PIPING PLOVER  (*Charadrius melodus*)
Atlantic Coast Population

REVISED RECOVERY PLAN

U.S. Fish and Wildlife Service
Hadley, Massachusetts
PIPING PLOVER \textit{(Charadrius melodus)}

Atlantic Coast Population

REVISED RECOVERY PLAN

Prepared by the

Atlantic Coast Piping Plover Recovery Team

for the

U.S. Fish and Wildlife Service
Region Five
Hadley, Massachusetts

Approved:  

\begin{center}
\textsc{Ronald E. Lamberton}
\end{center}

Regional Director, Northeast Region, U.S. Fish and Wildlife Service

Date: \textit{May 2, 1996}
# ATLANTIC COAST PIPING PLOVER RECOVERY TEAM

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anne Hecht</td>
<td>Team Leader, U.S. Fish and Wildlife Service</td>
<td>Sudbury, Massachusetts</td>
</tr>
<tr>
<td>David Avrin</td>
<td>National Park Service</td>
<td>Brooklyn, New York</td>
</tr>
<tr>
<td>Scott Melvin</td>
<td>Massachusetts Division of Fisheries and Wildlife</td>
<td>Westborough, Massachusetts</td>
</tr>
<tr>
<td>Janice Nicholls</td>
<td>U.S. Fish and Wildlife Service</td>
<td>Asheville, North Carolina</td>
</tr>
<tr>
<td>Christopher Raithel</td>
<td>Rhode Island Division of Fish and Wildlife</td>
<td>West Kingston, Rhode Island</td>
</tr>
<tr>
<td>Karen Terwilliger</td>
<td>Resource Management Associates</td>
<td>Locustville, Virginia</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY
Atlantic Coast Piping Plover Revised Recovery Plan

CURRENT STATUS: The Atlantic Coast piping plover (Charadrius melodus) population breeds on coastal beaches from Newfoundland to North Carolina (and occasionally in South Carolina) and winters along the Atlantic Coast from North Carolina south, along the Gulf Coast, and in the Caribbean. Since being listed as threatened in 1986, the population has increased from approximately 800 pairs to almost 1350 pairs in 1995; however, most of the apparent increase between 1986 and 1989 is attributable to increased survey effort in two States, and the population increase between 1989 and 1995 has been very unevenly distributed. Since 1989, the New England subpopulation has increased 346 pairs, while the New York-New Jersey and the Southern (DE-MD-VA-NC) subpopulations gained 62 and 18 pairs respectively, and the Atlantic Canada subpopulation declined by 34 pairs. Substantially higher productivity rates have also been observed in New England than elsewhere in the population’s range. Recovery of the Atlantic Coast piping plover population is occurring in the context of an extremely intensive protection effort now being implemented on an annual basis. Pressure on Atlantic Coast beach habitat from development and human disturbance is pervasive and unrelenting, and the species is sparsely distributed.

HABITAT REQUIREMENTS AND LIMITING FACTORS: Piping plowers nest above the high tide line on coastal beaches, sandflats at the ends of sandspits and barrier islands, gently sloping foredunes, blowout areas behind primary dunes, sparsely vegetated dunes, and washover areas cut into or between dunes. Feeding areas include intertidal portions of ocean beaches, washover areas, mudflats, sandflats, wrack lines, and shorelines of coastal ponds, lagoons, or salt marshes. Wintering plowers on the Atlantic Coast are generally found at secreting ends of barrier islands, along sandy peninsulas, and near coastal inlets.

Loss and degradation of habitat due to development and shoreline stabilization have been major contributors to the species’ decline. Disturbance by humans and pets often reduces the functional suitability of habitat and causes direct and indirect mortality of eggs and chicks. Predation has also been identified as a major factor limiting piping plover reproductive success at many Atlantic Coast sites, and substantial evidence shows that human activities are affecting types, numbers, and activity patterns of predators, thereby exacerbating natural predation.

RECOVERY OBJECTIVE: The primary objective of the revised recovery program is to remove the Atlantic Coast piping plover population from the List of Endangered and Threatened Wildlife and Plants by: (1) achieving well-distributed increases in numbers and productivity of breeding pairs, and (2) providing for long-term protection of breeding and wintering plowers and their habitat.

RECOVERY CRITERIA: Delisting of the Atlantic Coast piping plover population may be considered when the following criteria have been met:

1. Increase and maintain for five years a total of 2,000 breeding pairs, distributed among four recovery units as follows: Atlantic Canada, 400 pairs; New England, 625 pairs; New York-New Jersey, 575 pairs, Southern (DE-MD-VA-NC), 400 pairs.

2. Verify the adequacy of a 2,000-pair population of piping plowers to maintain heterozygosity and allelic diversity over the long term.
EXECUTIVE SUMMARY (Cont.)

3. Achieve five-year average productivity of 1.5 fledged chicks per pair in each of the four recovery units described in criterion 1, based on data from sites that collectively support at least 90% of the recovery unit's population.

4. Institute long-term agreements to assure protection and management sufficient to maintain the population targets and average productivity in each recovery unit.

5. Ensure long-term maintenance of wintering habitat, sufficient in quantity, quality, and distribution to maintain survival rates for a 2,000-pair population.

ACTIONS NEEDED:

1. Manage breeding piping plovers and habitat to maximize survival and productivity.
2. Monitor and manage wintering and migration areas to maximize survival and recruitment into the breeding population.
3. Undertake scientific investigations that will facilitate recovery efforts.
4. Develop and implement public information and education programs.
5. Review progress towards recovery annually and revise recovery efforts as appropriate.

In furtherance of action 1, appendices to this plan include: (a) guidelines for managing recreational activities in piping plover breeding habitat to avoid direct mortality, harassment, and/or harm (Appendix G); and (b) guidelines for preparation and evaluation of permit applications for incidental take of piping plovers (Appendix H).

ESTIMATED COSTS (in thousands):

<table>
<thead>
<tr>
<th></th>
<th>NEED 1</th>
<th>NEED 2</th>
<th>NEED 3</th>
<th>NEED 4</th>
<th>NEED 5</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 1</td>
<td>1885</td>
<td>150</td>
<td>330</td>
<td>60</td>
<td>3</td>
<td>2428</td>
</tr>
<tr>
<td>FY 2</td>
<td>1960</td>
<td>142</td>
<td>327</td>
<td>60</td>
<td>3</td>
<td>2492</td>
</tr>
<tr>
<td>FY 3</td>
<td>2035</td>
<td>142</td>
<td>287</td>
<td>60</td>
<td>3</td>
<td>2527</td>
</tr>
<tr>
<td>TOTAL</td>
<td>5880</td>
<td>434</td>
<td>944</td>
<td>180</td>
<td>9</td>
<td>7447</td>
</tr>
</tbody>
</table>

Costs beyond FY 3 will be determined as the recovery program proceeds.

DATE OF RECOVERY: A 168% increase in the New England population between 1989 and 1995 demonstrates that rapid recovery is possible with intensive protection efforts. Contingent on vigorous implementation of all recovery tasks, full recovery is anticipated by the year 2010.
ACKNOWLEDGMENTS

Susi von Oettingen of the U.S. Fish and Wildlife Service's New England Field Office and Mary Parkin and Paul Nickerson of the Northeast Regional Office provided invaluable help during all phases of preparation of this revised recovery plan.

During the last decade, hundreds of dedicated biologists and other professionals have contributed to the recovery efforts for the Atlantic Coast piping plover. The individuals listed below provided direct contributions to this recovery plan revision, by responding to special information requests or by reviewing sections of draft text. In many cases, their contributions represent compilations of information from dozens of additional individuals.

The Service gratefully acknowledges contributions of: Dr. Mark McCollough, Maine Department of Inland Fisheries and Wildlife; Julie Victoria, Connecticut Department of Environmental Protection; Lisa Gelvin-Innvaer, Delaware Division of Fish and Wildlife; Bob Cross, Virginia Department of Game and Inland Fisheries; Dave Jenkins, New Jersey Division of Fish, Game, and Wildlife; Laurie Maclvor, Maryland Natural Heritage Program; Ken Meskill, Michelle Alfieri, Mike Scheibel, and Bob Miller, New York State Department of Environmental Conservation; Tom Henson, North Carolina Wildlife Resources Commission; Jack Kuner, Carl Zimmerman, Kyle Jones, Jim Ebert, Bruce Lane, Ries Collier, and Michael Rikard, National Park Service; Cathy Brittingham and Meryl Goldin, The Nature Conservancy; Walker Golder, National Audubon Society; Bruce Johnson and Diane Amirault, Canadian Wildlife Service; Dr. Curt Griffin, University of Massachusetts; Dr. Joanna Burger, Rutgers University; Dr. Mark Ryan, University of Missouri, Columbia; Dr. Susan Haig, National Biological Survey, Corvallis, Oregon; Dr. Jeffrey R. Walters, Virginia Polytechnic Institute; Sue Philhower and Suzanne Wrenn, North Carolina State University, Raleigh; John Fussell, private consultant; Phil Wilkinson, South Carolina Department of Natural Resources; Robin Lepore, USDI Regional Solicitor’s Office; Graham Taylor, Charlie Hebert, Jennifer Casey, Sherman Stairs, Irv Ailes, Donna Surabian, Vince Turner, Ed Moses, John Schroer, Jack Fillio, Sharon Ware, Tony Leger, Ben Nottingham, Karen Mayne, Dana Peters, Kevin DuBois, Nancy Schlotter, Katie Zeeman, Tim Fannin, John Hickey, Ken Carr, Nancy Hillery, Pat Bosco, Chris Dowd, Walt Quist, Earl Possardt, and Carl Melberg, U.S. Fish and Wildlife Service.
* * *

The following recovery plan revision describes recovery progress to date and delineates further actions required to recover and/or protect the threatened Atlantic Coast population of the piping plover (Charadrius melodus). Attainment of recovery objectives and availability of funds will be subject to budgetary and other constraints affecting the parties involved, as well as the need to address other priorities.

This plan does not necessarily represent the views or official position of any individuals or agencies other than the U.S. Fish and Wildlife Service. Recovery plans are subject to modification as dictated by new findings, changes in species status, and the completion of recovery tasks.

Literature citations should read as follows:


Additional copies of this plan can be purchased from:

U.S. Fish and Wildlife Reference Service
5430 Grosvenor Lane, Suite 110
Bethesda, Maryland 20814
301-492-6403 or 1-800-582-3421

Document costs vary according to number of pages.
# TABLE OF CONTENTS

**PART I: INTRODUCTION** ................................................................. 1

Description and Taxonomy ....................................................... 3

Life History and Ecology .......................................................... 4
  Breeding ....................................................................................... 4
    Arrival and Courtship ............................................................ 4
    Nests ......................................................................................... 6
    Nesting Densities ................................................................. 6
    Egg-laying and Incubation ..................................................... 7
    Brood-rearing .......................................................................... 8
    Defense of Nests and Chicks ............................................... 11
    Feeding Habitat and Habits ................................................... 11
  Migration ..................................................................................... 13
  Wintering .................................................................................... 14
    Distribution .............................................................................. 14
    Habitat Selection ..................................................................... 15
    Habitat Use and Movements ................................................. 15
    Winter Site Fidelity ............................................................... 16
    Intra- and Inter-specific Interactions .................................... 16

Population Status and Distribution ........................................... 17
  Abundance ................................................................................. 17
    Trends Prior to 1985 ............................................................. 17
    Trends Since Listing Under the Endangered Species Act .......... 18
  Productivity .............................................................................. 24
  Survival ....................................................................................... 27
  Current Breeding Distribution ................................................. 27
  Breeding Site Fidelity and Dispersal ....................................... 28
  Habitat Carrying Capacity ....................................................... 29
  Vulnerability to Extinction ..................................................... 31
    Demographic Factors ............................................................. 31
    Genetic Factors ....................................................................... 33

Reasons for Listing and Continuing Threats .............................. 33
  Loss and Degradation of Breeding Habitat ............................ 34
  Disturbance of Breeding Plovers by Humans and Pets ............ 37
    Non-motorized Beach Activities ......................................... 39
    Motorized Vehicles ............................................................... 40
    Beach-cleaning .................................................................... 41
  Predation ................................................................................... 41
  Threats to Wintering Piping Plovers ...................................... 43
  Oil Spills and Other Contaminants ....................................... 44
PART II: RECOVERY ............................................. 57

Recovery Objective ........................................... 57

Recovery Tasks .................................................. 61
1. Manage breeding piping plovers and habitat to maximize survival and productivity ........................................ 61
2. Monitor and manage wintering and migration areas to maximize survival and recruitment into the breeding population ............................................... 81
3. Undertake scientific investigations that will facilitate recovery efforts ......................................................... 87
4. Develop and implement public information and education programs ..................................................... 96
5. Review progress towards recovery annually and revise recovery efforts as appropriate ......................................................... 98

PART III: IMPLEMENTATION ...................................... 99

Implementation Schedule ........................................ 101

APPENDICES ....................................................... 109

Appendix A - Locations of Current and Potential Breeding Sites ................................................. 111
Appendix B - Current and Potential Breeding Site Information ......................................................... 127
Appendix C - Summary of Current and Needed Breeding Site Management Activities ....... 139
Appendix D - Summary of Off-Road Vehicle Use at Breeding Sites ................................................. 157
Appendix E - Population Viability Analysis ......................................................... 173
Appendix F - Guidelines for the Use of Predator Exclosures to Protect Piping Plover Nests ................................................. 187
Appendix G - Guidelines for Managing Recreational Activities in Piping Plover Breeding Habitat on the U.S. Atlantic Coast to Avoid Take under Section 9 of the Endangered Species Act .......................... 191

Appendix H - Guidelines for the Preparation and Evaluation of Conservation Plans for Atlantic Coast Piping Plovers Pursuant to Section 10(a)(1)(B) and 10(a)(2) of the Endangered Species Act ..................... 199

Appendix I - Guidelines for Conducting Surveys for Piping Plovers in Atlantic Coast Wintering Habitat .................................................. 205

Appendix J - Estimated Cost of U.S. Atlantic Coast Piping Plover Protection Activities During the 1993 Breeding Season ............................... 207

Appendix K - Known Piping Plover Wintering Sites on the Southern Atlantic Coast and the Caribbean .................................................. 211

Appendix L - Summary of Comments on Draft Revised Recovery Plan and Service Responses .......................................................... 217

LITERATURE CITED ......................................................................... 231

LIST OF FIGURES

Figure 1. Current Breeding and Wintering Distribution of Piping Plovers in North America ................................................................. 2
Figure 2. Atlantic Coast Breeding Chronology ..................................... 5
Figure 3. Estimated Population by Region, 1986-1995 ...................... 20
Figure 4. Average Productivity by Region, 1988-1995 ...................... 26
Figure 5. Distribution of Piping Plovers on Outer Cape Cod, 1988-1993 .............................................................. 32

LIST OF TABLES

Table 1. Summary of Chick Mobility Data ........................................ 9
Table 2. Summary of Chick Time Budget Data ................................. 10
Table 3. Summary of Data on Distances at which Piping Plovers React to Disturbance ................................................................. 12
Table 4. Summary of Atlantic Coast Piping Plover Population Estimates, 1986 to 1995 ................................................................. 19
Table 5. Comparison of 1991 and 1994 Population Estimates Based on "Window" Census with Estimates Based on 1990 Census Methodologies ......................................................... 21
Table 7. Recovery Task Outline .......................................................... 59