foraging area, they had the capability to reach oiled areas from all the colonies in the potential oil exposure area and some species likely were also vulnerable to exposure when they returned to the ocean area in the vicinity of their breeding colonies each evening. The Trustees believe that due to these complicating factors, coupled with the other biological aspects of each species, only a portion of the seabirds known to have been in the area at the time of the spill, and which may have been exposed to oil, were actually observed or recovered oiled.

In addition to direct surface contact with oil, seabirds may also have been exposed to oil through ingestion and absorption. Exposure to oil can cause a variety of physiological effects. Direct contact with oil can foul feathers, irritate mucous membranes, and smother animals. As feathers become clogged with oil, heat insulation and water-repellancy are compromised (Holmes and Cronshaw 1977), and the bird may become hypothermic or drown. Oil droplets on the feathers of adults can be transmitted to chicks or eggs.

Table 4. Estimated population size and number of seabirds potentially exposed to oil during the Incident.

Species	*Status*[1]	*Estimated Population within the Potential Oil Exposure Area*
Newell's shearwater (*Puffinus auricularis newelli*)	T - S & F	26,000
Christmas shearwater (*P. nativitatis*)		52
Wedge-tailed shearwater (*P. pacificus*)		154,000
Hawaiian dark-rumped petrel (*Pterodroma phaeopygia sandwichensis*)	E - S & F	1,680
Band-rumped storm petrel (*Oceanodroma castro*)	E - S; C - F	Unknown
Bulwer's petrel (*Bulweria bulwerii*)		1,430
Red-tailed tropicbird (*Phaethon rubricauda*)		1,744
White-tailed tropicbird (*P. lepturus*)		560
Masked booby (*Sula dactylatra personata*)		1,244
Brown booby (*S. leucogaster plotus*)		932
Red-footed booby (*S. sula rubripes*)		27,350
Great frigatebird (*Fregata minor*)		2,060
Black noddy (*Anous minutus melanogenys*)		612
Brown noddy (*A. stolidus pileatus*)		85,400
Blue-gray noddy (*Procelsterna cerulea saxatilis*)		4
Gray-backed tern (*Sterna lunata*)		2,360
Sooty tern (*S. fuscata*)		188,850
White tern (*Gygis alba*)	T - S	420

[1] Status: C=Candidate, E=Endangered, F=Federal, S=State, T=Threatened.

Embryos in the early state of incubation are especially vulnerable to contact with oil and small quantities ranging from 1 to 20 microliters may be sufficient to cause death (Albers 1991). Experiments with exposure of wedge-tailed shearwaters to weathered crude oil resulted in reduced laying, lowered hatching success, and reduced breeding success (Fry *et al.* 1986).

The probability of detecting an oiled seabird varies between species because their nesting and roosting behaviors and colony locations are much less uniform than their foraging

behavior. The number of oiled seabirds recovered or observed during the spill event are listed in Table 5. The majority of these birds were recovered or observed on Kauai.

Table 5. Number of oiled birds recovered or observed during the Incident.

Species	*Oiled Birds Recovered or Observed*
Brown booby	21
Red-footed booby	77
Unidentified booby	1
Great frigatebird	1
Wedge-tailed shearwater	1
White-tailed tropicbird	3
Unidentified species	1

Figure 3 shows the locations of all oiled birds recovered on Kauai. Recoveries were scattered around the island. Oiled birds recovered on Oahu all came from the Sea Life Park colony. The species composition of oiled birds recovered or observed likely does not reflect that of all the birds that were oiled due to differences in size, color, and behavior of each species. The largest number of oiled birds recovered were for the relatively large-sized brown and red-footed boobies (65 cm - 74 cm long). Brown boobies forage close to shore and are thus more likely to wash up or return to shore if oiled. Red-footed boobies roost and nest above ground in accessible colonies. Their white plumage and conspicuous nesting and roosting behavior make it relatively easy to observe whether they have been oiled.

Due to the relative inaccessibility of most seabird colonies potentially affected by this spill, it was impossible to measure direct impacts to populations. Therefore, red-footed boobies were used as an indicator species for the impacts of the oil on all seabirds within the potential oil exposure area. Red-footed boobies were chosen for several reasons: (1) their

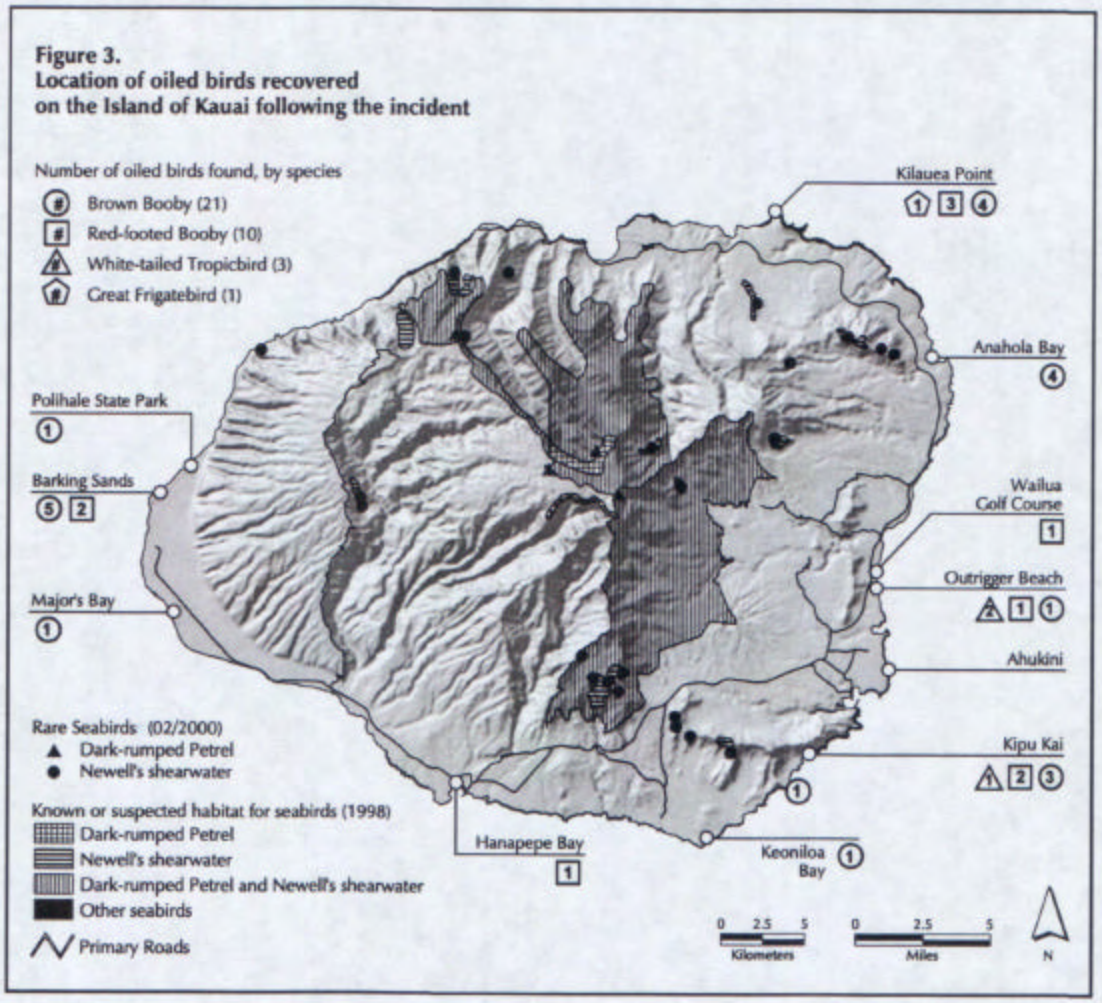

Figure 3.
Location of oiled birds recovered on the Island of Kauai following the incident

colonies were accessible for survey, (2) oil easily could be detected on their white plumage, and (3) they forage in the same general area as other seabirds present in the potential spill exposure area.

In order to estimate the number of birds potentially impacted by the spill, the Trustees employed two methods. The first method used the rate of oiling observed in red-footed boobies at the Kilauea Point colony on Kauai as a representative sample of an injured population and extrapolated this rate to other seabird populations. The second method involved the development of a correction or adjustment factor based on the estimated population impacted divided by the number of oiled birds found. This value was then compared to those for birds oiled in spills in California, Oregon, and Washington, as summarized by Carter *et al.* (1997). The Trustees used practical and conservative

estimates and their best professional judgment in the development of these methods. However, due to the delay in initiating injury assessment studies, numerous assumptions were required to develop these methods and seabird injury could not be determined with any requisite degree of certainty. Therefore, the Trustees and Tesoro commenced restoration planning with the intention of identifying restoration projects that would address a conservative estimate of injury.

3.4.4 Human Use Services

The eastern coast of Kauai provides numerous recreational opportunities to residents and tourists such as general beach recreation, surfing, kayaking, boating, fishing, opihi gathering and limu harvesting. The Tesoro oil spill affected several recreational sites on this coast including Fujii Beach (Waipouli Beach) and Nukoli'i Beach. Fujii Beach is a favorite location for many families on Kauai because an offshore reef creates a shallow pool where children can swim safely. Nukoli'i Beach is located behind two hotels and is used primarily by guests at those hotels.

As a result of the Tesoro oil spill, officials closed Fujii Beach and Nukoli'i Beach on September 13, 1998 (USCG 1998c). Both beaches had experienced oiling for several days prior to the official closing. During the closure, officials posted warning signs and used exclusionary tape to prevent the public from using the beaches. Fujii Beach reopened on September 16, 1998, though beach attendance did not return to normal until the beginning of the next week. Officials partially reopened Nukoli'i Beach on September 17, 1998. This beach fully reopened on September 20, 1998. Trustees believe that attendance levels at Nukoli'i Beach returned to normal quickly.

Substantial oiling and cleanup activities occurred at Kealia Beach and in the Ahukini area, although these areas were not officially closed to the public. Oiling also occurred at Kipu Kai. Fishermen and opihi harvesters would have been precluded from some of these areas. The Trustees estimated that the spill affected approximately 460 trips to Fugii Beach; 1,110 trips to Nukoli'i Beach during the full closure; and 870 trips to Nukoli'i Beach

during the partial closure. The Trustees also estimated that the spill affected approximately 50 fishing trips. Using literature values for general beach recreation and for fishing site closures, the Trustees estimated that the value of the recreational losses resulting from the oil spill was approximately $10,000.00. Although the Trustees gathered additional information concerning recreational impacts resulting from the Tesoro spill, the Trustees determined that quantifying those recreational losses would not be cost-effective.

4.0

RESTORATION

4.0 RESTORATION PLANNING

4.1 RESTORATION STRATEGY

The goal of restoration under OPA is to compensate the public for injuries to natural resources and services from the August 24, 1998 Tesoro oil spill. OPA requires that this goal be achieved by returning injured natural resources to their baseline condition and, if possible, by compensating for any interim losses of natural resources and services during the period of recovery to baseline.

Restoration actions under the OPA regulations are either primary or compensatory. Primary restoration is action(s) taken to return injured natural resources and services to baseline on an accelerated time frame. The OPA regulations require that Trustees consider natural recovery under primary restoration. Trustees may select natural recovery under three conditions: (1) if feasible, (2) if cost-effective primary restoration is not available, or (3) if injured resources will recover quickly to baseline without human intervention. Alternative primary restoration activities can range from natural recovery to actions that prevent interference with natural recovery to more intensive actions expected to return injured natural resources and services to baseline faster or with greater certainty than natural recovery.

Compensatory restoration is action(s) taken to compensate for the interim losses of natural resources and/or services pending recovery. The type and scale of compensatory restoration may depend on the nature of the primary restoration action and the level and rate of recovery of the injured natural resources and/or services given the primary restoration action. When identifying the compensatory restoration components of the restoration alternatives, Trustees must first consider compensatory restoration actions that provide services of the same type and quality, and of comparable value as those lost. If compensatory actions of the same type and quality and comparable value cannot provide a reasonable range of alternatives, Trustees then consider other compensatory restoration actions that will provide services of at least comparable type and quality as those lost.

In considering restoration for injuries resulting from the Incident, the Trustees first evaluated possible primary restoration for each injury. Based on that analysis, the Trustees determined that no primary restoration, other than natural recovery for ecological injuries, was appropriate. Thus, with the exception of the natural recovery alternative, only compensatory restoration projects are presented below.

Compensatory restoration alternatives should be scaled to ensure that the size or quantity of the proposed project reflects the magnitude of the injuries from the spill. The Trustees relied on the OPA regulations to select the scaling approach for compensatory restoration actions. The Trustees selected different scaling approaches for the ecological and the lost human use projects. Those approaches are discussed in further detail in Section 4.5.1.

The net removal proposed project is summarized in Section 4.5.2. The more detailed plan is part of the administrative record. It is possible that the details of the seabird predator control projects may require additional refinements or adjustments to reflect site conditions or other factors. The proposed restoration projects also may change to reflect public comments and further Trustee analysis. The Trustees assume that implementation of restoration will begin in 2000.

4.2 EVALUATION CRITERIA

The OPA regulations (15 CFR § 990.54) require that Trustees develop a reasonable range of primary and compensatory restoration alternatives and then identify the preferred alternatives based on the six criteria listed in the regulations:

1. cost to carry out the alternative,
2. extent to which each alternative is expected to meet the Trustees' goals and objectives in returning the injured natural resources and services to baseline and/or compensating for interim losses,
3. likelihood of success of each alternative,
4. extent to which each alternative will prevent future injury as a result of the incident and avoid collateral injury as a result of implementing the alternative,
5. extent to which each alternative benefits more than one natural resource and/or service, and
6. effect of each alternative on public health and safety.

In addition, the Trustees considered several other factors including:

1. cost effectiveness,
2. nexus to geographic location of the injuries, and
3. compliance with applicable federal and state laws and policies.

NEPA applies to restoration actions taken by federal Trustees. To reduce transaction costs and avoid delays in restoration, the OPA regulations encourage the Trustees to conduct the NEPA process concurrently with the development of the draft restoration plan.

To comply with the requirements of NEPA, the Trustees analyzed the effects of each preferred alternative on the quality of the human environment. NEPA's implementing regulations direct federal agencies to evaluate the potential significance of proposed actions by considering both context and intensity. For the actions proposed in this Final RP/EA, the appropriate context for considering potential significance of the action is local, as opposed to national or world-wide.

With respect to evaluating the intensity of the impacts of the proposed action, the NEPA regulations (40 CFR § 1508.27) suggest consideration of ten factors:

1. likely impacts of the proposed projects;
2. likely effects of the projects on public health and safety;
3. unique characteristics of the geographic area in which the projects are to be implemented;
4. controversial aspects of the project or its likely effects on the human environment;
5. degree to which possible effects of implementing the project are highly uncertain or involve unknown risks;
6. precedential effect of the project on future actions that may significantly affect the human environment;
7. possible significance of cumulative impacts from implementing this and other similar projects;
8. effects of the project on National Historic Places, or likely impacts to significant cultural, scientific or historic resources;
9. degree to which the project may adversely affect endangered or threatened species or their critical habitat; and
10. likely violations of environmental protection laws.

4.3 ENVIRONMENTAL CONSEQUENCES (INDIRECT, DIRECT, CUMULATIVE)

To restore resources lost as a result of the Incident, the Trustees examined a variety of proposed projects under the following restoration alternatives: (1) no action and natural recovery, (2) ecological restoration, and (3) lost human use restoration. The Trustees intend to avoid or reduce negative impacts to existing natural resources and services to the greatest extent possible. However, the Trustees could undertake actions that may have short- or long-term effects upon existing habitats or non-injured species. Project-specific environmental consequences for each proposed project are provided in Section 4.5. This section addresses the potential overall cumulative, direct, and indirect impacts, and other factors to be considered in both the OPA and the NEPA regulations.

The Trustees believe that the projects selected in this restoration program will not cause significant negative impacts to natural resources or the services they provide. Further, the Trustees do not believe the proposed projects will adversely affect the quality of the human environment in ways deemed "significant."

Cumulative Impacts: Since the Trustees designed the projects primarily to improve recovery of injured natural resources, the cumulative environmental consequences will be largely beneficial. These cumulative impacts include restoration of the injured ecosystem by increasing reproductive success of individual seabirds which will enhance recruitment of seabirds, protection of some endangered and threatened species, and enhancement

of intertidal and subtidal habitats. Both project and NEPA monitoring of projects funded under this Final RP/EA will confirm that cumulative impacts will be beneficial rather than adverse. Any cumulative adverse effects on an area or other area program, plan, or regulatory regime from a proposed project will result in reconsideration of the project by the Trustees.

Indirect Impacts: Environmental consequences will not be limited to the project location. Indirect beneficial impacts will occur in other parts of the Hawaiian Islands. Cumulative impacts at the project locations, and in the surrounding area, are expected to increase populations of seabirds, provide improved habitats for marine mammals and biota in intertidal and subtidal habitats, and provide a greater understanding of human interaction with natural resources. These projects could indirectly benefit a variety of federally *threatened and endangered species* and Hawaiian- listed sensitive species by improving habitats utilized during the lives of these species.

Direct Impacts: Overall, this Final RP/EA will enhance functionality of ecosystems. However, there will be some short-term impacts from the proposed projects such as:

- noise and air pollution -- machinery and equipment used during construction and other restoration activities will generate noise. This noise may disturb wildlife and humans. It is not anticipated, however, that the proposed projects will cause *significant noise impacts*.

- water quality -- although implementation of the proposed projects should result in no significant impact to water quality, there will be temporary increases in sedimentation and turbidity related to certain projects.

- visual -- there will be temporary visual impacts during implementation of some of the proposed projects. Once the Trustees complete those projects, the visual impacts will cease.

- public access -- public access may be temporarily affected during construction activities and net removal activities. Because implementation time for these projects will be relatively short, the impact will be short-lived.

See Section 5 for a discussion of potential impacts to the coastal zone and to endangered and threatened species.

No adverse effects are anticipated to sediment quality, soil, geologic conditions, energy consumption, wetlands or flood plains. The proposed restoration projects will have no social or economic impacts on neighborhoods or communities. General land use patterns and aesthetic qualities will not be affected by the preferred alternatives. The proposed projects will not affect any archaeological sites or sites of cultural significance to native Hawaiians.

4.4 EVALUATION OF RESTORATION ALTERNATIVE 1: NO ACTION/NATURAL RECOVERY

NEPA requires the Trustees to consider a "no action" alternative, and the OPA regulations require consideration of the equivalent, the natural recovery option. Under this alternative, the Trustees would take no direct action to restore injured natural resources or compensate for lost services pending environmental recovery. Instead, the Trustees would rely on natural processes for recovery of the injured natural resources. While natural recovery would occur over varying time scales for the injured resources, the interim losses suffered would not be compensated under the no action alternative.

The principal advantages of this approach are the ease of implementation and the absence of monetary costs because natural processes rather than humans determine the trajectory of recovery. This approach, more than any other, recognizes the tremendous capacity of ecosystems to self-heal.

OPA, however, clearly establishes Trustee responsibility to seek compensation for interim losses pending recovery of the natural resources. This responsibility cannot be addressed through a no action alternative. While the Trustees have determined for the Incident that natural recovery is appropriate as primary restoration for injuries to the shoreline, subtidal habitat, intertidal habitat and seabirds, the no action alternative is rejected for compensatory restoration. Losses were, and continue to be, suffered during the period of recovery from this spill, and technically feasible, cost-effective alternatives exist to compensate for these losses.

4.5 EVALUATION OF RESTORATION ALTERNATIVE 2: ECOLOGICAL RESTORATION

The Tesoro oil spill impacted several habitat types -- intertidal shoreline (which includes sandy beaches, rocky shores, etc.), water column and subtidal bottom, and the biota in those habitats. Species potentially affected by the spill include federal- or state-listed threatened and endangered species such as the endangered Hawaiian monk seal, the threatened Newell's shearwater and the endangered Hawaiian dark-rumped petrels, as well as other seabirds. Lost ecological services resulting from the spill include reductions in the ability of certain habitats to provide ecological functions such as the provision of food and refuge for various species and lost seabird functions.

4.5.1 Scaling Approaches

4.5.1.1 Lost Ecological Services.

The OPA regulations require the Trustees to consider compensatory restoration actions that provide services of the same type and quality, and of comparable value as those

injured. When services of the same type and quality, and of comparable value can be provided, the OPA regulations prescribe the "service-to-service" scaling approach to determine the appropriate scale of compensatory restoration.

The Trustees determined that "services of the same type and quality, and of comparable value" as the lost ecological services could be provided through habitat protection and enhancement and seabird projects. Therefore, consistent with the criterion described in Section 4.2 above, the Trustees followed the "service-to-service" approach to scale compensatory restoration projects that address lost ecological services.

In this case, the Trustees first selected habitat equivalency analysis (HEA)[6] as a scaling tool. HEA is commonly applied in NRDA cases to scale compensatory restoration projects that address lost ecological services. It is described in the preamble to the OPA regulations as a potential approach to scaling such projects.

In HEA, compensatory restoration projects are scaled so that the quantity of replacement services provided equals the quantity of lost services. These services are quantified in physical units of measure such as "acre years" or "bird years." There is no need to explicitly or directly value replacement services in monetary terms if they are comparable to the lost services. Therefore, to satisfy the compensation criterion, Trustees must evaluate whether compensatory restoration projects can provide services that are comparable to the lost services.

Scaling for this spill presented a challenge to the Trustees. Because no one anticipated oil from the August 24, 1998 spill off Barbers Point to appear on the shores of Kauai, Trustee efforts to gather precise data on area oiled and species impacted were hindered for several reasons. First, parts of the coastline potentially oiled were not accessible to Trustees and other areas proved difficult to reach. Second, there was a delay in the time between when the oil first reached Kauai's shoreline and arrival of the Trustees. This, in turn, hampered initiation of data collection by the Trustees. During this delay, oiled wildlife may have been scavenged from the shoreline or may have washed back to the ocean. Third, the Trustees had limited personnel to cover a relatively large geographic area. As a result, the Trustees focused on smaller areas which appeared to be more ecologically sensitive and more heavily impacted. Fourth, an unknown number of oiled seabirds undoubtedly perished at sea and their carcasses never washed ashore.

The Trustees and Tesoro attempted to fill some of the data gaps by conducting cooperative studies or surveys. These cooperative efforts included a follow-up study on exposure of opihi on Kauai; a series of surveys to observe physical effects of oiling on Hawaiian monk seals; oiled seabird surveys at Sea Life Park, Mokapu Point, Kaeana Point, and Moku Manu on Oahu; Kilauea Point, Lehua Rock, and Ka'ula Rock on Kauai;

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[6] This methodology is also known as resource equivalency analysis (REA).

and aerial seabird surveys in the Kauai Channel to assess seabird abundance and distribution. The Trustees also considered additional field work and other studies to provide more specific information for the scaling effort. The Trustees decided, however, that such work would be expensive to undertake and would not provide meaningful results in a timely fashion, if at all. Further, it was uncertain whether the studies would provide information that would significantly improve the accuracy or precision of the scaling results. Because both the Trustees and Tesoro preferred to focus on rapid implementation of restoration, they agreed to a more expedited process, recognizing that both sides would have to accept a degree of uncertainty in the scaling calculations. This uncertainty is compounded by the fact that even in the best of circumstances precise scaling calculations often are not possible due to incomplete knowledge of relevant physical and biological processes. Out of necessity, the calculations must utilize some simplifying assumptions.

To address the impacts of the oiling of the Kauai coastline, the Trustees and Tesoro spent considerable time discussing the appropriate "metric" or physical unit of measure to be used and variables or inputs necessary for the scaling exercise. Variables included types of habitat, the species utilizing the habitat, projected recovery lines for injured species and habitats, extent and nature (*e.g.*, light, medium, heavy) of oiling and potential for restoration. It soon became apparent to the participants in this process that the HEA method was not feasible due to disagreement on a multitude of inputs required for the HEA. Ultimately, the Trustees and Tesoro agreed on a simpler approach that included the extent of oiling, the types of injuries potentially caused by both the oiling and the subsequent cleanup activities, the type of restoration project(s) that could address those injuries, and the amount of necessary restoration.

The oiling occurred between Kilauea Point to Makahuena Point on the northeastern, eastern and southeastern coast of Kauai and between Makaha Point to Mana Point on the western side of the Island. The Trustees acknowledge that it is unlikely that oiling occurred in every area between those points. Likewise, it is unlikely that intertidal and subtidal habitat and the biota in those habitats in every part of that geographic range were affected. Due, however, to the lack of accurate and precise information and the agreement between the Trustees and Tesoro to use an expedited process, the Trustees believed it was in the public's interest to assume that the spill affected all of this area.

The Trustees then considered the types of impacts likely caused to the habitats in this area. The oil can cause mortality through toxicity to or smothering of small organisms. Cleanup activities can injure certain habitats when oiled areas are scrubbed or wiped clean by abrading or detaching small organisms, and the presence of cleanup crews can result in trampled or crushed biota.

During the aerial survey of the Hawaiian monk seals, the Trustees and Tesoro observed a number of abandoned heavy trawl (fishing) nets in the intertidal area and subtidal waters around Kauai. The Trustees and Tesoro agreed that a net removal project would address

many of the types of injuries identified above. Heavy fishing nets can crush, abrade or smother organisms. Because many nets are not firmly attached to the ocean bottom, they continue to move in the water, abrading the ocean bottom and intertidal areas. They also can cause mortality when fish, sea turtles, marine mammals or other organisms become entangled in the nets.

Finally, the Trustees and Tesoro agreed that the appropriate scale of a net removal project would be a concentrated effort to remove nets from the adjacent shoreline out to a ten-meter depth in the general area where the oil spill impacts were observed between Kilauea Point to Makahuena Point and between Makaha Point to Mana Point, for a specific length of time. The Trustees and Tesoro determined this time period by analyzing the number of nets in this area based on information from the February, 1999 Hawaiian monk seal survey and the locations of the nets (shoreline, intertidal or subtidal). After discussions with individuals with net removal experience, the Trustees and Tesoro estimated the amount of time required to remove the identified nets. They then built in additional time for weather contingencies.

4.5.1.2 Seabirds

To address the impacts of oiling on seabirds, the Trustees examined two types of models for scaling seabird injury. One type of model calculated lost bird-years based on the estimate of injured birds and then compared these numbers to the estimated number of saved bird-years for a particular restoration project. The other type of model was a simplified population productivity model which calculated the reproductive potential of a hypothetical seabird population that represented the variety of species potentially injured in the spill. The reproductive potential of this population was then determined for each of the proposed restoration projects to assess their value in restoring injured seabirds. Numerous assumptions were required to input data into each of these models making it difficult to apply them to the variety of species potentially injured in this spill and significantly raising the uncertainty of the accuracy of the models' output.

The ability to scale impacts to restoration actions was hampered by a variety of factors as discussed in Section 3.4.3. These factors include the delayed arrival of Trustees, resulting in delayed surveys and recovery efforts of injured wildlife; the uncertain trajectory of the oil due to the complex current and wind patterns in the vicinity of the islands; the limited shoreline area relative to open ocean in which to recover oiled birds; the inaccessibility or remoteness of many seabird colonies; the diverse roosting and nesting behavior of tropical seabirds; and the wide foraging range of tropical seabirds. All of these factors greatly decreased the likelihood that oiled birds would be detected or recovered and therefore affected the Trustees ability to scale potential injuries to restoration projects.

Given the uncertainties associated with the number of birds potentially oiled by the spill, the Seabird TWG agreed to focus on feasible restoration projects which would restore

species either actually found or observed oiled or likely to have been oiled by the spill. The Trustees have proposed three restoration projects to restore injured seabirds (see Sections 4.5.3 - 4.5.5.): (1) predator control in Newell's shearwater colonies on Kauai, (2) predator control and habitat enhancement on offshore islands in the Hawaii State Seabird Sanctuary, and (3) extension of the predator control fence at Kilauea Point NWR on Kauai.

The Trustees estimated that 26,000 Newell's shearwaters may have been present within the potential oil exposure area. An undetermined number of these birds may have been injured by the spill based on their wide foraging range and habit of rafting offshore of their nesting colonies on Kauai, however, the scope of injury could not be determined with any requisite degree of certainty. Newell's shearwaters are listed as both a Federal- and State-threatened species and their numbers have continued to decline (Day and Cooper 1999). The relative inaccessibility of their colonies, coupled with the biology of the birds (burrow nesting species which transits from colony at night), made it difficult to develop feasible restoration projects. Control of alien predators was determined to be a viable restoration option since predation is considered to be one of the factors affecting their recovery (Ainley *et al.* 1995) and predator control has been effective at other shearwater and petrel colonies.

Predator control and habitat enhancement on offshore islands in the Hawaii State Seabird Sanctuary was also proposed as a restoration option since this project would target many of the species potentially injured in the spill. These species include brown boobies, masked boobies, red-footed boobies, great frigatebirds, brown noddies, Bulwer's petrels, wedge-tailed shearwaters, and sooty terns. Many of these islands support introduced mammals and plants which degrade the quality of nesting habitat or otherwise reduce the reproductive success of breeding seabirds. Techniques for the eradication of rats, control of non-native plants, and restoration of native vegetation have been successfully employed on other islands and are expected to be equally effective on the island sanctuaries.

The Trustees have also proposed to repair and extend the predator control fence at Kilauea Point NWR on Kauai. The introduction of dogs, cats, mongooses, and rats to Hawaii has negatively impacted ground-nesting seabirds. The Kilauea Point NWR is one of the few sites on the main islands where seabirds can nest successfully due to predator-proof fences. A variety of seabirds would benefit from this project including Laysan albatross, wedge-tailed shearwaters, red-tailed tropicbirds, and white-tailed tropicbirds.

In developing seabird restoration projects, not all species potentially injured in the spill were able to be addressed due to the inaccessibility of their nesting colonies. These species include the black noddy, Hawaiian dark-rumped petrel, Christmas shearwater, gray-backed tern, and white tern. The Trustees believe that benefits to other injured seabirds will help compensate for the potential injury to these species. Additionally, a few species which were not the focus of these restoration efforts (*e.g.*, Hawaiian goose, Pacific golden plover, and ruddy turnstone) may benefit from the proposed projects due to their

use of these restoration sites. This enhancement of non-target populations is a likely outcome of most, if not all, restoration efforts.

4.5.2 Preferred Alternative: Net Removal Project

Project Description: Net removal activities will occur from the adjacent shoreline out to a ten-meter depth from Kilauea Point to Makahuena Point and from Makaha Point to Mana Point (work area). Recognizing that the February 1999 net information will need to be updated, the Trustees and Tesoro will gather additional information from the public concerning location of nets. Immediately before beginning the field work, the Trustees and Tesoro will conduct an aerial survey to verify the location of nets in the work area. Based on this information, the Trustees and Tesoro will complete a net removal action plan. Most net removal activities will be carried out by two teams -- a boat team and a shore team. All nets recovered by these teams will be disposed of by Tesoro in accordance with a pre-approved waste disposal plan. An aerial team, composed of a helicopter and pilot, will be available to assist in removal of nets from areas not readily accessible to land vehicles.

Restoration Objectives: The goal of this proposed project is to remove abandoned fishing nets from the general area where the Trustees observed impacts from the oil spill. This project meets the goals of the Trustees by compensating for interim losses to shoreline, intertidal and subtidal habitats and the biota in those habitats and by addressing potential injury to the endangered Hawaiian monk seal.

Probability of Success: The probability of success is high. Net removal activities have been and continue to be conducted in the Hawaiian Islands. Net removal techniques are well-known, cost effective, and relatively easy to implement.

Performance Criteria and Monitoring: The Trustees have established performance criteria in the net removal plan such as standards for net removal, definition of a net, disposal requirements, number of hours in a work day and definition of work area. Trustee representatives will monitor both the shore and boat teams. The Trustee representatives have authority to designate the geographic area within the work area where work will occur, to select which nets will be removed, and to provide directions on removing nets to minimize injury to coral or other living marine resources.

Benefits and Environmental Impacts: Abandoned fishing nets cause injury to shoreline, intertidal and subtidal habitats by smothering or crushing organisms and by abrading the ocean bottom and shoreline areas. Such nets also cause mortality to fish, sea turtles and marine mammals which may become entangled in them. Removal of the nets will cause some short-term disruption to the shoreline, intertidal and subtidal habitats.

Shoreline disruptions include personnel walking on the shore and dragging or hoisting nets into vehicles for disposal. To minimize shoreline impacts, heavy equipment such as

bulldozers, excavators, graders, or track hoes will not be used. Net removal activities will be conducted in a manner to avoid or minimize injury to corals and other living marine organisms. For example, if a net is partially encrusted and anchored to the substrate, only those sections not anchored and incorporated as part of the substrate will be removed. Completely encrusted nets that have become anchored and incorporated as part of the substrate will not be removed. Live coral colonies that are detached from the sea floor and caught in the nets being removed will be returned to the sea in the general vicinity as soon as practical and to the extent possible.

Evaluation: Abandoned fishing gear is a well-documented hazard to marine life in the Hawaiian Islands. In the Northwestern Hawaiian Islands, Hawaiian monk seals, sea turtles and seabirds have been found entangled in nets that have washed ashore (Boland 1997). The February 1999 Hawaiian monk seal aerial survey documented 133 nets around the Island of Kauai. While there will be some temporary, negative impacts to some natural resources as a result of the net removal, the Trustees have determined that the project's overall environmental impacts are positive.

4.5.3 Preferred Alternative: Predator Control in Newell's Shearwater Colonies on Kauai

Project Description: The core of the remaining breeding population of the threatened Newell's shearwater is located in rugged terrain at high elevations in the interior of the island of Kauai. Though the area is relatively inaccessible to humans, it has not escaped the impact of various species of alien predators such as feral cats (*Felis catus*) and rats (*Rattus rattus* and *R. exulans*). Recent studies suggest that the decline in Newell's shearwaters on Kauai is probably due to the combination of predation by alien mammals and collision with power lines and lighted structures (Ainley *et al.* 1995). The Trustees are proposing to reduce the rate of decline of this seabird on Kauai by initiating predator control programs during the breeding season when adults, chicks, and eggs are particularly vulnerable to these mammalian predators. Predator control would occur in the few relatively accessible nesting colonies. Cats would be controlled through the use of traps and removed from the shearwater colony site. Bait stations using the toxicant diphacinone would be used to control rats. Diphacinone is currently registered by the EPA for use in Hawaii in forests, on offshore islands, and in other non-crop outdoor areas to protect Hawaiian native and endangered plants and animals. The registration does not require the removal of poisoned rats. The rats are expected to die in their burrows and not be accessible to other animals.

Proposed colony sites for this work are three relatively low elevation areas on Kauai (Kalaheo, Kaluahonu, and Kapaa) at which predation has been demonstrated to be a problem and for which population size appears to be dramatically decreasing based on rates of predation observed in the colonies, continued declines in the numbers of birds collected during the annual "fallout" period when birds striking power lines and lighted

structures are collected and counted, and the overall decline in numbers of birds detected between two radar surveys on Kauai conducted six years apart (Ainley *et al.* 1995; Day and Cooper 1999). Limited information is available on these colonies. The number of traps and bait stations to be deployed at the sites will be dependent on surveys of the colonies prior to trapping and baiting as well as estimates of the predator population in the area.

Restoration Objectives: The goal of this proposed project is to enhance Newell's shearwater survivorship and productivity by controlling alien mammalian predators. All age classes of shearwaters are expected to benefit from this project. This project meets the goals of the Trustees by compensating for interim losses to seabirds and by addressing potential injury to the threatened Newell's shearwater.

Probability of Success: The probability of success is moderate. Reproduction and survivorship have increased for an ecologically similar species, the Hawaiian dark-rumped petrel at Haleakala National Park on Maui following feral cat control (Hodges 1994) and on the Galapagos Islands after control of feral cats and rats at breeding colonies (Coulter *et al.* 1985; Tomkins 1985). The Trustees expect to employ similar techniques for eradication of feral cats and rodents that have been well established and tested at many sites.

Performance Criteria and Monitoring: Success for this project will be measured by numbers of introduced mammals removed over time and by measuring population size and reproductive performance in the treated colonies. Comparisons of breeding success between colonies with and without predator control is best done by detecting the rate of avian traffic using radar sampling techniques to detect flights to and from the colonies. Differential changes in population size estimates made during fledging season downhill from predator control areas compared with un-managed sites would provide a measure of the efficacy of the actions taken at the colonies. This radar technique has been developed and calibrated for use on Newell's shearwaters on Kauai by Day and Cooper (1995; 1999).

Benefits and Environmental Impacts: Potential impacts from the proposed project includes the environmental benefits described under Restoration Objectives. There may be minor impacts to the colony area due to enhancement of trails to and through the colony. Limited disturbance may occur to some nesting birds during the set up and monitoring of traps and bait stations. Trail enhancement and disturbance will be minimized by limiting access points to the colony. Since nesting burrows are very dispersed, it is unlikely there will be mechanical damage to burrows from the setting of live-traps for cats. Due to the decreasing population size on Kauai, the number of traps and bait stations are expected to be limited.

Secondary impacts or impacts to non-target species from the use of diphacinone are not expected to occur. Other than the Hawaiian hoary bat, there are no native terrestrial

mammals on Kauai and the shearwater colonies are located in rugged terrain in high elevation areas away from human populations and livestock. The pueo (*Asio flammeus*), a native Hawaiian owl, occurs on Kauai but is not expected to be impacted by diphacinone bait stations. A study at Hakalau Forest NWR found that pueo did not scavenge rat carcasses placed on the ground (Lindsey and Mosher 1994). A review of other studies by Swift (1998) found that birds are not very susceptible to diphacinone. The blood clotting factor which diphacinone inhibits is not important in the avian blood clotting cascade (Belleville *et al.* 1982). Additionally, rats feeding at bait stations are expected to die in their burrows, thereby minimizing potential exposure to other species.

Evaluation: Declines in Newell's shearwater colonies on Kauai have been attributed, in part, to predation (Ainley *et al.* 1995) and the colonies have shown dramatic decreases in the past decade (Day and Cooper 1999). Diphacinone has a good safety record, is one of the most widely used rodenticides in the world (Swift 1998), and is not expected to impact native birds. While there may be some limited disturbance to nesting birds from trap and bait station placement and monitoring, the Trustees find that the benefits of the proposed project far outweigh any potential negative impacts. The Trustees believe this project will return Newell's shearwaters injured by the spill to their baseline levels and will provide some compensation to the public and the environment for the loss suffered during the period until recovery is achieved.

4.5.4 Preferred Alternative: Predator Control and Habitat Enhancement on Offshore Islands in the Hawaii Seabird Sanctuary

Project Description: The State of Hawaii manages 15 offshore islands that serve as seabird sanctuaries within the area potentially affected by the Incident. Three of the major factors which limit reproduction in these offshore seabird colonies are: rodent predation, encroachment of noxious vegetation, and loss of beneficial vegetation. These islands will be the target of restoration activities to control alien predators and invasive, non-native vegetation. Activities on the islands may include predator assessments, predator control, assessment of other threats to nesting seabirds, comprehensive surveys and mapping of vegetation, vegetation control, and restoration of native vegetation.

Introduced predators, such as rats, have had a devastating impact on nesting seabirds. For example, rats on Mokuauea Island and Ka'ula Rock prey on the eggs and chicks of all nesting seabirds, particularly wedge-tailed and Christmas shearwaters, Bulwer's petrel, ground-nesting terns, and tropicbirds. Rats also eat plant seeds which prohibits regeneration and contributes to vegetation loss. Plant seeds are a major source of food for mice and there is some evidence that, when food is scarce, mice will prey upon seabird eggs and chicks. Eradication of rats has been successfully completed on hundreds of offshore islands worldwide using toxicants (Moors 1985; Morrell *et al.* 1991; Taylor 1993; Veitch and Bell 1990). The Trustees propose to assess predator populations and then conduct predator control activities such as deploying diphacinone in bait stations

spaced at distances appropriate for the species being eradicated, at the time of year when alternative natural foods are most scarce. Diphacinone is a comparatively safe rodenticide registered by the EPA for use in Hawaii for conservation purposes on wildlands, including offshore islands. This registration does not require the removal of poisoned rats. The rats are expected to die in their burrows and not be accessible to other animals.

Introduced plants have also impacted seabirds by crowding out native vegetation and destroying nesting habitat. The Mokulua Islands off windward Oahu have areas of introduced koa haole trees (*Leucaena leucocephala*) which grow thick during the wet season, excluding indigenous vegetation and burrowing birds. In periods of drought or high salt spray, these trees die and leave the steep slopes they cover vulnerable to landslides further degrading nearby burrows of the wedge-tailed shearwater. At Manana Island off southeastern Oahu, golden crown-beard (*Verbesina encelioides*), an aggressive, non-native annual plant, has formed dense stands that preclude seabirds from nesting. At both Midway and Kure Atolls this plant's high seed production has allowed it to become a significant unwanted invader. Both of these plants have been successfully controlled in other wildlife areas by the State of Hawaii using a combination of carefully administered herbicides and mechanical control. The Trustees expect to follow similar procedures that have been refined by these earlier efforts.

Control of alien predators and invasive, non-native plants are two activities determined to be exempt from State environmental protection act review by the Hawaii State Office of Environmental Quality Control.

Restoration Objectives: The goal of this proposed restoration project is to enhance the survivorship and productivity of seabirds at each colony. For seabirds nesting on offshore islands, reducing or eliminating alien predators and improving the habitat by removing non-native plants is expected to increase survivorship of all age classes and increase reproduction by providing additional suitable nesting habitat. Species expected to benefit from the proposed project include the brown booby, masked booby, red-footed booby, great frigatebird, brown noddy, Bulwer's petrel, Pacific golden plover, wedge-tailed shearwater, sooty tern, and ruddy turnstone.

Probability of Success: The Trustees anticipate that the proposed restoration project will enhance survivorship and productivity at most, if not all, colonies because these same or very similar techniques have been successful in the past. Habitat enhancement for seabirds on offshore islands through removal of mammals and vegetation management has measurably increased seabird survivorship and reproductive performance for tropical seabird colonies on small islets in other parts of the world (Moors *et al.* 1992; Veitch and Bell 1990).

Performance Criteria and Monitoring: Success for this project will be measured by using standard monitoring techniques to track changes in population size and productivity

of the colonies on each island restored. Seabirds on offshore islets managed by the Hawaii Division of Forestry and Wildlife are surveyed annually using a combination of incidental visits and observation, on-site mapping, direct counts, estimation counts, point counts, and helicopter and fixed wing aerial photo analysis.

Successful removal of rats off islets will most likely result in qualitative changes in the form of vulnerable species such as Bulwer's petrels re-colonizing the site and quantitative changes in the increase in total number of nests and the hatching and fledging success of all nests. Invasive vegetation removal will result in increases in the numbers and distribution of nesting on each treated island and in increased reproductive success at those nests.

Benefits and Environmental Impacts: Potential impacts from the proposed project includes the environmental benefits described above. Limited disturbance may occur to some nesting birds during the set up and monitoring of bait stations and the mechanical removal of vegetation. This disturbance will be minimized by limiting access points to the colony and removing vegetation outside of peak nesting periods.

Secondary impacts or impacts to non-target species from the use of diphacinone are not expected to occur. There are no sightings of native mammals on these offshore islands. The pueo, a native Hawaiian owl, has been sighted on these islands but is not expected to be impacted by diphacinone bait stations. A study at Hakalau Forest NWR found that pueo did not scavenge rat carcasses placed on the ground (Lindsey and Mosher 1994). A review of other studies by Swift (1998) found that birds are not very susceptible to diphacinone. The blood clotting factor which diphacinone inhibits is not important in the avian blood clotting cascade (Belleville *et al.* 1982). Additionally, rats feeding at bait stations are expected to die in their burrows, thereby minimizing potential exposure to other species.

Evaluation: Introduced mammals and plants have degraded habitat quality and affected the survivorship and productivity of seabirds nesting on offshore islands. While there may be some limited disturbance to nesting birds during control activities, the Trustees find that the benefits of the proposed project far outweigh any potential negative impacts. The Trustees believe this project will aid in restoring seabirds potentially injured by the spill, provide protection and enhance the population of those species which were not injured by the spill, and provide some compensation to the public and the environment for the loss suffered during the period until recovery is achieved.

4.5.5 Preferred Alternative: Extension of the Predator Fence at Kilauea Point National Wildlife Refuge on Kauai

Project Description: Kilauea Point NWR is one of the few sites on the main Hawaiian Islands where seabirds can nest successfully due to the installation of a predator-proof

fence. The fence surrounding the refuge protects roosting and nesting seabirds and the endangered Hawaiian goose primarily from disruption by dogs. Seabirds in areas newly incorporated into the refuge that are not yet fenced, and those birds in areas where the existing fence is in poor condition, would be protected by extension and repair of the fence around the refuge (approximately 9,000 feet of six foot high fence line). Previous observations have shown that even temporary breaches in the fence due to events such as hurricanes have resulted in significant mortality of seabirds from uncontrolled dogs. Increasing residential development in the area, and the subsequent increase in dogs, underscore the need for additional protective measures to protect nesting seabirds.

Restoration Objectives: The goal of this proposed restoration project is to enhance the survivorship and productivity of seabirds nesting and roosting at Kilauea Point NWR. Extending and repairing the fence surrounding the bird colonies should immediately benefit the seabirds that are presently being disturbed and killed by uncontrolled dogs. Seabirds expected to benefit from the proposed project include Laysan albatross, red-footed boobies, Bulwer's petrels, wedge-tailed shearwaters, red-tailed tropicbirds, and white-tailed tropicbirds. An experimental group of threatened Newell's shearwaters which were reintroduced to Kilauea Point NWR will also benefit from the proposed project. The proposed project will also benefit the endangered Hawaiian goose.

Probability of Success: The probability of success of this project is high. The exclusion potential of fencing is well established in general and previous fencing efforts at Kilauea Point NWR have resulted in expansion of seabird colonies and an increase in population numbers for all seabirds breeding within the protected refuge boundaries.

Performance Criteria and Monitoring: Success for the fence improvement project at Kilauea Point NWR will be measured in the following ways: (1) documenting fence installation, repair, and maintenance actions; (2) conducting surveys of the condition of the fence and recording the number and locations of breaches; (3) reporting the number of birds killed by each type of predator; (4) using standard monitoring techniques to document changes in colony size, survivorship, and productivity of nesting birds; and (5) comparing the rate at which dogs enter the refuge after project completion to the rate observed in the previous ten years. Monitoring will be coordinated with other actions being conducted on the Refuge, such as the state-wide Hawaiian goose surveys, the state and federal fish and wildlife agencies' predator control work, and the red-footed booby colony surveys.

Benefits and Environmental Impacts: Potential impacts from the proposed project include the environmental benefits described above. Disturbance to seabirds is not expected to be an issue for this project since repairs and extension of the fence will occur outside of the nesting season. Extension of the fence should not affect nesting birds since they will not be present in the immediate area of the work. Disturbance to species such

as the Hawaiian goose can be avoided by conducting the work outside of the birds nesting season.

Evaluation: Entry of dogs and other mammals onto the Kilauea Point NWR has affected the survivorship and productivity of nesting birds. Roughly 400 wedge-tailed shearwaters were killed by dogs following damage to the fence from Hurricane Iniki in 1991. Previous fencing efforts at Kilauea Point NWR have resulted in the expansion of seabird colonies and an increase in population numbers for all seabirds breeding within the protected refuge boundaries. The Trustees find that the benefits of the proposed project far outweigh any potential negative impacts. The Trustees believe this project will aid in restoring seabirds potentially injured by the spill, provide protection and enhance the population of those species which were not injured by the spill, and provide some compensation to the public and the environment for the loss suffered during the period until recovery is achieved.

4.5.6 Non-Preferred Alternatives

The Trustees considered the following compensatory restoration projects to replace ecological service losses resulting from the spill. The Trustees rejected these alternatives because the alternatives did not meet one or more of the evaluation criteria discussed in Section 4.2.

- Opihi aquaculture program: Cultivation of opihi.
- Monitoring Hawaiian monk seals: A year-long monitoring program would be implemented to track the animals which were at Kipu Kai during the spill.
- Creation of opihi substrate: Additional rocky habitat of the type favored by opihi would be constructed.
- Education and public awareness campaign to encourage sport fishing techniques that will reduce the mortality of red-footed, brown, and masked boobies in the recreational trolling fishery around Oahu and Kauai.
- Radar survey of the perimeter of Kauai to monitor population trends and locate additional colonies of Newell's shearwaters and Hawaiian dark-rumped petrels.
- Funding of a biological technician at Kilauea Point NWR whose position would be dedicated to seabird monitoring and predator control.
- Non-native vegetation removal at Kure Atoll to improve nesting habitat for seabirds, particularly red-footed, masked, and brown boobies.

- Construction of artificial nesting platforms at Mokapu Point, Oahu, to increase nesting habitat available for red-footed boobies.

- Nest habitat improvement for wedge-tailed shearwaters at Kilauea Point NWR through re-vegetation of erosional scars with native plants and construction of artificial burrows.
- Training for volunteers in the proper handling of oiled wildlife.

- Purchase and maintenance of a portable oiled wildlife stabilization facility for use in future spills.

4.6 EVALUATION OF RESTORATION ALTERNATIVE 3: LOST HUMAN USE RESTORATION

For the purposes of this Final RP/EA, the lost human services resulting from the Incident and the cleanup activities are characterized as lost recreational opportunities at Fugii and Nukoli'i Beaches on the eastern shore of Kauai. Those losses occurred prior to the official closures of these beaches due to oiling, during the closures, during the partial reopening of Nukoli'i, and after the reopening of the beaches until beach attendance had returned to normal levels.

4.6.1 Scaling Approach

The Trustees decided that the best approach to compensating for lost visitor services as a result of the oiling and beach closures is to implement a compensatory restoration project that enhances the experience of visitors rather than increases the number of visitors. While such a project may not replace an entire visitor experience, it will, nonetheless, provide enhanced value to the public which will compensate for the lost visitor services.

The fact that the replacement services provided by a compensatory restoration project do not exactly correspond with the lost services (*i.e.*, the project considered would enhance the experience of visitors rather than increase the number of visitors) determines, in part, how compensatory restoration is to be scaled. The OPA regulations specify that when the lost and replacement services are not of comparable value, compensatory restoration will be scaled by valuing the lost and replacement services. In general, this approach requires Trustees to measure the value of lost services and then determine the scale of compensatory restoration actions that provide replacement services of equal value. Hence, in order to ensure that the public is neither over-compensated nor under-compensated, the value of replacement services must be measured in addition to the value of lost services to establish an equivalency between the two.

The Trustees selected the benefits transfer methodology to value lost visitor use. This methodology combines value estimates from existing economic studies with site-specific injury information to estimate the value of lost services. It is described in the preamble to the OPA regulations as a potential approach to scaling compensatory restoration actions. The Trustees determined that the benefits transfer methodology was appropriate based on the consideration of a number of factors, including the ability to implement the approach within a reasonable time frame and at a reasonable cost. The Trustees considered the increased cost of other methodologies that require more intensive data collection and analysis to be unreasonable relative to the expected increase in the quantity or quality of relevant information.

The OPA regulations provide that if, in the judgment of the Trustees, valuation of the lost services is practicable, but valuation of the replacement services cannot be performed within a reasonable time frame or at a reasonable cost, the Trustees may estimate the value of the lost services and then select the scale of compensatory restoration that has a cost equivalent to the lost value. Following this provision, the Trustees considered a set of compensatory restoration projects with a total cost equal to the value of lost visitor services, as estimated using the benefits transfer methodology. For a more detailed discussion on how the Trustees estimated the value of lost visitor services, *see* "Report on the Lost Recreation Use Resulting from the August 24, 1998 Tesoro Oil Spill off Barbers Point" in the administrative record. That report estimated the value to be *approximately $10,000.00.*

4.6.2 Preferred Alternative: Beach Cleanup Project

Project Description: The $10,000.00 will be placed in a beach debris cleanup fund which would be used to clean recreational beaches in the areas impacted by the spill.

Restoration Objectives: The goal of this proposed project is to remove debris from beaches on the eastern shore of Kauai which are used by residents and visitors. This project meets the goal of the Trustees by compensating for lost visitors' services which were negatively impacted by the oiling and closure of certain beaches.

Probability of Success: The probability of success is high. Beach cleanup activities are routine in Hawaii and easy to implement.

Performance Criteria and Monitoring: State or local officials will specify the types of debris to be removed and the location of the debris removal activities.

Benefits and Environmental Impacts: Debris on beaches used for recreational purposes degrades the quality of the beaches for users. Removal of the debris will enhance the users' enjoyment of the beaches. No adverse environmental impacts are

anticipated, and the debris removed will be placed in appropriate disposal containers or facilities.

Evaluation: Beach debris impairs users' enjoyment of beaches. Removal of such debris will enhance users' enjoyment of the beaches and will not cause any negative environmental impacts.

4.6.3 Non-Preferred Alternatives

The Trustees considered, but did not select, the following compensatory alternatives:

- Construction of showers and/or bathrooms at beaches.
- Construction of picnic tables at beaches.
- Contribution to funding to restore fishing pier at Ahukini.
- Building bikeway in Kapaa.

5.0

COORDINATION

5.0 COORDINATION WITH OTHER PROGRAMS, PLANS, AND REGULATORY AUTHORITIES

5.1 OVERVIEW

Two major federal laws guiding the restoration of the injured resources and services in Hawaii are OPA and NEPA. OPA and its regulations provide the basic framework for natural resource damage assessment and restoration. NEPA sets forth a specific process of impact analysis and public review. In addition, the Trustees must comply with other applicable laws, regulations and policies at the federal, state and local levels. The potentially relevant laws, regulations and policies are set forth below.

In addition to laws and regulations, the Trustees must consider relevant environment or economic programs or plans that are ongoing or planned in or near the affected environment. The Trustees must attempt to ensure that their proposed restoration activities neither impede nor duplicate such programs or plans. By coordinating restoration with other relevant programs and plans, the Trustees can enhance the overall effort to improve the environment affected by the Incident.

In initiating the Final RP/EA, the Trustees elected to combine the Restoration Plan required under OPA with the environmental review processes required under NEPA. This is expected to enable the Trustees to implement restoration more rapidly than had these processes been undertaken sequentially.

5.2 KEY STATUTES, REGULATIONS AND POLICIES

- Oil Pollution Act of 1990 (OPA), 33 USC §§ 2701, *et seq.*; 15 CFR Part 990

OPA establishes a liability regime for oil spills which injure or are likely to injure natural resources and/or the services that those resources provide to the ecosystem or humans. Federal and State agencies and Indian tribes act as Trustees on behalf of the public to assess the injuries, scale restoration to compensate for those injuries and implement restoration. Section 1006(e)(1) of OPA (33 USC § 2706(e)(1)) requires the President, acting through the Under Secretary of Commerce for Oceans and Atmosphere (NOAA), to promulgate regulations for the assessment of natural resource damages resulting from a discharge or substantial threat of a discharge of oil. Assessments are intended to provide the basis for restoring, replacing, rehabilitating, and acquiring the equivalent of injured natural resources and services.

This rule provides a framework for conducting sound natural resource damage assessments that achieve restoration. The process emphasizes both public involvement and participation by the Responsible Party(ies). The Trustees have used these regulations as guidance in this assessment.

- Hawaii Environmental Response Law, Title 10, Chapter 128D, Hawaii Revised Statutes

The State of Hawaii response law addresses the release or threatened release of any hazardous substance, including oil, into the environment. It creates an environmental response fund which can be used to pay for, among other things, costs of removal actions and costs incurred to restore, rehabilitate, replace or acquire the equivalent of any natural resources injured, destroyed or lost as the result of a release of a hazardous substance. The statute further provides that there shall be no double recovery for natural resource damages. The statute states that upon the request of the Department of Health, the attorney general will recover such costs from the responsible parties. The State of Hawaii Department of Health has promulgated regulations to address the cleanup of releases of hazardous substances. The federal and state Trustees have participated in cooperative injury assessment and restoration planning activities so as to avoid the possibility of any double recovery.

- National Environmental Policy Act (NEPA), as amended, 42 USC §§ 4321, *et seq.* 40 CFR Parts 1500-1508

Congress enacted NEPA in 1969 to establish a national policy for the protection of the environment. NEPA applies to federal agency actions that affect the human environment. NEPA established the Council on Environmental Quality (CEQ) to advise the President and to carry out certain other responsibilities relating to implementation of NEPA by federal agencies. Pursuant to Presidential Executive Order, federal agencies are obligated to comply with the NEPA regulations adopted by the CEQ. These regulations outline the responsibilities of federal agencies under NEPA and provide specific procedures for preparing environmental documentation to comply with NEPA. NEPA requires that an Environmental Assessment (EA) be prepared in order to determine whether the proposed restoration actions will have a significant effect on the quality of the human environment.

Generally, when it is uncertain whether an action will have a significant effect, federal agencies will begin the NEPA planning process by preparing an EA. The EA may undergo a public review and comment period. Federal agencies may then review the comments and make a determination. Depending on whether an impact is considered significant, an environmental impact statement (EIS) or a Finding of No Significant Impact (FONSI) will be issued.

The Trustees have integrated this Restoration Plan with the NEPA process to comply, in part, with those requirements. This integrated process allows the Trustees to meet the public involvement requirements of OPA and NEPA concurrently. The RP/EA is intended to accomplish NEPA compliance by: (1) summarizing the current environmental setting, (2) describing the purpose and need for restoration action, (3) identifying alternative actions, (4) assessing the preferred actions' environmental consequences, and (5)

summarizing opportunities for public participation in the decision process. Project-specific NEPA documents may be needed for some of the proposed restoration projects.

- Hawaii Environmental Impact Statements, Title 19, Chapter 343, Hawaii Revised Statutes

In this chapter, Hawaii has established a system of environmental review to ensure that environmental concerns are given appropriate consideration in decisionmaking along with economic and technical considerations. The statute provides for public review and opportunity for comments on a range of activities such as proposed use of state or county lands or proposed use within the shoreline area. The statute notes that when an action is subject both to this chapter and NEPA, the state agencies "shall cooperate with federal agencies to the fullest extent possible to reduce duplication between federal and state requirements." This cooperation would include concurrent public review. The Trustees will integrate the federal and state environmental review requirements as they proceed with restoration planning and implementation.

- Clean Water Act (CWA) (Federal Water Pollution Control Act), 33 USC §§ 1251, *et seq.*

The CWA is the principal law governing pollution control and water quality of the nation's waterways. Section 404 of the law authorizes a permit program for the disposal of dredged or fill material into navigable waters. The U.S. Army Corps of Engineers (Corps) administers the program. In general, restoration projects which move significant amounts of material into or out of waters or wetlands -- for example, hydrologic restoration of marshes -- require Section 404 permits.

Under Section 401 of the CWA, restoration projects that involve discharge or fill to wetlands or navigable waters must obtain certification of compliance with state water quality standards. The Hawaii Department of Health implements the Section 401 certification program. Generally, restoration projects with minor wetlands impacts (*i.e.*, a project covered by a Corps general permit) do not require Section 401 certification, while projects with potentially large or cumulative impacts must undergo a certification review.

- Coastal Zone Management Act (CZMA), 16 USC §§ 1451, *et seq.*, 15 CFR Part 923

The goal of the CZMA is to preserve, protect, develop and, where possible, restore and enhance the nation's coastal resources. The federal government provides grants to states with federally-approved coastal management programs. The State of Hawaii has a federally-approved program. Section 1456 of the CZMA requires that any federal action inside or outside of the coastal zone that affects any land or water use or natural resources of the coastal zone shall be consistent, to the maximum extent practicable, with the enforceable policies of approved state management programs. It states that no federal

license or permit may be granted without giving the State the opportunity to concur that the project is consistent with the state's coastal policies. The regulations outline the consistency procedures.

The Trustees do not believe that any of the proposed projects will adversely affect the state's coastal zone. However, to comply with the CZMA, the Trustees intend to seek the concurrence of the State of Hawaii that their preferred projects are consistent to the maximum extent practicable with the enforceable policies of the state coastal program.

- Marine Mammal Protection Act (MMPA), 16 USC §§ 1361, *et seq.*

The Marine Mammal Protection Act is the principal federal legislation which protects marine mammals. It also recognizes the important role that marine mammals play in the ecosystem as well as their recreational and aesthetic value. The MMPA places a moratorium, with few exceptions, on the taking or importing into the United States of marine mammals or their products. The MMPA defines "take" as "to harass, hunt, capture, or kill or attempt to harass, hunt, capture, or kill any marine mammal." The Department of the Interior/U.S. Fish and Wildlife Service and the Department of Commerce/NOAA share responsibility for the management and conservation for these species.

It is possible that Hawaiian monk seals may be in the area where the net removal project will occur. Trustee observers will ensure that no marine mammals are disturbed during the net removal project.

- Endangered Species Act (ESA), 16 USC §§ 1531, *et seq.*, 50 CFR Parts 17, 222, 224

The ESA directs all federal agencies to conserve endangered and threatened species and their habitats and encourages such agencies to utilize their authorities to further these purposes. Under the Act, the National Marine Fisheries Service (NMFS) and the USFWS publish lists of endangered and threatened species. Section 7 of the Act requires that federal agencies consult with these two agencies to minimize the effects of federal actions on endangered and threatened species. Prior to implementation of the proposed projects, the Trustees will conduct Section 7 consultations in conjunction with Essential Fish Habitat (EFH) consultation as noted below.

As noted in the Final RP/EA, several federal and state-listed species frequent the areas impacted by the oil spill. The proposed projects will provide benefits to some of those species such as the green sea turtle, the Hawaiian monk seal, the Newell's shearwater and the Hawaiian dark-rumped petrels, and protected plants in the vicinity (Hawaii NHP 2000). The Trustees will ensure that no endangered or threatened species are disturbed during the restoration projects. Should it be determined that any of the proposed projects will adversely affect a threatened or endangered species, the Trustees will either redesign the project or substitute another project.

- Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), 16 USC §§ 1801 *et seq*.

The Magnuson-Stevens Fishery Conservation and Management Act as amended and reauthorized by the Sustainable Fisheries Act (Public Law 104-297) establishes a program to promote the protection of EFH in the review of projects conducted under federal permits, licenses, or other authorities that affect or have the potential to affect such habitat. After EFH has been described and identified in fishery management plans by the regional fishery management councils, federal agencies are obligated to consult with the Secretary of Commerce with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any EFH.

The Trustees believe that the proposed restoration projects will have no adverse effect on EFH and will promote the protection of fish resources and EFH. The Trustees will consult with NMFS prior to implementation of any restoration project occurring in an area covered by the Western Pacific Fishery Management Council.

- Hawaii Conservation of Aquatic Life, Wildlife, and Land Plants, Title 12, Chapter 195D

Recognizing that many species of flora and fauna unique to Hawaii have become extinct or are threatened with extinction, the state established procedures to classify species as endangered or threatened. The statute directs the DLNR to determine what conservation measures are necessary to ensure the continued ability of species to sustain themselves. The Trustees will work with the appropriate state officials concerning the potential disturbance of protected species as a result of the net removal and predator control projects. *See* discussion above.

- Fish and Wildlife Coordination Act (FWCA), 16 USC §§ 661, *et seq*.

The FWCA requires that federal agencies consult with the USFWS, NMFS, and state wildlife agencies for activities that affect, control or modify waters of any stream or bodies of water, in order to minimize the adverse impacts of such actions on fish and wildlife resources and habitat. This consultation is generally incorporated into the process of complying with Section 404 of the Clean Water Act, NEPA or other federal permit, license or review requirements.

In the case of NRDA restoration actions under this Final RP/EA, the fact that the three consulting agencies for the FWCA (*i.e.*, USFWS, NMFS and DLNR) are represented by the Trustees means that FWCA compliance will be inherent in the Trustee decisionmaking process.

- Rivers and Harbors Act, 33 USC §§ 401, *et seq*.

The Rivers and Harbors Act regulates development and use of the nation's navigable waterways. Section 10 of the Act prohibits unauthorized obstruction or alteration of navigable waters and vests the Corps with authority to regulate discharges of fill and other materials into such waters. Restoration actions that require Section 404 Clean Water Act permits are likely also to require permits under Section 10 of the Rivers and Harbors Act. However, a single permit usually serves for both. Therefore, the Trustees can ensure compliance with the Rivers and Harbors Act through the same mechanism.

- Executive Order (EO) 12898 - Environmental Justice

On February 11, 1994, President Clinton issued EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. This EO requires each federal agency to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority and low income populations. EPA and the CEQ have emphasized the importance of incorporating environmental justice review in the analyses conducted by federal agencies under NEPA and of developing mitigation measures that avoid disproportionate environmental effects on minority and low-income populations. The Trustees have concluded that there are no low income or ethnic minority communities that would be adversely affected by the proposed restoration activities.

- Executive Order (EO) 11988 -- Construction in Flood Plains

This 1977 Executive Order directs federal agencies to avoid to the extent possible the long- and short- term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct or indirect support of development in flood plains wherever there is a practicable alternative. Each agency is responsible for evaluating the potential effects of any action it may take in a flood plain.

Before taking an action, the federal agency must determine whether the proposed action will occur in a flood plain. For major federal actions significantly affecting the quality of the human environment, the evaluation will be included in the agency's NEPA compliance document(s). The agency must consider alternatives to avoid adverse effects and incompatible development in flood plains. If the only practicable alternative requires siting in a flood plain, the agency must: (1) design or modify the action to minimize potential harm, and (2) prepare and circulate a notice containing an explanation of why the action is proposed to be located in the flood plain. The Trustees have determined that none of the proposed projects is located in a flood plain.

5.3 OTHER POTENTIALLY APPLICABLE LAWS AND REGULATIONS

This section lists other laws that potentially affect the Trustees' restoration activities. The statutes or their implementing regulations may require permits from federal or state permitting authorities. The permitting process also may require an evaluation of statutes other than those noted below.

Archaeological Resources Protection Act, 16 USC §§ 470, *et seq.*
Clean Air Act, 42 USC §§ 7401, *et seq.*
Migratory Bird Treaty Act, 16 USC §§ 703, *et seq.*
National Marine Sanctuaries Act, 16 USC §§ 14
National Wildlife System Administration Act, 16 USC §§ 668dd, *et seq.*
Executive Order 12996, National Wildlife System Administration

6.0

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- Carol Terry, DLNR, Honolulu, HI.

7.0

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7.0 REFERENCES

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8.0

BUDGET

8.0 BUDGET

Final costs and allocation of available funds for restoration projects will depend on a determination by the Trustees as to whether the proposed projects will be implemented under the Final Restoration Plan, and then finalization and approval of associated design documents.

APPENDICES

APPENDICES

A.1 ACRONYMS

°C	Centigrade (degrees)
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CORPS	U.S. Army Corps of Engineers
CZMA	Coastal Zone Management Act
CWA	Clean Water Act
DLNR	Department of Land and Natural Resources, State of Hawaii
DOH	Department of Health, State of Hawaii
DOI	U.S. Department of the Interior
Draft RP/EA	Draft Restoration Plan and Environmental Assessment
EA	Environmental Assessment
EFH	Essential Fish Habitat (under MSFCMA)
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
FWCA	Fish and Wildlife Coordination Act
HEA	Habitat Equivalency Analysis
IBRRC	International Bird Rescue Research Center
IFO	Intermediate fuel oil
KM	Kilometers
LAT	Lead Administrative Trustee
MMPA	Marine Mammal Protection Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRDA	Natural Resource Damage Assessment
NWR	National Wildlife Refuges (USFWS)
OPA	Oil Pollution Act of 1990
PAH	Polycyclic aromatic hydrocarbons
PPM	Parts per million
%	Percent
Refuges	USFWS-managed wildlife refuges
REA	Resource equivalency analysis
RP/EA	Restoration Plan and Environmental Assessment
§	Section
SCAT	Shoreline Cleanup Assessment Team
Tesoro	Tesoro Hawaii Corporation
TWG	Technical Working Group
USC	United States Code
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service

A.2 INDEX TO ADMINISTRATIVE RECORD

1.0 STATUTES, REGULATIONS AND AGREEMENTS

1.1 OIL POLLUTION ACT OF 1990
- 33 USC § 2701, *et seq.*
- 15 CFR Part 990
- OPA Guidance documents (NOAA)

1.2 HAWAII ENVIRONMENTAL RESPONSE LAW
- Title 10, Chapter 128D Haw. Rev. Stat.

1.3 NATIONAL ENVIRONMENTAL POLICY ACT AND AGENCY EQUIVALENTS
- 42 USC § 4321, *et seq.*
- 40 CFR Parts 1500-1508
- NOAA Directive 216-6
- Title 19, Chapter 343 Haw. Rev. Stat.

1.4 ENDANGERED SPECIES ACT AND STATE EQUIVALENT
- 16 USC 1531 *et seq.*
- 50 CFR Part 17
- Title 12, Chapter 195D Haw. Rev. Stat
- List of Hawaii's endangered and threatened birds

1.5 COOPERATIVE AGREEMENT
- 11/13/98. Joint Cooperative Natural Resource Damage Assessment Agreement

1.6 AUTHORIZED OFFICIAL DESIGNATION
- 06/29/99. Taylor, W.R., U.S. DOI, to A. Badgley, USFWS. Designation of Authorized Official for Natural Resource Damage Assessment and Restoration Activities associated with Tesoro Hawaii SPM Oil Spill, Pacific Ocean, Kauai and Oahu, HI. 4 pp.

2.0 INJURY ASSESSMENT DETERMINATION AND QUANTIFICATION

2.1 US COAST GUARD POLLUTION REPORTS
- 08/98-12/98 POLREPS One through Fourteen

2.2 BEACH CLOSURE NOTICES
- 09/13/98. USCG - Honolulu Area Unified Command Release No. 2
- 09/14/98. Notice from Outrigger Hotel General Manager to Guests

2.3 NEWS RELEASES AND CLIPPINGS (USCG, MEDIA)
- Honolulu Area Unified Command Press Releases
- *Honolulu Advertiser* media reports
- 09/15/98. Hawaii Department of Health News Release. "Public urged to report effects of recent oil spill," 1p.

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2.4 OTHER RESPONSE ACTIVITIES

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- 09/15/98. Rogers, S., USCG Marine Safety Laboratory (MSL), to Mr. Le. Oil Sample Analysis Report, MSO Honolulu, Case Number MC98011773, MSL Case Number 98-281/98-282. 23 pp.

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- 05/07/99, *Hawaiian Monk Seal* -- EMAIL re results of Kauai overflight.

2.5.3 LOST USE SERVICES

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2.5.4 INTERTIDAL AND SUBTIDAL BIOTA

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2.5.5 SEABIRDS

- 09/20/98. Seabird Injury Quantification Plan (Field Data Collection), USFWS. 3 pp.

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3.0 RESTORATION PLANNING

3.1 PRELIMINARY RESTORATION PLANNING: DEVELOPMENT OF POTENTIAL PROJECTS

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3.2 NOTICE OF PUBLIC MEETING

3.3 NOTICE OF AVAILABILITY OF DRAFT RP/EA

3.4 DRAFT RESTORATION PLAN

3.5 FINAL RESTORATION PLAN

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APPENDIX A.3

PUBLIC MEETING COMMENTS ON TESORO DRAFT RESTORATION PLAN AND ENVIRONMENT ASSESSMENT

A public meeting on the Draft Restoration Plan and Environmental Assessment was held on June 21, 2000, at the Kapaa Public Library on Kauai, Hawaii. The audience members asked a number of questions of the Trustees. Listed below is a brief summary of the questions and the responses.

- Why was there a delay between the spill and the notification of the Trustees?

  Response: The purpose of this meeting is to discuss the Restoration Plan and the proposed restoration activities rather than response activities. Please contact Tesoro Hawaii Corporation if you'd like to discuss the response activities in more detail.

- Why do the Trustees use compensatory restoration rather than direct?

  Response: Nothing can be done at this time to help directly the injured species and there is no real way to compensate for the loss. We can provide ways to increase population growth to compensate for injured birds by yielding more chicks. Also, fishing nets are a potential entanglement hazard and their removal will reduce potential injury to seals and turtles, other threatened/endangered species, and the reefs.

- Why net removal -- is there a problem w/abandoned nets on the shoreline?

  Response: Fishermen lose their nets and they become tangled up on the shoreline or in the intertidal where they can injure resources such as the opihi and endangered/threatened species. We can increase the value of their environment, make things better for these species, by removing the nets. We found 133 during the survey.

- What were the known mortalities to birds?

  Response: One hundred and five birds were found oiled, approx. 30 were cleaned and released, and some died. We didn't do full sampling and analysis. We know that oil upsets the thermoregulatory process in birds and there are some questions as to whether cleaned and released birds can even reproduce successfully (sublethal effects). It is costly to measure sublethal effects, but we can do some things to help existing populations.

- What about economic impacts and how to measure them?

  Response: The economic impact evaluation was done by a third-party. A Tesoro representative from the audience stated that the claim line was opened and the company received claims for about $20,000.00 from fishermen with fouled lines; there were no claims by the hotels. The representative believed that the "hotel packs" which were brought in immediately seemed to be effective.

- When will restoration begin?

  Response: When the settlement negotiations have been concluded, the Consent Decree is entered, and the Plan is final.

Participants.

NAME	ADDRESS	ORGANIZATION	PHONE
Charles O'Neill	733 Bishop St., Honolulu, HI	Reinwald O'Connor and Playdon	808-524-8350
Jude Schwarce	3040 Umi St.	Dept. Health	808-241-3323
John Naughton	NMFS-Honolulu	NOAA	808-973-2935
Don Heacock	3060 Eiwa St., Lihue	DAR/DLNR	808-274-3344
Melisa Mars		Garden Island Newspaper	808-249-3681
Tom Telfer	3060 Elwa St., Lihue	DLNR/DOFAN	808-274-3433
Dave Aplin	PO Box 1128, Kileauea	USFWS	808-828-1413
Carol Terry	1151 Punchbowl St., Honolulu	DLNR/DFW	808-587-0166
Barry Ogilby	Three Embarcadero Ctr., San Francisco, CA	McCutchen, Doyle, Brown & Enersen	415-393-2000
D.H. Leonard	733 Bishop St., Honolulu, HI	Tesoro Hawaii	808-547-3688
F. David Hoffman, Jr.	733 Bishop St., Honolulu, HI	Tesoro Hawaii	808-547-3280
R. Chris Jansen	733 Bishop St., Honolulu, HI	Tesoro Hawaii	808-547-3242
Nathan Hokama	733 Bishop St., Honolulu, HI	Tesoro Hawaii	808-547-3639
Susan A. Kusunoki	733 Bishop St., Honolulu, HI	Tesoro Hawaii	808-547-3425
Gary Gill		Dept. Health	
Curtis Martin		Dept. Health, HEER	
Kathleen Ho		Hawaii Office of Attorney General	
Francis Oishi		Dept. Land and Natural Resources, Aquatic Resources	
Dan Palawski		USFWS	
Gail Siani		NOAA	206-526-4566

APPENDIX A.4

PUBLIC COMMENTS AND TRUSTEE RESPONSES
TESORO DRAFT RESTORATION PLAN AND ENVIRONMENTAL ASSESSMENT

Two written public comments were received during the public comment period (June 7-July 10, 2000). Their comments are provided below, along with the responses by the Trustees.

The Trustees appreciate the input from these two individuals:

Carl J. Berg, Jr.
Ph.D, Zoology
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4.5.3: Preferred Alternative: Predator Control in Newell's Shearwater Colonies on Kauai (pp. 44-46)

Comment: p. 44. Be VERY careful that the predator removal efforts do not actually increase predation by opening up trails through the uluhe fern. Frankly, the only way to keep this from happening might be to fence in the entire colony, which might not be feasible. (Cooper)

Response: The Trustees appreciate your concern regarding the potential to increase predation in the Newell's shearwater colonies. The colonies proposed for predator control work are already compromised by trail systems and have known mammalian predation. As noted in the Final Restoration Plan, we will attempt to minimize trail enhancement and disturbance to the birds by limiting access points to the colony. Fencing colonies from rat predators was not considered to be a viable option since it would be expensive, impracticable, and potentially more disruptive to nesting seabirds.

Comment: I am familiar with the studies done on the seabirds of Kauai and the great concern over the diminishing population estimates for these federally listed threatened and endangered species. Section 4.5.3 does not address the significant "taking" of the Newell's shearwater and dark-rumped petrel by the power lines that intercept the birds during their flights between the ocean and their nesting habitats in the mountains of Kauai. I feel that something must be done to stop the killing of the birds by the power lines. Section 4.5.3 focuses, instead, on predator control within the breeding colonies. This I support. I strongly believe that action such as

that proposed must be taken immediately to control population decline by the introduced predators. Furthermore, the benefits of predator control will far out weigh any disturbance to the natural habitat. We do not have the luxury of time to do further scientific studies. (Berg)

Response: The Restoration Plan notes that recent studies suggest that the decline of Newell's shearwaters on Kauai is due to the combination of predation by alien mammals and collision with power lines and lighted structures. Of these threats, predation was found to be the most serious threat to shearwater survival. The U.S. Fish and Wildlife Service and the State of Hawaii, Department of Lands and Natural Resources, organized the Save Our Shearwaters (SOS) program in 1978 to recover, rehabilitate, and release shearwaters injured by their attraction to lights and subsequent collisions with structures and power lines. This program has been highly successful in recovering and rehabilitating injured shearwaters. Additional measures have been developed to reduce fallout from collisions with lighted structures and power lines such as reducing the intensity of lights and placing lines underground at specific "hot spots" where the risk to shearwaters may be the greatest. These measures, however, are voluntary. Given the limited funds available for restoration, the high costs of placing power lines underground, and the success of the SOS program, the Trustees decided to focus efforts on an area which has not received attention to date, namely predator control. We appreciate your support of the proposed predator control project.

Comment: Some other restoration ideas not specifically mentioned: (1) bury existing power lines in bird "hot spots" where birds have been found historically, and (2) test marker balls effectiveness at reducing collision. (Cooper)

Response: Placement of power lines underground in seabird "hot spots" has been identified by scientists as a measure which would reduce seabird collisions. However, this measure is a voluntary effort and can be very expensive. The Trustees are focusing their efforts and limited funding on projects that will restore, protect, and enhance natural resources potentially injured by the spill and that will provide some compensation to the public and the environment for the loss suffered during the period until recovery is achieved. For this reason, broader research activities, such as testing the effectiveness of marker balls, were not considered in developing this Plan.

4.5.4 Preferred Alterative: Predator Control and Habitat Enhancement on Offshore Islands in the Hawaii Seabird Sanctuary (pp. 46-48)

Comment: The proposed action for offshore islands (Section 4.5.4) is well designed and backed by extensive experience. It will have significant impact on the restoration of seabirds. (Berg)

Response: The Trustees appreciate your comment.

4.5.5 Preferred Alternative: Extension of the Predator Fence at Kilauea Point National Wildlife Refuge on Kauai (pp. 48-50)

Comment: I am most familiar with the proposed alternative for the extension of the predator fence at Kilauea Point Natural Wildlife Refuge on Kauai (Section 4.5.5), as I am a volunteer hike leader at that refuge. The objectives of the proposed alternative are great, well worth the expenditure of funds, but I would like to offer some corrections and additions to the proposal. (Berg)

The proposed fence does not protect against mongooses, since none are present on Kauai, nor against mice and rats that can easily pass through the fence, nor against cats that may pass through or climb over. It functions primarily to keep dogs and humans from entering the refuge. (Berg)

Temporary breaches in the fence have resulted in significant mortalities of seabirds from uncontrolled dogs. While the hurricane did damage the fence, subsequent lack of maintenance and repair has allowed mass killings of birds up to as recently as this spring. The Kilauea Point National Wildlife Refuge is sorely lacking a Comprehensive Conservation Plan and the process of constructing one will not begin until the year 2007. Currently there is no formalized management plan for each of the species of birds that inhabit the refuge. The development of such a plan, one the specifically identifies fence survey and maintenance schedules, reporting schedules and the personnel responsible, should be a requirement of your funding. (Berg)

Specifically, under "Performance Criteria and Monitoring" should be the requirement for: (1) Conducting frequent surveys of the condition of the fence and recording of the number and locations of breaches etc. (2) Documentation of fence installation, repair and maintenance actions. (3) Reporting of the number of birds killed by each type of predator. (4) Standard monitoring. Techniques to document changes in colony size, survivorship, and productivity of each species of bird. (Berg)

It is unclear how the extension of the fence line as proposed by this restoration action plan is related to the extension currently underway and more importantly, how it is compatible with the proposed development of hiking trails, laboratories and a pavilion on the refuge's Crater Hill properties. These proposed developments will increase human disturbance of the birds and the probability of predation by dogs, thus negating any restoration activities on the refuge. A Comprehensive Conservation Plan is needed for the refuge. (Berg)

Response: The Trustees appreciate your support of this proposed project. The text has been revised to note that the predator fence provides protection primarily from dogs. Your suggestions regarding performance criteria and monitoring also have been incorporated into the Final Restoration Plan. Some of the performance criteria and monitoring actions are being addressed under other programs, such as the state-wide Hawaiian goose surveys, the state and federal fish and wildlife agencies' predator control work at the Kilauea Point NWR, and the red-footed booby colony surveys. The Trustees appreciate your concern regarding the development of a Comprehensive Conservation Plan (CCP) which specifically addresses the predator control fence. The Trustees will forward your comments concerning the CCP to the Kilauea Point NWR staff for consideration.

The installation and maintenance of the predator control fence, however, is an action that can occur in the absence of a CCP and which will provide significant and more immediate benefits to seabird resources, particularly in light of additional development in the area. A fencing plan was developed by the Kilauea Point NWR in 1997. It entailed erecting literally miles of fence, and in some places constructing two fences in parallel, to ensure that dogs would not decimate the seabird colonies at the refuge. Although the fencing plan has been initiated, there are insufficient funds to complete this entire project. The project outlined in this Restoration Plan will complement ongoing efforts and allow for completion of the predator exclusion fence at the refuge.

4.5.6 Non-Preferred Alternatives (p. 50-51)

Comment: I am in strong support of one of your non-preferred alternatives, the nest habitat improvement for wedge-tailed shearwaters at Kilauea Point. The Crater Hill properties could be greatly enhanced for nesting by the planting of native species of plants and construction of artificial burrows, once the area is properly fenced. Population densities are currently so low in this area to allow for expansion without any fear of population dependent disease outbreaks. I believe we would see an immediate increase in the number of successful nest sites the following breeding season. (Berg)

Response: The Trustees appreciate your support for this project. As mentioned in your comments, the Crater Hill properties need to be fenced prior to habitat enhancement due to disruption by predators such as dogs. The Trustees have no information suggesting that habitat is a limiting factor for wedge-tailed shearwaters. Therefore, our efforts focused on installing and maintaining a predator control fence in this area as a method to enhance seabird populations. However, we will share your suggestions for habitat enhancement with the Kilauea Point NWR staff.

Alternatives Not Raised in Draft Plan

Some other restoration ideas not specifically mentioned:

(1) Comment: Bury existing power lines in bird "hot spots" where birds have been found historically, and test marker balls effectiveness at reducing collision; Increase light shielding on Kauai. (Cooper)

Response: Scientists have developed a variety of measures (e.g., burying power lines and increasing light shielding) to reduce shearwater fallout from collisions with lighted structures and power lines. These measures, however, are voluntary and some, such as burying power lines, are very expensive. Others, such as increasing light shielding, are best approached through revisions in building codes. Given the limited funds available for restoration, the high costs of placing power lines underground, the alternatives for addressing light shielding issues, and the success of the SOS program, the Trustees decided to focus efforts on an area which has not received attention to date, namely predator control.

(2). Comment: Did you consider aerial dispersal of rodenticide (would have to be careful about non-target species, however)? (Cooper)

Response: Aerial dispersal was considered, however, pesticide registration for this technique has not yet been granted for the State of Hawaii.

(3) Comment: Do a predator assessment in the Alakai swamp--how many rats/cats are in the area? (Cooper)

Response: The Trustees are focusing their efforts and limited funding on projects that will restore, protect, and enhance natural resources potentially injured by the spill and that will provide some compensation to the public and the environment for the loss suffered during the period until recovery is achieved. For this reason, broader research survey activities were not considered in developing this Plan.

(4) Comment: Do radar surveys of the other main islands (Oahu, Maui, Molokai, Big Island) to obtain baseline information on distribution and abundance of petrels and shearwaters. (Cooper)

Response: As noted above, the Trustees are focusing on projects that will restore natural resources rather than broader research activities.

Appendix A.5

TRUSTEE ADOPTION RESOLUTION

The undersigned, as authorized officials of their respective federal and state natural resource trustee agencies, hereby approve and adopt the *"Final Restoration Plan and Environmental Assessment for the August 24, 1998 Tesoro Hawaii Oil Spill (Oahu and Kauai, Hawaii)"* and select the restoration projects described as Preferred Alternatives contained therein.

FOR THE U.S. DEPARTMENT OF THE INTERIOR:

By: Anne Badgley _____ 10/17/00
Anne Badgley — Date
Regional Director, Region 1
U.S. Fish and Wildlife Service

Approved as to Form:

By: _____ _____
Charles McKinley — Date
Assistant Field Solicitor
Office of the Solicitor

FOR THE STATE OF HAWAII,
DEPARTMENT OF LAND AND NATURAL RESOURCES

By: _____ _____
Timothy E. Johns — Date
Chairman of the Board of
Land and Natural Resources

FOR THE STATE OF HAWAII,
DEPARTMENT OF HEALTH

By: _____ _____
Gary Gill — Date
Deputy Director, Department of Health

TRUSTEE ADOPTION RESOLUTION

The undersigned, as authorized officials of their respective federal and state natural resource trustee agencies, hereby approve and adopt the *"Final Restoration Plan and Environmental Assessment for the August 24, 1998 Tesoro Hawaii Oil Spill (Oahu and Kauai, Hawaii)"* and select the restoration projects described as Preferred Alternatives contained therein.

FOR THE U.S. DEPARTMENT OF THE INTERIOR:

By: Anne Badgley — 10/17/00
Anne Badgley — Date
Regional Director, Region 1
U.S. Fish and Wildlife Service

Approved as to Form:

By: Charles McKinley — 11/6/00
Charles McKinley — Date
Assistant Field Solicitor
Office of the Solicitor

FOR THE STATE OF HAWAII,
DEPARTMENT OF LAND AND NATURAL RESOURCES

By: _____ _____
Timothy E. Johns — Date
Chairman of the Board of
Land and Natural Resources

FOR THE STATE OF HAWAII,
DEPARTMENT OF HEALTH

By: _____ _____
Gary Gill — Date
Deputy Director, Department of Health

TRUSTEE ADOPTION RESOLUTION

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FOR THE U.S. DEPARTMENT OF THE INTERIOR:

By:_____ _____

Ann Badgley — Date
Regional Director, Region 1
U.S. Fish and Wildlife Service

Approved as to Form:

By:_____ _____

Charles McKinley — Date
Assistant Field Solicitor
Office of the Solicitor

FOR THE STATE OF HAWAII,
DEPARTMENT OF LAND AND NATURAL RESOURCES

By: Timothy E. Johns 9/7/00

Timothy E. Johns — Date
Chairman of the Board of
Land and Natural Resources

FOR THE STATE OF HAWAII,
DEPARTMENT OF HEALTH

By:_____ _____

Gary Gill — Date
Deputy Director, Department of Health

TRUSTEE ADOPTION RESOLUTION

The undersigned, as authorized officials of their respective federal and state natural resource trustee agencies, hereby approve and adopt the *"Final Restoration Plan and Environmental Assessment for the August 24, 1998 Tesoro Hawaii Oil Spill (Oahu and Kauai, Hawaii)"* and select the restoration projects described as Preferred Alternatives contained therein.

FOR THE U.S. DEPARTMENT OF THE INTERIOR:

By:_____ _____

Ann Badgley
Regional Director, Region 1
U.S. Fish and Wildlife Service

Date

Approved as to Form:

By:_____ _____

Charles McKinley
Assistant Field Solicitor
Office of the Solicitor

Date

FOR THE STATE OF HAWAII,
DEPARTMENT OF LAND AND NATURAL RESOURCES

By:_____ _____

Timothy E. Johns
Chairman of the Board of
Land and Natural Resources

Date

FOR THE STATE OF HAWAII,
DEPARTMENT OF HEALTH

By:_____ 8/30/00

Gary Gill
Deputy Director, Department of Health

Date

TRUSTEE ADOPTION RESOLUTION

FOR THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, DAMAGE ASSESSMENT AND RESTORATION PROGRAM:

This certifies that the Damage Assessment and Restoration Program (DARP) Managers, on behalf of the National Oceanic and Atmospheric Administration, approved the restoration projects described as Preferred Alternatives contained in the *"Final Restoration Plan and Environmental Assessment for the August 24, 1998 Tesoro Hawaii Oil Spill (Oahu and Kauai, Hawaii)"*. Approval by the Program Managers is pursuant to the Damage Assessment and Restoration Program Board of Directors' delegation decision of July 17, 1996.

By: Katherine A. Pease — 22 August 2000

Katherine A. Pease — Date

Senior Counselor for Natural Resources

DARP Manager

Appendix A.6

FINDING OF NO SIGNIFICANT IMPACT

RESTORATION PLAN AND ENVIRONMENTAL ASSESSMENT FOR THE TESORO HAWAII OIL SPILL (AUGUST 24, 1998) (OAHU AND KAUAI, HAWAII)

The National Oceanic and Atmospheric Administration is the lead federal agency for National Environmental Policy Act (NEPA) compliance for the Final Restoration Plan and Environmental Assessment for the August 24, 1998 Tesoro Hawaii Oil Spill (Oahu and Kauai, Hawaii) (Restoration Plan). The cooperating agencies include the U.S. Department of the Interior (U.S. Fish and Wildlife Service) and the State of Hawaii (through the Department of Health and the Department of Land and Natural Resources).

The Environmental Assessment for this project evaluated three alternatives, including the "no action" alternative. The public was afforded two opportunities to review and provide input on the alternatives, including the preferred alternatives. A public meeting was held on Kauai, Hawaii, on June 21, 2000 to present the Draft Restoration Plan to the public. The Draft Restoration Plan was also made available to the public for a 30-day public comment period, ending July 10, 2000, in both hardcopy form and posting on government web pages. The public comments received as a result of the public comment process was favorable to the Preferred Alternatives and has been included as Appendices A.3 and A.4 to the Plan.

DETERMINATION:

Based upon an environmental review and evaluation of the Restoration Plan and Environmental Assessment for the August 24, 1998 Tesoro Hawaii Oil Spill (Oahu and Kauai, Hawaii), I have determined that the proposed action does not constitute a major federal action significantly affecting the quality of the human environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969, as amended. Accordingly, an Environmental Impact Statement is not required for this project.

Anne Badgley 10/17/00

Anne Badgley
Regional Director, Region 1
U.S. Fish and Wildlife Service

Date

DETERMINATION:

Based upon an environmental review and evaluation of the Final Restoration Plan and Environmental Assessment for the August 24, 1998, Tesoro Hawaii Oil Spill, Oahu and Kauai, Hawaii, I have determined that the proposed action does not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969, as amended. Accordingly, an environmental impact statement is not required for these projects.

William T. Hogarth — 10/23/00

for Penelope D. Dalton
Assistant Administrator for Fisheries
National Marine Fisheries Service
National Oceanic and Atmospheric Administration

Date