Damage Assessment and Restoration Planning For Marine Birds

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CONTENTS

I. INTRODUCTION

A. Background

The NOAA Restoration Center (RC) is devoted solely to restoring the coastal and marine habitats that support the nation's fisheries and trust resources. One important way that the Restoration Center achieves results is through working as an integral part of NOAA's Damage Assessment and Restoration Program (DARP). NOAA established the DARP to conduct natural resource damage assessments for oil spills and releases of hazardous materials and to restore NOAA trust resources harmed by these pollution releases. Under the DARP, scientists**,** managers**,** and attorneys ensure that injured marine resources are restored after oil spills, ship groundings, chemical releases or other toxic events. They do this by first assessing the injury to resources, then implementing restoration actions quickly and effectively. This process is done in concert with other federal, state, local, and tribal trustees who are responsible for the same injured resources. This document has been prepared to assist in determining damages to marine bird resources and planning actions to restore them.

Marine birds (for purposes of this document, the term "marine bird" will refer to seabirds, sea ducks and shorebirds) are an important component of the marine ecosystem and are commonly injured in oil spills or hazardous material releases. Such injuries can occur as direct mortalities or indirectly through habitat degradation, lost reproductive success, and/or contaminated food supplies and toxicological effects associated with the exposure to the contaminant. Marine birds rely on a healthy marine environment to provide the prey base necessary for reproduction, migration and general maintenance. In addition, some seabirds rely on, and contribute to, the terrestrial ecosystem. For example, the federally threatened Marbled Murrelet (Brachyramphus marmoratus marmoratus) relies on old growth forests, up to at least forty miles inland from the coast for nesting habitat. Marine bird populations, like other elements of the marine ecosystem are a critical "part of the whole." Therefore, in many ways, seabirds integrate the marine and terrestrial ecosystems. They affect and are affected by all changes in these complicated and delicate ecosystems.

Maintaining healthy populations of marine birds provides multiple human and ecological benefits. Due to their location at the top of the food chain, many marine birds can provide valuable information regarding the status of other aspects of the marine environment (Furness and Monaghan 1987, Cairns 1987, 1992). Seabird guano production in and around colony sites provides nutrient input that increases primary production, and increases production in benthic communities including seagrasses (Wootton 1991, Kenworthy and Swartzchild *pers. comm.*, Wainright et al., 1998, Palomo et. al., 1999). In addition, guano is habitat for other species, and a natural source of fuel (Ross and Randall 1990, Heezik and Seddon 1997). Seabirds and their eggs also serve as an important food source for predators and scavengers such as Bald Eagles (*Haliaeetus leucocephalus*), Peregrine Falcons (*Falco peregrinus*), Great Horned Owls (*Bubo virginianus*), foxes, coyotes and raccoons.

However, many marine bird populations are declining. Threats such as habitat disturbance, nesting habitat degradation and loss, changes in food supply, fishery bycatch and others have had a substantial impact on seabird populations worldwide. Currently there are fourteen marine bird species listed as federally endangered and six species listed as threatened (see Appendix B for a complete list). Marine birds are long–lived, have low reproductive rates and have delayed onset of breeding, meaning that they typically do not start breeding until at least their third or fourth year (Duffy and Nettleship 1992). These characteristics make marine birds vulnerable and slow to recover from human disturbance and other threats. Many marine birds are also restricted in their breeding range. For example, the entire U.S. population of both the federally endangered California Brown Pelican (*Pelecanus occidentalis californicus*) and the Xantus's Murrelet (*Synthliboramphus hypoleucus*), a species of special concern, breed on only two islands in California. In addition, over 40% of the federally endangered Roseate Tern (*Sterna dougalli*) breed on one island in Massachusetts. These restricted breeding ranges put such populations at extreme risk to multiple threats such as disturbance, predation and oil spills.

Marine birds are a major public and recreational attraction to many coastal areas and provide viewing services to "bird-watchers" and the tourism industry (French and French 1989). For example, tourists visiting the State of Maine spend nearly $3 billion in the state annually, mostly related to coastal recreation. The public's level of participation in bird-related recreation is a strong indication of the value of birds to society. Nature-based recreation is the fastest growing segment of the tourism industry, increasing approximately 30% annually since 1987. Seventy-seven percent of U.S citizens, or 150 million, spent $29.2 billion in 1996 to observe, photograph and feed wildlife, a 39% increase in dollars from 1991. Were wildlife watching a corporation, it would have ranked 23rd on the *Fortune 500* list that year (The North American Bird Conservation Initiative in the United States 2000). The bird watching industry continues to grow every year. Birding is growing faster than many other outdoor recreational activities such as biking, pleasure walking, skiing and golfing. Bird watching as an activity increased 200% from 21 million participants in 1982-83 to an estimated 63 million in 1997. Collectively, birders spend approximately $20 billion per year on backyard bird feeding, travel and related paraphernalia. In 1991, 24.7 million birders traveled away from their homes to participate in birding activities, spending $5.2 billion on goods and services (The North American Bird Conservation Initiative in the United States 2000). At a national level, economic activity directly associated with the non-consumptive enjoyment of birds generated 191,000 jobs and more than $895 million in sales and income tax revenues in 1991. In addition, three million migratory bird hunters generated $1.3 billion in retail sales, having a total economic multiplier effect of $3.9 billion when combined with the 46,000 additional jobs and $176 million in sales and income tax revenues produced. Clearly, birds provide an important contribution to our nation's economy (The North American Bird Conservation Initiative in the United States 2000).

The public also values marine birds as important natural resource to protect in its own right and to pass on to future generations. A recent economic analysis conducted by the California Department of Fish and Game suggests that California households are willing to pay an average of $76 in a one-time payment to protect the Central California coast from an oil spill whose impacts would include primarily seabirds (Carson et al., 1996). Fishermen have traditionally used feeding seabirds to locate aggregations of fish in the open ocean (Furness and Monaghan

1987). In many areas, such as Alaska, native people have traditionally relied on the meat and eggs of ducks, geese, cranes, eiders and other aquatic birds for subsistence.

Unfortunately, continual injuries due to oil and chemical pollution in addition to threats such as habitat disturbance, nesting habitat degradation and loss, changes in the food supply, fishery bycatch and changes in water temperature threaten the persistence of marine birds (Fry et. al., 1986, Eppley et al., 1990, Burger 1994, Nur et al., 1997, Andres 1997, 1999). Although a damage assessment deals with the effects of oil and chemical pollution, those injuries can be exacerbated by other threats. Effective restoration may need to focus on these other threats in order to restore the injured populations to baseline.

B. Trusteeship

As trustees for the Nation's natural resources, NOAA and other natural resources trustees are responsible for restoring, replacing, rehabilitating or acquiring the equivalent of injured natural resources. To determine the type and magnitude of restoration necessary to compensate the public, natural resource trustees must assess the injuries to trust resources. Approaches for making such assessments for marine birds are discussed in Section II. NOAA's trustee responsibilities for injuries related to oil spills or hazardous releases derives from the Oil Pollution Act of 1990 (OPA), the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP)(40 CFR Part 300), and various executive orders. Some of these authorities are discussed in Section III.

In addition to CERCLA and OPA, NOAA also is a natural resource trustee under the National Marine Sanctuaries Act (NMSA). It is through the NMSA that NOAA's role in marine bird damage assessment and restoration is most clearly established. Marine bird species spend a large portion of their life cycle in national marine sanctuaries feeding, roosting and rearing their young. The fact that marine birds may be considered sanctuary resources does not mean that NOAA is the sole trustee for those species. As in most cases, NOAA shares a trust interest with others. In the case of marine birds, co-trustees would include Department of the Interior (DOI), state agencies and possibly tribal interests. This shared trusteeship mandates coordination and cooperation.

Typically, in cases involving NOAA, the co-trustees form a case specific trustee council to ensure that their activities are coordinated. Even without the formation of a trustee council, it is NOAA's policy and practice to work cooperatively with all entities having a trustee interest.

In general, damage assessment and restoration within NOAA are accomplished through the NOAA Damage Assessment and Restoration Program (DARP). However, in the area of marine bird assessment and restoration, NOAA has had limited experience. Thus, it relies on the expertise of the U.S. Fish and Wildlife Service (USFWS), the U.S. Geological Survey (USGS) and state agencies. To improve its ability to fulfill its co-trustee responsibility for marine birds and to become a more effective team member, NOAA is taking steps to increase the level of marine bird expertise within the DARP.

C. Purpose

The purpose of this document is to provide NOAA employees with the background and contacts to obtain information on marine birds in a useful and efficient manner. It also synthesizes information regarding present activities by NOAA and other agencies in the area of marine bird damage assessments and restoration plans. In addition, this document provides direction to NOAA personnel on specific issues frequently raised in relation to marine bird restoration and on seeking assistance with casework. The direction presented in this document is not intended to supercede existing federal regulations on natural resource damage assessment. Rather, the information is presented to assist NOAA personnel who are involved in the development and review of natural resource damage assessment and restoration involving marine birds.

NOAA does not expect to duplicate the expertise of other agencies but aims to give its own employees adequate background to work effectively with DOI and other trustee agencies on marine bird issues. As the importance of incorporating an ecosystem-wide approach becomes more widely recognized, NOAA understands that moving toward more efficient and accurate damage assessments and effective restoration techniques will require, among other things, greater cooperation between agencies and more consistency between regions. With its increased expertise, NOAA plans to improve communication with other agencies, including consultation with USFWS. This will enhance NOAA's capability to technically evaluate damage assessment reports and restoration plans. In addition, NOAA will be better able to participate more effectively in trustee decisions related to seabirds.

This document is subject to comprehensive annual review and revision that will be initiated and coordinated by the NOAA/NMFS Office of Habitat Conservation. Request for specific changes or revisions requiring immediate attention should be brought to the attention of Jennifer Boyce, NOAA Restoration Center, Office of Habitat Conservation in Long Beach, CA (Jennifer.Boyce@NOAA.GOV) or Russell Bellmer, NOAA Restoration Center Office of Habitat Conservation in Silver Spring, MD (Russell.Bellmer@NOAA.GOV).

D. Scope of this document for NRDA of Marine Birds

In order to provide NOAA employees with the necessary background to work effectively with co-trustees, the scope of the document will include events occurring in all coastal regions of the United States, including Alaska and Hawaii as well as Puerto Rico, Guam, American Samoa. For purposes of this document, the term "marine bird" refers to seabirds, sea ducks, and shorebirds. These general categories encompass birds in nine Orders based on the American Ornithological Union Taxonomic system. The following Orders are represented: Gaviiformes (loons), Podicipediformes (grebes), Procellariiformes (albatross, fulmars, petrels, and shearwaters), Pelecaniformes (tropicbirds, boobies, gannets, pelicans, cormorants, anhingas, frigatebirds), Ciconiiformes (bitterns, egrets, herons) Phoenicopteriformes (flamingos), Anseriformes (sea ducks), Gruiformes (rails, crakes, coots and moorhens), and Charadriiformes (plovers, oystercatchers, sandpipers, gulls, terns, murres, murrelets, auklets, puffins). This document addresses all injuries of concern to natural resource trustees.

This document addresses both injury and damage assessment and restoration phases of the DARP process. As a federal co-trustee for marine resources, NOAA has the responsibility of working with other trustees to ensure that the natural resource damage assessment and restoration process for marine birds meets the program goals of restoring the resources that were injured by the release of oil or hazardous substances and obtaining compensation for the interim losses. In addition to ecological losses, this includes public use losses such as coastal recreation and bird watching; or in the case of ducks, geese, swans, and some other aquatic birds, hunting.

II. BACKGROUND INFORMATION

A. Status of Marine Bird Injury Assessment

Background: OPA and CERCLA broadly define natural resources to include such things as land, fish, wildlife, biota, air, water, 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 (including the resources of the Exclusive Economic Zone), any state or local government or Indian tribe or any foreign government. When addressing injuries to such natural resources, trustees consider both the resource itself as well as the services provided by that resource. NOAA's OPA defines services as "functions performed by a natural resource for the benefit of another natural resource and/or the public" (15 CFR 990.30). A NOAA document defines "human services" as "the human uses of natural resources, or functions of resources, that provide value to the public, and include fishing, hunting, nature photography, and education, or existence, bequest and option passive use services" (NOAA 1997b). The document defines "ecological services as "the physical, chemical, or biological functions that one natural resource provides for another, such as provisioning of food, protection from predation, and nesting habitat (NOAA 1997b)."

The goal of the injury assessment phase is to determine whether a pollution release caused any injuries and, if so, to quantify those injuries and losses to the services that they provide. Food webs, life histories, and demography of marine birds are extremely complex which makes quantifying injury and measuring restoration success very difficult. Restoration for some species of marine birds has additional challenges due to their remote habitat requirements. Injury assessment for marine birds is still not an exact science, although much has been learned from restoration following the Exxon Valdez oil spill and other subsequent oil spills nationwide (Ford et al., 1987, 1996, Page et al., 1990).

Oil spill-related injuries to marine birds, which can be quantified as lost natural resources and lost human or ecological services, generally fall into six categories (e.g., Bourne 1970, Butler et. al., 1988, Burger 1994, Irons 1996, Sharp et. al., 1996, Anders 1999):

- ?? Mortality due to direct oiling of adults and young, including direct ingestion of oil and oiling of plumage
- ?? Reduced reproductive success due to transfer of oil from adults to young and eggs
- ?? Mortality or reduced reproductive success due to indirect poisoning from feeding on contaminated fish and/or feeding contaminated fish to young (poisoning can result in lethal or sub-lethal injury to embryos and young, injury to female reproductive systems, etc.)
- ?? Mortality or reduced reproductive success due to decreased food supply
- ?? Mortality or reduced reproductive success due to lost habitat; and
- ?? Lost future generations due to the lag time between loss and restoration of breeding individuals.

Injury to birds from hazardous material releases generally takes the form of a poisoned food source, decrease in food supply, or habitat degradation. Toxic materials may remain in the environment for long periods of time and are often transferred up the food chain through the

process of bioaccumulation. In some cases, there is the potential for interaction between toxic chemicals. These interactions can affect toxic responses in several ways. Sometimes, the effects of two chemicals are simply additive, however in some cases, synergisms or antagonisms occur. A synergism refers to the situation where the combined effect of two chemicals is greater than the additive effect of the individual chemicals. An antagonism occurs when one chemical decreases the toxic effect of the other. Seabirds are high trophic level feeders and therefore are highly susceptible to injury from hazardous material releases. Toxicants can cause a variety of injuries ranging from death to reduced reproductive output (Fry 1981, Risenbrough 1986, and Nisbet 1994). Some toxic materials do not persist in the environment but can still cause immediate damage to seabirds.

In oil spills and hazardous material releases, the specific injury to marine bird populations depends upon a multitude of life history factors, as well as current population status. The type and probability of injury are highly variable and depend upon the specific behavioral and life history characteristics of the species. For example, certain species of auks undergo a flightless period during molt, which may make them more vulnerable to direct oiling than terns and gulls that undergo a more continuous molt and maintain flight abilities. Feeding habits and habitat also may affect the nature and risk of oiling for different species. Alcids, for example, have been cited to be highly vulnerable to oiling, due in part to their pursuit-diving feeding technique, and habit of forming groups and "roosting" on the water (King and Sanger 1979, Seip et al., 1991, Wiese and Ryan 1999).

Approaches: Over the past decade, much effort has been made to increase the cost- effectiveness and precision of estimates of impacts to marine bird populations in natural resource damage assessments. For example, following the Exxon Valdez oil spill, the National Contingency Plan was updated, modeling techniques were refined and a myriad of studies was initiated to improve assessments and the accuracy of measurement methods (Ehler 1990, Ford et. al., 1996, USFWS 1997, Wright and Duffy 1999). In addition, efforts to monitor marine bird populations have increased and contributed to improved knowledge of baseline population size, and status and breeding success.

At present, there are two major procedural approaches to quantifying injury to marine birds. One type of assessment involves collecting field data regarding recovered carcasses and developing an appropriate multiplier. This multiplier is generally based on Oil Vulnerability Indices, search effort and the nature of the spill. Oil Vulnerability Indexes are management tools which are developed using behavioral and demographic characteristics of birds as well as oiling histories, to determine a simple categorical ranking system for the susceptibility of a particular species to mortality resulting from oiling (King and Sanger 1979, Seip et al., 1991, Williams et al., 1994). Another assessment technique employs simplified models that require minimal fieldwork. It is typically only used for small spills where scientific documentation is either not cost effective or when case-specific data was not collected (NOAA 1997a).

More specifically, marine bird injuries are generally addressed by use of the Natural Resource Damage Assessment Model for Coastal and Marine Environments (NRDAM/CME) (French and French 1989, and French et al., 1996a,b) and other related models, or by the use of models based on body counts and estimated carcass recovery rates. NRDAM/CME models estimate the

number of birds oiled at sea using the trajectory of the oil slick and estimates of bird abundance and distribution at sea. Methods using body counts and estimates of sampling efficiency range from those using Oil Vulnerability Indices, to those using carcass trajectory modeling (i.e., the incorporation of sinking rates, scavenging rates, carcass recovery rates, etc., into models) (King and Sanger 1979, Seip 1991, Williams, et. al., 1994, Rosenberger and Burlington 1990, Ford et. al., 1996). Estimates of total mortality from such models can be verified through comparison with counts of oiled birds on shorelines. In California, a "swept-through" modeling technique is being used to establish injury. This technique consists of a combination of model-based procedures and aerial, water and/or land-based surveys conducted in the field.

In some cases, additional population modeling is done to evaluate intergenerational losses. Various population modeling techniques are being used throughout the country. However, due to limited funds and manpower, this more sophisticated approach is by no means universal. While in many cases this information may be invaluable, it should be noted that trustee agencies are not required to establish a population level injury or to conduct additional population modeling to evaluate intergenerational losses to establish injury. The types and levels of modeling depend on the species injured, numbers affected and the amount of baseline information available for the injured species.

Due to the limited baseline data available for some marine bird populations, it is often difficult to accurately evaluate injury to marine birds and scale restoration projects. In general, the approach to restoration depends on a number of factors including: the nature of the injury, the diversity of species injured, the baseline information available on the species/populations injured, or the existence of a monitoring program to measure the success of restoration efforts.

B. Status of Marine Bird Restoration

Under NOAA OPA regulations, restoration is defined as any action (or alternative), or combination of alternatives to restore, rehabilitate, replace, or acquire the equivalent of injured natural resources and services (NOAA 1997b). Restoration actions are described in two categories:

> **Primary Restoration**, which is any "action, including natural recovery, that returns injured natural resources and services to baseline"; and
> **Compensatory Restoration**, which is "the compensation for interim losses of natural resources that occur from the date of the incident to recovery." (OPA regulations at §990.30)

Restoration of seabird resources requires a very broad definition. Direct restoration of a specific colony may be selected as the most appropriate way to approach seabird injuries at one site, while other, more indirect techniques, such as broad improvement of feeding or breeding habitat for a variety of species, may be more effective in other situations (Warheit et al., 1997).

Therefore, each situation must be approached on a case-by-case basis. Depending on the kind of disturbance faced by seabird populations and the biology of the birds, restoration alternatives may need to take into consideration restoration of individual colonies, the restoration of

geographic range or rehabilitation of metapopulations. In situations where a population has been extirpated, habitat protection or enhancement may not be adequate to restore seabird communities. This may be attributed to seabirds' strong tendency for philopatry (tendency to return to the same breeding site each year) and colonial nesting strategies (breeding in dense concentrations). As most seabirds share either one or both of these characteristics, often they do not readily colonize new habitat or return to former nesting sites following extirpation. The re-establishment of highly colonial species may require the development of innovative translocation or social facilitation methods. This technique has been used to restore colonies of terns, puffins, albatrosses, shearwaters and murres (Kress 1983, Parker et al., 1997, 1998, 1999, Podolsky 1990, and Bell 1994). Social attraction techniques such as decoys and sound broadcasting equipment transmitting recorded colony sounds create the appearance of an active colony; thereby increasing the likelihood of restoring a colony in these situations.

Restoration of injured marine bird populations is a fairly new field and, except in a few cases (Kress 1978, 1983, 1988, Parker 1997, 1998, 1999, Harlow 1995, Podolsky 1990, Bell 1994, Veitch et al., 1990, Talyor et al., 2000) published data on the success of the techniques are limited. In general, approaches for marine bird restoration can be summarized under eight general types of actions:

1. Direct restoration (involves the direct manipulation of factors impeding the population's recovery):

?? Restoration of breeding habitat (e.g., removal of introduced predators, or vegetation or breeding space competitors such as gulls)
?? Social facilitation (use of decoys and sound mimicry to attract birds back to abandoned colonies)
?? Restoration or improvements to feeding grounds
?? Captive breeding projects to increase population sizes

2. Indirect restoration (these restoration options are one step removed from direct manipulation of the population or its breeding habitat. These options involve more broad-based techniques that may not result in the immediate recovery of the injured population but over time will result in their recovery to pre-spill levels):

?? Protection and monitoring of marine bird colonies
?? Habitat acquisition for conservation
?? Public awareness training for conservation of bird populations and nesting habitat
?? Projects addressing other factors affecting mortality such as fishing by-catch mortality; light and noise during mating and nesting; disturbances caused by recreational activities; etc.

It is critical to consider a species home range when developing restoration alternatives. As marine birds can travel extensive distances between their breeding habitat and wintering areas, restoration alternatives occurring within the immediate spill area may not be the most effective approach to returning the injured resource to baseline. For example, suppose a population of seabirds wintering in the area of an oil spill were heavily injured. The limiting factor in the population's stability is predation from introduced predators at their breeding colonies 300 miles

from the spill area. The most effective restoration alternative may be to remove the introduced predators in order to increase the species productivity.

3. **Restoration planning** can be broken down into five steps:

a. development of restoration alternatives (15 CFR Part 990.53(a)-(c));
b. scaling of restoration alternatives (15 CFR Part 990.53(d));
c. selection of restoration alternatives to implement (15 CFR Part 990.54);
d. development of restoration plan (15 CFR Part 990.55);
e. implementation of selected alternative (15 CFR Part 990.60-66);

These steps can be conducted in coordination with the potentially responsible party (PRP). Under OPA, the development of a restoration planning document is required and public comment on restoration alternatives must be solicited. The NEPA process is also followed to ensure public participation in the process.

According to the OPA Rule (15 CFR Part 990.54(a)(1)-(6)), the identification of restoration alternatives should be based on several criteria including:

?? Extent to which the 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
?? The alternatives likelihood of success
?? Extent to which the alternative will prevent future injury as a result of the incident, and avoid collateral injury as a result of implementing the alternative
?? Extent to which the alternative benefits more than one natural resource and/or service, and the effect of the alternative on public health and safety; and
?? Cost to implement the alternative (this includes: implementation, operation and maintenance, oversight, and monitoring)

III. CHECKLIST OF CRITICAL FACTORS TO CONSIDER IN MARINE BIRD DAMAGE ASSESSMENT AND RESTORATION

The following checklist is intended to highlight major points to consider when conducting damage assessment and restoration activities for marine birds. It is not to be considered a complete guide to conducting a damage assessment. For more information on any one of these points, please consult the references in Appendix A in this document.

A. Species and Population Background

___Life history characteristics
- ___Demographics (age at first breeding, recruitment, longevity)
- ___Age structure of the population (if known)
- ___Feeding requirements (primary prey base)
- ___Potential effects from contaminants to various life stages (lethal and sub-lethal, e.g. reproductive, immune system, other physiological effects)
- ___Origin of injured population (does it breed elsewhere or is it local?)

___Status of species locally, regionally, nationally and worldwide
___Research and/or restoration conducted on the species to date
___Identify individuals with local or general knowledge of injured bird species
___Historical cases
- ___Have other cases dealt with similar species or habitats
- ___If so, what was the outcome?

B. Damage Assessment

___Characteristics of the released oil or hazardous substance
___Nature and types of the injury: Does the injury assessment take long-term and indirect effects into consideration along with acute mortality?
___Estimated number of birds killed or injured (e.g. number of oiled carcasses, cleaned and released birds)
___Information on oiled birds not collected (e.g. scavenged, lost at sea, missed in search effort, flew outside response area)
____Number of birds cleaned and released, life expectancy and reproductive losses
____Age structure of the injured birds (if known)
___Lost generations must be taken into consideration: The loss of individual birds usually means loss of future generations in the lag time between injury and completion of restoration.
___ Estimated injury to prey-base: it may be necessary to conduct restoration of the prey-base (if possible) to adequately restore the injured species.
___ Injury to feeding or breeding habitats (short and long term): It may be necessary to restore damaged habitat to achieve restoration
___ History of effects on this particular marine bird population to the extent known (e.g. chronic pollution and small and large scale effects)
___ Long-term population impact

C. Restoration Planning Strategies

___ Alternative approaches to direct restoration: Has a reasonable range of alternative approaches been explored (i.e., addressing other sources of injuries such as losses from by-catch mortality, human disturbances, and/or predation)?

___ The value of integrated projects: if the project is integrated with restorations for other species, is there a clear and definable benefit to the injured birds?

___ Impacts of restoration actions on other living marine resources: how will the project integrate with other ongoing management actions occurring in the area?

___ Design of monitoring plans:

Are there any studies, management, or restoration projects currently in progress?

Are monitoring plans designed in such a way that the information can be used to improve future management decisions regarding restoration?

Are monitoring plans designed in such a way that one can determine the success of the restoration project?

___ Value of research:

If research work is planned, can it be demonstrated to be essential to accomplishing restoration for this event?

Is research designed in such a way that the data collected is compatible with existing data but not duplicative?

IV. RECOMMENDATIONS

The purpose of this section is to provide recommendations to NOAA personnel on issues frequently raised in relation to marine bird restoration and to provide guidelines for selecting consultants to assist with casework. The order of the recommendations does not indicate level of importance. Recommendations presented in this document are intended only as direction to provide information for NOAA personnel who are involved in the development and review of damage assessment and restoration plans involving marine birds. These recommendations are not intended to, nor do they, supercede existing federal regulations.

A. Restoration in Contaminated Areas

NOAA recognizes that restoring birds to contaminated areas may result in detrimental effects to the birds and counteract restoration actions. Therefore, we recommend the following actions be performed before choosing to restore marine birds to contaminated areas where impacts could potentially affect restoration of the species:

- ?? alternative sites should be investigated and a clear explanation is given as to why these sites are unsuitable;
- ?? potential injuries to the birds due to the contamination should be evaluated and incorporated into the restoration plan and recovery time (these injuries are considered when the value of the restoration plan is weighted against other restoration alternatives); and
- ?? careful monitoring of restored populations should be built into the restoration plan and rigorously collected data used to further the goals of restoration science.

B. Rehabilitation of Marine Birds

Many studies have shown that the survival rates of rehabilitated birds (birds that have been exposed to oil or other types of injury and subsequently cleaned and released) are considerably lower than non-oiled birds (Anderson et al., 1996, Sharp 1996). In addition, rehabilitated birds may exhibit lower reproductive success than control birds (see Section VII of this document for a listing of citations). In light of this and historical cases, NOAA prefers that rehabilitation be funded through response costs rather than restoration funds. Restoration funds should be directed at those activities that have the greatest probability of restoring the injured resource.

C. Selecting a Contractor

When selecting a contractor to assist in natural resource damagement assessment and restoration activities for marine birds, NOAA's recommends looking for individuals with experience in the following areas:

- ?? marine bird behavior, biology and ecology
- ?? marine bird life history
- ?? marine bird population status and monitoring methodologies
- ?? demography as it applies to marine birds

- ecological modeling as it applies to marine birds
- habitat restoration as it applies to marine birds
- a broad range of bird species
- general ecology
- statistical applications
- NOAA and other federal and state trust resources
- ecosystem and food web interactions
- Knowledge of CERCLA and OPA regulations
- working on interdisciplinary teams

Experience with NRDA activities that are not related to marine birds does not necessarily constitute qualification in the specific area of marine bird NRDA. All of the individuals listed in Appendix B have a wide range of experience spanning at least some of the critical areas. Therefore, the list constitutes a good starting point for selection.

D. Living Marine Resources

NOAA emphasizes the need for an ecosystem perspective when developing the restoration phase. NOAA stresses that restoration projects should be designed to benefit a multitude of living marine resources if possible. NOAA encourages restoration planners to consider the impacts of restoration actions to both marine birds and other marine resources and to avoid situations where restoration actions are working at cross-purposes with on-going management actions.

E. Using Existing Data and Current Expertise

During response, damage assessments and restoration planning NOAA personnel should take advantage of the information and expertise already available in the area of marine birds. The following list contains recommendations on available information and expertise for consideration during natural resource damage assessments and response activities:

- Utilize existing seabird population databases such as the Pacific Seabird Group Seabird database and North American Waterbird Conservation Plan as a source of baseline information. The North American Colonial Waterbird Conservation Plan (NACWCP) is a cohesive, multi-national partnership for conserving and managing colonial-nesting waterbirds (seabirds, wading birds, terns and gulls) and their habitats throughout North America. The plan divides the continent into distinct ecological regions, identifies and prioritizes regional conservation goals and essential habitats, delineates critical research needs and provides pubic outreach materials and training programs. The prioritized regional goals listed in the plan may be helpful in identifying the most valuable restoration alternatives and as a source of baseline information. The anticipated release date is 2001. More information and a copy of the plan are available at http://www.nacwcp.org/.
- Collect as much information on injuries to marine birds during emergency response as possible (e.g. observations of numbers of oiled shorebirds).

?? Utilize trustee agency staff with marine bird experience to answer questions regarding time-critical data collection, injury assessment activities, restoration planning and cooperative assessments with responsible parties (see Appendix B).

?? Build upon or take advantage of existing marine bird injury assessments and restoration planning (see Appendix D).

?? Consider recent advances in the field of preventative measures to minimize impacts. For example, recently the use of bird deterrents has been suggested as a method to deter birds from oil slicks and prevent oiling. While such techniques are still being tested, they offer potential as a cost effective and ecologically safe way of reducing injury to marine birds (see Appendix A, I-Preventative Measures for a listing of references on this topic).

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VI. STATUTORY BACKGROUND

Congress and the President have enacted a series of environmental laws to address the degradation of the Nation's natural resources. The following are summaries of the statutes which are either directly or indirectly addressed in this document and which provide the legislative authority for NRDA activities. Not all of these authorities relate directly to marine birds, but they have been included because of their potential applicability to the general NRDA. The legal authorities are presented in three categories: (A) authorities that establish Federal natural resource trusteeship; (B) authorities that establish agency trusteeship; and (C) agency compliance with NEPA and Environmental Justice.

A. Authorities Establishing Federal Natural Resource Trusteeship

Oil Pollution Act of 1990 (OPA), 33 U.S.C. 2701, et seq.; 15 C.F.R. 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 compensation for those injuries and implement restoration. Section 1006(e)(1) of OPA [33 U.S.C. 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 discharge or substantial threat of a discharge of oil. The Act defines "natural resources" to include land, fish, wildlife, water sources 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, or any foreign government. Assessments are intended to provide the basis for restoring, replacing, rehabilitating, and acquiring the equivalent of injured natural resources and services. The process emphasizes both public involvement and participation by the Responsible Party(ies).

Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA or Superfund) 42 U.S.C. 9601 et seq.

CERCLA provides the basic legal framework for cleanup and restoration of the nation’s hazardous substances sites. Under CERCLA, responsible parties are liable for damages, including reasonable assessment costs, for injuries to, or the loss of, natural resources. The term "natural resources" is broadly defined by CERCLA to mean "land, fish, wildlife, biota, air, water, 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, any foreign government, or any Indian tribe . . . ." The statute provides that parties responsible for contamination of sites and the current owners or operators of contaminated sites are liable for the cost of clean up and restoration. Compensation is used to restore, replace, or acquire the equivalent of natural resources and services through restoration. CERCLA establishes a hazard ranking system for assessing the nation’s contaminated sites with the most contaminated sites being placed on the National Priorities List (NPL).

National Marine Sanctuaries Act (NMSA), 16 U.S.C. 1431, et seq.

The National Marine Sanctuaries Act mandates that parties who destroy, cause the loss of, or injure sanctuary resources are responsible for their restoration. The statute requires the Secretary of Commerce to designate national marine sanctuaries in accordance with specific guidelines and to develop and review management plans for these sites. It provides for the continuation of existing leases, licenses and other established rights in sanctuary areas, and for the development of research and education programs. The statute also prohibits destruction, injury or loss of sanctuary resources, and establishes liability for response costs and natural resource damages for injury to these resources. The Act defines "response costs" as "the costs of actions taken or authorized by the Secretary to minimize destruction or loss of, or injury to, sanctuary resources, or to minimize the imminent risks of such destruction, loss, or injury." The Act further defines "sanctuary resource" as "any living or nonliving resource...that contributes to the conservation, recreational, ecological, historical, research, educational, or aesthetic value of the sanctuary." Under this Act, NOAA's responsibility for natural resources includes the responsibility for marine birds.

Clean Water Act (CWA)(Federal Water Pollution Control Act), 33 U.S.C. 1251, et seq.

The CWA is the principal law governing water quality of the nation's waterways. Section 404 of the law authorizes a permit program for the disposal of dredged material into navigable waters. The U.S. Army Corps of Engineers (Corps) administers the program. In general, restoration projects which move material in or out of waters or wetlands require section 404 permits. Section 401 of the CWA provides that restoration projects that involve discharge or fill to wetlands or navigable waters must obtain certification of compliance with state water quality standards. Generally, restoration projects with minor wetlands impacts do not require 401 certification, while projects with potentially large or cumulative impacts must undergo a certification review. Often the preferred NRDA restoration projects selected by trustee councils will require such permits.

Park System Resource Protection Act (PSRPA) 16 U.S.C. 19jj

Public Law 101-337, the Park System Resource Protections Act (16 U.S.C. 19jj), requires the Secretary of the Interior to assess and monitor injuries to National Park Service (NPS) resources. A "park system resource" is defined by the PSRPA as "any living or nonliving resource that is located within or is a living part of a marine regimen or a Great Lakes aquatic regimen...within the boundaries of a unit of the NPS...." The Act specifically allows the Secretary of the Interior to recover response costs and damages from the Responsible Party causing the destruction, loss of, or injury to park system resources. "Response costs" are defined by the Act to include the costs of actions taken by the Secretary of Interior to prevent, abate or minimize the destruction, loss or injury or imminent risk of such destruction, loss or injury. The Act further provides that "response costs" include monitoring ongoing effects of incidents causing such destruction, loss, or injury.

B. Authorities Establishing Agency Trusteeship

Migratory Bird Treaty Act of 1918, 16 U.S.C. 703, et seq.

The Migratory Bird Treaty Act implements four international treaties involving protection of migratory birds, including all marine birds, and is one of the earliest statutes (amended several times) to provide for avian protection by the Federal Government. Among its other provisions, it broadly prohibits actions to "pursue, hunt, take, capture, kill, attempt to take, kill, possess, offer for sale, sell, offer to purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird...or any part, nest, or egg of such bird." Exceptions to these prohibitions are only allowed under regulations or permits issued by USFWS. Hunting of game birds, including waterfowl and certain shore birds, is annually regulated through a process in which the USFWS sets "framework regulations" based on the best current population data available, and States pass regulations that conform to those Federal regulations. All other prohibited actions, including those by Federal employees, are only allowed under specific permits issued by the USFWS. Criminal violations of this Act are enforced by USFWS, and it is also the primary statute under which USFWS and Interior have responsibility to manage all migratory birds wherever they occur, including marine birds. This statute also is the basis for USFWS oversight and permitting of collection and preservation or rehabilitation of birds oiled during spill response, which usually provides the primary data for determining extent of injury to marine birds and the need for restoration. More information on this law can be found at http://migratorybirds.fws.gov/intrnltr/treatlaw.html.

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

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 Services (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. Section 10 of the Act allows parties to 'take' listed species, provided that the take is 'incidental' to otherwise lawful activity and is accompanied by a 'conservation plan' approved by the Department of Interior. If a NRDA restoration project will have an affect on a threatened or endangered species, the trustees must obtain a permit under Section 10 from the USFWS.

Marine Mammal Protection Act (MMPA), 16 U.S.C. 3371-3378, et seq.

Under the MMPA, the Secretary of Commerce is responsible for the conservation and management of pinnipeds (other than walruses) and cetaceans. The Secretary of the Interior is responsible for walruses, sea and marine otters, polar bears, manatees, and dugongs. The Secretary of Commerce delegated MMPA authority to NMFS. Title II of the Act established an independent Marine Mammal Commission and its Committee of Scientific Advisors to oversee and recommend actions necessary to meet the intents and provisions of the Act. The Act provides that the Secretary shall allow the incidental, but not intentional, taking, by U.S. citizens engaged in activities other than commercial fishing of small numbers of depleted as well as

non-depleted marine mammals if, after notice and opportunity for public comment, the Secretary finds that the total of such taking will have a negligible impact on the affected species or stock, and prescribes regulations setting forth permissible methods of taking, and requirements for monitoring and reporting such taking." However, the 1994 Amendments provide that this regulation requirement may be waived provided that the proposed activity results in only harassment, and no serious injury or mortality is anticipated. NMFS regulations concerning MMPA permits and procedures are published at 50 C.F.R. Parts 216 and 228-229, with additional joint NMFS-USFWS regulations appearing at 50 C.F.R. Part 403.

The Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. 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 essential fish habitat (EFH) in the review of projects conducted under federal permits, licenses, or other authorities that affect of have the potential to affect such habitat. After EFH has been described and identifies 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.

Trustees must ensure that preferred restoration projects will have no adverse effects on EFH and will promote the protection of fish resources and EFH. Prior to implementation of any restoration projects that may potentially create a potential adverse impact to EFH, the trustees must consult with NMFS.

Fish and Wildlife Coordination Act (FWCA), 16 U.S.C. 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 of 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.

Anadromous Fish Conservation Act (AFCA) 16 U.S.C. 757a, et seq.

The AFCA authorizes the Secretary of Commerce, along with the Secretary of Interior, or both, to enter into cooperative agreements to protect anadromous and Great Lakes fishery resources. To conserve, develop, and enhance anadromous fisheries the Secretary may enter into agreements with States and other non-Federal interests. An agreement must specify: (1) the actions to be taken; (2) the benefits expected; (3) the estimated costs; (4) the cost distribution between the involved parties; (5) the term of the agreement; (6) the terms and conditions for disposal of property acquired by the Secretary; and (7) any other pertinent terms and conditions. The Act authorizes federal grants to the states or other non-Federal entities to improve spawning areas, install fishways, construct fish protection devices and hatcheries, conduct research to improve management, and otherwise increase anadromous fish resources. Following the

collection of these data, the Secretary makes recommendations pertaining to the elimination or reduction of polluting substances detrimental to fish and wildlife in interstate or navigable waterways.

The trustees may be able to take advantage of the provisions and funding of AFCA in order to leverage anadromous fish restoration plans and projects. Joint NMFS-USFWS regulations applicable to this program are published in 50 C.F.R. Part 401.

Coastal Zone Management Act (CZMA), 16 U.S.C. 1451, et seq., 15 C.F.R. Part 923

CZMA establishes a policy 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. Most coastal states have a federally approved coastal management 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.

To comply with the CZMA, trustees must seek the concurrence of states that their preferred projects are consistent to the maximum extent practicable with the enforceable policies of state coastal programs.

Rivers and Harbors Act, 33 U.S.C. 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 Army Corps of Engineers 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 mechanisms.

C. Impact Analysis and Public Review

National Environmental Policy Act (NEPA), 42 U.S.C. 4321-4370d; 40 C.F.R. Parts 1500-1508

The National Environmental Policy Act (NEPA) sets forth a specific process of impact analysis and public review. NEPA is the basic national charter for the protection of the environment. Its purpose is to "encourage productive and enjoyable harmony between man and the environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; and to enrich the understand of the ecological systems and natural resources important to the Nation." The law requires the government to consider the consequences of major federal actions on human and natural aspects of the environment in order

to minimize, where possible, adverse impacts. Equally important, NEPA established a process of environmental review and public notification for federal planning and decisionmaking.

Generally, when it is uncertain whether an action will have a significant effect, federal agencies will begin the NEPA planning process by preparing an Environmental Assessment (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 significance (FONSI) will be issued.

The trustees have integrated OPA and CERCLA restoration planning 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. Restoration Plans and EAs or EISs are intended to accomplish partial NEPA compliance by summarizing the current environmental setting; describing the purpose and need for restoration action; identifying alternative actions; assessing the preferred actions' environmental consequences; and summarizing opportunities for public participation in the decision process. Project-specific NEPA documents will need to be prepared for those proposed restoration projects not already analyzed in an environment assessment or environmental impact statement.

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 must determine that no low-income or ethnic minority communities are affected by any restoration actions.

D. Other Potentially Applicable Laws and Executive Orders

This section lists additional federal laws that potentially affect NRDA and restoration activities. The statutes or their implementing regulations may require permits from federal or state permitting authorities.

Archaeological Resources Protection Act, 16 U.S.C. 470, et seq.
Bald Eagle Protection Act, 16 U.S.C. 668,668 note, 668a-668d
Clean Air Act, 42 U.S.C. 7401, et seq.
Emergency Wetlands Resources Act, 16 USC 3901.
Executive Order 11514- Protection and Enhancement of Environmental Quality
Executive Order 11990- Protection of Wetlands
Executive Order 11991- Relating to the Protection and Enhancement of Environmental Quality
Executive Order 12580- Superfund Implementation
Estuarine Protection Act, 16 USC 1221 et seq.

Federal Water Pollution Control Act, 33 USC 1321 et seq.
Fish and Wildlife Conservation Act ("Nongame Act"), 16 USC 2901-2911
Lacey Act Amendments of 1981, 16 USC 3371-3378
Migratory Bird Conservation Act, 16 USC 715-715r
Migratory Bird Hunting and Conservation ("Duck") Stamp Act. 16 USC 718-718j.
National Historic Preservation Act, 12 USC 470 et seq.
National Park Act of August 19, 1916 (Organic Act), 16 U.S.C. 1, et seq.
National Wildlife Refuge Administration Act, 16 USC 668dd-668ee.

VII. APPENDICES

A. Selected References

This section includes selected literature references related to damage assessment and restoration of marine birds. This is a sampling of the available literature and is not intended to be considered a complete listing. To obtain case-specific reports contact Jennifer Boyce or Russell Bellmer of the NOAA Restoration Center, or refer to this website: http://www.darp.noaa.gov/

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B. Contact List For Information Related To Damage Assessment And Restoration Of Marine Birds

The following contact list includes employees of trustee agencies, contractors, academics and others who can be considered experts in the area of marine birds and/or damage assessment and restoration. NOAA employees should work with their local damage assessment and restoration program staff to identify appropriate local and or regional contacts from other trustee agencies. Additional information is provided for those individuals with specific bird related experience. This list is a sampling of such experts and is not to be considered a complete listing of such individuals. If information is needed on an expert for a specific bird species, the most direct way to obtain this information would be to send mail to the seabird list-server (seabird@uct.ac.za). This list-server is a forum for marine bird experts throughout the world to obtain information and contacts and to discuss related issues. Members of this list are always willing to offer assistance on finding information or relevant contacts.

1. Trustee Agency Personnel

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National Park Service

*Sarah Allen (restoration and restoration planning, foraging ecology, seabirds) Point Reyes National Seashore	NPS Point Reyes, CA 94956	415-663-8522 Sarah_Allen@nps.gov
Rick Dawson Environmental Response Planning, and Assessment Unit	National Park Service Atlanta, GA 30303	404-331-2629 Rick_Dawson@nps.gov

United States Fish and Wildlife Service

Catherine Berg Environmental Contaminants	U.S. Fish and Wildlife Service 1011 East Tudor Road Anchorage, AK 99503-6199	907-786-3598 Catherine_Berg@fws.gov
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Cindy Chaffee Western Washington Office	510 Desmond Drive SE, Suite 102 Lacey, WA 98503	360-753-4324 Cindy_Chaffee@fws.gov
Pete Escherich (restoration planning)	322 Arlington Square 4401 N. Fairfax Drive Arlington, VA 22203	703-358-2148 Pete_Escherich@fws.gov
*Elizabeth Flint (restoration, tropical seabirds) Remote Pacific Islands National Wildlife Refuge	P.O. Box 50167 Honolulu, HI 96850	808-541-1201
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*James Haas (restoration and restoration planning, seabirds and bald eagles)	2800 Cottage Way, Rm W-2605 Sacramento, CA 95825-1846	916-414-6600 James_Haas@fws.gov
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*David Irons (restoration, seabirds)	1011 E. Tudor Rd Anchorage, AK 99503	907-786-3909 David_Irons@fws.gov
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*Roy Lowe (human disturbance, population, monitoring, murres) Oregon Coast NWR Complex	2127 SE OSU Drive Newport, Oregon 97365-5258	542-867-4550 Roy_Lowe@fws.gov
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Dave Roseneau Alaska Maritime NWR	MailStop 634 Homer, Alaska 99603-8021	907-235-6546 Dave_Roseneau@fws.gov
*Arthur Sowls (introduced predators, population monitoring, seabirds) Alaska Maritime N.W.R	2355 Kachemak Bay Drive. Ste. 101 Homer, AK 99603	808-541-3441 Art_Sowls@fws.gov
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Department of Interior
Office of the Solicitor

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State Agencies
State of Washington

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United States Geological Survey

*John Piatt (foraging ecology, seabirds) Alaska Science Center	1011 East Tudor Road Anchorage, AK 99503	John_Piatt@usgs.gov

California Department of Fish and Game/Office of Oil Spill Prevention and Response (CDFG-OSPR)

*Steve Hampton (HEA /REA, seabirds)	CDFG/OSPR Sacramento, CA 94244-2090	916-323-4724 shampton@ospr.dfg.ca.gov
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Kathy Verrue-Slater	P.O Box 944209 Sacramento, CA 94244-2090	916-324-9813 kvslater@ospr.dfg.ca.gov

*Indicates specific seabird expertise

2. Non-Trustee Agency Personnel: The purpose of this list is to provide trustee employees access to marine bird experts and should not be considered an endorsement of a particular contractor or organization. Nor does this list encompass the universe of such expertise. In the event that agency personnel wish to use one or more of the listed individuals or companies, federal or state procurement or contracting requirements must be followed. Current interests are noted parenthetically, however all of these people have considerable experience with damage assessment or marine birds and can most likely offer assistance in a very broad range of areas.

Modelers

Hal Caswell (population models)	Biology Dept. MS-34 Woods Hole Oceanographic Institution Woods Hole MA 02543	508-289-2751 hcaswell@whoi.edu
Glen Ford (damage assessment models)	R.G. Ford Consulting Company 2735 N.E. Weidler Street Portland OR 97232	503-287-5173 503-282-0799 eci@teleport.com
Deborah French (damage assessment models)	Applied Science Associates, Inc. 70 Dean Knauss Drive Narragansett, RI 02882	401-789-6224 dfrench@appsci.com
Gordon Swartzman (variety of modeling techniques)	Applied Physics Laboratories University of Washington 1013 NE 40th Street Seattle, WA 98105-6698	206-543-1300 (or 0061) gordie@alava.apl.washington.edu

Bird/ NRDA and/or Restoration Experts

David G. Ainley (food web studies, variety of species)	H.T. Harvey and Associates P.O Box 1180 Alviso, CA 95002	dainley@harveyecology.com
Daniel Anderson (general marine bird ecology, restoration and restoration planning, human disturbance, brown pelicans and western grebes)	University of California, Davis Department of Wildlife, Fish, and Conservation Biology 1081 Academic Surge Bldg. Davis, CA 95616	dwanderson@ucdavis.edu
Jennifer Arnold (general marine bird, ecology, NRDA, population monitoring, terns, gulls)	Department of Biology University of Massachusetts/Boston 100 Morrissey Blvd. Dorchester, MA 02135	617-287-6635 or 6610 Jennifer.Arnold@umb.edu
John Atwood (general marine bird ecology, population monitoring, terns)	Antioch NE Graduate School 40 Avon Street Keene, NH 03431-3516	603-357-3122 x370 Jatwood@antiochne.edu

Brad Blodget (general marine bird ecology, population monitoring, restoration)	Massachusetts Division of Fisheries and Wildlife Field Headquarters 1 Rabbit Hill Road Westborough, MA 01581-3337	508-792-7270 x152 Brad.Blodget@state.ma.us
Joanna Burger (general marine bird ecology, terns, gulls, skimmers, shorebirds)	Cell Biology and Neuroscience 604 Allison Road Piscataway, NJ 08854	732-445-4318 Burger@biology.rutgers.edu
Harry R. Carter (restoration and restoration planning, population monitoring, human disturbance, murres, auklets, petrels, murrelets)	U.S. Geological Survey/Humboldt State University Western Ecological Research Center 6924 Tremont Road Dixon, CA 95620	707-678-0682 x625 Harry_Carter@usgs.gov
Robert Day (general marine bird ecology, murrelets)	ABR, Inc. P.O. Box 80410 Fairbanks, AK 99708-0410	907-455-6777 907-455-6781 bday@abrinc.com
Hector Galbraith (general marine bird ecology, NRDA)	Galbraith Environmental Sciences 633 Furman Way Boulder, CO80305	720 304 8764 hgalbraith2@home.com
Frank Gress (general marine bird ecology contaminants, restoration and restoration planning, pelicans)	California Institute of Environmental Studies 3804 Whaler Avenue Davis, CA 95616	fgress@pacbell.net
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C. Scientific Societies For Marine Bird Research

The following is a list of scientific societies with a focus on marine bird research. For the North American societies the web page is listed. For up-to-date information on current events related to marine birds and for information on organizations outside of North America visit http://www.nmnh.si.edu/BIRDNET/index.html

1. North American Societies:

American Ornithologists' Union
http://www.aou.org/
Association of Field Ornithologists
http://www.afonet.org/index.html
CIPAMEX, Sección Mexicana del Consejo Internacional para la Preservación de las ves
Not available
Cooper Ornithological Society
http://www.cooper.org/
Pacific Seabird Group
http://www.pacificseabirdgroup.org/
Raptor Research Foundation
http://biology.boisestate.edu/raptor/
Society of Canadian Ornithologists | Société des Ornithologistes du Canada
http://www.nmnh.si.edu/BIRDNET/SocCanOrn/index.html
Society for Caribbean Ornithology
http://www.nmnh.si.edu/BIRDNET/SCO/index.html
The Waterbird Society
http://www.nmnh.si.edu/BIRDNET/CWS/index.html
Wilson Ornithological Society
http://www.ummz.lsa.umich.edu/birds/wos.html

2. Societies outside of North America:

Royal Australasian Ornithologists' Union
African Bird Club
British Ornithological Trust
Oriental Bird Club
Wild Bird Society of the Republic of China (Taiwan)
Wild Bird Society of Japan
Western Hemisphere Shorebird Reserve Network (Red Hemisferica de Reservas de Aves Playeras)
Neotropical Bird Club, based in the United Kingdom
Wild Bird Society of Japan

D. Federally Threatened And Endangered Bird Species

This list will change over time. Information included here was current as of April 2001.
For the most current information, refer to this website: http://endangered.fws.gov.wildlife.html.

Species Name
E - Akepa, Hawaii *(Loxops coccineus coccineus)*
E - Akepa, Maui (*Loxops coccineus ochraceus)*
E - Akialoa, Kauai *(Hemignathus procerus*)
E - Akiapola`au *(Hemignathus munroi)*
E - Albatross, short-tailed *(Phoebastria albatrus)*
E - Blackbird, yellow-shouldered *(Agelaius xanthomus)*
E - Bobwhite, masked *(Colinus virginianus ridgwayi)*
E - Broadbill, Guam (Myiagra freycineti)
E - Cahow *(Pterodroma cahow)*
T - Caracara, Audubon's crested *(Polyborus plancus audubonii)*
E,XN - Condor, California *(Gymnogyps californianus)*
E - Coot, Hawaiian *(Fulica americana alai)*
E - Crane, Mississippi sandhill *(Grus canadensis pulla)*
E,XN - Crane, whooping *(Grus americana)*
E - Creeper, Hawaii *(Oreomystis mana)*
E - Creeper, Molokai *(Paroreomyza flammea)*
E - Creeper, Oahu *(Paroreomyza maculata)*
E - Crow, Hawaiian *(Corvus hawaiiensis)*
E - Crow, Mariana *(Corvus kubaryi)*
E - Crow, white-necked *(Corvus leucognaphalus*)
E - Curlew, Eskimo *(Numenius borealis)*
E - Duck, Hawaiian *(Anas wyvilliana)*
E - Duck, Laysan *(Anas laysanensis*)
T - Eagle, bald *(Haliaeetus leucocephalus)*
T - Eider, spectacled *(Somateria fischeri)*
T - Eider, Steller's *(Polysticta stelleri)*
E - Elepaio, Oahu *(Chasiempis sandwichensis ibidus)*
E - Falcon, northern aplomado *(Falco femoralis septentrionalis)*
E - Finch, Laysan *(Telespyza cantans)*
E - Finch, Nihoa *(Telespyza ultima)*
E - Flycatcher, southwestern willow *(Empidonax traillii extimus)*
T - Gnatcatcher, coastal California *(Polioptila californica californica)*
T - Goose, Aleutian Canada *(Branta canadensis leucopareia)*
E - Goose, Hawaiian *(Branta sandvicensis)*
E - Hawk, Hawaiian *(Buteo solitarius*)
E - Hawk, Puerto Rican broad-winged *(Buteo platypterus brunnescens)*
E - Hawk, Puerto Rican sharp-shinned *(Accipiter striatus venator)*
E - Honeycreeper, crested *(Palmeria dolei)*
T - Jay, Florida scrub *(Aphelocoma coerulescens)*
E - Kingfisher, Guam Micronesian *(Halcyon cinnamomina cinnamomina)*

E - Kite, Everglade snail *(Rostrhamus sociabilis plumbeus)*
E - Mallard, Mariana *(Anas oustaleti)*
E - Megapode, Micronesian *(Megapodius laperouse)*
E - Millerbird, Nihoa *(Acrocephalus familiaris kingi)*
T - Monarch, Tinian *(Monarcha takatsukasae)*
E - Moorhen, Hawaiian common *(Gallinula chloropus sandvicensis)*
E - Moorhen, Mariana common *(Gallinula chloropus guami)*
T - Murrelet, marbled *(Brachyramphus marmoratus marmoratus)*
E - Nightjar, Puerto Rican *(Caprimulgus noctitherus)*
E - Nukupu`u *(Hemignathus lucidus)*
E - `O`o, Kauai *(Moho braccatus)*
E - `O`u *(Psittirostra psittacea)*
T - Owl, Mexican spotted *(Strix occidentalis lucida)*
T - Owl, northern spotted *(Strix occidentalis caurina)*
E - Palila *(Loxioides bailleui*)
E - Parrot, Puerto Rican *(Amazona vittata)*
E - Parrotbill, Maui *(Pseudonestor xanthophrys)*
E - Pelican, brown *(Pelecanus occidentalis)*
E - Petrel, Hawaiian dark-rumped *(Pterodroma phaeopygia sandwichensis)*
E - Pigeon, Puerto Rican plain *(Columba inornata wetmorei)*
E,T - Plover, piping *(Charadrius melodus)*
T - Plover, western snowy *(Charadrius alexandrinus nivosus)*
E - Po`ouli *(Melamprosops phaeosoma)*
E - Prairie-chicken, Attwater's greater *(Tympanuchus cupido attwateri)*
E - Pygmy-owl, cactus ferruginous *(Glaucidium brasilianum cactorum)*
E - Rail, California clapper *(Rallus longirostris obsoletus)*
E,XN - Rail, Guam *(Rallus owstoni)*
E - Rail, light-footed clapper *(Rallus longirostris levipes)*
E - Rail, Yuma clapper *(Rallus longirostris yumanensis)*
T - Shearwater, Newell's Townsend's *(Puffinus auricularis newelli)*
E - Shrike, San Clemente loggerhead *(Lanius ludovicianus mearnsi)*
E - Sparrow, Cape Sable seaside *(Ammodramus maritimus mirabilis)*
E - Sparrow, Florida grasshopper *(Ammodramus savannarum floridanus)*
T - Sparrow, San Clemente sage *(Amphispiza belli clementeae)*
E - Stilt, Hawaiian *(Himantopus mexicanus knudseni)*
E - Stork, wood *(Mycteria americana)*
E - Swiftlet, Mariana gray *(Aerodramus vanikorensis bartschi)*
E - Tern, California least *(Sterna antillarum browni)*
E - Tern, least *(Sterna antillarum)*
E,T - Tern, roseate *(Sterna dougallii dougallii)*
E - Thrush, large Kauai *(Myadestes myadestinus)*
E - Thrush, Molokai *(Myadestes lanaiensis rutha)*
E - Thrush, small Kauai *(Myadestes palmeri)*
T - Towhee, Inyo California *(Pipilo crissalis eremophilus)*
E - Vireo, black-capped *(Vireo atricapillus)*
E - Vireo, least Bell's *(Vireo bellii pusillus)*

E - Warbler, Bachman's *(Vermivora bachmanii)*
E - Warbler, golden-cheeked *(Dendroica chrysoparia)*
E - Warbler, Kirtland's *(Dendroica kirtlandii)*
E - Warbler, nightingale reed *(Acrocephalus luscinia)*
E - White-eye, bridled *(Zosterops conspicillatus conspicillatus)*
E - Woodpecker, ivory-billed *(Campephilus principalis)*
E - Woodpecker, red-cockaded *(Picoides borealis)*

E - Endangered
T - Threatened
XN – Extinct

E. Inventory Of NRDA Cases Involving Seabirds

Name of Case	Location/ Date	Nature of Damage/ Volume of Spill	Species				
			Gulls	Terns	Plovers	Loons	Grebes
WEST COAST							
American Trader	Huntington Beach, CA/ February 7, 1990 41,244 gallons of No. 6 Fuel Oil	oil spill/ tanker	glaucous-winged gull, California gull, western gull, Thayer's gull, ring-billed gull, Bonaparte's gull, mew gull, herring gull, Herman's gull, black-legged kittiwake	caspian tern, Forester's tern, royal tern	semipalmated plover, killdeer, black-bellied plover, snowy plover	common loon, pacific loon, red-throated loon	western grebe, eared grebe, horned grebe, pied-billed grebe
Apex Houston	Point Lobos, CA/ January 28 to February 1, 1986	oil spill/ tanker 25,000 gallons of crude oil	glaucous-winged gull, western gull, California gull, ring-billed gull, mew gull			common loon, Pacific loon, and red-throated loon	
Cape Mohican	San Francisco (Gulf of the Farallones), CA/ October 28, 1996	oil spill/ cargo ship in dry dock 96,000 gal. spilled on dry dock and 40,000 gal. spilled in San Francisco Bay	mew gull, western gull, ring-billed gull, Heermann's gull, Bonaparte's gull, glacous-winged gull, California gull, hybrid gull	Forester's tern, elegant tern, caspian tern	snowy plover, black-bellied plover	common loon, red-throated loon, Pacific loon	western grebe, western/ Clark's grebe, Clark's grebe, eared grebe
Chevron Pipeline Oil Spill	Waiau Stream and Pearl Harbor/ Hawaii May 14, 1996	pipeline oil spill		white tern, black noody,	golden plover, black-bellied plover,		
Command Spill	Gulf of the Farallones Sanctuary, Monterey Bay Sanctuary, San Mateo coast, CA September 27-28, 1999	oil spill/ tanker					
Exxon Valdez	Prince William Sound, AK/ March 24, 1989	oil spill/ tanker over 10,100,000 gallons of crude oil	black-legged kittiwake			common loon	sp.?
Kure/ Humbolt Bay	Humbolt Bay, CA/ November 5, 1997	oil spill/ fishing vessel					
Kuroshima	Dutch Harbor, AK/ November 1997	oil spill/ seafood freighter/ 39,000 gallons	glaucous-winged gull, sp.?			common loon, sp.?	red-necked grebe, horned grebe
Montrose	Los Angeles, CA/ 1947-1982	hazardous material release/ outfall pipe	western gull, yellow-footed gull, glaucous-winged gull				
Nestucca	Gray's Harbor, WA/ December 22, 1988	oil spill/ barge? 231,000 gallons of #6 fuel oil	glaucous-winged gull, herring gull, mew gull, ring-billed gull, gull (sp.?), black-legged kittiwake, kittiwake (sp.?)			common loon, Pacific loon, red-throated loon, sp.?	red grebe, western grebe, sp.?
New Carissa	Coos Bay, Oregon/ February 4, 1999	oil spill/ cargo ship	still in development stages		snowy plover		
Pearl Harbor	Honolulu Bay, HI/ May 14, 1996	oil spill/ pipeline		black noddy, white tern	Pacific golden plover, black-bellied plover		
Platform Irene	Santa Barbara, CA/ September 28-30, 1997	oil spill/ pipeline 12,600 to 21,000 gallons of crude oil	sp.?	least tern	snowy plover		sp.?
Point Reyes Mystery Spill	Point Reyes, CA/ November 16, 1997	oil spill/ orphan spill	sp.?		snowy plover	sp.?	western grebe

Name of Case	Scoters	Alcids	Cormorants	Pelicans	Procellarids	Other Shorebirds
WEST COAST						
American Trader	black scoter, surf scoter	rhinoceros auklet, common murre, Cassin's auklet, Xantus's murrelet	double-crested cormorant, Brandt's cormorant, pelagic cormorant	brown pelican	northern fulmar, black-vented shearwater, sooty shearwater, short-tailed shearwater, black storm-petrel	dunlin, surfbird, ruddy turnstone, black turnstone, dowitcher (2 species), spotted sandpiper, wandering tattler, least sandpiper, western sandpiper, sanderling, marbled godwit, black-necked stilt, whimbrel, willet, greater yellowlegs, lesser yellowlegs, American avocet, red phalarope
Apex Houston	white-winged scooter, surf scooter	common murre, ancient murrelet, marbled murrelet, rhinoceros auklet, auklets sp.?	Brandt's cormorant, sp.?		northern fulmar	sanderling, red phalarope
Cape Mohican			Brandt's cormorant, double-crested cormorant	brown pelican		sanderling, willet, marbled godwit, long-billed curlew, western sandpiper
Chevron Pipeline Oil Spill						Hawaiian stilt, wandering tattler, rudy turnstone,
Command Spill		estimated 3-4,000 common murre mortality		brown pelican		
Exxon Valdez		common murre, thick-billed murre, marbled murrelet, Kittlitz's murrlet, pigeon guillemontt, auklet sp.?	pelagic cormorant, red-faced cormorant, double crested cormorant, sp?		fulmar (sp.?), shearwater (sp?), storm petrel (sp.?), horned puffin	
Kure/ Humbolt Bay		marbled murrelet common murre				
Kuroshima	black scoter	alcid (sp.?), common murre, crested auklet, least auklet, auklet (sp.?), murrelet (sp.?)	sp.?		storm-petrel, fulmar (sp.?)	
Montrose		pigeon guillemont, Cassin's auklet, Xantus's murrelet	pelagic cormorant, double-crested cormorant, Brandt's cormorant	brown pelican	ashy storm-petrel	
Nestucca	black scoter, white-winged scoter, surf scoter, sp.?	common murres, Cassin's auklet, parakeet auklet, rhinoceros auklet, auklet (sp.?), ancient murrelet, marbled murrelet, murrelet (sp.?), guillemont, horned puffin, tufted puffin, puffin (sp.?)	Brandt's cormorant, sp.?		northern fulmar, fulmar (sp.?), petrel (sp.?), storm-petrel (sp.?), shearwater (sp.?), sp.?	dunlin, sandpiper
New Carissa						
Pearl Harbor						bristle-thighed curlew, sanderling, wandering tattler, ruddy turnstone, Hawaiian stilt
Platform Irene			sp.?	brown pelican		
Point Reyes Mystery Spill	surf scoters	common murre		brown pelican		sanderlings

Name of Case	Ducks	Herons and Egrets	Others	Damage Assessment/ Estimate of Total Number of Birds Injured (ET)/ Total Settlement $
WEST COAST				
American Trader	American wigeon, wood duck, mallard, gadwall, pintail, green-winged teal, blue-winged teal, cinnamon teal, European wigeon, shoveler, ruddy duck, canvasback, lesser scaup, bufflehead, oldsquaw, red-breasted merganser		American coot, sora, Virginia rail, pomeraine jaeger, black skimmer, rock dove, passerines (finch (sp.?), red-winged blackbird), peregrine falcon, laysan albatross	Expert report: Impacts to Birds, American Trader Oil Spill by D. Michael Fry- very detailed, but confidential. Expert reviews of "Impacts to Birds"- confidential OVI was used to estimate the number of birds injured and then compare the estimate to the actual observations and recoveries. ET=3400 (Numbers represent mortality based on extrapolation) Total settlement=$3,984,247
Apex Houston	sp.?			Detailed reports and expert critiques (including modeling of bird fate using multipliers estimated from spill trajectories and observation, population models). ET=10,000 (represents estimated mortality from extrapolation) Total settlement=$6,400,000
Cape Mohican	northern pintail, western sandpiper, bufflehead, American wigeon		black oystercatcher, passerines (sp.?)	ET=4000 (based on direct observation. No extrapolation was done) Total settlement=$3,650,000 (restoration)
Chevron Pipeline Oil Spill	Hawaiian duck, mallard, Hawaiian coot, northern pintail, northern shoveler	black-crowned night-heron, cattle egret	brown booby,	NRDA claimed injuries to intertidal habitat, water column habitat, subtidal habitat, freshwater marsh habitat and lost human use. No real estimates of number of birds injured. Claim based on the fact that birds were in the exposed environment and hence come into contact with oil. Settlement reached at $1,00,000 for biological injuries.
Command Spill				Never completed report on wildlife casualties because the RP agreed to settle, Expedited assessment based on D. French trajectory model and Glen Ford-swept through model contacts
Exxon Valdez	harlequin duck	bald eagle, black oyster-catcher		A multitude of long term studies have been done on Exxon Valdez. The list of species given here is by no means complete. Multiple modeling techniques were used to attempt to estimate the number dead. ET=250,000-375,000
Kure/ Humbolt Bay				NRDA in progress ET= information being collected
Kuroshima	red-breasted merganser, oldsquaw, harlequin, Stellar's eider		emperor goose, Aleutian Canada goose	Pre-assessment data used to estimate injury. Searching for birds was done in a remote area. Calculation of damage was rather simple (no unified report) a high multiplier of 10 was used due to the remoteness of the area (e.g. 200 birds found then 2000 are estimated as killed). ET=130+ (This number represents the number of birds found oiled. The extrapolated estimate is 2000)
Montrose			black oystercatcher, bald eagle, peregrine falcon	Expert reports: bird Injury studies-mostly look at egg shell thinning and toxin levels in eggs. Changes in reproductive success are indicated where known. NRDA still in progress.
Nestucca	bufflehead, canvasback, mallard, merganser, oldsquaw, goldeneye, scaup		Canada goose, coot, crow, pheasant, sp.?	Losses were estimated by modeling using spill trajectories, distribution and abundance, observation and recovery of dead and living oiled birds, scavenging and sinking rates. ET=13,473 (This number represents birds recovered oiled. It does not represent bird mortalities based on extrapolation.)
New Carissa				still in draft stages
Pearl Harbor	Hawaiian duck, mallard	black-crowned night-heron, cattle egret	brown booby, barred dove, passerines, Hawaiian coot	Draft Environmental Assessment and Restoration Plan (a couple of pages documenting at risk species, vague evidence of injury and general recovery times). Most information on bird injury seems to be anecdotal accounts. ET= not clear from Draft EA/RP
Platform Irene			burrowing owl	Bird injury report (confidential) ET=200 (based on direct observations no extrapolations were done)
Point Reyes Mystery Spill				NRDA in progress , 2,000 or more birds collected with correction factor of 10 or more, unknown RP, Glen Ford hind casting report in progress.

Name of Case	Restoration/ Available funds for Restoration
WEST COAST	
American Trader	Draft restoration plan to be released to public by June 2000. Projects include creating roosting space for brown pelicans by building a permanent floating roosts and improving jetties, providing increased security for roosting sites through signage and public education, removing predators to marine birds (black rats) on Anacapa Island. Bird restoration=$3,284,567
Apex Houston	Acquisition of marbled murrlet nesting nabitat Recolonization of impacted common murre colonies Restoration=$5,416,000
Cape Mohican	Restoration planning stage. Proposed restoration alternatives are: enhancement and management of Red Rock Island for cormorants, western gulls, black crowned night herons, snowy egret, brown pelican; restoration of native vegetation at Marin Islands NWR; tern habitat enhancement Alaneda Point; enhancement of shorebird foraging areas through removal of exotics.
Chevron Pipeline Oil Spill	Enhancement and maintenance endowment of Pohuala Marsh, mangrove removal, and other projects at Pearl Harbor to improve foraging habitat for waterbrids.
Command Spill	Received 2.5 million for common murres, 0.5 million for marbled murrelets, ? amount for violations of endangered species act from oiled pelican observations. Restoration planning just beginning - potential to collaborate with Apex and Point Reyes Mystery Spill
Exxon Valdez	
Kure/ Humbolt Bay	NA
Kuroshima	Predator (fox) eradication
Montrose	
Nestucca	Education, Destruction Island habitat improvement (rabbit removal), monitoring common murre colonies and aerial surveys, reduction of mortality induced by net fisheries
New Carissa	NA
Pearl Harbor	Feeding habitat through mangrove removal
Platform Irene	NA
Point Reyes Mystery Spill	NA

Name of Case	Location/ Date	Nature of Damage/ Volume of Spill	Species				
			Gulls	Terns	Plovers	Loons	Grebes
Tenyo Maru	Olympic Peninsula, WA/ July 22, 1991	oil spill/ fishing vessel 354,800 gallons of intermediate fuel 97,800 gallons of diesel fuel	mew gull, California gull, western/glaucous winged gull, sp.?	caspian tern, arctic tern		common loon, red-throated loon	western grebe
Tesoro Hawaii Oil Spill	Islands of Oahu and Kauai, Hawaii August 24, 1998	accidental hose failure at Tesoro's single-point mooring/ 117 barrels of bunker oil		sooty tern, white tern, gray-backed tern, brown noody, black noody, blue-gray noody			
Tulalip Landfill	Everett, WA/ 1964-1979/ proposed for NPL 1991 and add 1995	hazardous waste site/ landfill	Bonaparte's gull, ring-billed gull, mew gull	Arctic tern			
Wayfarer	Point Reyes, CA/ June 10, 1995	oil spill/ damage from helicopters incurred during clean-up activities	western gull			3 sp.?	western grebe
EAST COAST							
Anitra	New Jersey, May 13, 1996	oil spill, barge	laughing gull, herring gull, great black-backed gull	common tern, least tern	semipalmated plover, piping plover		
Exxon Bayway	Linden, New Jersey/ January 1-2, 1990	oil spill/ pipeline, 567,000 gallons of #2 fuel oil	herring gull, great black-backed gull				
Julie N	Portland, Maine/ September 27, 1996	oil spill	gull (sp.)				grebe (sp.)
Lake Barre	Terrebone Bay, Louisiana/ May 16, 1997	oil spill/ pipeline 275,562 gallons of crude oil	laughing gull, sp.?	sp.?	semipalmated plover		
LCP Chemical	Brunswick, Georgia/ 1955-1994	hazardous material release		least tern			
Nautilus	Kill van Kull, in NY Harbor; nesting beaches on Long Island's south shore and the NJ shore.	oil spill, 267,000 gallons of #6 fuel oil			piping plover		
New Bedford Harbor	New Bedford, MA/Late 1940's-1977/Designated superfund site in 1983	hazardous material release PCB's, etc.	laughing gull, common black-headed gull, Bonaparte's gull, ring-billed gull, herring gull, Iceland gull, lesser black-backed gull, glaucous gull, great black-backed gull	roseate tern, common tern, Forester's tern, least tern, black tern	black-bellied plover, semipalmated plover, killdeer	red-throated loon, common loon	horned grebe, red-necked grebe
North Cape	Rhode Island/ January 19, 1996	oil tanker, 828,000 gallons of #2 home heating oil	sp.?		piping plover	common loon, red-throated loon	sp.?
Tampa Bay	Tampa Bay, Florida/ August 10, 1993	oil spill/ 2 tankers: 32,000 gallons Jet A fuel, 330,000 gallon #6 fuel	laughing gull	royal tern, common tern, least tern, tern (sp.?)		common loon	

Name of Case	Scoters	Alcids	Cormorants	Pelicans	Procellarids	Other Shorebirds
Tenyo Maru	surf scoter, white-winged scoter	common murre, marbled murrelet, rhinoceros auklet, pigeon guillemont, Cassin's auklet, horned puffin, tufted puffin	double-crested cormorants, Brandt's cormorant, pelagic cormorant, sp.?		northern fulmar, sooty shearwater, short-tailed shearwater, shearwater (sp.?), fork-tailed storm-petrel, leach's storm-petrel, storm-petrel (sp.?)	black turnstone
Tesoro Hawaii Oil Spill						
Tulalip Landfill						
Wayfarer	surf scoter	common murre, pigeon guillemont, rhinoceros auklet	2 sp.?	brown pelican	ashy storm-petrel, sooty shearwater	
EAST COAST						
Anitra						sanderling, semipalmated sandpiper, ruddy turnstone, short-billed dowitcher, willet
Exxon Bayway			double-crested cormorant			
Julie N			double-crested cormorant			shorebird (sp.)
Lake Barre						semipalmated sandpiper, sandpiper (sp.?), willet
LCP Chemical						
Nautilus						
New Bedford Harbor	black scoter, surf scoter, white-winged scoter		great cormorant, double-crested cormorant			American oystercatcher, greater yellowlegs, lesser yellowlegs, willet, spotted sandpiper, ruddy turnstone, sanderling, semipalmated sandpiper, least sandpiper, purple sandpiper, dunlin
North Cape	sp.?		sp.?			
Tampa Bay			double crested cormorant, cormorant (sp.?)	brown pelican		red knot, willet, sanderling, sandpiper (sp.?), shortbilled dowitcher, marbled godwit, black-bellied plover, Wilson's plover, piping plover, plover (sp.?)

Name of Case	Ducks	Herons and Egrets	Others	Damage Assessment/ Estimate of Total Number of Birds Injured (ET)/ Total Settlement $
Tenyo Maru	bufflehead		black-footed albatross, crow, sp.?	Models were not used for mortality extrapolation from carcass counts because scavenging probabilities were not available. Losses were calculated based on bird actual recoveries, abundance and distributions, and spill trajectories ET=4,300 (Number represents those birds actually found dead and oiled. It does not represent mortality estimated by extrapolation). Total settlement=$9,000,000
Tesoro Hawaii Oil Spill			Newell's shearwater wedge-tailed shearwater, tropicbirds, boobies, petrels, frigatebird	Damage claim for intertidal and subtidal habitat, endangered Hawaiian monk seals, seabirds and lost public use. Estimate that 26,000 Newell's shearwaters could have been present within the oil spill area. 105 birds recovered or observed during incident, no total estimate provided.
Tulalip Landfill	wood duck, green-winged teal, redhead	great-blue herons	bald eagle, Canada geese, brandt geese, tundra swan, trumpeter swan, osprey, red-tailed hawk, kingfisher, great-horned owl, barn owl, snowy owl, falcon (sp.?), passerines	Unclear with present information. ET=unclear Settlement=$1,000,000
Wayfarer			black oystercatcher	Initial collection of field data/ NRDA in progress
EAST COAST				
Anitra	mallard, black duck, brant		osprey, American oystercatcher, black skimmer	Type A model, basic modeling to determine injury to piping plover and sanderling. A full population model was not done. Sanderlings and least terns appeared to be dropped as species of concern as time went on. ET=6,500 (represents birds found oiled not extrapolations)
Exxon Bayway	gadwall, mallard	cattle egret, snowy egret, black-crowned night heron	rail (sp.), Canada goose, glossy ibis	Long term monitoring studies were used to evaluate indirect and non-lethal effects. ET=679 (recovered dead/oiled) Total settlement=$15,000,000
Julie N	black duck, mallard, common eider	wading bird (sp.)	rail (sp.)	Basic population model of the black duck (used as umbrella species) ET=40 (number of birds found oiled, expected to be very low estimate)
Lake Barre	mottled duck	snowy egret, great egret, great blue herons, Louisiana heron	king rail, clapper rail, marsh sparrow, sparrow (sp.?), red-winged blackbird	Type A model used by trustees. ET=333 (includes model extrapolation)
LCP Chemical			wood stork, clapper rail	Collection of samples and measurement of toxins, extrapolation from other reports of the effects of certain toxins on bird species. ET=unclear from information provided
Nautilus				Total settlement=$4,000,000
New Bedford Harbor	red-breasted merganser, common merganser, hooded merganser, bufflehead, barrows goldeneye, common goldeneye, oldsquaw, common eider, lesser scaup, greater scaup, ring-necked duck, redhead, canvasback, American Wigeon, Eurasian wigeon, gadwall, northern shoveler, blue-winged teal, northern pintail, mallard, American black duck, green-winged teal, wood duck	great blue heron, great egret, snowy egret, green-backed heron, black-crowned night-heron	mute swan, great white fronted goose, snow goose, brant, Canada goose, turkey vulture, osprey, bald eagle, northern harrier, sharp-shinned hawk, Cooper's hawk, American kestrel, peregrine falcon, clapper rail, Virginia rail, American coot, snowy owl, belted kingfisher	Due to the time span of the injury, damage assessment was a means of determining general injuries, not an exhaustive study of the effects of contaminates. For the roseate tern, several ESA-related documents are used including the recovery plan. ET= unclear Total settlement=$99,600,000
North Cape	black duck, mallard, eider (sp.?), bufflehead, goldeneye, merganser (sp.?), pintail, ruddy duck, scaup (sp?),	heron (sp.?)	gannet(sp.?), swan (sp.?), goose (sp.?), coot (sp.?)	Three expert reports and a summary document on "Injury Quantification and Restoration Scaling"- basic method is calculating damage in bird years using available life history information and scaling the result to restoration ET=2,292 (estimated direct mortality)
Tampa Bay		snowy egret, great egret, egret (sp.?), great blue heron, yellow crowned night heron, green backed heron, little blue heron	black skimmer, rock dove, song bird, parasitic jaeger, American oystercatcher	Damage assessment consisted of a ratio of 2:1. The results of this 2x multiplier were enhanced based on previous studies of the effected birds. ET=732 Total settlement=$8,000,000

Name of Case	Restoration/ Available funds for Restoration
Tenyo Maru	Restoration of common murre colonies; Oiled Wildlife Rehabiliatation Center; public education signs and brochures: Marbled Murrelet Habitat Protection and River Silt Reduction; emergency towing vessel
Tesoro Hawaii Oil Spill	Amount of funds for restoration is not available. Restoration projects include predator control and habitat enhancement for seabirds, remove fishing nets from shoreline to benefit monk seals, funding for beach cleanup activities to compensate for lost public use.
Tulalip Landfill	Estuarine habitat creation/ restoration, habitat enhancement, species specific restoration (nest boxes or perches). Restoration=$1,000,000 potential
Wayfarer	NA
EAST COAST	
Anitra	
Exxon Bayway	Land acquisition, marsh restoration=$11,113,000
Julie N	Marsh restoration, land acquisition
Lake Barre	Marsh enhancement, restoration based settlement
LCP Chemical	NA
Nautilus	Island Beach interpretive center, NJ/NY piping plover project (monitoring, predator control, beach management) Restoration=$3,300,000
New Bedford Harbor	Common and roseate tern restoration, reclamation of nesting habitat, restoration of sites, chemical analysis of PCB levels. Restoration=$23,700,000
North Cape	Plover habitat protection and monitoring, loon habitat protection, sea duck habitat protection, salt pond land acquisition. Restoration based settlement
Tampa Bay	Funding rehabilitation facilities, acquisition of equipment for small spill response including disposal items and monofilament. Restoration=$2,945,556 and RP implemented projects