

Final Restoration Plan for the Piping Plover
to Compensate for Losses From
the B.T. Nautilus Oil Spill
in New Jersey

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Prepared for:

U.S. Department of the Interior and
Trustees of the B.T. Nautilus Settlement

Submitted by:

U.S. Fish and Wildlife Service
Ecological Services, Region 5
New Jersey Field Office

in cooperation with the

New Jersey Department of Environmental Protection
Office of Natural Resource Damages and
Division of Fish, Game and Wildlife
Endangered and Nongame Species Program

February 1995





United States Department of the Interior

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February 10, 1995

Mr. Andrew Raddant
Regional Environmental Officer
Office of Environmental Policy
and Compliance
U.S. Department of the Interior
408 Atlantic Avenue, Room 142
Boston, Massachusetts 02210-3334

Dear Mr. Raddant:

The U.S. Fish and Wildlife Service (Service), in cooperation with the New Jersey Department of Environmental Protection, Office of Natural Resource Damages and the Division of Fish, Game and Wildlife, Endangered and Nongame Species Program (NJDEP), is submitting the enclosed report entitled, "*Final Restoration Plan for the Piping Plover to Compensate for Losses from the B.T. Nautilus Oil Spill in New Jersey*" (Plan) for approval by the Trustees of the B.T. Nautilus settlement (Trustees). Information presented in the Plan describes activities to be implemented in New Jersey to partially compensate for losses to the piping plover (*Charadrius melodus*) population that occurred as a result of the B.T. Nautilus oil spill in June 1990. The piping plover, Atlantic coast population, is federally-listed as threatened pursuant to the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.). Additionally, the piping plover is State-listed as an endangered species pursuant to the New Jersey Endangered Species Conservation Act (N.J.S.A. 23:2A-6).

The Plan was developed by biologists representing the Service, NJDEP, National Park Service, and The Nature Conservancy. A draft restoration plan for the piping plover was presented to the Department of the Interior (Department) on June 20, 1994 for distribution to the Trustees. In the draft plan, funding was requested from the Department's portion of the B.T. Nautilus settlement to conduct restoration activities for the piping plover in New Jersey and New York. Concurrently, a similar piping plover restoration plan was presented to the Trustees by the NJDEP to request funding from the State of New Jersey's portion of the B.T. Nautilus settlement as partial compensation for losses to the piping plover in New Jersey. Based on comments from the Trustees on these two piping plover restoration plans, the Service and the NJDEP decided to combine the piping plover restoration plans. A draft version of the report combining the plans was submitted to the Trustees for discussion on December 12, 1995. As a result of that discussion on December 12 and subsequent discussions, the New York portion of the restoration plan has been deleted because the details of piping plover restoration in New York are still under discussion by biologists in that State.

The Plan now represents the combined restoration plans via the Service and NJDEP for the piping plover in New Jersey. Funding to implement the first three years of the Plan is being requested from the Department's portion of the B.T. Nautilus settlement, and funding to implement the last two years of the Plan is being requested from the State of New Jersey's portion of the B.T. Nautilus settlement. The New York plan will be submitted separately, and the implementation of the Plan for New Jersey is not contingent on any forthcoming restoration plan for New York.

The Service appreciates the opportunity to submit this Plan for piping plover restoration to the Department and to the Trustees. Since the impacts on this federally-listed / State-listed species occurred in 1990, approval of this Plan by February 15, 1995 is requested in order to initiate the restoration activities during the 1995 piping plover nesting season. The Service looks forward to working with your office to ensure that federal trust resources, damaged as a result of oil spills, are restored. If you have any questions regarding this Plan, please contact John Staples or Dana Peters of my staff.

Sincerely,

A handwritten signature in dark ink, appearing to read "Clifford G. Day". The signature is stylized with a large, looped "C" and a long, sweeping "y" at the end.

Clifford G. Day
Supervisor

Enclosure

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I. INTRODUCTION

This restoration plan was developed by biologists representing the New Jersey Department of Environmental Protection, U.S. Fish and Wildlife Service (Service), National Park Service, and The Nature Conservancy. Information presented in the plan includes a description of activities to be implemented during 1995, 1996, 1997, 1998, and 1999 to partially compensate for losses to the Atlantic coast piping plover (*Charadrius melodus*) population in New Jersey that occurred as a result of the B.T. Nautilus oil spill. The Atlantic coast population of the piping plover is listed as threatened pursuant to the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) (U.S. Fish and Wildlife Service, 1985). Primary responsibility for the piping plover, pursuant to the Endangered Species Act, is vested with the Service through the Department of the Interior (DOI). The threatened designation for the piping plover reflects concern that the continued existence of the species is imperiled, and underscores the high priority given by the federal government to protect this federal trust resource. Similarly, the piping plover is listed as an endangered species pursuant to the New Jersey Endangered Species Conservation Act (N.J.S.A. 23:2A-6). Through the cooperative provisions and federal assistance granted to the States by Section 6 of the Endangered Species Act, the State of New Jersey is also accountable for the management and protection of this species.

II. EXTENT OF B.T. NAUTILUS OIL SPILL

On June 7, 1990, the oil tanker B.T. Nautilus, owned by the Nautilus Motor Tanker Company of London, England, grounded in the Kill Van Kull waterway between New Jersey and New York. The grounding resulted in approximately 267,000 gallons of #6 fuel oil being discharged from the B.T. Nautilus into the Kill Van Kull and adjacent waterways.

Heavy oils, such as #6 fuel oil, are highly persistent thick substances that tend to sink. The fuel oil from the B.T. Nautilus, congealed into tarballs that adversely impacted over 200 miles of shoreline along the New Jersey and New York coasts. The B.T. Nautilus oil spill and resultant tarball wash-ups affected natural resources in: the Kill Van Kull; the Arthur Kill; Newark Bay; Raritan Bay; Sandy Hook Bay; Upper and Lower New York Harbor; New Jersey coastal beaches as far south as Cape May; Long Island beaches as far east as the eastern tip of Fire Island; and, the coastal waters of the New York Bight. Tidal inundation (approximately five feet) and ocean currents compounded the environmental impacts of this spill.

III. DAMAGE ASSESSMENT

The States of New Jersey and New York, the cities of New York, New York and Elizabeth, New Jersey, the National Oceanic and Atmospheric Administration (NOAA), and the DOI (the Governments) in anticipation of litigation and for purposes of settlement, jointly conducted a natural resource damage assessment to measure and quantify injuries to natural resources resulting from the subject spill. This assessment was used to recover damages from the responsible party in order to fund restoration activities for the damaged resources.

The damage assessment for B.T. Nautilus relied upon the "Type A" computer model, officially known as the "Natural Resource Damage Assessment Model for Coastal and Marine Environments," developed by the DOI. This model predicts the physical fate of the spilled substance, biological effects, and economic damages caused by the spill. In addition to the computer model assessment, supplemental calculations were completed for damages caused by the cleanup, as well as for recreational beach-use losses, transportation closures, and adverse impacts to wetlands and endangered species.

Overall, the resources damaged by the oil released from the B.T. Nautilus included birds, fish, intertidal biota, wetlands, State parks, federal recreational areas, surface waters, and public beaches. Damages from the spill outside of the New York / New Jersey Harbor Estuary area primarily included lost recreational use of beaches and injuries to piping plovers, which were nesting on beaches along the New York and New Jersey Atlantic coastline. Injuries to the piping plover accounted for a major component of the damage claim.

The basis for the federal government's claim with regard to the piping plover was the evidence collected, which included direct visual confirmation of the oiling of at least 27 piping plovers and 2 eggs. The oiled birds included: 12 birds at Breezy Point, New York on the Gateway National Recreation Area (GNRA) and Breezy Point Cooperative; five birds at Sandy Hook, New Jersey (also part of the GNRA); and, 10 birds and 2 eggs in New Jersey, outside of the GNRA. Oil and "tar balls" from the spill were reported as far south as Brigantine, New Jersey and as far east as the eastern tip of Fire Island on Long Island, New York. It is assumed that additional undocumented losses to the piping plover population could have occurred anywhere within and possibly beyond this area.

IV. OIL SPILL SETTLEMENT

A settlement resolving all federal and State (New York and New Jersey) claims with the Nautilus Motor Tanker Company was reached in June of 1993. A total of \$3.3 million (plus interest from the Escrow Account established by the

Nautilus Motor Tanker Company) was paid in compensation for natural resource injuries. The Governments agreed that responsibility for the expenditures of the total funds, together with any interest accrued thereon, would be divided into thirds among: the State of New York and the City of New York, jointly; the DOI and the NOAA, jointly; and, the State of New Jersey, via subcommittees established by a Memorandum of Agreement.

Funding for ^{Federal} the first three years of this restoration plan is being requested from the ~~DOI~~ \$1.1 million portion of the B.T. Nautilus settlement disbursement. Funding for the last two years is being requested from the State of New Jersey's \$1.1. million portion of the settlement. ✓

The Governments are in the process of preparing a New York / New Jersey Harbor Estuary Comprehensive Restoration Plan (comprehensive plan). The comprehensive plan will address injuries to natural resources in the New York / New Jersey Harbor area caused by past oil spills, including the B.T. Nautilus oil spill, and any future spills. The piping plover restoration plan is considered a supplement to the comprehensive plan because the restoration plan addresses injured resources outside of the New York / New Jersey Harbor Estuary that have already been identified and acknowledged by the Governments. The piping plover restoration plan will be implemented before the completion of the comprehensive plan in order to begin the restoration required to compensate the public for the damages incurred by the B.T. Nautilus oil spill.

V. THE PIPING PLOVER (ATLANTIC COAST POPULATION)

A. DESCRIPTION AND LIFE HISTORY

The piping plover is a small shorebird weighing from 1.6 to 2.3 ounces (46-64 grams) with a length up to seven inches (17.7 centimeters) and a wing spread up to 14 inches (35.4 centimeters) (Palmer, 1967). The upper parts of the body are light beige, the rump and underparts are white, and the upper tail is black. Bright orange legs, a dark band encircling the neck, and a dark stripe across the forecrown are distinguishing marks in summer adults, but these markings are obscure in winter plumage.

The piping plover breeds only in North America. Three separate populations occur in three distinct geographic regions: along the Atlantic coast of North America, from Newfoundland south to North Carolina; along the Great Lakes; and, on major river systems and alkali lakes and wetlands in the Northern Great Plains. In 1986, pursuant to the Endangered Species Act, the Atlantic coast piping plover population, the subject of the B.T. Nautilus oil spill, and the Great Plains piping plover population were listed as threatened. The Great Lakes population was listed as endangered.

The Atlantic coast population of the piping plover nests on sandy beaches above the high tide line on mainland coastal beaches, sand flats, and barrier island coastal beaches. The nesting sites are typically located on gently sloping foredunes, blowout areas behind primary dunes, washover areas cut into or between dunes, ends of sandspits, and on sites with deposits of suitable dredged or pumped sand. Nest sites are shallow scraped depressions in substrates ranging from fine-grained sand to mixtures of sand and pebbles, shells, or cobble (Bent, 1929; Burger, 1987; Cairns, 1982; Flemming et al., 1990; MacIvor, 1990). Piping plovers usually nest in areas with little or no vegetation although, on occasion, piping plovers will nest among stands of American beach grass (*Ammophila breviligulata*) (MacIvor, 1990). Although the nests are most often on the open beach, the young birds and eggs may be difficult to detect due to the cryptic coloring of the birds and eggs, which provides effective camouflage.

Piping plovers begin returning to their Atlantic coast nesting beaches in mid-March. Eggs may be present on the beach from mid-April through late July. Clutch size is generally four eggs and the incubation period usually lasts for 27-28 days. Piping plovers fledge only a single brood per season, but may renest several times if previous nests are lost. Chicks are precocial (mobile and capable of foraging within several hours of hatching). They may move hundreds of yards from the nest site during their first week of life. Chicks remain together with one or both parents until they fledge (are able to fly) at 25 to 35 days of age. Depending on the date of hatching, flightless chicks may be present on beaches from mid-May until late August (Goldin, 1990; MacIvor, 1990; Howard et al., 1993).

Foods for the adults and chicks consist of invertebrates such as marine worms, fly larvae, beetles, crustaceans or mollusks (Bent, 1929; Cross, 1989; Nicholls, 1989). Feeding areas include intertidal portions of ocean beaches, ocean washover areas, mudflats, sandflats, wrack lines (organic ocean material left by high tide), shorelines of coastal ponds, lagoons or salt marshes. Feeding activities of both adults and chicks may occur during all hours of the day and night (Burger, 1993) and at all stages in the tidal cycle (Goldin, 1993; Hoopes, 1993).

B. POPULATION STATUS

The piping plover was once a common summer resident on Atlantic coast beaches. However, by the beginning of the 20th century, uncontrolled hunting, primarily for the millinery trade, and egg collecting greatly reduced the piping plover population. Following passage of the Migratory Bird Treaty Act in 1918 (16 U.S.C. 703-712) and changes in the fashion industry, the piping plover population recovered to some extent in the 1920's and 1930's. Available data suggest that the most recent population decline began in the late 1940's or early 1950's (Haig and Oring, 1985), which corresponds to the increase in development and recreational beach use along the Atlantic coast after World War II.

In 1993, the United States Atlantic coast piping plover population, estimated at 875 nesting pairs (U.S. Fish and Wildlife Service, 1993), plus the 235 estimated nesting pairs along the Atlantic coast of Canada (Hecht, Piping Plover Recovery Team Leader, pers. comm., 1994) yielded a total of approximately 1,100 nesting pairs along the entire Atlantic coast. Although the New York / New Jersey regional piping plover population estimate increased from 208 pairs in 1986 to 319 in 1989, biologists attribute most of this apparent increase to intensified survey efforts (Ducey-Ortiz et al., 1989; U.S. Fish and Wildlife Service, 1989). New York / New Jersey piping plover counts between 1989 and 1993 have been relatively static. Productivity of piping plovers in New York / New Jersey during 1988 through 1993 averaged 1.02 chicks per pair, compared to 1.27 chicks per pair for the entire U.S. Atlantic coast range (Hecht, Piping Plover Recovery Team Leader, pers. comm., 1994). Observed productivity in New England between 1988 and 1993 has averaged 1.67 chicks per pair (U.S. Fish and Wildlife Service, 1993). Major observed increases in the New England piping plover population between 1989 and 1993 support biologists' hypothesis that habitat in New Jersey can support increases in the piping plover population, if productivity can be increased (Hecht, Piping Plover Recovery Team Leader, pers. comm., 1994).

C. THREATS

Development along the Atlantic coastal shoreline for residential and commercial uses, and the subsequent stabilization of the once shifting and dynamic beach ecosystem by seawalls, breakwaters, jetties, and groins has resulted in the destruction and alteration of the natural beach to such an extent along the Atlantic coast that much of the beach no longer provides suitable habitat for the piping plover. In addition to the threat caused by this alteration of habitat, human use of the beach for sunbathing, fishing, off-road vehicle use, beach raking, and countless other activities poses a seasonal, but direct and ever-increasing threat to the piping plover. The species' propensity to nest on the open beach, which receives heavy use by humans, has made the species particularly susceptible to disturbance in the 20th century.

Due to the cryptic coloring of piping plovers and their eggs, pedestrians on beaches may inadvertently crush eggs (Burger, 1987; Hill, 1988; Cape Cod National Seashore, 1993). Unleashed dogs may chase plovers (McConnaughey et al., 1990), destroy nests (Hoopes et al., 1992), and kill chicks (Cairns and McLaren, 1980). Pedestrians may flush incubating plovers from nests, exposing eggs to avian predators or to direct solar radiation. Repeated exposure of the eggs during high summer temperatures may cause overheating, killing the embryos. Pedestrians can also displace unfledged chicks (Strauss, 1990; Burger, 1991; Hoopes et al., 1992; Loegering, 1992; Goldin, 1993). Other human activities that are highly disturbing to piping plovers include firework displays (Howard et al., 1993), and kite flying. Plovers are more intolerant of kites than pedestrians, dogs, or vehicles. Plovers may be reacting to kites as though kites represent potential avian predators (Hoopes et al., 1992).

Unrestricted use of motorized vehicles and beach rakers is a serious threat to piping plovers and their habitats. Vehicles on the beach can crush eggs, adults, and chicks. Beaches used by vehicles during nesting and brood-rearing periods generally have fewer breeding plovers than would be expected, considering the available nesting and feeding habitat. In contrast, plover abundance and productivity has increased on beaches where vehicle restrictions, during chick-rearing periods, have been combined with the protection of nests from predators (Goldin, 1993).

In addition to direct mortality, vehicles may also degrade piping plover habitat or disrupt the plovers' normal behavior patterns. Vehicles can crush wrack into the sand, making the wrack unavailable as cover or a foraging substrate, and can create ruts that may trap chicks or prevent chicks from accessing habitat that is otherwise suitable (MacIvor, 1990; Strauss, 1990; Hoopes et al., 1992; Goldin, 1993). Mechanical beach rakers, employed on a daily basis by many seaside municipalities, can crush eggs or young, scatter chicks, destroy feeding habitat by eliminating the wrack line, and eliminate the natural beach substrate that would be suitable for nesting.

Additionally, an increase in human residences and activity near the beach is correlated with an increase in predators of the piping plover, both wild and domestic. Non-native species such as feral cats and Norway rats are considered significant predators at some sites (Goldin et al., 1989; Post, 1991). Indigenous animals such as foxes, raccoons, skunks, opossums, crows, and gulls, all of which are known to prey on piping plovers and their eggs, are attracted to areas where trash is left by humans. High populations of these predators are thought to be suppressing the productivity of piping plovers at some sites (U.S. Fish and Wildlife Service, 1988). Free-ranging cats and dogs from nearby residences are also known to harass nesting piping plovers and prey on piping plover eggs and chicks (Cairns and McLaren, 1980).

VI. EVALUATION OF RESTORATION ALTERNATIVES

The goal of the piping plover restoration plan is to implement activities that result in an increase in piping plover numbers to offset those lost as a result of the oil spill. Several alternatives were considered to restore the piping plover resource. These alternatives, which are discussed in detail below, include: (1) the proposed action, which combines non-lethal predator control, increased stewardship and law enforcement at the nesting sites, and public education; (2) captive propagation and release; (3) acquisition of piping plover habitat; (4) lethal predator control; (5) transplanting piping plover chicks from other sites; (6) beach closures; (7) renourishment of eroded beaches; and, (8) no action.

A. PROPOSED ACTION

The proposed action includes non-lethal predator control, increased stewardship and law enforcement at nesting sites, and public education. This recommended alternative is aimed toward reducing the threats that are attributable to human interference with piping plover nesting and rearing of chicks and predation by feral and domestic animals. Reducing such threats is accomplished by a combination of predator exclosures, stewardship to protect nesting piping plovers from natural predators and human disturbance, public education, and law enforcement. These proven standard techniques are currently employed by biologists throughout the piping plover range to increase the productivity of the species. Increasing the use of these techniques is expected to result in incremental increases in the number of piping plover chicks that are successfully fledged, thereby increasing the piping plover population in New Jersey.

B. CAPTIVE PROPAGATION AND RELEASE

Captive propagation, the incubating of eggs and rearing of chicks in captivity, has been used on an emergency basis with limited success to increase the number of various endangered species. There is no available, proven means to undertake captive propagation on piping plovers. Techniques do not currently exist to rear piping plovers in captivity or to release them in a way that assures their recruitment into the wild breeding population. Furthermore, any attempt to develop such techniques would require adults to be removed from the wild, which would result in an initial population reduction.

C. ACQUISITION OF PIPING PLOVER HABITAT

Habitat acquisition could result in additional protection to nesting piping plovers from human disturbance. However, since most of the privately-owned coastal beaches in New York and New Jersey are highly developed, this alternative would be cost prohibitive. Furthermore, purchase alone would not necessarily increase productivity of piping plovers. Because of human disturbance and increase in predators due to human presence, management would be necessary to increase productivity. There are dune areas in New Jersey that might be purchased to aid in the protection of the adjacent coastal beaches for piping plovers; however, the purchase of such parcels alone would not be sufficient to increase productivity of the piping plover sufficiently to offset losses resulting from the oil spill.

D. LETHAL PREDATOR CONTROL

Predator control would be directed toward skunks, raccoons, foxes, and possibly gulls and crows to ensure a chance of nesting success. Predator control alone would not address the problem of human disturbance, which is recognized as a major threat to the nesting success of the piping plover.

E. TRANSPLANTING PIPING PLOVER CHICKS

The drawback of transplanting plover chicks from other sites is that it would not result in a net population increase. Previous attempts to foster chicks have resulted in agonistic reactions from the intended foster-parents.

F. BEACH CLOSURES

The key benefit of beach closures is that this alternative would most likely result in increases in the piping plover population. However, since most beaches in New Jersey are intensively used by the public, complete closure of these areas is not feasible.

G. RENOURISHMENT OF ERODED BEACHES

Beach restoration could increase suitable nesting habitat for the piping plover; however, beach renourishment is expensive (average costs for beach renourishment projects for communities in New Jersey is \$2 million), and would be cost prohibitive. Furthermore, renourishment is often a temporary remedy to beach erosion and renourished beach areas would also be subject to the same threats that occur on existing beaches (i.e., human disturbance and nest predators).

H. NO ACTION

The piping plover was listed as threatened pursuant to the Endangered Species Act because of existing threats to the species, including human disturbance, predation, and habitat loss. The piping plover cannot overcome these threats without active management. Taking no action to limit these threats will result in continued decline of the piping plover population. Conversely, the piping plover population has responded favorably to active management, which includes protection from human disturbance and nest predation.

VII. PROPOSED ACTION

A. OVERVIEW

As previously stated, the goal of this restoration plan is to implement activities that will result in an increase in piping plovers to offset plover mortality from the B.T. Nautilus oil spill. State and federal biologists involved with the protection of the piping plover in New Jersey have decided that the most cost effective, direct, and immediately attainable means to increase piping plover numbers is to reduce the threats attributable to human interference with the nesting and rearing of chicks and to reduce threats from

predators (i.e., feral and domestic animals). The techniques identified in the proposed action are proven standard techniques that are currently employed by biologists throughout the piping plover range to increase the productivity of the species. Increasing the use of these techniques is expected to result in incremental increases in piping plover chicks fledged at selected breeding sites throughout New Jersey. The extent of the proposed activities was deemed necessary in order to ensure the success of the restoration plan to compensate for losses caused by the B.T. Nautilus oil spill.

Reducing the threats from disturbance will be achieved by augmenting existing stewardship and law enforcement at nesting sites, non-lethal predator control, and increasing public awareness of the threats to the piping plover. These techniques can increase hatching success of eggs and reduce mortality of chicks. The State of New Jersey implements as much site protection as possible with available funds, but has identified additional protection that could be implemented to improve reproductive success at sites along the New Jersey coastline within the limits of the spill area. In 1993, the productivity rate (fledglings / pair) for the piping plover in New Jersey was 0.93 (U.S. Fish and Wildlife Service, 1993). This rate is below the average 1993 productivity rate of 1.46 for the U.S. Atlantic coast piping plover population, which indicates that the productivity can be expected to increase in New Jersey with increased protection.

Population restoration efforts are proposed at beaches radiating out from the spill site along the shoreline of New Jersey (Sandy Hook to Cape May). Emphasis will be given to piping plover nesting beaches where added management actions are expected to result in the greatest improvement of the fledgling success of the piping plover.

This proposed action for population restoration: will result in increased numbers of piping plovers; is proven and technically feasible; is cost effective and within the available funding; will have minimal adverse impact on the public while serving the public need to have the injured resource restored to pre-spill conditions; and, will have long-range positive effects through the development of cooperative agreements with municipalities. The following restoration activities are proposed for implementation at selected sites along the Atlantic coast of New Jersey.

B. STEWARDS

Employ stewards on beaches where pedestrians, joggers, sun-bathers, picnickers, fishermen, boaters, horseback riders, or other recreational users are present in numbers that could harm or disturb territorial, courting, or incubating plovers, their eggs, or chicks. Stewards would interact with the public by distributing brochures and explaining signed / fenced areas in order to reduce the potential for recreationists and their pets to disturb breeding plovers and chicks. Stewards would: check for nests; observe incubating piping plovers; record breeding status and success; erect fencing and exclosures when and where necessary; and, help to educate the public.

C. FENCING

Erect fencing, which consists of posts and string, around individual nests. In some locations more substantial fencing, such as standard hardware pasture fence, must be erected around large areas that contain several nests. These fenced areas do not preclude beach recreational access. Signs may be posted on fenced areas to educate the public about the nesting birds.

D. PREDATOR EXCLOSURES

Construct and maintain predator exclosures. Experiments with wire fences, to exclude predators from incubating plovers and their eggs, were first conducted on the Atlantic coast in 1987. Because of the observed effectiveness of the exclosures, by 1993, exclosures were deployed in every State and at least three Canadian Provinces. For example, improved hatching success at the GNRA (Breezy Point) was attributed to the use of predator exclosures on 14 of 18 nests (Hake, 1993). Constructing and maintaining predator exclosures can be accomplished by stewards stationed at the various beaches. Since the use of exclosures is not without risks, such as nest abandonment, the predation threat must be assessed and the potential benefits and risks must be evaluated by trained and knowledgeable personnel, according to the revised guidelines developed by the U.S. Atlantic Coast Piping Plover Recovery Team. Exclosed nests must be monitored to detect and rectify any problems.

E. LAW ENFORCEMENT

Employ additional law enforcement personnel to deter encroachment by pedestrians into nesting areas and prevent unauthorized vehicles from entering nesting areas and feeding areas for unfledged chicks. Enforcement personnel would also provide additional support to enforce laws related to the protection of the piping plover.

F. MEMORANDUM OF UNDERSTANDING

Initiate Memoranda of Understanding (MOU) among coastal municipalities, the New Jersey Endangered and Nongame Species Program and the Service to ensure that municipal management of the beaches is determined to be compatible with the well-being of the piping plover. The municipalities in New Jersey, with jurisdiction over beaches where piping plovers nest, directly influence the condition and use of the nesting habitat and the capability of these sites to produce plovers. Formal agreements, such as a MOU, would increase the stability and predictability of beach management carried out by municipalities; assist in implementing piping plover restoration projects; and, ensure the development of beach management plans that address the co-existence of recreational use and the piping plover.

G. EDUCATION

Establish educational signs and informational displays. The success of the piping plover in many areas along the Atlantic coast, particularly along the heavily-populated New Jersey shoreline, is dependent to a large extent on the perception and behavior of the public that frequent the piping plover nesting areas. Educational signs and information can help improve the public's understanding of, and interest in, the piping plover and promote respect for the birds and their habitat. Because many beach users are transient, providing educational signs at the actual nest sites is recommended. Additionally, several sites within the areas affected by the oil spill have been identified where construction of permanent educational / interpretive signs and displays would be viewed by a large public audience and thus, would add to the protection of the site.

VIII. SPECIFIC RESTORATION ACTIVITIES FOR SELECTED SITES

The activities described above are proposed for the following sites and can only be implemented with the permission of the applicable landowners or municipal managers, as necessary. As proposed, various agencies or organizations will receive funding and will implement the activities, as described, in the most cost-effective and efficient manner.

A. INDIVIDUAL SITE RESTORATION ACTIVITIES

AREA #1. Sandy Hook - Coast Guard Beach and Gateway National Recreation Area (GNRA) in Monmouth County. Restoration activities on these beaches would be conducted for the first three years as described below with funds from the DOI settlement.

- o Steward: One steward will be stationed at this area during the piping plover nesting season (April 1 - September 1).
- o Law enforcement: The law enforcement budget for the GNRA will be supplemented in order to provide additional support to enforce laws related to the protection of the piping plover.
- o Education: Interpretive signs will be designed, constructed, and installed at Sandy Hook.

AREA #2.

Raritan Bay and coastal beaches in Monmouth County;
Mantoloking and Island Beach State Park in Ocean County.

Although only the Mantoloking beach currently supports nesting piping plovers, the other Monmouth County beaches must be surveyed at regular intervals, particularly in the beginning of the piping plover nesting season each year, to detect any new territorial behavior or nesting by piping plovers. Restoration activities on these beaches would be conducted as described below for five consecutive years, using funds from the DOI settlement for the first three years and funds from the State of New Jersey settlement for the last two years.

- o Steward / coordinator: One person will be stationed at this area during the piping plover nesting season (April 1 - September 1). In addition to steward duties, this person will be responsible for coordinating the activities of the steward stationed at AREA #3, prepare summary reports on the activities at AREAS #2, and #3, and develop MOUs with the appropriate municipalities throughout the State for the management of beaches to protect the piping plover. These duties will require a full-time, year-round position for the entire five-year period covered by this plan; however, during the first and last years of implementation, employment will coincide with the start and completion of the piping plover nesting season.

AREA #3.

Barnegat Light in Ocean County; Holgate and Little Beach Island (Edwin B. Forsythe National Wildlife Refuge) in Ocean and Atlantic Counties. These beaches support nesting piping plovers and will require extensive stewarding, particularly at Barnegat Light where recreational use co-occurs with the nesting piping plover population. Activities on these beaches would be conducted as described below for five consecutive years, using funds from the DOI settlement for the first three years and funds from the State of New Jersey settlement for the last two years.

- o Steward: One steward will be stationed at this area during the piping plover nesting season (April 1 - September 1).
- o Predator exclosures: Predator exclosures will be placed around nests on these beaches.
- o Education: Interpretive signs will be designed, constructed, and installed.

AREA #4. North Brigantine / Brigantine Beach and Inlet in Atlantic County; Ocean City in Ocean County. Activities on these beaches will be conducted as described below for five consecutive years with funds from the DOI settlement the first three years and funds from the State of New Jersey settlement the last two years.

- o Steward: One steward will be stationed at this area during the nesting season (April 1 - September 1).
- o Fencing: Pasture fence will be erected in strategic areas to protect large piping plover nesting areas.
- o Education: Interpretive signs will be designed, constructed, and installed.

AREA #5. Corsons Inlet and Whale Beach in Cape May County.

- o Steward: One steward will be stationed at this area throughout the piping plover season (April 1 - September 1).
- o Coordinator: Approximately 35 percent of a New Jersey Endangered and Nongame Species Program Assistant Zoologist's time will be needed to directly coordinate and supervise the stewards stationed at AREAS #4 and #5, and prepare summary reports on the activities at AREAS #4 and #5.

B. STATEWIDE ACTIVITIES

1. Administrative Assistant

An administrative assistant will be employed on a part-time basis for the five-year period to administer the additional personnel matters and vehicle maintenance necessary to conduct the delineated tasks in this restoration plan.

2. Administrative Support

Supervisory time will be required in order to hire stewards and an administrative assistant, supervise and train the administrative assistant, and purchase a vehicle.

3. Overall Project Management

Approximately 30 percent of a New Jersey Endangered and Nongame Species Program Principal Zoologist's time will be required during the first year and 25 percent in subsequent years of the project in order to train the necessary personnel and to manage the increased stewarding program in the identified areas.

4. Oversight

Service biologists will conduct field visits of the sites, review annual reports on the progress of the restoration, and assist with the development of the MOUs among participating municipalities. It is anticipated that this level of participation will require approximately three weeks of staff time per year.

5. Truck and Maintenance

A 4x4 off-road vehicle will be purchased for use by the stewards to transport fencing and other equipment to the beach sites. These costs include fuel and maintenance.

6. Truck Insurance

Automobile insurance for the above-mentioned vehicle will be required.

7. Mileage

Daily transportation for the stewards to the various beaches will be needed from their established base offices to the sites. Transportation will be provided by personal vehicles with mileage reimbursed at a rate of 29 cents per mile. It is estimated that approximately 12,000 miles per year will be needed for the stewards to reach their assigned beaches and attend occasional coordination meetings at the New Jersey Endangered and Nongame Species Program office in Tuckahoe, New Jersey. The purchased truck will only be used to transport equipment (exclosures, fencing, and signs) to the sites and will be used by all of the stewards that are hired to implement this restoration plan.

8. Equipment

- o Four pairs of binoculars
- o Two spotting-scopes and tripods
- o Five hand-held two-way radios with repeaters.

9. Law Enforcement

Funding will be provided to cover law enforcement activities via the Service in order to provide additional support to enforce federal laws related to the protection of the piping plover.

IX. RESTORATION PLAN BUDGET

A. SPECIFIC RESTORATION ACTIVITIES BUDGET

DOI SETTLEMENT FUNDS

NEW JERSEY SETTLEMENT FUNDS

AREA #1

Steward:

Year 1 = \$6,745
Year 2 = \$7,015
Year 3 = \$7,296
Total = \$21,056

Law Enforcement:

Year 1 = \$1,500
Year 2 = \$1,500
Year 3 = \$1,500
Total = \$4,500

Educational
equipment:

Year 1 = \$3,000
Year 2 = \$2,000
Year 3 = \$2,000
Total = \$7,000

AREA #2

Steward/
Coordinator:

Year 1 = \$29,780
Year 2 = \$37,180
Year 3 = \$38,667
Total = \$105,627

Year 4 = \$40,214
Year 5 = \$30,161
Total = \$70,375

AREA #3

Steward:

Year 1 = \$6,745
Year 2 = \$7,015
Year 3 = \$7,296
Total = \$21,056

Year 4 = \$7,587
Year 5 = \$7,891
Total = \$15,478

Predator
exclosure
equipment:

Year 1 = \$500
Year 2 = 0
Year 3 = 0
Total = \$500

Year 4 = \$300
Year 5 = 0
Total = \$300

Educational
equipment:

Year 1 = \$1,000
Year 2 = \$200
Year 3 = \$200
Total = \$1,400

Year 4 = \$200
Year 5 = \$200
Total = \$400

AREA #4

Steward:

Year 1 = \$6,745
Year 2 = \$7,015
Year 3 = \$7,296
Total = \$21,056

Year 4 = \$7,587
Year 5 = \$7,891
Total = \$15,478

Fencing
equipment:

Year 1 = \$1,000
Year 2 = \$200
Year 3 = \$200
Total = \$1,400

Year 4 = \$200
Year 5 = \$200
Total = \$400

Educational
equipment:

Year 1 = \$1,000
Year 2 = \$200
Year 3 = \$200
Total = \$1,400

Year 4 = \$200
Year 5 = \$200
Total = \$400

AREA #5

Steward:

Year 1 = \$6,745
Year 2 = \$7,015
Year 3 = \$7,296
Total = \$21,056

Year 4 = \$7,587
Year 5 = \$7,891
Total = \$15,478

Coordinator:

Year 1 = \$13,763
Year 2 = \$14,314
Year 3 = \$14,886
Total = \$42,963

Year 4 = \$15,482
Year 5 = \$16,101
Total = \$31,583

STATEWIDE

Administrative
assistant:

Year 1 = \$8,946
Year 2 = \$9,304
Year 3 = \$9,676
Total = \$27,926

Year 4 = \$10,063
Year 5 = \$10,466
Total = \$20,529

Administrative
support:

Year 1 = \$14,438
Year 2 = \$5,005
Year 3 = \$5,205
Total = \$24,648

Year 4 = \$5,413
Year 5 = \$5,630
Total = \$11,043

Overall Project
Management:

Year 1 = \$20,556
Year 2 = \$17,815
Year 3 = \$18,528
Total = \$56,899

Year 4 = \$19,269
Year 5 = \$20,040
Total = \$39,309

Oversight:

Year 1 = \$4,611
Year 2 = \$4,795
Year 3 = \$4,987
Total = \$14,393

Year 4 = \$5,187
Year 5 = \$5,394
Total = \$10,581

Truck:

Year 1 = \$19,000
Year 2 = \$ 1,200
Year 3 = \$ 1,500
Total = \$21,700

Year 4 = \$2,000
Year 5 = \$2,500
Total = \$4,500

Truck
Insurance:

| | |
|-------------------------|-------------------------|
| Year 1 = \$2,000 | |
| Year 2 = \$2,050 | Year 4 = \$2,150 |
| <u>Year 3 = \$2,100</u> | <u>Year 5 = \$2,200</u> |
| Total = \$6,150 | Total = \$4,350 |

Mileage:

| | |
|-------------------------|-------------------------|
| Year 1 = \$3,480 | |
| Year 2 = \$3,480 | Year 4 = \$3,480 |
| <u>Year 3 = \$3,480</u> | <u>Year 5 = \$3,480</u> |
| Total = \$10,440 | Total = \$6,960 |

Other
Equipment:

Year 1 = \$2,400 (binoculars and scopes)
Year 1 = \$4,000 (radios)
 Total = \$6,400

Law
Enforcement:

Year 1 = \$5,000
 Year 2 = \$5,000
Year 3 = \$5,000
 Total = \$15,000

DOI FUNDS (Years 1,2, and 3) = \$432,570
 NEW JERSEY FUNDS (Years 4 and 5) = \$247,164

B. RESTORATION PLAN BUDGET TOTALS BY PROJECT YEAR

| <u>Category</u> | <u>Year 1</u> | <u>Year 2</u> | <u>Year 3</u> | <u>Year 4</u> | <u>Year 5</u> |
|----------------------------------|----------------|----------------|----------------|---------------|---------------|
| Personnel: | \$119,074 | \$116,473 | \$121,133 | \$118,389 | \$111,465 |
| Equipment: | \$12,900 | \$2,600 | \$2,600 | \$900 | \$600 |
| Transportation: | \$24,480 | \$6,730 | \$7,080 | \$7,630 | \$8,180 |
| Law Enforcement: | <u>\$6,500</u> | <u>\$6,500</u> | <u>\$6,500</u> | <u>0</u> | <u>0</u> |
| Yearly Totals: | \$162,954 | \$132,303 | \$137,313 | \$126,919 | 120,245 |
| Personnel five-year total: | \$586,584 | | | | |
| Equipment five-year total: | \$19,600 | | | | |
| Transportation five-year total: | \$54,100 | | | | |
| Law enforcement five-year total: | \$19,500 | | | | |

C. TOTAL BUDGET FOR NEW JERSEY

Overall five-year total = \$679,734

X. PIPING PLOVER RECOVERY

The U.S. Atlantic Coast Piping Plover Recovery Team is in the process of revising the piping plover recovery plan (U.S. Fish and Wildlife Service, 1988). All of the restoration activities presented in the *Final Restoration Plan for the Piping Plover to Compensate for Losses from the B.T. Nautilus Oil Spill in New Jersey* have been reviewed by selected members of the recovery team, and are consistent with the goals and tasks identified in the recovery plan. Implementation of the tasks in this restoration plan will facilitate recovery of the Atlantic coast piping plover population.

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B. PERSONAL COMMUNICATION

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