U.S. FISH AND WILDLIFE SERVICE

ENVIRONMENTAL ACTION MEMORANDUM

Within the spirit and intent of the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality's Regulations for Implementing NEPA, and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record and have determined that the action of:

- strengthening ongoing efforts to re-establish a wider diversity of nesting species on Monomoy National Wildlife Refuge by removing nesting herring and great black-backed gulls from the northern end of South Monomoy using DRC-1339 gull toxicant;

___ is a categorical exclusion as provided by 516 DM 6, Appendix 1. No further documentation will be made. (Complete signature blocks below)

_X_ is found not to have significant environmental effects as determined by the attached Environmental Assessment and Finding of No Significant Impact.

___ is found not to have special environmental conditions as described in the attached Environmental Assessment. The attached Finding of No Significant Impact will not be final nor will any actions be taken pending a 30-day period for public review (40 CFR 1501.4 (d) (1)).

___ is found to have significant environmental effects and a Notice of Intent to prepare an Environmental Impact Statement will be published in the Federal Register before the project is considered further.

___ is environmentally unacceptable and/or contrary to Service policy on _____ and will not be implemented.

___ is an emergency situation. Only those actions necessary to control the immediate impacts of the emergency will be taken. Other related actions remain subject to NEPA review.

1. Sharon Ware, Acting Proj. Ldr. May 6, 1996
Edward A. Moss April 17, 1996
Project Leader Date

2. [signature] May 6, 1996
ARD-Central Date

3. [signature] 5/6/96
ES-ESC Date

4. [signature] 5/6/96
ARD-North Date

5. [signature] 5/6/96
ES-REC Date

6. ACTING [signature] 5/6/96
Regional Director Date

ENVIRONMENTAL ASSESSMENT:

RESTORATION OF AVIAN DIVERSITY

ON

MONOMOY NATIONAL WILDLIFE REFUGE

Submitted by: Sharon Ware, Acting Project Leader for Edward A. Moses — May 6, 1996
Edward Moses — April 17, 1996
Refuge Manager — **Date**

Reviewed by: Paul R. Nickerson — 5/6/96
Paul Nickerson — **Date**
Endangered Species Coordinator

Concurred by: Ralph W. Abele — 5/6/96
Ralph Abele — **Date**
Regional Environmental Coordinator

Concurred by: for Donald J. Frickie — May 6, 1996
Donald Frickie — **Date**
Assistant Regional Director-Central

Concurred by: Sharon Ware Acting ARD-ES for Ronald D. Hovey — May 6, 1996
Ralph Pisapia — **Date**
Assistant Regional Director-North

Approved by: ACTING Cathy Short — 5/6/96
Ronald E. Lambertson — **Date**
Regional Director

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

ENVIRONMENTAL ASSESSMENT:

Restoration of Avian Diversity
on
Monomoy National Wildlife Refuge

U.S. Fish and Wildlife Service
Monomoy National Wildlife Refuge
Chatham, Massachusetts

April 1996

FINDING OF NO SIGNIFICANT IMPACT

Proposal to Restore Avian Diversity on Monomoy National Wildlife Refuge

The Fish and Wildlife Service (Service) has proposed strengthening ongoing efforts to re-establish a wider diversity of nesting species on Monomoy National Wildlife Refuge (NWR) and, ultimately, restore the integrity of the Monomoy ecosystem by removing nesting herring and great black-backed gulls from approximately 350 acres on the northern end of South Monomoy Island. This action builds upon the 1988 Monomoy NWR Master Plan which called for the Service to preserve a natural diversity of flora and fauna by maintaining areas free of nesting gulls on the refuge.

The Service has analyzed alternatives to the proposed action including the No Action alternative (i.e., suspension of all gull control efforts on the refuge) and two additional alternatives: continuation of current gull management, and removal of all nesting herring and great black-backed gulls from both North and South Monomoy Islands.

The need for action stems from adverse impacts on other nesting birds due to the high population of large gull species on the refuge. Current populations and distribution of herring and great black-backed gulls in the Northeast exceed historic levels (Drury 1973-74; Andrews 1990). Prior to 1920, herring and great black-backed gulls were not known to nest in Massachusetts. Subsidized by human-supplied food sources, these gulls have extended their breeding range south from Maine and the Atlantic Provinces of Canada (Drury 1973-74). Species, including Arctic, common and roseate terns were displaced from several major colonies by gulls between 1936 and 1960 (Nisbet 1973). On Monomoy, herring gulls increased from 5 nesting pairs in 1963 to a peak of 15,300 pairs in 1984, and great black-backed gulls grew from zero prior to 1965 to more than 8,000 in 1990. Breeding populations of these two species have declined in recent years to an estimated 5,200 pairs of herring gulls and 7,350 pairs of great black-backed gulls in 1995, but these smaller populations continue to occupy virtually all suitable nesting habitat on the refuge.

A primary purpose of the National Wildlife Refuge System is to conserve migratory birds, especially threatened and endangered species. Another priority goal is to preserve a natural diversity and abundance of flora and fauna on refuge lands. Despite recent declines in the refuge breeding populations of herring and great black-backed gulls, these species are expected to continue to dominate the majority of suitable habitat on the refuge and displace other nesting species indefinitely. Therefore, active management of the large herring and great black-backed gull colony on the refuge is necessary at this time to meet refuge objectives as well as legal mandates.

Reasons for selection of the proposed action:

- The rate of recruitment of nesting piping plovers on the refuge would likely increase to a level comparable to that of other Massachusetts sites, thereby facilitating progress towards the Massachusetts Division of Fisheries and Wildlife's

provisional abundance objective of 94 breeding pairs on South Monomoy Island while contributing to the overall recovery effort for the Atlantic Coast piping plover population.

- Nesting opportunities for common, Arctic, roseate and least terns, laughing gull, black skimmer, willet, American oystercatcher, spotted sandpiper, and American black duck would be expanded, and re-establishment of a wider diversity of nesting species on the refuge is likely.

- The proposed treatment area is separated from the rest of the herring and great black-backed gull colony by a natural geographical break in nesting habitat which would facilitate maintenance of the area once it is cleared of nesting herring and great black-backed gulls. Additionally, the proposed treatment area represents the best piping plover habitat available on the refuge.

- DRC-1339 gull toxicant represents the most effective method currently available for clearing an area of nesting herring and great black-backed gulls where they have a history of success. Of all methods considered and analyzed, DRC-1339 poses the least amount of disturbance to other nesting species. Properly applied, DRC-1339 poses little risk of accidental poisoning of non-target species, and because it breaks down rapidly there is virtually no potential for secondary poisoning. It has also been used successfully in similar restoration projects in Maine and Massachusetts.

- The proposed action represents a conservative approach to minimizing negative impacts of a substantial human-abetted increase in populations of herring and great black-backed gulls on outer Cape Cod and the Northeast United States. While landfill closures have occurred on Cape Cod, herring and great black backed gulls are long-lived and could persist at human-abetted levels on the refuge for several years. Also, remaining gulls are adapting to take advantage of other food sources. Nesting opportunities for terns and other species that are deterred from nesting in a large gull colony have not increased appreciably despite recent declines in gull numbers because these smaller gull populations continue to occupy virtually all suitable nesting habitat on the refuge. A variety of nesting species are likely to benefit from the proposed action. The "worst case" scenario is that no additional nesting birds will take advantage of newly established gull-free habitat. There is little potential for adverse impacts on wildlife, other than the gulls, from the proposed management activities. While implementation of this management activity will be monitored to ascertain its site-specific consequences, this proposal contains no activities that have not received extensive testing elsewhere. No irreversible consequences or irretrievable commitments of resources have been identified.

No more than 2,850 nests (number of estimated nests located within treatment area) will be treated per year. While projections based on the Ram and Seal Island experiences with the proposed avicide suggest a range of 3,204 to 5,937 gulls which may be taken in the first year and

projections of 4,075 - 7,593 gulls taken over the four years, adoption of this alternative represents an incremental and overall environmentally insignificant increase from the baseline projected take of up to 2,500 birds under Alternative 1. This take will not have a significant environmental effect because no colony (of the estimated 470 herring gull and 397 great black-backed gull colonies region-wide in 1984-85) is being eliminated, the regional population estimates are likely underestimates of the number of existing colonies, and the actual effects on long-term gull populations and productivity are insubstantial.

Study of the environmental and socio-economic effects of the proposal has shown them not to represent a negative impact on the quality of the human environment.

Based on a review and evaluation of the attached Environmental Assessment entitled "Restoration of Avian Diversity on Monomoy National Wildlife Refuge", I have determined that removal of nesting herring and great black-backed gulls from a portion of Monomoy NWR using DRC-1339 gull toxicant does not constitute a major Federal Action which would significantly affect the quality of the human environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969. Therefore, the preparation of an Environmental Impact Statement is not required.

ACTING Cathy Short

Regional Director
U.S. Fish and Wildlife Service
Hadley, Massachusetts

5/6/96

Date

PREFACE TO THE FINAL ENVIRONMENTAL ASSESSMENT

This preface is intended to facilitate public review of the final EA. The preface contains a description of changes incorporated in the final document and a summary of the proposed action.

Changes from the Draft Environmental Assessment

Since the close of the public comment period on the draft EA, which extended from February 22, 1996 to April 8, 1996, the U.S. Fish and Wildlife Service has re-evaluated its proposals in light of public comments received (See Appendix E for a summary of public comments and Service responses). Changes reflected in this document include:

- Clarification of the history of complex interactions among terns, herring and great black-backed gulls, and avian predators that have affected the nesting success of terns on Monomoy NWR during the last 25 years (Section III.).
- Addition of documentation of gull depredation on piping plover nests on the refuge (Section III.).
- Clarification of other alternatives considered but not analyzed in EA (Section IV. and Appendix G).
- Expansion of plans to monitor proposed treatment area and collect specific data that will aid in evaluating the effectiveness of the gull removal program (Appendix F).
- Clarification of the history of gull control on the refuge since 1988 and revision of the projected number of nesting gulls to be removed in 1996 under Alternative 1 (No New Action: Continue Curent Management).
- Addition of potential negative consequences relative to the refuge's Canada goose breeding population.
- Definition and discussion of what the Service refers to as species diversity (Section I.).
- Further analysis of impacts of the Proposed Action and Alternative 3 on the regional breeding populations of herring and great black-backed gulls.
- Clarification of expected socio-economic impacts under each alternative.

Summary of the Proposed Action

Ongoing efforts to restore avian diversity on Monomoy National Wildlife Refuge (NWR) will be strengthened by implementing a gull removal program on the northern end of South Monomoy

Island using 1339 gull toxicant. Removal of nesting herring and great black-backed gulls from a specific area high in value to other, less abundant nesting bird species will be conducted in conjunction with management programs which are currently in place protecting nesting birds from human disturbance and predators (USFWS 1988). The U.S. Fish and Wildlife Service (Service) will be committed to all aspects of this restoration project by implementing long-term monitoring, and evaluating affects of proposed management actions on beach nesting birds, grassland nesting birds, and wetland nesting birds.

Overall, this proposal seeks to re-establish a wider diversity of nesting species on the refuge. The specific objectives are: (1) to increase piping plover abundance, thereby facilitating progress towards the Massachusetts Division of Fisheries and Wildlife's provisional abundance objective of 94 breeding pairs on South Monomoy Island while contributing to the overall recovery effort for the Atlantic Coast piping plover population; and (2) to increase nesting habitat opportunities for common, Arctic, roseate and least terns, laughing gull, black skimmer, willet, American oystercatcher, spotted sandpiper, and American black duck.

A primary purpose of the National Wildlife Refuge System is to conserve migratory birds, especially threatened and endangered species. Another priority goal is to preserve a natural diversity and abundance of flora and fauna on refuge lands. Despite recent declines in the regional and/or refuge populations of breeding herring and great black-backed gulls, under current management these gull species are expected to continue to dominate the majority of suitable habitat on the refuge and displace other nesting species indefinitely. Therefore, active management of the large herring and great black-backed gull colony on the refuge is necessary at this time to meet refuge objectives as well as legal mandates. The Proposed Action is in accordance with tasks outlined in the Recovery Plan for the threatened piping plover. This proposal re-emphasizes the Service's commitment to long term management of diverse nesting bird populations on Monomoy NWR.

Herring and great black-backed gull nests within the proposed treatment area on South Monomoy Island will be annually located and pre-baited with plain bread cubes (to enhance bait acceptance) during mid-May, beginning with the 1996 nesting season. Gull nests will then be baited with bread cubes treated with 1339 gull toxicant according to label procedures. A maximum of two treatments will be applied between May and June in 1996. Licensed pesticide applicators from the Department of Agriculture and the Service will bait nests with avicide. The avicide is highly toxic to gulls, and when applied to the nest (in accordance with label instructions), results in virtually no accidental poisoning of other species. Gull removal using the avicide is planned at least through the 1999 nesting season, with interim assessments conducted annually. The Service is committed to maintaining the proposed area free of nesting gulls after the avicide treatments have been completed, by using harassment, selective shooting, and/or productivity suppression techniques to discourage recruits from re-colonizing.

Proposed methods have resulted in successful restorations of seabird colonies and enhancement of avian diversity on several National Wildlife Refuge units in Maine since 1984, including Petit Manan Island, Seal Island, and Ship and Trumpet Islands. The National Audubon Society successfully employed these methods in a long term project initiated in 1973 to re-establish breeding Atlantic puffins and terns on Eastern Egg Rock in Maine. Seabird restoration projects

on other private, as well as State-owned, lands in Maine and Massachusetts have also had success with the proposed management activities.

No negative environmental consequences are anticipated from the use of this registered avicide, or with the removal of herring and great black-backed gulls from this relatively small portion of South Monomoy Island. This is not a plan to reduce gull populations in general; only herring and great black-backed gulls which are nesting in a specific area on one island. The current population of large gulls on Monomoy NWR exceeds historic levels (Forbush 1925). Increases in the population and distribution of these species both regionwide and locally have been attributed to the availability of human-generated food sources such as landfills and fish offal (i.e. fish industry waste) (Drury 1973-74; Griffin and Cavanagh, 1990). The need for action stems from adverse impacts on other nesting birds due to the high population of large gull species on North and South Monomoy Islands.

1. PURPOSE AND NEED FOR ACTION

The Service proposes to strengthen ongoing efforts to re-establish a wider diversity of nesting species on Monomoy National Wildlife Refuge (Map 1) and, ultimately, restore the integrity of the Monomoy ecosystem by removing nesting herring and great black-backed gulls from approximately 350 acres on the northern end of South Monomoy Island.[1] The primary objectives of the proposed management action are:

> (1) to increase piping plover abundance, thereby facilitating progress towards the Massachusetts Division of Fisheries and Wildlife's provisional abundance objective of 94 breeding pairs on South Monomoy Island while contributing to the overall recovery effort for the Atlantic Coast piping plover population, and;
>
> (2) to increase nesting habitat opportunities for common, Arctic, roseate and least terns, laughing gull, black skimmer, willet, American oystercatcher, spotted sandpiper, and American black duck.

The need for action stems from adverse impacts on other nesting birds due to the high population of large gull species on the refuge. Current populations and distribution of herring and great black-backed gulls in the Northeast exceed historic levels (Drury 1973-74; Andrews 1990). Prior to 1920, herring and great black-backed gulls were not known to nest in Massachusetts. Subsidized by human-supplied food sources, these gulls have extended their breeding range south from Maine and the Atlantic Provinces of Canada (Drury 1973-74). On Monomoy, herring gulls increased from 5 nesting pairs in 1963 to a peak of 15,300 pairs in 1984, and great black-backed gulls grew from zero prior to 1965 to more than 8,000 in 1990. Breeding populations of these two species have declined in recent years to an estimated 5,200 pairs of herring gulls and 7,350 pairs of great black-backed gulls in 1995, but these smaller populations continue to occupy virtually all suitable habitat on the refuge.

During a 3 year study of dynamics of the herring and great black-backed gull population on Monomoy NWR, Griffin and Cavanagh (1990) determined that gulls nesting on the refuge forage over virtually all of Cape Cod and portions of Cape Cod Bay, Nantucket Sound, and the Atlantic Ocean. Additionally, the study identified a direct relationship between use of a given landfill by large gull species and size of the human population using the facility. In comparing population trends, the rapid growth of the Monomoy herring and great black-backed gull colony appears to reflect growth of the year-round human population on Cape Cod over the last 30 years - 70,000 Cape residents in 1960; 148,000 in 1980; 187,868 in 1991 (Cape Cod Commission pers. comm.). Thus, the growth of the Monomoy herring and great black-backed gull colony can be attributed, at least in part, to the increased development of the Cape Cod area between 1960 and the late 1980's.

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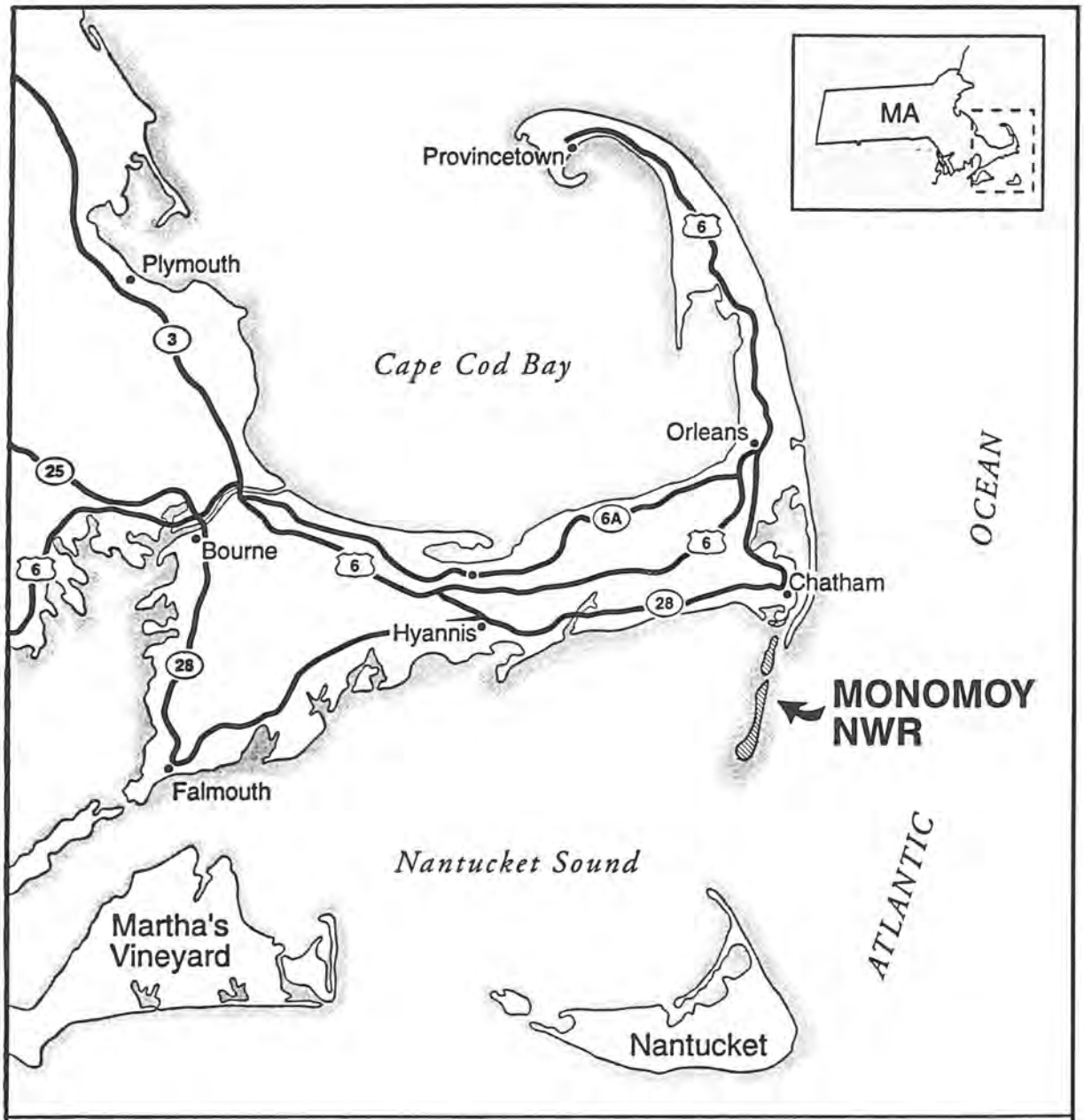
[1] A complete listing of scientific names for all animal and plant species in this document is provided in Appendices C and D, respectively.



Map 1 - Vicinity Map

While herring and great black-backed gull populations on Monomoy were increasing during the 1970's, populations of other species that breed in similar habitat were declining. Common terns fell from 4,000 breeding pairs in 1970 to less than 300 in 1995, while nesting roseate terns, Arctic terns, and laughing gulls have been displaced completely from the refuge. Three hundred pairs of least terns bred on the refuge in 1987, 28 pairs in 1995. The most immediate concern, however, is the impact of herring and great black-backed gulls on nesting opportunities for the threatened piping plover. Between 1983 and 1993, only 2 to 5 pairs of plovers per year nested on the refuge, despite substantial available habitat. The piping plover nesting population increased to 7 pairs in 1994 and 14 pairs in 1995. While encouraging, the rate of growth in the Monomoy plover population lags substantially behind that of nearby sites, and the presence of the gulls has been identified as the major factor retarding the rate of plover recovery on the refuge (Hecht, Atlantic Coast Piping Plover Recovery Team Leader, in litt., 1995; Hecht and von Oettingen, 1995; MacCallum, Massachusetts Division of Fisheries and Wildlife, in litt., 1993 and 1996). The Service has determined that additional management activities to enhance plover abundance on Monomoy NWR must be implemented to assure that the refuge's potential for contributing to the recovery of this threatened species is reached.[2]

The Service defines species diversity in terms of (1) species richness (the total number of species present), and (2) species evenness (the measure of how evenly distributed the number of individuals of different species are). Although species richness on the refuge has increased in recent years, species evenness has been distorted by large increases in nesting herring and great black-backed gull populations. In terms of the 14 nesting species regularly inventoried, herring and great black-backed gulls have increased from about 24% of the total number of individuals in 1966 to approximately 95% of total individuals in 1995 (See Appendix A).

In addition to the quantitative measures of species richness and species evenness, there are important qualitative aspects of a healthy wildlife community that the Service expects to improve through this project. For example, increasing the abundance of a rare species (such as the piping plover) or one on the edge if its range (such as the American oystercatcher) on Monomoy improves the probability that these species will persist there, even if the increase is too small (relative to large numbers of other species) to substantially change quantitative measures of refuge-wide species evenness. Increasing opportunities for currently unproductive species, such as the common tern, to become more productive would likewise represent a genuine improvement in the Monomoy wildlife community. Common and least terns on Monomoy could be far more resilient if they had the flexibility to move their nest sites in response to predation pressure, as they did when gull-free nesting habitat was abundant on the refuge.

II. AUTHORITY AND POLICY

The National Wildlife Refuge System Administration Act of 1966 defined the National Wildlife

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[2]Detailed information about vulnerability of this species to extinction and current threats are provided in the draft revised Atlantic Coast Piping Plover Recovery Plan (USFWS 1995).

Refuge System as including refuges or other areas established for restoration, preservation, development and management of wildlife and wildlife habitat. The Lacey Act of 1900 gave the Department of the Interior the authority to conserve, preserve and restore game birds and other wild birds. The Fish and Wildlife Act of 1956 authorized the Secretary of the Interior to take such steps as may be required for the development, advancement, management, conservation and protection of fish and wildlife resources. The Migratory Bird Treaty Act of 1918, as amended, established Federal responsibility for protection of the International Migratory Bird Resource. Herring and great black-backed gulls, and other migratory birds such as waterfowl, piping plover, tern spp., black skimmer, American oystercatcher, willet, and spotted sandpiper are protected under the Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712) as are their nests and eggs. Prohibited acts include pursuing, hunting, shooting, wounding, killing, trapping, capturing, and collecting of protected species, or attempting such conduct. Permitted exceptions listed in 50 C.F.R. Part 13 and Part 21 allow the Service to engage in control of depredating species when necessary.

The National Wildlife Refuge System has broad goals that are used as guidelines for managing individual refuges[3]. The primary goal is wildlife protection, including the preservation, restoration, and enhancement of threatened and endangered species and migratory birds. Another priority goal is to preserve a natural diversity and abundance of flora and fauna on refuge lands.

Regional Resource Plans link national policy direction to on-the-ground Service activities in specific geographic areas. The Northeast Regional Resource Plan directs implementation of several strategies to support tern breeding at Monomoy. Those strategies include controlling competition for nesting space and predation by other species.

Since 1994, Resource Priority Plans for the Service's ecosystem management areas have provided additional guidance for managing Service lands. Monomoy NWR is part of the Connecticut River/Long Island Sound Ecosystem which includes Dukes and Nantucket Counties and the western shoreline of Buzzards Bay. The Connecticut River/Long Island Sound Ecosystem team lists protection, resoration, and enhancement of beach strand species as a "special emphasis" within its resource priorities.

In 1970, Public Law 91-504 designated the Monomoy Wilderness, comprising about 2,600 acres on what was then Monomoy Island. The Service is mandated to manage the Monomoy Wilderness for the conservation of migratory birds in accordance with the provisions of the Wilderness Act of 1964. The Act requires Federal agencies to protect the natural processes of the ecosystem from degradation or interference and to preserve attributes of naturalness and solitude. Wildlife diversity is an integral component of the wilderness ecosystem. Where

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[3]A comprehensive outline of Service policy pertaining to refuge management that includes the mission and goals of the National Wildlife Refuge System is provided in the Service's Refuge Manual.

management actions are required to protect or restore wilderness qualities, the Service shall make use of methods and equipment which will accomplish the task with the least impact on wilderness character. This concept is often referred to as the "minimum tool" principle.

The Endangered Species Act of 1973 directs Federal agencies to carry out programs for the conservation of endangered and threatened species and to conserve the ecosystems upon which these species depend. Threatened bald eagles and endangered peregrine falcons both utilize Monomoy as a migratory stopover and are known to winter on the refuge. Threatened piping plovers use the islands for both nesting and staging. Endangered roseate terns frequent the refuge during the nesting and pre-migration season, as well, and historically nested on the Monomoy Islands.[4] Recent policy direction from the Secretary of Interior (USDI 1995) charges Federal agencies with fully meeting their responsibilities for threatened and endangered species recovery in order to reduce impacts of endangered species protection on other landowners.

III. BACKGROUND

Sections of the following summaries were taken from the Final Environmental Assessment, Colonial Seabird Management on Two Bush Island (Franklin Island NWR) and Little Two Bush Island (Maine Dept. of Inland Fish and Wildlife), February 1992; and the Final Environmental Assessment, Master Plan, Monomoy NWR, February 1988.

Herring and Great Black-backed Gull Trends

There is no convincing evidence that herring gulls nested in Massachusetts until relatively recent years. It is known that there were no colonies in Massachusetts in the 19th century and that colonies in Maine were limited to remote islands "down east" (Drury 1973-74). The millinery trade of the late 1800's, as well as egging and sheep pasturing restricted colonies in Maine and the Maritimes. Audubon had to travel to Labrador to observe great black-backed gulls and Bent found them nesting only south to Nova Scotia in 1912. However, with protection and availability of abundant artificial food sources (dumps and fish offal) the New England population of these two gulls increased exponentially between 1900 and 1945 (Drury 1973-74). By 1977, the New England populations of nesting herring and great black-backed gulls had reached more than 40,000 and 8,000 pairs, respectively (Erwin 1979). And in 1984, herring and great black-backed gull populations in Massachusetts alone were estimated at 35,655 nesting pairs and 10,768 nesting pairs, respectively (Andrews 1990). Current data suggests that the statewide herring gull population is now declining (17,583 pairs in 1995), while the great black-backed population is still increasing (15,078 pairs in 1995; B. Blodget, MDFW, pers. comm.).

Herring gulls and great black-backed gulls breed in wide-spread colonies along the Atlantic Coast from the Carolinas north to Canada, Iceland and Europe. Herring gulls also nest in significant

[4]Detailed information about the population status of this species and threats are provided in the Northeast Roseate Tern Recovery Plan (USFWS 1989).

numbers inland in the Great Lakes and interior Canada, while great black-backed gulls nest only in small numbers in the Great Lakes.

Regionwide surveys for colonial nesting waterbirds were conducted for the Northeastern part of the Atlantic Coast in 1977, 1984-85, and 1994-95. This includes all coastal areas from Maine to Virginia inland to the Fall line. The statistics generated from these surveys are used as estimates of the breeding population. Since estimates of variance are not known for any of the species surveyed, the most appropriate uses of this survey data for various species are as indices of population trends. All known breeding colonies are surveyed using standardized procedures. However, all breeding colonies are not found for all species within this survey area. Therefore, this survey represents an adequate census for the common tern and a good index to population trend for the great blue heron.

There are numerous breeding colonies of herring and great black-backed gulls scattered throughout this survey area, and the percentage of colonies surveyed is not known. This survey provides breeding population trends for these two species, and a crude breeding population estimate that is not defined by a measure of error. Therefore any interpretation of actual population numbers is subject to scrutiny with regard to population size. This is the best available data on population trends for these species. However, it is likely that the actual regional breeding populations for both species is higher than the population indices generated by this survey for both species (G. Haas, USFWS, pers. comm.).

In the Northeast, the herring gull population index was estimated as 91,995 pairs in 1977 (Erwin and Korschgen 1979), 108,014 pairs in the 1984-85 period (Andrews 1990) and 61,103 pairs in the 1994-95 period (B. Hoover, National Biological Survey, pers. comm.). A significant portion of the difference between the 1977 and 1984-85 indices was attributed to an underestimate of herring gulls on the Monomoy Islands in 1977 (Andrews 1990). However, the current regional population trend for herring gulls represents a declining breeding population. Limited food sources during the winter period is thought to be the major factor contributing to this decline (Haas, per. comm.).

Similarly, the great black-backed gull population index was estimated as 17,405 pairs in 1977, 30,782 pairs in the 1984-85 period, and 40,700 pairs in the 1994-95 period. The current great black-backed gull population trend represents an increasing breeding population.

Interactions Between Gulls and Other Species

Herring and great black-backed gulls begin breeding earlier in the season than the smaller colonial seabirds, and gradually excluded such species from many islands in New England (Drury 1965; Nisbet 1973). Displacement by the larger gulls can cause terns and laughing gulls to nest in marginally suitable habitat, such as sites prone to flooding or storm-tides, or sites easily accessible to mainland-based predators. The large gulls not only crowd out the terns, but also prey on their eggs and young (Hatch 1970; Kress 1985).

Specific examples of gulls crowding out terns and laughing gulls from nesting islands have been recorded in Massachusetts, including Tern Island in 1963, Ram Island and Bird Island in 1965-66 (Drury 1965), Milk Island, Penikese Island, Great Weepecket and Muskeget Islands between the 1930s and 1940s (Church et al. 1954). Terns will not establish new colonies on islands overrun with gulls (Nisbet 1970). When nesting opportunities are limited, terns are not able to make seasonal movements that are, as Nisbet (1970) suggests, necessary to maintaining healthy populations and to carry individual colonies over bad years.

Until 1985, numbers of nesting terns on Monomoy NWR remained comparable to the impressive populations of the early 1970's (Appendix A). Productivity, however, began to decline in 1978. Displacement by large gulls may have made the terns more vulnerable to predators by concentrating them in fewer locations. Other formerly used tern colony sites on the islands had become overrun by herring and great black-backed gulls (USFWS 1988). Gulls were also most likely responsible for the displacement of terns on South Monomoy in 1971. A variety of predators (Nisbet and Welton 1984; Nisbet and Forster 1980), storm-tides and shrinking habitat options may all have contributed to virtually no tern productivity between 1980 and 1994 (Fitch 1985; USFWS, unpubl. repts., 1985-1994).

MacIvor (unpubl. repts., 1986-1988) observed gulls depredating piping plover nests on outer Cape Cod. In fact, she attributed 100% of piping plover nest failures in 1988 on Monomoy NWR to herring and great black-backed gulls. In addition to direct predation on piping plovers, herring and great black-backed gulls usurp plover nesting space and may cause plovers to abandon former nesting areas. Raithel (1984) noted that piping plovers no longer nest on the northern tip of Block Island where a large gull colony now occurs. Cross (1988) attributed the absence of breeding plovers on South Metompkin Island (contrasted with 30 pairs and 5 pairs, respectively, on islands immediately to the north and south) to intimidation and nest site competition from 2,000+ pairs of herring gulls. Cartar (1976) suggested that invading gulls were a major factor in plover nest destruction at Long Point, Ontario. The Massachusetts Division of Fisheries and Wildlife (MDFW), in its comments on the Proposed Rule for Federally listing the piping plover (1985) speculated that the tremendous increase in herring gulls on Monomoy NWR since 1960 may have resulted in gull predation on plover chicks. MacIvor also suggested that gulls may be affecting plover nesting on Monomoy by interfering with establishment of territories and courtship activities (USFWS 1988).

The large gulls are also known to prey on many species of waterfowl. (B. Blodget pers. comm.; Bellrose 1980). On Seal Island in Maine, common eider ducklings are especially vulnerable as they attempt the overland journey from the nest site to water (Baird 1988; H. Heusemann, MDFW, pers. comm.). While gull predation on nesting waterfowl species on Monomoy NWR has not been documented, Service biologists believe that nesting waterfowl are subjected to a high level of harassment and predation, especially since several species are known to nest up to a mile from water (Bellrose 1980).

Although American black duck and Canada geese are often found nesting in dense patches of vegetation throughout both islands, the primary waterfowl nesting and brooding area is located

in the vicinity of freshwater wetlands on South Monomoy Island. These wetlands are situated within a dense section of the herring and great black-backed gull colony and are frequented by large numbers of gulls daily. Brood sizes for species such as mallard, American black duck (a species of special concern in the Atlantic Flyway), and gadwall recorded during recent annual surveys are noticeably less than incidental observations of clutch size earlier in the season (E. Moses, D. Burke, and S. Ware, pers. obs.).

History of Gull Control in the Northeast

Gulls have been commonly controlled at landfills, airports, reservoirs, and seabird colonies for about 50 years. As gull numbers increased, many biologists and public officials recognized the need for additional local control. Thomas (1972) recognized the need for gull removal when damage to other bird populations was occurring. Tyler (1975) of the Maine Critical Areas Program recommended site-specific gull removal as a tern management strategy. The Massachusetts Audubon Society (Nisbet 1971) recommended gull removal and harassment of gulls to protect tern colonies and other nesting seabirds on certain Maine Islands. The National Audubon Society (1985) adopted a resolution supporting the conservative use of gull control techniques, including tested avicides, where necessary to protect vulnerable species and maintain avian diversity. And the Service's Endangered Species Office, believing that nesting gulls pose a substantial threat to piping plovers and other nesting shorebirds on-site, has encouraged the National Park Service to control a herring and great black-backed gull colony at Breezy Point, New York (Kaufman, in litt., 1992; Nickerson, in litt., 1994).

In recent years, successful applications of DRC 1339 gull toxicant have been carried out in Maine in conjunction with projects to restore colonies of terns and Atlantic Puffins. In 1973, Dr. Stephen Kress of the National Audubon Society initiated a long term project to restore puffins and terns at Eastern Egg Rock, an island in Muscongus Bay. In 1974 and 1975, the established gull colony was removed with 1339 gull toxicant and in the following years gulls attempting to nest were discouraged by shooting and nest disruption. In 1980, terns nested there for the first time since 1937 and the island has subsequently become a major nesting site for three tern species, including over 80 pairs of endangered roseates, and puffins (Kress 1983). In 1971 and 1986, the National Audubon Society also requested application of the avicide at Matinicus Rock, an important site for terns and other seabirds which were declining due to increasing numbers of gulls.

In 1984, the Service used 1339 gull toxicant to help restore a mixed tern colony to Petit Manan Island, a National Wildlife Refuge in Maine. Once the site of a thriving tern colony consisting of Arctic, common, and roseate terns, large gulls moved in after the light was automated and the lighthouse abandoned in the the mid-70's. All nesting terns had left by 1980 (Drennan et al. 1986). Terns returned to the island within three weeks of gull removal and the colony now has the largest nesting population on the Maine Coast. At Seal Island NWR where Dr. Kress was attempting to restore puffin and tern colonies, removal of gulls with 1339 gull toxicant was initiated in 1984. In 1989, Arctic terns nested there for the first time in nearly 40 years. The Service prepared Environmental Assessments and Findings of No Significant Impacts for both

restoration projects.

Gull control was initiated in 1993 as part of a tern restoration project on Ship and Trumpet Islands in Blue Hill Bay, Maine. By removing territorial gulls with 1339 gull toxicant, and establishing tern decoys and tape recordings on one portion of Ship Island, Service biologists and researchers from the College of the Atlantic encouraged common terns to nest after a 52 year absence (J. Megyesi, Petit Manan NWR, pers. comm.).

Locally, restoration of a former tern colony on Ram Island, owned by the MDFW, was accomplished with the help of this effective, registered avicide. Ram Island once supported one of the largest common and roseate tern colonies in Massachusetts. The terns, however, were displaced by nesting herring and great black-backed gulls in the early 1970's. In 1993, following two years of gull removal and one year of harassment (by shooting), common and roseate terns established a nesting colony of 93 pairs and two pairs, respectively. Numbers of roseates increased to 76 breeding pairs in 1994 and to 197 pairs in 1995. Four-hundred thirty one breeding pairs of common terns and 37 breeding pairs of least terns were also present in 1995. (B. Blodget pers. comm.)

History of Gull Control on Monomoy NWR

During the 1970's, tern populations on Monomoy became restricted in area and declined in numbers, while nesting herring and great black-backed gull populations increased to very high levels and expanded to occupy extensive areas of the refuge, including former locations of tern colonies.

In 1979, the Service made a preliminary effort to protect a large tern colony on North Monomoy Island (the only colony remaining on the refuge) from encroaching herring and great black-backed gulls. Active gull nests were sprayed with an oil-formaldehyde mixture, which inhibits egg hatching, and at least 45 adult herring gulls were shot in a buffer zone adjacent to the nesting terns.

In 1980, a more comprehensive program was initiated. In addition to shooting and trapping nesting gulls from a buffer zone around the terns, the plan called for creation of a 130 acre alternate tern nesting area at a former colony site on South Monomoy Island using 1339 gull toxicant to clear gulls from the area. The first of two planned annual applications was administered in June 1980. Reduction in the number of nesting herring and great black-backed gulls was achieved. However, the avicide program was suspended after the first treatment due to the negative reaction that ensued from some segments of the public.

Subsequently, control efforts through 1984 were focused on reducing the number of nesting gulls on only the North Monomoy Island using shooting, hazing devices, scarecrows, and nest destruction. While this program did prevent gulls from expanding their colony, it was unsuccessful in reducing gull populations (Lortie et. al. 1985).

Gull control subsequent to 1988 is described under Alternative 1.

IV. ALTERNATIVES INCLUDING THE PROPOSED ACTION

Alternatives considered by the Service but not analyzed in this EA included methods to clear gulls from the treatment area in the proposed action or the entire refuge using shooting, harassment, and/or productivity suppression. A description of these techniques, and the reason(s) why they were not selected for inclusion in the EA is found in Appendix G. Reasons for rejecting these techniques generally fell into one or more of the following categories:

- The technique causes unacceptable levels of disturbance or damage to other wildlife species on the site, including the species that this project is intended to benefit.

- The technique allows breeding herring and great black-backed gulls to continue to nest in the treatment area for the duration of their natural life-span. Since these gull species are long-lived (15 to 20 years), they will continue to occupy habitat and exclude other species. Furthermore, continued presence of the nesting gulls will continue to attract new and younger gulls into the colony, perpetuating the problem beyond the life-span of its current occupants.

- The technique is impractical, especially for implementation on the scale needed to provide gull-free areas that are larger than the small fragmented areas being maintained under the No New Action Alternative (Alternative 1).

Many of the techniques discussed in Appendix G were unsuccessfully employed in a 1982-84 effort by the Service and Massachusetts Audubon Society to remove gulls from North Monomoy Island. Despite the nearly full-time efforts of two to three employees during two to four months of the year, the gull population on North Monomoy declined less than 2% during this time and actually increased over the entire refuge. Furthermore, these activities caused disturbance to non-target species, including piping plovers, harbor seals, short-eared owls, and waterfowl (USFWS 1988).

One commentator on the draft EA suggested that the Service consider alternatives of (1) removing only great black-backed gulls or (2) removing only non-breeding gulls from the treatment area.

1. Controlling only great black-backed gulls in the treatment area was not proposed because observations by Service personnel on Monomoy and in Maine show that both species contribute to displacement of other nesting birds. For example, by 1980, gulls had substantially displaced terns on Monomoy, despite the fact that great black-backed gulls at that time comprised less than 20% of the large gull population. Herring gulls have been the primary species implicated in exclusion of plovers at several other Atlantic Coast sites (Hecht, pers. comm.). Removal of only great black-backed gulls from the treatment

area would be ineffective. However, the Service believes that an advantage of the treatment area described in the Proposed Action is that it contains lower numbers of both gull species and a lower proportion of herring gulls than another potential treatment area at the south end of South Monomoy Island. In 1995, the proposed treatment area was occupied by 1,850 pairs of great black-backed gulls (25% of the total Monomoy great black-backed population) but only 1,000 pairs of herring gulls (20% of the total Monomoy herring gull population).

2. Removal of only non-breeding gulls is not proposed because the Service believes that removal of nesting gulls will reduce the density of gulls in the treatment area to a level that other species can tolerate, as they do on other Cape Cod sites. Furthermore, DRC-1339 is only approved for application at established gull nests. Under the proposed action, following treatment of nesting gulls with DRC-1339, selective shooting may be used to remove non-breeding gulls that are observed depredating nests of other species. However, the Service believes that attempting large-scale removal of non-breeding gulls using shooting and harassment would cause unacceptable levels of disturbance to other species (see Appendix G).

An element common to the four Alternatives analyzed in the following discussion is that management programs currently in place protecting nesting birds from human disturbance and predators would be continued. These include seasonally restricting public use in areas of high value to sensitive wildlife species, monitoring piping plover and tern nesting areas, use of piping plover predator exclosures, prohibiting dogs on the island portions of the refuge, and preventing re-establishment of the islands by mammalian predators (USFWS 1988).

Under the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality defines two types of No Action alternatives. One type involves continuation by an agency of a management/operations plan currently in place (e.g., Alternative 1 described below). The other is when, literally, no federal action would occur at all (e.g., Alternative 4 described below).

ALTERNATIVE 1. No New Action: Continue Current Gull Management

Under this alternative, gull management would continue as provided in the 1988 Monomoy Master Plan (USFWS 1988). Although the Master Plan listed DRC 1339 as one of several tools that might be employed to achieve gull-free habitat, this gull control technique has not been utilized at Monomoy during the intervening years. Therefore, for the purposes of this EA, the use of DRC 1339 as provided for by the Master Plan is specifically excluded from the no new action alternative.

Creation and/or maintenance of gull-free habitat and a buffer zone is a major component of the Monomoy Master Plan and was intended to re-establish and perpetuate a natural diversity and abundance of refuge wildlife (USFWS 1988). It has guided avian diversity restoration efforts to date but with little success. The Master Plan envisioned maintaining up to 210 acres of gull-free

habitat scattered throughout the refuge. Harrasment, selective shooting, productivity suppression and DRC 1339 were identified as suitable methods to be used. Table 1 describes the acreages of both suitable nesting habitats for seven species targeted for enhancement and the areas to be maintained gull-free.

To this end, maintenance of existing gull-free habitat for other beach nesting species between 1988 and 1992 was attempted through the destruction of gull nests and eggs. In 1993 and 1994, Migratory Bird Treaty Act permits were issued for the take of herring and great black-backed gulls (using selective shooting) within the the 210 acres, with the objective of removing up to 5,000 birds (combined species total). Due to the fact that these gulls quickly adapt to stay clear of shooting range, this method resulted in an effective take of less than 1,500 birds in 1993 and less than 200 birds in 1994. Observations of large numbers of herring and great black-backed gulls nesting and loafing in the vicinity of less abundant nesting species prompted reconsideration of management alternatives following the 1994 field season. Breeding laughing gull and least tern numbers have continued to decline on the refuge since 1988. The common tern population on the refuge shrank between 1988 and 1993, and, although the breeding population increased slightly during the last 2 years, productivity remained poor.

In the event that suitable gull-free habitat for competing species falls below the minimum acreage listed in Table 1, nesting herring and great black-backed gulls would be removed from the best potential habitat. Acres maintained gull-free would be sufficient to provide a total number of acres of suitable habitat for listed competing species within the range specified in Table 1.

Because wildlife on the refuge may shift their nesting areas from year to year and geomorphological processes are continually forming new habitat, it is not possible to predict if or where gull removal would be needed.

Other nesting species throughout both islands would be monitored throughout the nesting season. Evaluation of gull control effects on other nesting species would be similar to that proposed in Appendix F, except that gulls taken by shooting (rather than by DRC 1339 gull toxicant) would be used to generate morphometric models to predict gender. The effectiveness of the gull management program would be evaluated annually.

Table 1. Suitable Nesting Habitat to be Maintained Gull-Free under Alternative 1.

SPECIES	SUITABLE NESTING HABITAT	TOTAL ACRES TO BE MAINTAINED GULL-FREE
common, roseate, and Arctic tern; black skimmer	Beaches and dunes lightly vegetated with beachgrass, dusty miller, and sea rocket, interspersed with denser stands of beach grass. Habitat should be at least 2-3 feet above mean high tide. Minimize proximity to owls, black-crowned night herons, and herring and great black-backed gulls.	50-100
least tern	Unvegetated or very sparsely vegetated beach, preferably within 100 meters of water.	10-50
laughing gull	Dense stands of tall beach grass.	10-20
piping plover	Foredunes, dune blowouts, and washovers about 2 feet above mean high tide.	20-40
		Total= 90-210 acres

ALTERNATIVE 2. Removal of Gulls from Part of South Monomoy Island (Proposed Action)

This alternative differs from Alternative 1 in several ways. It includes the use of DRC-1339 gull toxicant as provided for (but not used) in the 1988 Monomoy NWR Master Plan, and focuses on contiguous gull-free habitat rather than scattered areas. The acreage to be established gull-free under this alternative was increased from a maximum of 210 acres (under Alternative 1) to approximately 350 acres. Additionally, the criteria for the type of habitat under the 1988 Monomoy Master Plan (see Table 1) places emphasis on the best potential habitat. This alternative reflects the Service's belief that the amount of contiguous habitat, not just acreage, is another component of habitat quality.

Subsequent to adoption of the 1988 Master Plan, it was observed that while scattered areas of gull-free habitat may have provided some benefit for nesting piping plovers, it only perpetuated unfavorable nesting conditions for common terns, laughing gulls, and other species. Aside from the relative ineffectiveness of gull control measures used in 1988-1994, the Service believes that

an area of unfragmented gull-free habitat will result in greater benefit to other nesting species (including the piping plover) than the current management approach (Alternative 1).

Under this alternative, efforts to restore diversity of nesting species would be focused on the northern portion of South Monomoy Island (Map 2), an area identified as valuable habitat to nesting endangered species and other, less abundant nesting species. Removal of nesting herring and great black-backed gulls would be accomplished using DRC 1339 gull toxicant, a registered avicide. The proposed treatment area is an estimated 2.5 mile long stretch located immediately north of the narrowest section of South Monomoy Island often referred to as the "false break". This narrow washover represents a geographical break separating the proposed treatment area from the rest of the herring and great black-backed gull colony on the island. The amount of habitat occupied by nesting gulls within the proposed area is approximately 350 acres. In 1995, an estimated 1,000 pairs of herring gulls and 1,850 pairs of great black-backed gulls nested within the treatment area shown in Map 2. No more than 2,850 gull nests (1995 estimated number of nests in proposed area) would be treated per year. Other areas on North and South Monomoy Islands, where an estimated 9,700 gull pairs (4,200 pairs of herring gulls and 5,500 pairs of great black-backed) nested in 1995, would not receive avicide baits.

Ideally, by placing avicide-treated baits in a gull nest, at least one member of every nesting pair receives baits. In actual practice, however, the effectiveness of DRC 1339 is variable depending on colony density (aggressive individuals may steal 1339 baits from neighbors' nests) and the presence of duplicate or inactive nests (inactive nests, mistaken for active ones, may be baited unnecessarily) (Blodget and Henze, 1992, B. Benedict, Petit Manan NWR, pers. comm.).

Herring and great black-backed gull nests within the treatment area would be annually located and pre-baited with plain bread cubes in mid-May, beginning with the 1996 breeding season.

Soon after, gull nests would be baited with bread cubes treated with 1339 gull toxicant (exact dates will depend on weather and nesting chronology variations). Within three weeks of the initial avicide treatment, the bait would again be applied to large gull nests in the designated area. Unconsumed bait will be collected and buried, however, past experience at other sites has shown that virtually all of the bait is eaten by the gulls. Most of the birds become lethargic within 12 hours after ingesting the bait. They then become comatose and die passively from kidney failure and congestion of major organs within 24-48 hours, usually at the nest. Additional background information on 1339 gull toxicant, an avicide registered with the U.S. Environmental Protection Agency, is provided in Appendix B. Licensed pesticide applicators from the U.S. Department of Agriculture would bait nests with avicide and supervise licensed applicators from the Service.

Appropriate measures would be taken during gull control operations to minimize disturbance to other nesting species. These measures would include surveying the designated area prior to pre-baiting gull nests to identify areas where terns, piping plovers, and other species may be nesting. If other nesting species are present, minimal time and number of people would be used to remove herring and great black-backed gulls in their vicinity.

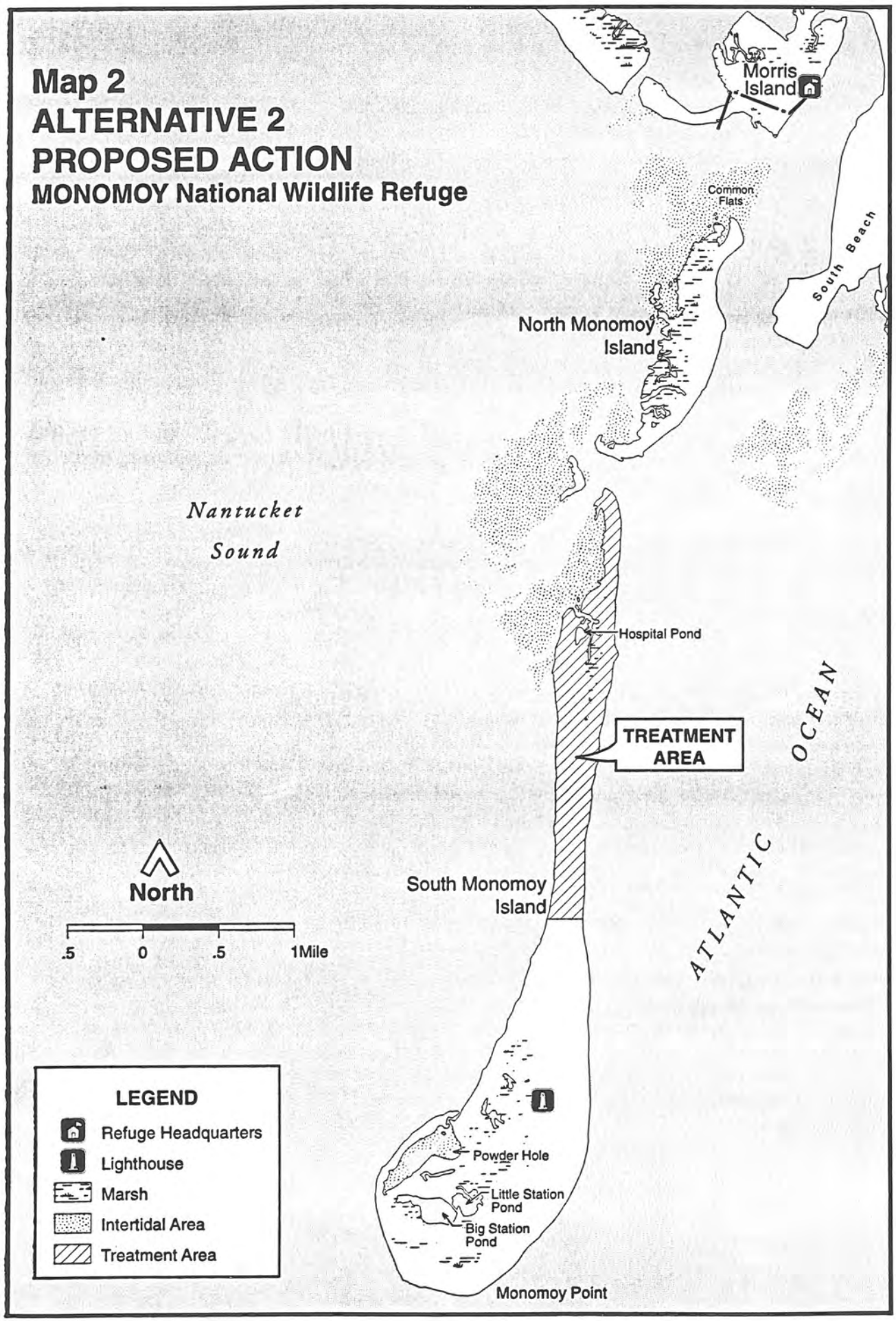
Thorough searches of the proposed treatment area and neighboring sites for gull carcasses would be initiated within 24 hours after avicide applications, and continue for several days. Gull carcasses recovered on the island would be promptly buried on-site; those recovered on the mainland would be transported to a pre-determined mainland site for burial. The Service will attempt to accommodate requests from scientific institutions for gull carcasses.

Refuge personnel would be available to pick up any gull carcasses reported on the mainland beginning within 12 hours after each avicide treatment and continuing for several days. News releases to the local media, wildlife rehabilitators, and Town offices would keep the public informed of upcoming dates of avicide treatments and where to report sightings of sick gulls or gull carcasses.

Following the second 1339 avicide application of each season, any herring and great black-backed gull nests found within the treatment area would be destroyed and individuals trying to establish new nests within the treatment area discouraged using harassment techniques or selective shooting. Appropriate measures would be taken to avoid disturbance to piping plovers, terns, and other species nesting nearby.

The avicide portion of this alternative would continue through the 1999 nesting season. During this period, the treatment area would be monitored closely throughout each nesting season and the effectiveness of 1339 gull toxicant evaluated annually. The Service is developing a protocol for evaluating the proposed action. In general, the effects of the proposed treatment would be compared using the treatment area and one or more untreated areas as controls. See Appendix F for a full description of the monitoring program proposed. In addition, since very little documentation currently exists on gull interactions with grassland nesting birds, monitoring of grassland nesting birds on both islands using standardized breeding bird survey techniques may be initiated in 1996 if time and availability of qualified personnel permits. The need for continued use of avicide (and/or other techniques to discourage recruits from re-colonizing) within the designated area, and possibly elsewhere on the refuge, would be evaluated following the 1999 nesting season. An informed decision concerning future use of both lethal and non-lethal gull control techniques would be made at that time. An analysis of the appropriate level of NEPA compliance would occur prior to any avicide use beyond the four years of treatment proposed.

Public outreach would consist primarily of informative news releases and feature articles in the Great Meadows NWR Complex's quarterly update. Outreach efforts may be expanded in future years by developing an on-site interpretive display or providing off-site group presentations and/or educational programs, as budget and personnel constraints allow.


Map 2
ALTERNATIVE 2
PROPOSED ACTION
MONOMOY National Wildlife Refuge
Morris Island
Common Flats
South Beach
North Monomoy Island
Nantucket Sound
Hospital Pond
TREATMENT AREA
ATLANTIC OCEAN
North
.5 0 .5 1Mile
South Monomoy Island
Powder Hole
Little Station Pond
Big Station Pond
Monomoy Point
LEGEND
Refuge Headquarters
Lighthouse
Marsh
Intertidal Area
Treatment Area

ALTERNATIVE 3. Refuge-wide Gull Removal

This alternative seeks to re-establish a wider diversity of nesting species on Monomoy NWR through complete removal of nesting herring and great black-backed gulls on both North and South Monomoy Islands using 1339 gull toxicant. Removal of nesting herring and great black-backed gulls, follow-up maintenance and monitoring, and public outreach/notification would be conducted according to procedures and time-frames outlined in Alternative 2 (Proposed Action).

Under this alternative, approximately 12,550 nesting gull pairs (5,200 pairs of herring gulls and 7,350 pairs of great black-backed gulls) would be subject to removal. No more than 12,550 gull nests (1995 estimated number of nests in proposed area) would be treated per year.

ALTERNATIVE 4. No Action: Abandon All Gull Control Efforts

Under this alternative, all gull control on both islands would be suspended indefinitely. Since 1989, management of herring and great black-backed gull nesting populations has included selective shooting of gulls and nest destruction. Both islands would continue to be monitored closely during the nesting season.

V. AFFECTED ENVIRONMENT

A. Physical Resources

The Monomoy Islands make up the bulk of Monomoy National Wildlife Refuge in the town of Chatham, Barnstable County, Massachusetts. The refuge consists of a 40 acre parcel on Morris Island (which is connected to the mainland by a causeway), as well as North and South Monomoy Islands. The ephemeral configuration of the islands makes it difficult to accurately state their size. In 1984, they encompassed approximately 2,750 acres. North Monomoy Island is an estimated 2.0 miles long and 0.5 miles wide. South Monomoy Island is approximately 5.5 miles long and 1.5 miles across at its widest point.

Nearly a third of the upland area on the islands is devoid of vegetation. Beachgrass is the most common plant species present. Seaside goldenrod, dusty miller, beach pea, sea rocket, and other coastal plants are scattered through the beachgrass. False heather and lichens cover many level areas. Woody vegetation is largely restricted to poison ivy, bayberry, and beach plum. A few pitch pines, black pines, and beaked willows, all less than 15 feet high, grow on South Monomoy Island. There are many large clumps of exotic salt spray rose.

A thorough assessment of refuge beaches conducted by Service and MDFW biologists in 1995 found all of the prime piping plover habitat to be located on South Monomoy Island. Suitability of habitat for breeding plovers was evaluated using a ranking scheme developed by MDFW (1996). To summarize, sections of beach with abundant suitable nesting habitat and with feeding

habitat available along both an ocean-side beach and a pond, bay, estuary, or salt marsh were assigned the highest rank of "A+". Sections of beach with abundant nesting habitat but only ocean-side feeding opportunities were ranked "A". Sections of beach where suitable nest sites or feeding habitat were less abundant because of narrow beach width, low elevation, steepness of foredune, dense vegetation, rocky or cobbly substrate on the beach or in intertidal areas, or heavy pedestrian use were assigned rankings between A-/B+ and C. Habitat believed unlikely to be used by nesting plovers was ranked "D". Estimates of quantity and quality of plover habitat on South Monomoy, based on these criteria, are shown in Table 2 (See Map 3, also).

Table 2. Piping Plover Habitat on South Monomoy Island (MDFW 1996).

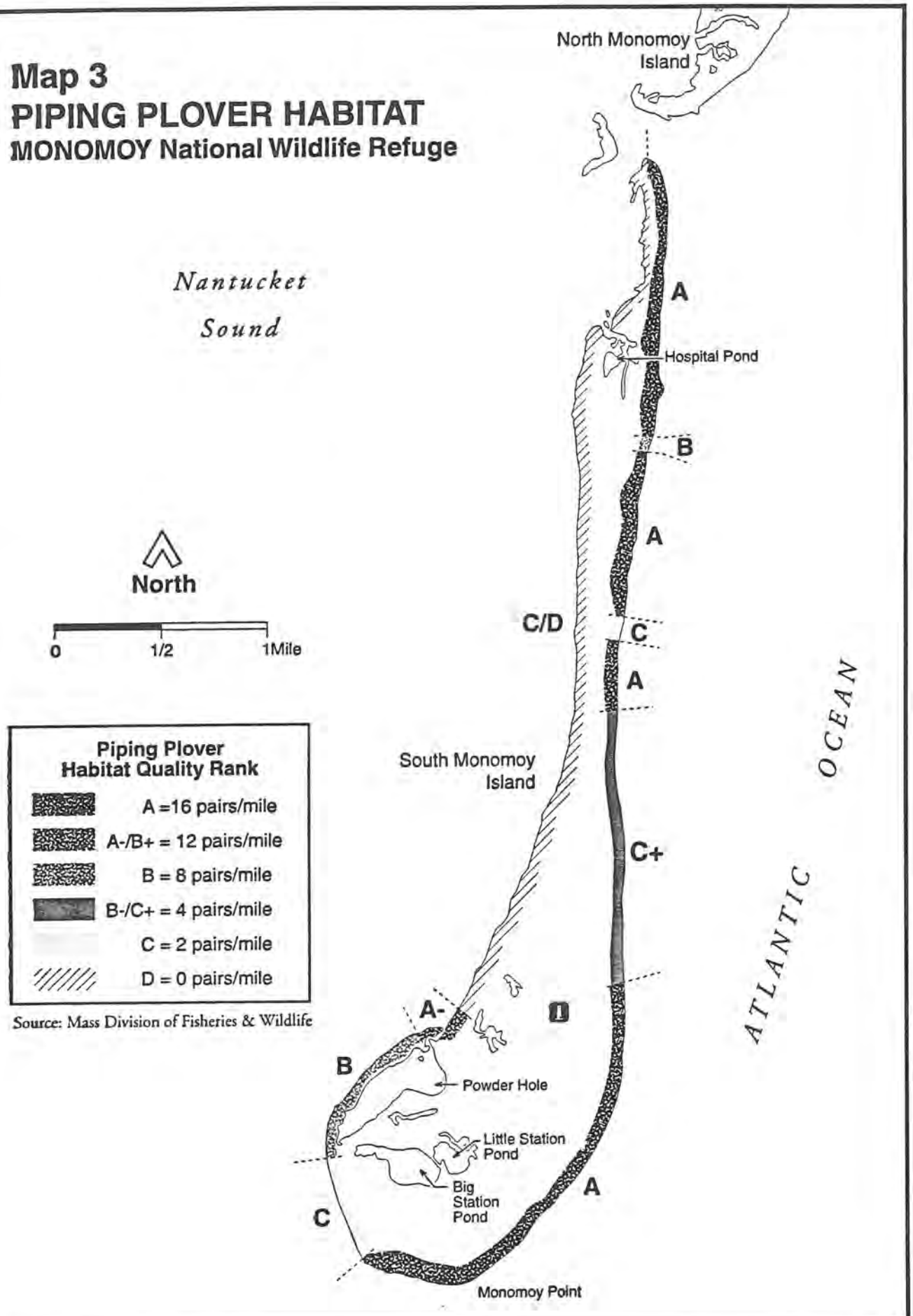
Rank (per MDFW)	Linear Miles of Piping Plover Habitat	Estimated Capacity (plover pairs/mile)	Estimated Capacity on Monomoy NWR (plover pairs)
A	5.0	16	80
A-/B+	0.5	12	6
B	0.1	8	1
B-/C+	1.2	4	5
C	0.8	2	2
			Total = 94

Saltmarshes, totalling about 150 acres, are located at the north end of South Monomoy Island and along the west side of North Monomoy Island. Vegetation consists of regular and short-form saltmarsh cordgrass with a broad border of saltmarsh hay, mixed with saltgrass, black grass, and other occasional herbaceous species. The freshwater ponds and marshes, which cover more than 135 acres on South Monomoy Island, host cat-tail, pond lilies, and phragmites.

The Monomoy Lighthouse Complex, located on South Monomoy Island, consists of a light tower, keeper's residence, and generator shed. Monomoy Light is listed on the National Register of Historic Places. The Cape Cod Museum of Natural History, under cooperative agreement with the Service, maintains and uses the facility to conduct overnight cultural history and natural history tours.

Designated in 1970, Monomoy Wilderness Area encompasses the Monomoy Islands with the exclusion of two tracts totalling 260 acres. The largely unaltered character of the landscape dominated by dunes, sandflats, marsh, and the surrounding ocean, contributes greatly to the wilderness character of the islands.

Map 3
PIPING PLOVER HABITAT
MONOMOY National Wildlife Refuge



Source: Mass Division of Fisheries & Wildlife

2/96

B. Biological Resources

Historically, the Monomoy Islands supported an incredible variety and abundance of nesting birds. Nesting shorebird species have included the threatened piping plover, spotted sandpiper, American oystercatcher, black skimmer, and willet. Colonial nesting species have included the common tern, endangered roseate tern, Arctic tern, least tern, herring gull, great black-backed gull, laughing gull, black-crowned night heron, snowy egret, and glossy ibis. Freshwater ponds on South Monomoy Island attract a variety of breeding waterfowl, including Canada goose, American black duck, gadwall, ruddy duck, northern pintail, and green-winged and blue-winged teal. Nesting raptors have included short-eared owl, great horned owl, and northern harrier. Consult Appendix A for the current status of the regularly inventoried species.

Between 1965 and 1980, Monomoy supported one or more of the largest mixed tern colonies in the Northeast. Until 1979, nesting populations ranged from 2,000 to 4,000 pairs. Most of these were common terns, but several hundred pairs of roseates were also present. Arctic terns, on the southern edge of their range, never numbered more than three or four dozen pairs. In 1970, there were three least tern colonies totalling 200 pairs. Least terns peaked at 300 nesting pairs in 1987. Laughing gulls first colonized Monomoy in 1971. Their numbers rose steadily through the 1970's, peaking at 1,000 pairs in 1981. Currently, common and least terns (approximately 289 pairs and 28 pairs, respectively,) represent the only colonial nesting seabirds (other than the large gulls) breeding on the refuge. Laughing gulls abandoned their nesting efforts on the refuge following the 1993 season.

Since 1993, nesting terns have been divided among 2 separate colonies; a common tern colony occurs on North Monomoy Island, while a mixed colony of common and least terns occurs on the north end of South Monomoy Island.

Griscom and Snyder reported 15 pairs of piping plovers on Monomoy in 1955. Between 1983 and 1993, only 2 to 5 pairs of plovers per year nested on the refuge, despite substantial available habitat. The piping plover population increased to 7 pairs in 1994 and 14 pairs in 1995. Based on the amount and quality of suitable habitat available on the refuge, the carrying capacity for piping plovers is estimated to be 94 breeding pairs (MDFW 1996). This estimate is based solely on physical attributes of the habitat; the effects of large concentrations of herring and great black-backed gulls on quality of habitat were not considered.

Since 1990, nesting plovers on the refuge have been found only on South Monomoy Island. Loose concentrations of nesting pairs have been located in two relatively gull-free areas; the north tip of the island (3 pairs in 1995), and at the southwest end of the island in an area often referred to as "Powderhole" (6 pairs). Pairs of territorial plovers also occur sporadically along the east side of the island, from the south tip north approximately 5 miles to Hospital Pond (5 pairs in 1995).

Monomoy's strategic location on the Atlantic Flyway also makes it a major staging area for fall populations of many migratory waterfowl, passerines, raptors (including the threatened bald eagle and endangered peregrine falcon), seabirds, and shorebirds. A 1984 report of the International

Shorebird Survey cites Monomoy among the five most important of 454 autumn shorebird stopover areas studied east of the Rocky Mountains.

Mammals that occur include harbor and gray seals, white-tailed deer, meadow voles, and muskrat. A population of Fowler's toads and garter snakes on South Monomoy Island are the only known reptile and amphibian species occurring on the islands.

C. Social and Economic Resources

Cape Cod is a popular vacation destination; the resident population nearly triples during the peak summer months. An estimated total of 51,300 people visited the Refuge in 1995. Approximately 35% of those visits occurred on the Monomoy Islands.

The islands are open to wildlife-oriented activities such as birdwatching, nature study, hiking, surf-fishing, and shellfishing. Public use is seasonally restricted to protect wildlife and habitat.

The variety of refuge wildlife during migrations attracts birders from throughout the Northeast. Many birding clubs and recreational groups organize field trips. The Massachusetts Audubon Society and Cape Cod Museum of Natural History have permits to conduct natural history and birding tours of the islands. Both also offer cruises to view wintering seals. Three ferry services seasonally offer transportation to the islands.

The intertidal flats surrounding the islands are an important source of quahogs and softshell clams for local shellfishermen who also dredge sea clams and mussels from Nantucket Sound immediately to the west.

VI. ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1. No New Action: Continue Current Gull Management

Maintenance of gull-free areas on the islands would preserve opportunities for some species to expand their nesting efforts to some extent. However, since the areas that are currently gull-free do not represent the best habitat available for piping plover and other beach nesting birds, any increase in these species would be minimal. And, because the existing gull-free habitat is highly fragmented, its habitat value to other species is reduced as many of the areas have large concentrations of loafing gulls, most associated with adjacent nesting areas.

Since this alternative focuses on providing gull-free habitat for beach nesting species such as tern spp., laughing gull, and piping plover, it is unlikely that nesting waterfowl populations would benefit from the proposed management actions, particularly since no observations of waterfowl nests in current gull-free areas have been documented.

The continued presence of large numbers of nesting gulls on the refuge in future years would

continue to severely limit opportunities for common and least terns (the only other colonial seabird species currently nesting on the refuge) to relocate in response to avian predators or storm-tides. Furthermore, since the management approach proposed under this alternative was adopted in 1988, tern numbers have dwindled, tern productivity has continued to be poor, and laughing gulls have abandoned their refuge colony site.

While there has been an increase in the number of nesting piping plovers under this alternative since 1988, it pales in comparison to that seen at other sites such as nearby South Beach in Chatham or Parker River NWR where 28 pairs and 21 pairs, respectively, were recorded in 1995 (H. Barbour, MDFW; Parker River NWR, unpubl. rept. 1995). The moderate increase in the abundance of nesting plovers on the refuge is especially disappointing when both the amount and quality of suitable habitat is considered (Table 2). The recent high of 14 plover pairs is attributed primarily to recent increases in the abundance of plovers in Massachusetts (160 breeding pairs in 1991; 445 pairs in 1995 [A. Hecht, pers. comm.]) and more effective enforcement of seasonal beach closures, rather than to maintenance of gull-free habitat. Reduced numbers of nesting gulls on the refuge may also have been a minor factor in recent, lower increases. Under this alternative, plover numbers are projected to gradually increase, but at a much slower rate than at other Massachusetts sites.

Both the 1995 refuge gull survey and the 1994-95 region-wide colonial waterbird survey (preliminary results), suggest that herring gulls are declining. Since human generated garbage seems to be more important to nesting herring gulls than great black-backed gulls on Monomoy NWR (Griffin and Cavanagh, 1990), their recent decline on the refuge may be a direct result of recent landfill closings. Although the 1995 refuge survey shows a moderate decrease in great black-backed gulls since 1990, both regional and Massachusetts' current trends indicate the breeding population is still increasing at some sites.

Although the nesting herring and great black-backed gull population on Monomoy NWR has declined in recent years, these smaller populations continue to occupy virtually all suitable nesting habitat. This is consistent with findings at the Isle of May in Scotland where herring gulls and lesser black-backed gulls that survived an intensive gull reduction program spread out to maintain occupancy of almost all suitable habitat on their colony site (Coulson et al., 1982; Coulson 1991).

Maintaining small pockets of gull-free habitat spread out across two islands would be very labor intensive. Fragmentation of existing gull-free habitat also increases the complexity of the task of evaluating the amounts available each spring. In addition, the continued presence of a herring and great black-backed gull colony on the refuge acts as a "magnet", attracting gulls in search of new nest sites. This virtually assures that additional habitat evaluations and gull control (within designated areas) would be needed with every nesting season. While on-going maintenance and evaluations of gull-free habitat are also an integral component of Alternative 2, the level of effort required with that management approach would be less due to the relative ease of "defending" a single, large gull-free area. This alternative represents an inefficient, long-term commitment of Service funds.

Since there would not be any change in current management programs under this alternative, no adverse impacts on wildlife oriented recreation or other socio-economic considerations are expected.

The probability of dispersing gulls to off-refuge sites under this alternative, while not large, would be the highest of all the alternatives considered because harassment and nest destruction are intended to encourage gulls to move. While the presence of a large gull colony always poses a threat that they will spread to nearby sites, harassment of individuals encroaching on existing gull-free areas may result in slightly higher numbers of attempts to pioneer nearby beaches.

Because wildlife on the refuge may shift their nesting areas from year to year and geomorphological processes are continually forming new habitat, it is not possible to predict if or where gull removal would be needed. In 1993 and 1994, the Service estimated that as many as 5,000 birds would have been removed had the Service adhered to gull-free area objectives outlined in the 1988 Monomoy NWR Master Plan (USFWS Depredation Permit Application 1993). Due to a variety of factors (e.g., inavailability of qualified personnel, weather, nesting phenology), the maximum number of gulls actually removed was approximately 1,044 in 1993. In light of on-the-ground observations in 1995, the number of gulls projected to be removed under this alternative in 1996 may be as many as 2,500 birds.

As the refuge plover population has gradually increased and expanded into new nesting areas and with the recent division of common terns into 2 colony locations, there has been an associated increase in administrative and operational costs. These costs have been proportional to increased needs for seasonal plover/tern monitors, posts and signs used to delineate additional closures of nesting habitat, and other necessary supplies and equipment. Increases in program costs would likely continue in future years to meet various equipment replacement needs and seasonal staff salaries.

ALTERNATIVE 2. Removal of Gulls from Part of South Monomoy Island (Proposed Action)

The area proposed for gull removal under this alternative includes the best plover habitat on the refuge, and possibly even some of the best on the Atlantic Coast (Hecht and von Oettingen, 1995). A thorough assessment of the refuge's beach habitat in 1995 (Section III.A) revealed that the previous piping plover estimated carrying capacity of 30+ breeding pairs (1995 Draft Revised Piping Plover Recovery Plan) was very conservative. The revised estimated plover capacity for the proposed treatment area alone is 40 pairs. Five territorial plover pairs were recorded in this area in 1995. Removal of herring and great black-backed gulls from the designated area would likely increase recruitment of breeding pairs and improve reproductive success of plovers within that area. Thus, selection of this alternative would facilitate progress towards the MDFW's piping plover provisional abundance objective of 94 pairs on South Monomoy Island and contribute to the overall recovery effort for Atlantic coast piping plover populations.

Establishing and maintaining the northern portion of South Monomoy Island free of nesting

herring and great black-backed gulls would expand opportunities for breeding terns on the refuge or from nearby off-refuge sites to relocate in response to endemic predators and storm-tides. If common, roseate, Arctic and least terns, and laughing gulls expand and/or re-establish nesting colonies on the refuge (e.g., within the proposed treatment area), this would likely increase their distribution in Massachusetts and reduce the potential impact of an environmental disaster on these populations.

Nesting opportunities for other beach nesting species (willet, American oystercatcher, black skimmer, spotted sandpiper) and waterfowl (American black duck and Canada goose) within the treatment area would increase under this alternative. Reproductive success for populations nesting within the treatment area would likely improve as well. Currently, the resident Canada goose population in the Chatham area is not considered a problem (H. Heusemann and L. Henze, ADC, pers. comm.). In 1995, the refuge-wide breeding population of Canada geese was estimated at less than ten pairs, only one of which is believed to have nested within the proposed treatment area. If numbers of resident Canada geese in the Chatham area reach nuisance levels in the future, the Service would evaluate the potential contribution of the refuge's breeding population and, if deemed necessary, solicit recommendations from appropriate State and Animal Damage Control personnel.

Comparison of 1990 and 1995 refuge gull surveys shows substantial decreases in the herring gull population, while great black-backed numbers have only slightly declined (Appendix A). This change is believed to be a result of reduced food availability and, in the case of the herring gull, competition with the larger great black-backed gull. This overall trend increases the likelihood of successfully clearing nesting large gulls from the northern portion of South Monomoy Island at this time.

Implementing gull control measures within the proposed treatment area would be labor-intensive during the first and second year of the program, however, the level of effort should begin to decline in years 3 and 4, and eventually stabilize, as the numbers of nesting gulls within the treatment area decline and become less of an attractant to gulls in search of new nest sites.

Projections of the number of gulls that would be removed annually under this alternative were made under two scenarios. One set of estimates (Table 3; Figure 1) is based on past experiences at Seal Island NWR, Maine, where control of a nesting colony of herring and great black-backed gulls using 1339 gull toxicant was initiated in 1986.[5] The second set of estimates (Table 4; Figure 2) is based on past experiences at Ram Island, Massachusetts, where control of herring and great

[5]On Seal Island NWR, 3 consecutive years of avicide use achieved a significant reduction in the gull colony. Control efforts since 1989 have consisted primarily of harassment and selective shooting, with the exception of a "maintenance" application of gull toxicant in 1991 (unpub. rept. to Petit Manan NWR; B. Benedict pers. comm.).

black-backed gulls was initiated in 1990.[6] These restorations were selected for analysis because (1) the Seal Island NWR project was closest in size (of those with readily available data) to Alternatives considered in this EA, and (2) the Ram Island gull colony was most similar to the Monomoy gull colony with respect to various environmental conditions (e.g., accessibility to mainland food sources). The actual number of gulls removed under this alternative (and alternative 3) will likely vary from these projected estimates because:

- According to the 1995 gull survey on Monomoy, herring and great black-backed gulls have declined since 1990. If this trend continues (which will be determined with continued refuge-wide surveys every five years) gull populations will likely decline faster than predicted by Griffin and Cavanagh (1990), and gull removal using DRC 1339 under this alternative will be more effective and may span fewer years;

- Past projects using DRC 1339 have targeted treatment applications to coincide with maximum numbers of nesting herring and great black-backed gulls. Because remaining birds abandon the nest after about 3 days (Transue and Burger 1989), and because females are predominantly taken in the first treatment application (Blodget and Henze 1992; Megyesi 1995; Kress, pers. comm.; USFWS unpubl. data, Petit Manan National Wildlife Refuge), territorial males are left to return in subsequent years with new mates. The Monomoy project treatment schedules will attempt to target both individuals at the nest [7]. By removing both territorial birds, it is expected that the number of established birds in the treatment area will be reduced substantially in the first year, and fewer birds will need to be removed in subsequent years. Revision of the treatment application schedule would in no way alter plans to discourage re-colonization of the area using harrasment, selective shooting, and productivity suppression;

- Rates of immigration and/or emigration, bait-shyness and natural mortality will vary from colony to colony;

- In both the Seal and Ram Island projects, the entire nesting population was targeted rather than one area of the colony. Since the Monomoy project targets only a portion of the nesting colony, the untreated area, where nesting gulls remain, is more likely to attract new recruits than the treatment area. Therefore, fewer new nests may require treatment in years 2-4 .

The risk of dispersing gulls from the treatment area to nearby off-refuge sites under this management approach would probably be the lowest of all the alternatives. The large numbers

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[6]On Ram Island, only 2 consecutive years of avicide use were necessary to significantly reduce the gull colony. Control efforts since 1991 have consisted primarily of harassment and selective shooting (Blodget and Henze, 1992; Harlow 1994; B. Blodget pers. comm.).

[7]Note: two applications/year are planned for 1996.

of breeding herring and great black-backed gulls left undisturbed on the southern end of South Monomoy Island and the entirety of North Monomoy Island are likely to function as "magnets" for any surviving gulls that might be dispersed from the proposed treatment area. Furthermore, by reducing the overall breeding gull population, production would be curtailed, reducing the number of gulls in the Cape Cod area that would be reaching sexual maturity in future years. In the unlikely event that gulls from the refuge do attempt to pioneer new sites where they do not have an established history of successful reproduction, they could be relatively easily dislodged using the same nest destruction techniques that have been practiced on other Cape Cod beaches in recent years.

Review of the preliminary results of the 1994-95 Atlantic coast colonial waterbird inventory indicates that herring and great black-backed gulls on the entire refuge comprise approximately 8% and 19% of the regional breeding population of these species, respectively, though the survey is likely an underestimate of the true breeding population (Haas, pers. comm.). This alternative targets just 2% and 5% of the Northeast populations, respectively, in the first year, and substantially fewer in subsequent years. The removal of approximately 2% of the regional herring gull breeding population and 5% of the regional great black-backed gull breeding population in any one year is not expected to seriously impact the overall regional breeding population for both species. Both species take two or more years to reach sexual maturity, and the breeding population is supported by a large subadult population. The removal of breeding adults and destruction of eggs will not be additive to the normal mortality for these species (Haas, pers. comm.). Both species have a high reproductive potential and breeding habitat is not limited. This mortality should be compensatory for both the herring gull, which has a declining population trend, and the great black-backed gull, which has an increasing population trend (Haas, pers. comm.). Winter mortality appears to be the primary limiting factor for both species. Given the following, it is unlikely that this alternative would have a significant adverse effect on the viability of these two species:

- In the Northeast United States, from Maine to Virginia, 470 herring and 397 great black-backed colonies were recorded in 1984-85 (Andrews 1990). These figures likely underestimate the actual number of colonies in the region (See Section III. Background).

- This alternative will not eliminate a great black-backed and herring gull colony. Rather, a portion of the refuge is targeted by this alternative and will be maintained free of nesting gulls.

- The action proposed is not anticipated to reduce the regional breeding population of herring or great black-backed gulls. This mortality is expected to be compensatory to the normal annual mortality rate for these species, and the regional breeding populations for both species are expected to recover by the next breeding season (Haas, pers. comm.).

There are no significant negative environmental effects associated with the use of 1339 gull toxicant. The avicide is highly toxic to gulls, yet is much less toxic to most other avian species and has a low toxicity to mammals. Although a chemical is used, very small amounts are actually

applied which rapidly degrade into harmless products or are diluted to the point where they do not present an environmental hazard (Schafer 1979; USDA 1994, Appendix P).[8]

Appropriate measures would be taken during gull control operations to minimize disturbance to other nesting species. These measures would include surveying the designated area prior to pre-baiting gull nests to identify areas where terns, piping plovers, and other species may be nesting. If other nesting species are present, minimal time and number of people would be used to remove herring and great black-backed gulls in their vicinity.

Under this alternative, the proposed treatment area will be closed to visitors during the several weeks of treatment. Wildlife oriented activities such as birdwatching, nature study, hiking, and surf-fishing would be restricted temporarily. This does not represent a significant effect or change from current practices as many of these activities are currently restricted to protect wildlife and habitat. The proposed action will not have an adverse effect on any other socio-economic considerations such as historic sites, archeological resources, local employment, property values, etc.

There would be an increase in administrative and operational costs. Additional funding would be required for necessary equipment, Animal Damage Control personnel assistance, and seasonal refuge staff to assist with implementation of management actions and intensive follow-up monitoring. As discussed in Alternative 1, the increase in costs to monitor and warden plover nesting areas would increase proportionately with any increase in the breeding plover population on the refuge.

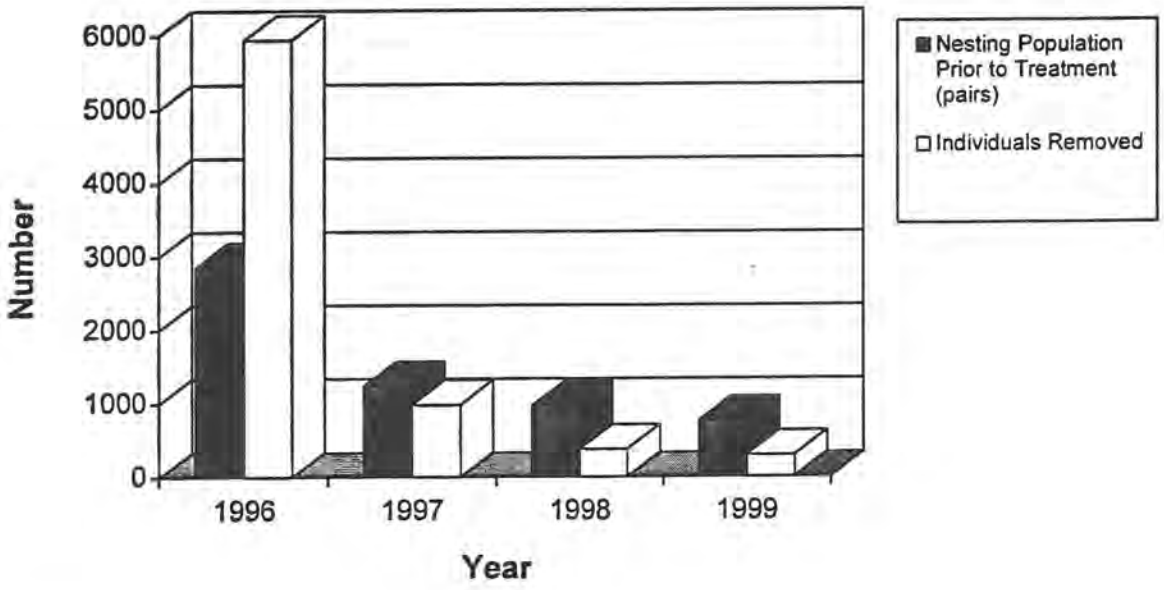
Re-establishment of a wider diversity of nesting species and, ultimately, preservation of the integrity of the Monomoy ecosystem would be achieved under this alternative. Moreover, the proposed action would contribute to recovery of the threatened piping plover and, possibly, the endangered roseate tern. Proposed management activities are in accordance with Endangered Species Act mandates for Federal agencies, Department of Interior Secretary Babbitt's directive for endangered species recovery on Service lands, the National Wildlife Refuge System's goals for protection of endangered and threatened species and preservation of wildlife diversity, and objectives of the MDFW's Conservation Plan for Piping Plover (1996) (See Section II.). The proposed action is also consistent with policies of the National Audubon Society.

[8] See Appendix B for more detailed information about DRC 1339 gull toxicant.

Table 3. Gull Removal Projections under Alternative 2 (Proposed Action) Proportional to the Seal Island NWR Restoration.

Restoration Project:	**Nesting Gull Population Before Avicide Treatments:**	**Number of Gulls Removed Annually:**
Seal Island NWR (actual #'s)		
Year 1	1,106 pairs	2,304 birds [9]
Year 2	480 pairs	381 birds
Year 3	377 pairs	147 birds
Treatment Area on South Monomoy Island (projected #'s)		
Year 1	2,850 pairs	5,937 birds
Year 2	1,237 pairs	981 birds
Year 3	971 pairs	378 birds
Year 4 [10]	762 pairs	297 birds

Figure 1. Gull Removal Projections for Monomoy NWR under Alternative 2 (1996 - 1999), Proportional to the Seal Island NWR Restoration.



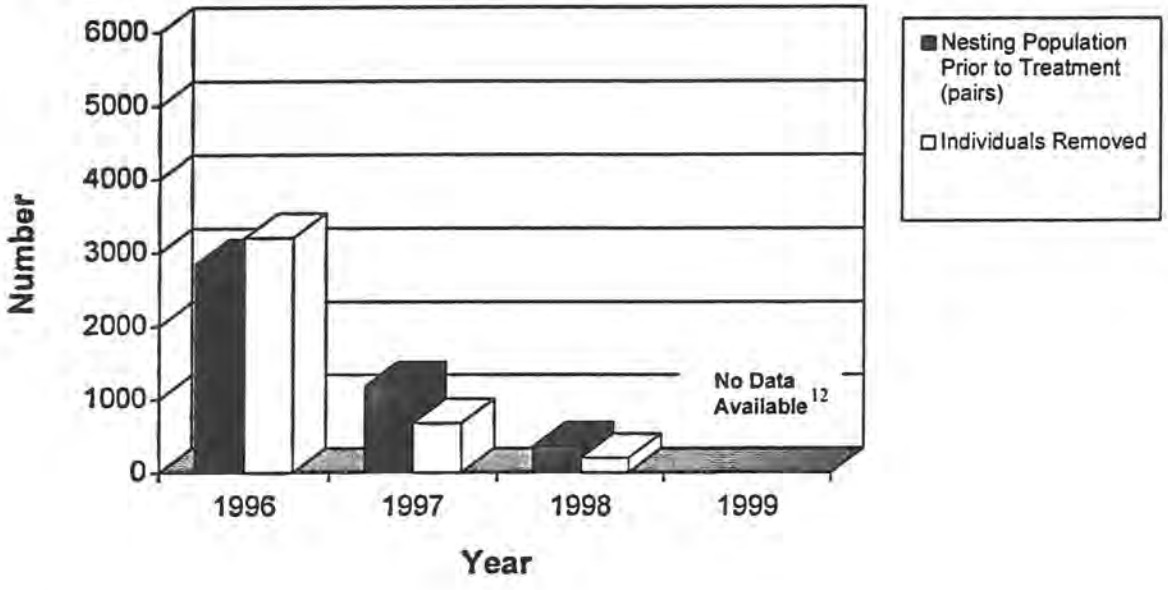
[9] Represents number of gulls removed in 2 out of 3 avicide treatments.

[10] Assumes proportional drop in gull population and same ratio of gulls removed/nest as observed Year 2 to Year 3 on Seal Island NWR.

Table 4. Gull Removal Projections under Alternative 2 (Proposed Action) Proportional to the Ram Island Restoration.

Restoration Project:	**Nesting Gull Population Before Avicide Treatments:**	**Number of Gulls Removed Annually:**
Ram Island (actual #'s)		
Year 1	732 pairs	823 birds
Year 2	303 pairs	172 birds
Treatment Area on South Monomoy Island (projected #'s)		
Year 1	2,850 pairs	3,204 birds
Year 2	1,180 pairs	670 birds
Year 3 [11]	354 pairs	201 birds
Year 4 [12]	---	---

Figure 2. Gull Removal Projections for Monomoy NWR under Alternative 2 (1996 - 1999), Proportional to the Ram Island Restoration.



[11] Assumes same ratio of gulls treated/nest as observed Year 1 to Year 2 on Ram Island.

[12] Due to the shorter duration of avicide use on Ram Island, a 4th year projection could not be made.

ALTERNATIVE 3. Refuge-wide Gull Removal

In the short term, disturbance to all nesting species on the islands would be high due to large numbers of assisting personnel traversing the islands before, during, and immediately after avicide treatments. The long term benefits for piping plovers, terns, laughing gulls, and other beach nesting species, however, would be similar to those identified in Alternative 2 (Proposed Action) but on a larger scale. Depredation of smaller nesting species and/or their young by loafing gulls would probably still occur in some areas, but at levels more typical of a healthy ecosystem. Moreover, if common, roseate, Arctic and least terns, and laughing gulls reclaim historic colony sites on the refuge, this would likely enhance their distribution in Massachusetts and reduce the potential impact of an environmental disaster on these populations.

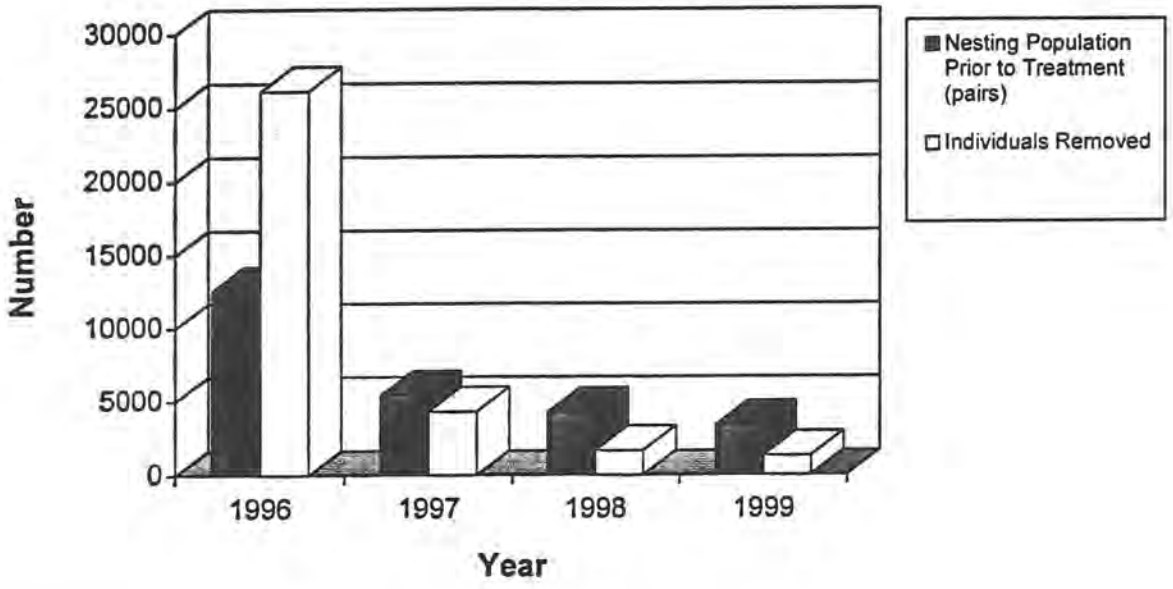
Long term benefits for nesting waterfowl would be greatest under this alternative, and would not be restricted to just American black duck. Since nesting herring and great black-backed gulls would be completely removed from the refuge, including habitat surrounding freshwater ponds at the south end of South Monomoy Island (the refuge's primary waterfowl nesting and brooding area), depredation of waterfowl nests and young by the large gulls would be greatly reduced. The potential for increasing the refuge's resident Canada goose population would be greatest under this alternative. Currently, resident Canada geese in the Chatham area are not considered a problem (H. Heusemann and L. Henze, pers. comm.). In 1995, the refuge-wide breeding population of Canada geese was estimated at less than ten pairs. If resident Canada geese in the Chatham area reach nuisance levels in the future, the Service would evaluate the potential contribution of the refuge's breeding population and, if deemed necessary, solicit recommendations from appropriate State and Animal Damage Control personnel.

As in Alternative 2, gull removal estimates have been prepared based on past experiences at Seal Island NWR in Maine (Table 5; Figure 3), and Ram Island in Massachusetts (Table 6; Figure 4). Similarly, projected numbers removed on Monomoy would likely vary from the Ram and Seal island projects due to factors discussed under Alternative 2.

Table 5. Gull Removal Projections under Alternative 3 (Refuge-wide Gull Removal) Proportional to the Seal Island NWR Restoration.

Restoration Project:	Nesting Gull Population Before Avicide Treatments:	Number of Gulls Removed Annually:
Seal Island NWR (actual #'s)		
Year 1	1,106 pairs	2,304 birds [13]
Year 2	480 pairs	381 birds
Year 3	377 pairs	147 birds
North and South Monomoy Islands (projected #'s)		
Year 1	12,550 pairs	26,144 birds
Year 2	5,447 pairs	4,324 birds
Year 3	4,278 pairs	1,668 birds
Year 4 [14]	3,360 pairs	1,310 birds

Figure 3. Gull Removal Projections for Monomoy NWR under Alternative 3 (1996 - 1999), Proportional to the Seal Island NWR Restoration.



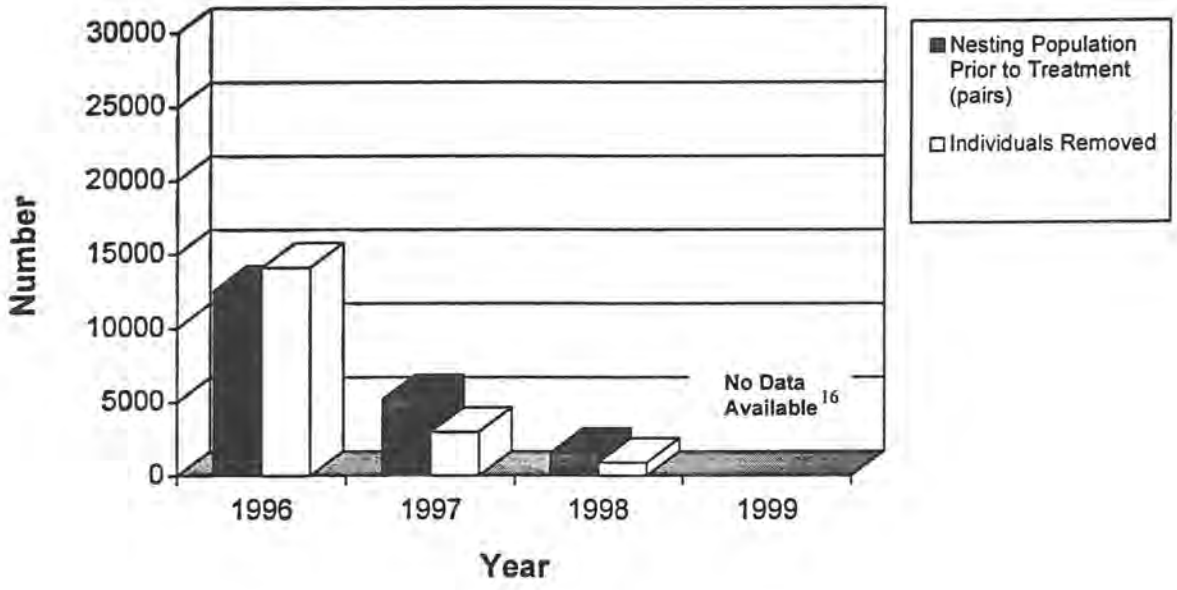
[13] Represents number of gulls removed in 2 out of 3 avicide treatments.

[14] Assumes proportional drop in gull population and same ratio of gulls removed/nest as observed Year 2 to Year 3 on Seal Island NWR.

Table 6. Gull Removal Projections under Alternative 3 (Refuge-wide Gull Removal) Proportional to the Ram Island Restoration.

Restoration Project:	**Nesting Gull Population Before Avicide Treatments:**	**Number of Gulls Removed Annually:**
Ram Island (actual #'s)		
Year 1	732 pairs	823 birds
Year 2	303 pairs	172 birds
North and South Monomoy Islands (projected #'s)		
Year 1	12,550 pairs	14,110 birds
Year 2	5,195 pairs	2,949 birds
Year 3 [15]	1,560 pairs	886 birds
Year 4 [16]	---	---

Figure 4. Gull Removal Projections for Monomoy NWR under Alternative 3 (1996 - 1999), Proportional to the Ram Island Restoration.



[15] Assumes same ratio of gulls treated/nest as observed Year 1 to Year 2 on Ram Island.

[16] Due to the shorter duration of avicide use on Ram Island, a 4th year projection could not be made.

Removal of all nesting herring and great black-backed gulls on Monomoy NWR could potentially impact the Northeast regional breeding populations during the first year by approximately 8% and 19%, respectively, with substantially fewer numbers of both species targeted in subsequent years. The removal of approximately 8% of the regional herring gull breeding population and 19% of the regional great black-backed gull breeding population in any one year is hard to evaluate. This action is expected to reduce the overall regional breeding population for both species, but this reduction will be considerably less than 8% for herring gulls or 19% for great black-backed gulls. Both species take two or more years to reach sexual maturity, and the breeding population is supported by a large subadult population (Haas, pers. comm.). The removal of breeding adults and destruction of eggs may be slightly additive to the normal mortality for these species (Haas, pers. comm.). Both species have a high reproductive potential and breeding habitat is not limited. Winter mortality appears to be the primary limiting factor for both species. Removal of nesting herring and great black-backed gulls completely from the refuge is not likely to have a significant impact on the contined viability of this species because:

- Breeding great-black backed and herring gulls occur from the Arctic to the Carolinas and Mexico, respectively. A conservative survey from Maine to Virginia (which likely underestimates the number of colony sites occupied) in 1984-85 recorded 470 and 397 breeding colonies of herring and great black-backed gulls, respectively (Andrews 1990).

- The action proposed may reduce the regional breeding population of herring or great black-backed gulls or have no impact. It is unknown whether this mortality might be slightly additive to the normal annual mortality rate for these species, and the regional breeding populations for both species could be slightly reduced by this action.

- The number of gull colonies on Cape Cod, as well as state-wide, virtually assures that gulls would have some level of presence on the refuge in future years (e.g., loafing and feeding) despite the absence of a nesting population. Gulls which use Momonoy to feed and loaf would not be affected by this project unless in direct conflict with other nesting species. Effects of these individuals would be reviewed on a case-by-case basis prior to removal.

The risk of dispersing gulls to nearby sites might be slightly higher than in Alternatives 1, 2, and 4 because of the greater disturbance factor associated with larger numbers of people distributing DRC 1339 baits and recovering carcasses throughout the entirety of both islands. Also, removing large numbers of nesting gulls from the refuge would reduce the associated "magnet" effect that attracts gulls in search of new nest sites.

The associated administrative and operational costs for this gull-control program would be substantially greater than any of the alternatives considered because of the large numbers of certified pesticide applicators, other assisting personnel, and equipment that would be required.

Socio-economic effects under this alternative would be slightly higher than in Alternative 2 in terms of impacts on wildlife-oriented activities. This alternative would be neutral, however, as far as impacts on other socio-economic considerations such as historic sites, archeological resources, local employment, and property values, etc..

This alternative would be extremely labor-intensive, and the likelihood of accomplishing two complete avicide applications by June 30 of each year (per DRC 1339 label instructions) would be much lower than under Alternative 2 (Proposed Action) considering the awesome logistics involved in treating approximately 2,700 acres. Although a substantial increase in avian diversity would likely occur in the long term under this alternative, the overwhelming financial commitment and logistics involved make this an unrealistic management approach at this time.

ALTERNATIVE 4. No Action: Abandon All Gull Control Efforts

Consequences for nesting wildlife under this alternative would be similar to those discussed in Alternative 1 (No New Action) except for common terns which, like laughing gulls and roseate and Arctic terns, might abandon the islands in future years.

While administrative and operational costs related to gull control efforts would no longer be necessary, costs for additional seasonal personnel to search for territorial plovers and other nesting species would increase. Replacement costs for related equipment and supplies such as signs and posts to delineate closures of tern breeding areas might decline to some extent.

The risk of dispersal of gulls to nearby off-refuge sites would be slightly lower than in Alternatives 1 and 3 because nesting gulls would not be disturbed. Dispersal would be a continuing, low-level threat, however, since production from the Monomoy gull colony would continue to contribute to the overall Cape Cod gull population. In the unlikely event large gulls do attempt to pioneer nearby sites, they could probably be relatively easily discouraged using the same nest destruction techniques that have been practiced at local beaches in recent years.

Re-establishment of a wider diversity of nesting species on Monomoy NWR would not occur in the absence of an assertive management program to reduce the herring and great black-backed gull colony present on the refuge. In addition, selection of this alternative would erode the public's perception of the Service's commitment to assisting the recovery of endangered species and other declining migratory bird populations.

VII. CONSULTATION AND COORDINATION WITH OTHERS

The decision to strengthen efforts to restore diversity of nesting species on Monomoy NWR was made following a review of seabird restoration projects on various islands in the Northeast, and consultation with endangered species biologists from the Service and MDFW.

There has been close liason between biologists from the Service and the MDFW in developing

the proposed action. A cooperative agreement with the U.S. Department of Agriculture/Animal Damage Control, who will be assisting with and supervising the application of 1339 baits, will be prepared. Local conservation commissions and some private conservation organizations will be alerted to the actions planned this year prior to avicide applications.

An internal Section 7 endangered species consultation will be completed and required permits will be obtained for this restoration project prior to its implementation.

A summary of public comments and Service responses is provided in Appendix E.

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Appendix A

Nesting Records for Selected Bird Species On Monomoy NWR

Date — Nesting Pairs, by Species

	Common Tern	Roseate Tern	Arctic Tern	Least Tern	Laughing Gull	Herring Gull	Great Black-backed Gull	Oyster-catcher	Willet	Black Skimmer	Black-crowned Night Heron	Snowy Egret	Piping Plover	Short-eared Owl
1961						1								
1962						3								
1963						15								
1964						75								
1965						420	75			1				
1966	2,500	900	40			1,000								
1967										1				
1968										1				
1969						8,000				1				
1970	4,000	350		200		6,000		1		1				
1971	3,000	100	25		2								8*	
1972	1,600				60		175						6*	
1973	2,100				120									
1974	2,200				140									
1975	2,250				150					1				
1976	2,350	450	11		180									
1977	2,100	400	10	0	250									
1978	2,700				350									
1979	3,400	180	18	140	500			4						
1980	3,400	400	5		700	15,300	3,300				12			
1981	1,995	35	6		1,000	13,600	3,900				15	4		
1982	1,500	0	3		600					0				
1983	1,300	0	2	0	900			9	13	1	40	82	5	
1984	1,200	2	3	2	800	14,500	5,000	12	13	1	85	82	3	4
1985	290	0	2	290	423			16		3	111	84	5	5
1986	400	1	2	270	2			20	26	2	176	57	3	5
1987	1,000	7	1	300	28			16	35	0	202	90	2	2
1988	361	1	0	267	4			17	25	0	130	44	5	1
1989	570	0	0	100	378			19	20	2	104	35	4	1
1990	501	1	0	50	117	9,595	8,180	17	40	0	250	85	4	1
1991	555	0	0	0	0			8*	22	0	127	43	2	0
1992	128	0	0	0	31			9	16	0	166	72	3	1
1993	99	0	0	12	13			11	7	0	237	72	4	0
1994	190	0	0	0	0			17		0	201	69	7	0
1995	289***	0	0	28	0	5,200	7,350						14	0**

*Data from partial survey - included only northern portion of refuge.

**Sporadic sightings of a short-eared owl on South Monomoy Island during the nesting season were recorded, however, no known nesting occurred.

***Although breeding tern populations have fluctuated since 1986, productivity has been consistently poor since 1980.

Note: blanks indicate that no information exists, not that a species was known to be absent.

Appendix B

Removal of Nesting Gulls using 1339 Gull Toxicant:

Thomas (1972) pointed out the advantages of using toxicants for reducing gull populations that are competing with other nesting seabirds in Europe. It is often advantageous to use a toxicant because the target birds are removed quickly, efficiently, and permanently, with little or no disturbance to other species. However, to be safely used, the toxicant must be highly toxic to the target species, have low toxicity to non-target species, including mammals, and decompose rapidly to avoid secondary poisoning or environmental contamination.

A compound known as DRC-1339 gull toxicant (3 chloro-4-methyl benzenamine hydrochloride) was formulated in the early 1960's and originally tested in the Service's Denver Wildlife Research Center for starling control. It was also found to be highly toxic to gulls, and was subsequently tested by the Service and Massachusetts Audubon Society at specific gull colonies in Maine and Massachusetts. One of the sites where it was successfully tested was Bird Island in Buzzards' Bay, Massachusetts, a site where nearly half of the roseate terns in the Northeast presently nest.

DRC-1339 gull toxicant meets the requirements for use of toxicants because it is highly toxic to gulls, has a low toxicity to mammals, decomposes rapidly to harmless products, causes a calm death from uremia and congestion of major organs, and when applied properly results in virtually no accidental poisoning of non-target species (Schafer 1979; Decino et. al. 1966; Besser et. al. 1966; USDA 1994, Appendix P).

It is registered for use on gulls with the U.S. Environmental Protection Agency, and has precise application instructions (copies of the label available on request). It may only be applied by U.S. Department of Agriculture personnel certified by the Pesticide Bureau for the State in which it is applied.

Application is preceded by prebaiting the nest site with plain bread cubes to increase bait acceptance. Since gulls are scavengers and commonly feed at landfills and off fishing boats, they readily accept the bait. The bait is prepared by mixing the toxicant with margarine and spreading on bread. The bread is then cut into cubes and placed in the gull nest. Past experience has shown that the gulls readily ingest the bait within minutes after it is applied. Their territorial behavior and aggressiveness assures that non-target species do not get a chance to even get close to the bait. Any unconsumed bait must be collected and buried within 12 hours.

DRC-1339 gull toxicant acts as a kidney suppressant. The kidneys gradually fail to function properly; toxic waste products such as uric acid gradually accumulate in the bloodstream causing uremic poisoning. Most of the birds become lethargic within 12 hours after ingesting the bait. They then become comatose and die passively from kidney failure and congestion of major organs

within 24-48 hours, usually at the nest. Generally, the gulls are found dead with wings folded and appear to be sleeping when approached.

Once ingested, 80% of the DRC-1339 gull toxicant is metabolized into non-toxic chemicals within 2-4 hours. Approximately 10% is excreted unchanged and 10% remains in the body after death (Schafer 1979).

Using the required dosages, the amount that is excreted unchanged or left in the body is about 11 mg/bird. If deposited on the water, it is quickly diluted; if deposited on the soil, it is degraded within 48 hours (Schafer 1979; USDA 1994, Appendix P). The amount left in the bird is too little to cause secondary poisoning of most scavengers if consumed (Schafer 1979; Besser et. al. 1966; USDA 1994, Appendix P).

Toxicity tests have shown that DRC-1339 is highly toxic to gulls and birds in the blackbird and starling families, but much less toxic to other bird species. To test the possibility of chronic toxicity and secondary poisoning, a northern harrier, cooper's hawk and a kestrel were fed a diet of starlings killed by ingesting 1339 gull toxicant. The northern harrier was fed 222 starlings over 104 days, the cooper's hawk was fed 191 starlings over 135 days, and the kestrel was fed 60 over 141 days. None of these raptors showed any ill effects, and all actually gained weight (DeCino et. al. 1966).

Appendix C

Scientific Names of Animal Species Identified in this Environmental Assessment:

Common Name	Scientific Name
American Black Duck	Anas rubripes
American Oystercatcher	Haematopus palliatus
Arctic Tern	Sterna paradisaea
Atlantic Puffin	Fratercula arctica
Bald Eagle	Haliaeetus leucocephalus
Black-crowned Night Heron	Nycticorax nycticorax
Black Skimmer	Rynchops niger
Blue-winged Teal	Anas discors
Canada Goose	Branta canadensis
Common Eider	Somateria mollissima
Common Tern	Sterna hirunda
Harbor Seal	Phoca vitulina
Herring Gull	Larus argentatus
Gadwall	Anas strepera
Garter Snake	Thamnophis spp.
Glossy Ibis	Plegadis falcinellus
Gray Seal	Halichoerus grypus
Great Black-backed Gull	Larus marinus
Great Horned Owl	Bubo virginianus
Green-winged Teal	Anas crecca
Laughing Gull	Larus atricilla
Least Tern	Sterna albifrons
Lesser Black-backed Gull	Larus fuscus
Mallard	Anas platyrhynchos
Meadow Vole	Microtus pennsylvanicus
Muskrat	Ondatra zibethicus
Northern Harrier	Circus cyaneus
Northern Pintail	Anas acuta
Peregrine Falcon	Falco peregrinus
Piping Plover	Charadrius melodus
Ruddy Duck	Oxyura jamaicensis
Short-eared Owl	Asio flammeus
Snowy Egret	Egretta thula
Starling	Sturnus vulgaris
Roseate Tern	Sterna dougallii
Spotted Sandpiper	Actitis macularia
White-tailed Deer	Odocoileus virginianus
Willet	Catoptrophorus semipalmatus

Appendix D

Scientific Names of Plant Species Identified in this Environmental Assessment:

Common Name	Scientific Name
Bayberry	Myrica pensylvanica
Beachgrass	Ammophila breviligulata
Beach Pea	Lathyrus japonicus
Beach Plum	Prunus maritima
Beaked Willow	Salix bebbiana
Black Grass	Juncus gerardi
Black Pine	Pinus thunbergii
Cat-tail	Typha angustifolia and Typha latifolia
Dusty Miller	Artemisia caudata
False Heather	Hudsonia tomentosa
Fowler's Toad	Bufo woodhousei fowleri
Lichen	Cladonia spp.
Phragmites	Phragmites communis
Pitch Pine	Pinus rigida
Poison Ivy	Rhus radicans
Pond Lilies	Nymphaea odorata
Saltgrass	Distichlis spicata
Salt Spray Rose	Rosa rugosa
Saltmarsh Hay	Spartina patens
Seaside Goldenrod	Solidago sempervirens
Sea Rocket	Cakile edentula
Short-form Saltmarsh Cordgrass	Spartina alterniflora

Appendix E

On 22 February, 1996 the United States Fish and Wildlife Service (Service) released a Draft Environmental Assessment (DEA) entitled "Restoration of Avian Diversity on Monomoy National Wildlife Refuge" (Monomoy NWR). Copies were sent to appropriate Federal and State agencies, county governments, scientific organizations, and other interested parties with a request for comments that might contribute to the development of a final Environmental Assessment (EA). Comments were accepted during a 45 day comment period, which ended on 8 April, 1996. In addition, the DEA and a news release were sent to the following newspapers: *Boston Globe*, *Boston Herald* (returned as undeliverable), *The Cape Codder*, *The Cape Cod Chronicle*, *Cape Cod Times*, *The Register*, and *Chatham Current*.

About 45 people attended a walk-in open house on 6 March, 1996 at the Chatham Town Hall, Chatham MA. Sixty-one people attended a public meeting on 6 March, 1996 at the Chatham Elementary School Gymnasium, Chatham MA. Following a presentation by Norman Olson (Service Rep.), 18 people made public statements. Topics raised at the hearing overlapped issues submitted in writing, and many who made public statements submitted the same thoughts in writing.

Two hundred and five comments (both written and public statements) were received during the comment period (47 letters were from elementary school children), and 4 letters were received the following week. Affiliations of the comments are tabulated below:

Support	**Neutral**	**Oppose**
1-Federal Agency	1-Private Organization or County	13-Private Organization or County
2-State Agency	6-General Public	163-General Public
2-Private Organization or County		
18-General Public		

Written comments and public statements are addressed in the following summary. Comments of a similar nature or point are grouped. The Service's response to each issue is provided immediately following the statement of the issue. Numbers in parentheses indicate the assigned number of the commentator(s) who raised the issue. More complex letters are addressed individually.

1. The Service should let nature take its course (3, 7, 16, 21, 23, 24, 25, 26, 27, 29, 30, 36, 37, 41, 42, 43, 44, 47, 50, 54, 56, 58, 69, 76, 79, 80, 86, 91, 94, 103, 108, 111, 113, 116, 118, 130, 131, 133, 134, 135, 138, 140, 141, 147, 154, 155, 162, 167, 170, 192, 193, 198, 199, 202, 205). This proposal is unnecessary (108, 120, 122, 132, 152, 156, 157). Man has done enough damage to our environment (18, 36, 81, 89, 107, 117, 138). All actions against gulls should be stopped (147) and no new action should be taken at this time (95, 132, 144). Terns and plovers and gulls coesixted fine before man (31).

Increases in population trends and distribution of herring and great black-backed gulls, both in the Northeastern U.S. and on outer Cape Cod, have been attributed to availability of human-generated food sources such as landfills and fish offal (See Section I. and III. of EA). To this end, the growth of the Monomoy herring and great black-backed gull colony is attributed, at least in part, to increased development of the Cape Cod area between 1960 and the late 1980's. The resultant Monomoy gull population is a human-abetted intrusion on the normal abundance and diversity of wildlife on the refuge. Current composition of wildlife populations on Monomoy is very much the consequence of human activity, and is not a "natural situation".

Several commentators recognized that the current situation is actually a man-made problem (1, 32, 35, 53, 73, 84, 86, 89, 94, 96, 108, 136, 138, 145, 148) and suggested that man either be managed (94, 96), or manage to correct the imbalance (53, 84, 142, 148). One commentator suggested that Alternative 4 (abandon all gull control efforts) is unacceptable because it gives the message that the Service doesn't recognize the need to manage resources.

2. Piping plover numbers are already increasing (3, 5, 29, 45, 47, 49, 51, 54, 56, 76, 78, 79, 96, 97, 98, 108, 120, 122, 124, 126, 130, 136, 144, 147, 152, 156), at what might be nature's rate (126), and tern numbers are increasing (78) or have stabilized (54). The need to generate an accelerated rate of increase in piping plovers is uncertain and the objective speculative (143).

Between 1983 and 1993, only 2 to 5 pairs of plovers per/year nested on the refuge, despite substantial available habitat. Nesting piping plovers increased to 7 pairs in 1994 and 14 pairs in 1995. While piping plover numbers are increasing, particularly in New England, the Atlantic Coast population is still small and vulnerable to extinction, and it is important to take steps to reduce that vulnerability. While encouraging, the rate of growth of the Monomoy piping plover population lags substantially behind that of nearby sites (also noted by commentators 124 and 125), and the presence of gulls has been identified as the major factor retarding the rate of piping plover recovery on the refuge (See EA, section I., for source citations).

Eventual removal of piping plovers from the endangered and threatened species list (which is the objective of the Endangered Species Act) as provided in the draft revised recovery plan will require long-term protection of habitat and piping plovers on enough sites to support 2000 pairs (625 in New England). The Service believes it is especially important for Federal lands to realize their potential for contributing to the recovery of this threatened species. National Wildlife Refuges are the first places the Service is likely to look for sites where long-term protection can be assured, so increasing the piping plover population on Monomoy represents an important and lasting contribution to recovery.

3. Gull populations are naturally declining and/or will continue to decline (8, 13, 15, 29, 30, 36, 47, 51, 54, 56, 72, 76, 78, 79, 80, 96, 97, 103, 104, 108, 109, 120, 122, 123, 124, 126, 136, 137, 144, 145, 147, 149, 152, 154, 156, 192). The gull population

will be manageable in 5 years with non-toxic solutions (72) and will be close to target numbers in 2-3 years (130) or 5 years (126, 143). Great black-backed gulls have been increasing and herring gulls have been decreasing (54, 152) with no evidence to theorize its result on Monomoy species (54). The population should be left alone and reviewed in 6 years (109) or monitored (132).

Current trend data indicate that the herring gull population (on Monomoy, in MA and region-wide) is declining, while the great black-backed gull population is increasing (except on Monomoy; See Section III. of the EA). Even if Monomoy gull numbers continue to shrink, as they have in recent years, herring and great black-backed gulls are expected to continue to dominate the majority of suitable habitat on the refuge and displace other nesting species indefinitely. Therefore, active management of the large herring and great black-backed gull colony on the refuge is necessary at this time to meet refuge objectives as well as legal mandates. Please also refer to summary response #4.

The Service has not set any "target" population numbers for herring and great black-backed gulls on the refuge (except for the proposed treatment area). The Service believes that an assertive program to remove gulls from a defined area with a commitment to tenaciously defend it against any gulls that attempt to recolonize in the future is the only way to assure that piping plovers will be able to attain estimated carrying capacity for any stretch of beach on Monomoy, and that nesting opportunities for other species will be improved. The current gull population trends on the refuge increase the likelihood of successfully clearing gulls from the proposed treatment area. Long-term monitoring and evaluation of wildlife responses to the proposed action increases the Service's ability to implement wise management practices.

Some commentators recognized that gulls keep other birds from Monomoy (171, 172) by occupying suitable habitat (124, 125, 142), and depredating piping plover nests (125) and, although herring gull populations are decreasing naturally, the magnitude is still too high for piping plover recovery (124, 142). Breeding biology (early initiation of nesting activity) and longevity (20 years or more) ensure gulls will continue to dominate avifauna under Alternatives 1 and 4 (6). Other commentators suggested gulls will naturally seek another food source and adjust their population to the level of that food source accordingly (35) and that the Service should remove half the gulls (195).

4. This is incompatible with the Wilderness Concept (120). Is/how is this proposed alternative in accordance with the USFWS mission (43)? As a wildlife refuge (133) and the only federally designated wilderness area in MA (120, 123), Monomoy NWR should be left alone. How do you justify this (52)? Is species extinction to regenerate another species a refuge mandate (72)? Why not let the plovers go extinct in that area (88). Could the gulls become endangered, extinct, or eliminated from its natural range as a result of this removal (97, 155, 161, 162, 168)?

In 1970, Public Law 91-504 designated the Monomoy Wilderness, comprising about 2,600 acres

on what was then Monomoy Island. The Service's mandate is to manage the Monomoy Wilderness for conservation of migratory birds in accordance with provisions of the Wilderness Act (16 U. S. C. 1131-1136). The Wilderness Act of 1964 requires Federal Agencies to protect natural processes of the ecosystem from degradation or interference, and to preserve attributes of naturalness and solitude. The Wilderness Act (Section 6) also permits management of natural resources. A natural abundance and diversity of wildlife is an integral component of the wilderness ecosystem. Where management actions are required to protect or restore wilderness qualities, they should make use of methods and equipment which will cause the least impact on wilderness character. (This concept is often referred to as the "minimum tool" principle.) DRC-1339 is believed to be the most effective method currently available to clear nesting gulls from an area where they have a history of success. It also poses the least amount of disturbance (of other available techniques) to other inhabitants (See Appendix G).

The Endangered Species Act of 1973 directs Federal Agencies to carry out programs for conservation of endangered and threatened species and to conserve ecosystems upon which these species depend. Threatened piping plovers use Monomoy Islands for both nesting and staging. Endangered roseate terns frequent the Refuge during the nesting and pre-migration season, as well, and historically nested on Monomoy Islands. Recent policy direction from the Secretary of Interior (USDI 1995) charges Federal Agencies with fully meeting their responsibilities for threatened and endangered species recovery in order to help reduce impacts of endangered species protection on other landowners. The proposed action is in accordance with tasks outlined in the Recovery Plan for the threatened piping plover. It would be inconsistent with congressional mandate and secretarial directive if the service let piping plovers go "extinct", or more correctly, become a non-breeding species like the roseate tern. In addition, the Northeast Regional Resource Plan directs implementation of several strategies to support tern breeding at Monomoy. Those strategies include controlling competition for nesting space and predation by other species.

The National Wildlife Refuge System has broad goals that are used as guidelines for managing individual refuges. The primary goal is wildlife protection, including preservation, restoration, and enhancement of threatened and endangered species and migratory birds. Preserving a natural diversity and abundance of flora and fauna on refuge lands is another priority goal. Allowing the disappearance or "extinction" of one species on a National Wildlife Refuge in favor of another species is not a refuge mandate and is not the goal of this project, which targets only 20% of herring gulls and 25% of great black-backed gulls on the refuge. In fact, the number of herring and great black-backed gulls targeted for removal by the proposed action in the first year is just 2% and 5%, respectively, of the Northeast population total. The number of gulls removed in subsequent years would be substantially fewer. Given that both species have a high reproductive potential, breeding habitat is not limited, and only a portion of the refuge colony will be affected, the removal of this number of breeding adults is not expected to have a significant impact on the continued viability of the regional populations.

One commentator noted the proposed action would not cause extinction of herring and great black-backed gulls. One commentator recognized the proposal was in accordance with the

Service's goals (32), and management is an integral part of our mandate (148). Others expressed confidence in the Service's knowledge and responsibility to act in the best interest of all species on the refuge, despite outside emotional opinions (34, 84) that tend to be unaware of the biology (32, 34). Others thought it would be indefensible not to act aggressively to protect nesting shorebirds on Monomoy from gulls, in light of high levels of protection from humans established on recreational beaches (84, 124) and state and town properties (124, 125).

5. The Service has not defined diversity (120). There is plenty of diversity on Monomoy (76) and avian diversity has actually increased (120, 132). There has been a net gain in the number of nesting species (120). There is doubt that gulls actually have the ability to change avian diversity on an island (120). Bird watchers don't need the government to design a stage and set for them (5). This will not influence bird watching opportunities (132). Bird watching opportunities will actually decrease as more areas are closed off to protect the possible increase in nesting shorebirds (120). Inclusion of feral Canada Geese is inappropriate(123).

The EA was modified to reflect comments on diversity and resident Canada Geese; please refer to Section I. of the EA for a clear definition of what the Service refers to as species diversity, and Section VI. for a discussion of consequences relative to the Canada goose breeding population on the refuge. Because of the subjectivity of the Service's observation regarding bird watching opportunities, it has been removed from the EA.

Some commentators recognized gulls' destructive nature on plovers (33, 184), terns (33), other shorebirds (9, 33, 48, 84), nesting success of other waterbirds (12), and their ability to take over habitat (17) and scare away piping plovers (203). One commentator noted that action was necessary to provide habitat for a wider diversity of species (124).

6. The gulls did not do anything wrong (36, 134) or to us (165, 169). There are many positive things that gulls do (164, 185): eat things so we don't get sick (10), help keep the environment clean (6, 23, 36, 60, 72) and pick barnacles off whales' backs (175, 186). Some people enjoy the aesthetic value of gulls (3, 52, 57, 72, 80, 118, 122, 134, 139, 155, 185).

This proposal is intended to redress a human-abetted imbalance in wildlife populations, rather than as retribution to gulls. Only a portion of the herring and great black-backed gull colony on the refuge will be affected by the proposed action. Thus, impacts on above-stated benefits of gulls on the environment will be minimal. Please also refer to Section VI. of the EA for a detailed discussion of expected impacts on the regional herring and great black-backed gull populations.

One commentator considered gulls useless (172), and others recognized negative impacts of gulls

on humans such as: taking over picnicking areas (17), stealing bait (33), getting tangled in monofilament line (33), defecating on cars (203), and being dirty in general (114). These inconveniences, however, have had no influence on the Service's reasons for implementing the proposed alternative.

7. All species in a wildlife refuge should be protected (3, 27, 30, 36, 43, 49, 51, 56, 72, 83, 87, 147, 183) from humans, not from each other (36, 43, 72). Aren't gulls protected by law (36)? Why should we kill one type of bird to help another bird (2, 21, 23, 29, 36, 38, 45, 46, 52, 56, 58, 60, 68, 77, 85, 92, 93, 98, 128, 134, 137, 138, 162, 166, 183). Gulls were here first (130). Another species will take its place (36).

Herring gulls, great black-backed gulls, and other migratory birds such as waterfowl, piping plovers, tern spp., black skimmers, American oystercatchers, willets, and spotted sandpipers are all protected under the Migratory Bird Treaty Act of 1918 (16 U. S. C. 703-712) as are their nests and eggs. Prohibited acts include pursuing, hunting, shooting, wounding, killing, trapping, capturing, and collecting of protected species, or attempting such conduct. Permitted exceptions listed in 50 CFR part 13 and part 21 allow the Service to engage in control of depredating species when necessary.

The Service believes recovery plans for rare species such as piping plovers and roseate terns that may require some level of gull control are compelling reasons for action. Again, the current high population of gulls on Monomoy NWR is a result of human activities. Gulls were not present as a nesting species in Massachusetts in the 19th century (USFWS 1988), while the piping plover was described by 19th century naturalists as a common summer resident on the beaches of the Atlantic Coast (USFWS 1995). On Monomoy, past records indicate that piping plovers nested at least as early as 1955 (USFWS 1988), while nesting herring gulls and great black-backed gulls were not observed until 1961 and 1965, respectively. Please also refer to summary response # 4.

One commentator expressed concern for the rights of the piping plover (184).

8. Killing wildlife in a wildlife refuge sends a bad message (72, 106, 120). What will children and/or tourists (39, 49, 51, 52, 77, 106, 132, 134, 147, 154) and electorate (72) think? There should be some type of public outreach program (109).

The Service is striving to communicate that the need for this action stems from a human-abetted imbalance of wildlife populations. Population control is a legitimate management tool on a National Wildlife Refuge; it is used on a case-by-case basis on Service lands throughout the United States. Please also refer to response #4.

As stated in the EA, public outreach will consist primarily of informative news releases and feature articles in the Great Meadows National Wildlife Refuge Complex's quarterly update, Meadows

Messenger. In addition, annual progress will be evaluated and reports written as part of Monomoy NWR's Annual Narrative. These are unpublished reports, however, they are available for review at Refuge Headquarters in Chatham, Massachusetts. Outreach efforts may be expanded in future years by developing an on-site interpretive display or providing off-site group presentations and/or educational programs, as budget and personnel constraints allow.

One commentator noted the proposal is sound management and that this is a morally defensible action to attempt to restore a measure of avian diversity (148).

9. Many gulls will fly away (179) and might die in other places (51). There is no guarantee a gull will not end up dying on beaches in sight of tourists and children (72). How will carcass removal be adequately handled by USFWS staff (132). Poisoning the gulls last time had nasty consequences for the ponds (76) and nearby beaches (111, 134) where the gulls died.

When DRC-1339 was used in 1990 and 1991 on Ram Island, Massachusetts, 77% of the total collected birds were retrieved on the island (Blodget and Henze 1992). In addition, there were no reports of gulls dying off Monomoy NWR during the 1980 DRC-1339 treatment and all, except 1 bird, were located South of the lighthouse (Atwell USFWS unpubl. memo, 1980).

The Service recognizes that the 1980 avicide treatments occurred on the southernmost end of South Monomoy Island, and realizes the possibility that some birds treated during this proposed action (on the northern end of South Monomoy) may fly to the mainland. Therefore, the Service intends to actively search the mainland for gulls, beginning the day following the first avicide treatment and continuing for at least a week after the end of the proposed treatment. In addition, staff will be available to respond to specific calls for the entire treatment period. News releases to local media, wildlife rehabilitators, and Town offices will keep the public informed of upcoming dates of avicide treatments and where to report sightings of sick gulls or gull carcasses.

Beginning 24 hours after DRC-1339 is applied, additional Service personnel (consisting of staff from Animal Damage Control and other refuges, and several volunteers) will conduct thorough searches of the treatment area. Searches will continue for several days. Gull carcasses recovered on the island will be recorded and buried on-site.

10. Will there one day be too many seals (2), terns (72), coyotes or raccoons (36)? Do we want to live in a world where the solution to a problem is to kill off what we don't want (49, 77)?

The Service is not proposing a Refuge-wide eradication of gulls. Rather, the goal is to create a gull-free area where opportunities for other nesting species will be available. At the end of the proposed treatment period, non-lethal techniques to discourage inexperienced new breeders from nesting in the area will be reviewed. The need for this action is based on the dual findings that

1) gull numbers are a human-abetted imbalance and 2) this is exerting severe impacts on rare species.

11. It is not fair to kill an animal if you aren't going to use it (162, 190); what are you going to use the dead birds for (162)?

The draft EA (page 13) stated that gull carcasses removed on the island would be promptly buried on site. Carcasses recovered on the mainland would be transported to a pre-determined mainland site for burial or provided to a scientific institution upon request. Suggestions made during the comment period (82) regarding scientific data collection from the carcasses have been incorporated into the final EA (See Appendix F). Briefly, a subsample of the culled gulls will be used by Refuge personnel for educational purposes, to develop techniques for externally sexing great black-backed gulls, and to evaluate the sex ratio of birds killed using the proposed treatment. The Service will also attempt to accommodate requests from scientific institutions for gull carcasses.

12. Is there a more humane solution; poisoning is cruel and the gulls will die in agony (3, 14, 18, 22, 30, 45, 46, 51, 52, 54, 58, 61, 68, 79, 83, 89, 92, 96, 100, 104, 105, 112, 122, 123, 130, 131, 132, 134, 135, 137, 152, 154)? There is no such thing as a calm (96, 121, 138, 163) or painless death (52, 58). Poisoning of any animal is wrong (23, 42, 51, 121, 123, 129, 147, 190). Oiling of eggs is cruel (138).

The Service is not aware of any other technique that will accomplish objectives and is considered more humane than DRC-1339. The avicide acts as a kidney depressant. The kidneys fail to function properly and toxic waste products such as uric acid gradually accumulate in the bloodstream causing uremic poisoning and congestion of major organs. Usually within 12 hours, the gulls become lethargic and return to the nest site where they become comatose and die within 24-48 hours. Generally, the gulls are found dead with wings folded and appear to be sleeping when approached.

Oiling eggs is not a strategy currently being used or proposed for future use by the Service.

13. What state concerns or requirements are necessary to meet regulation concerns for avicide application (109)? Is there a safer way of dealing with the gull problem to avoid the risks of toxins being introduced into the environment/ecosystem (8, 38, 50, 51, 58, 108, 128, 147): tidal marshes, estuaries, and areas of run-off (136); plants; groundwater (1); drinking water (72, 176, 179, 182, 183); crabs and lobsters (40); shellfish (145); seals (147); nontarget species (1, 8, 11, 31, 72, 83, 92, 131); scavengers (1, 8, 31, 72, 77, 83, 103, 131); domestic animals (92, 131); humans (31, 92, 176, 179, 180, 182, 187) or other birds and animals (38, 40, 85, 175, 177, 183, 89, 130, 166, 204)? One commentator expressed concern about burying gulls on the island (23). Wouldn't burying thousands of gulls effectively make Monomoy Island

a landfill, which would leach nitrides and cause eutrophication in surface waters (72)? Who is going to gather and dispose of the birds before others eat them (83)? Couldn't DRC-1339 result in more endangered species (31)?

Label directions are federal regulation and will be followed, as well as Massachusetts Pesticide Regulations. DRC-1339 can only be applied by certified Service personnel and members of Animal Damage Control (U.S. Department of Agriculture) will be present during baitings. Rapid breakdown virtually insures that secondary poisoning will not occur. In laboratory tests, raptors fed exclusively on DRC-1339 killed starlings for over 100 days showed no ill effects and actually gained weight (DeCino et al. 1966). In another study, cats which fed on starlings treated with DRC-1339 "were unaffected, and no cases of secondary poisoning were observed or reported" (Besser et al. 1967). Also, the method of distribution (mixed with margarine and spread on bread cubes that are placed directly in the gull nests) make accidental poisoning of non-target avian species very unlikely; very few other bird species present will consume bread and gulls defend their nests very aggressively against other birds. Application of DRC-1339 on Seal Island, Maine (S. Kress, pers. comm., cited in Griffin and Cavanagh 1990) and Ram Island, Massachusetts (B. Blodget, pers. comm., cited in Griffin and Cavanagh 1990) did not result in deaths of non-target species. See Appendix B for more information on DRC-1339.

The Service does not believe that burying gulls on Monomoy would cause a landfill effect, particularly since there are no freshwater wetlands located within the treatment area. Additionally, as there is a certain level of mortality naturally associated with any large seabird and/or waterbird colony, bird carcasses (buried or exposed) are a relatively common find on the Monomoy Islands. The Service will not be burying all gulls, or even large numbers of gulls, in one ditch. Rather, gulls will be buried individually or together in small numbers. . Please also see summary response # 9.

14. Is there a better way to solve this problem (4, 26, 38, 57, 77, 87, 106, 119, 168)? Technology can certainly find a more positive approach to save the plover (19, 20, 61, 62, 63, 64, 65, 66, 158, 159, 160). The Service should relocate gulls (3, 83, 88, 166, 193, 198) and feed them trash (191), trap them and put them in a zoo (177), put a cage around them (186, 188), or use sleeping powder (166, 181, 188) so they will sleep while piping plovers reproduce (193). The Service should use birth control (71, 104, 105, 123, 129, 137, 138, 149) or drugs that act like estrogen and make male gulls non-fertile (72). The Service could shake (1, 4, 46, , 112, 149, 161, 194, 199), pin prick (55, 100, 149), break (93), collect (14, 101), replace eggs with plastic ones (4) or otherwise mechanically destroy nests (72, 136). What about shooting gulls (31)? The Service should use electronic methods to prevent roosting of gulls in certain areas (72, 138). Advertisements for bird control systems, including: flash tape, audio tapes, eye balloons, and flags, were sent in by an anonymous commentator (92).

The Final EA (Section IV. and Appendix G) has been modified to reflect the Service's

consideration of several alternatives suggested during the comment period, as well as clarify several other alternatives originally considered but not analyzed in this EA. Herring and great black-backed gulls are long-lived (up to 20 years or more), and once they have a history of successful nesting on a site, they are very tenacious. No other method has been demonstrated to be effective in removing large numbers of gulls from an area where they have established themselves as successful nesters.

One commentator noted disturbance of nesting gulls and physical destruction of eggs and nests are less effective than the proposed removal of adult birds (6).

15. Gulls might be too smart to eat buttered bread (166).

Only nests where plain bread cubes had been accepted during the prebait phase would be treated with DRC-1339 bread cubes. Gulls have voracious appetites and past experience at other sites has shown that virtually all of the bait is eaten by the gulls.

16. Poisoning birds will result in laying of more eggs because they will feel threatened (15).

The proposed action is intended to suppress all productivity in the treatment area through removal of breeding birds and by destroying remaining eggs. There is no evidence to suggest other gulls nesting in the vicinity will "feel threatened" and lay more eggs.

17. The Service should be exploring other methods to secure habitat (60): restrict humans from the island (123), restrict humans in another area that will provide habitat (70), move the piping plovers (10, 46, 178, 182, 94, 193, 198), stop building and destruction of habitat (129). The birds will migrate to other areas when the gulls have taken over (121). What if 94 pairs of plovers don't nest on Monomoy, or if more than 94 nest (139)?

This project is compatible with the Service's commitment to protect habitat on and off Monomoy from development and disturbance (See also response #18). However, the Service is also committed to needed management especially to counter human-abetted threats to wildlife, including population imbalances on National Wildlife Refuges such as Monomoy.

The estimated carrying capacity of 94 piping plover pairs was based on the quality and quantity of habitat on <u>all</u> of South Monomoy Island (See Section V. and Table 2 of EA). The estimated plover capacity for the proposed treatment area alone is 40 pairs. The Service believes these capacity estimates furnish a useful indicator of actual versus potential habitat use on Monomoy.

One commentator suggests closing off more beach areas will not help anyone (135).

18. The Service should work to maintain protection of other areas (152) and provide maximum incentive for compliance and strict enforcement of regulations (96) to protect terns and plovers on beaches (152). The Service should use traps, snares and cages (60, 98) to protect them from predators (178), machines (ORV's) (72, 98), people, and dogs (72). The Service should also educate people about pets and ORV's (129).

Management programs currently in place on the refuge that protect nesting birds from human disturbance and predators will be continued under all of the alternative proposals. These include, but are not limited to: seasonally restricting public use in areas of high value to sensitive wildlife species, monitoring piping plover and tern nesting areas, using piping plover predator exclosures, prohibiting dogs on the island portions of the refuge, and preventing reestablishment of mammalian predators on the islands (USFWS 1988).

19. The Service should keep on using current gull management (145) and harassment techniques that: have been successful (51, 136), are species-specific, and pose no threat to the environment (145).

The Service does not feel that the current gull management approach (outlined in the 1988 Monomoy NWR Master Plan), which was intended to facilitate re-establishment of a natural diversity and abundance of refuge wildlife, has been successful. Maintenance of existing gull-free habitat for use by other beach nesting species between 1988 and 1992 was attempted through the destruction of gull nests and eggs. In 1993 and 1994, Migratory Bird Treaty Act permits were issued for the take of herring and great black-backed gulls (using selective shooting), with the objective of removing up to 5,000 birds (combined species total). Due to the fact that these gulls quickly adapt to stay clear of shooting range, this method resulted in an effective take of less than 1,500 birds in 1993 and less than 200 birds in 1994.

Subsequent to adoption of the gull-free area and buffer zone concept in 1988, it was observed that while scattered areas of gull-free habitat may have provided some benefit for nesting piping plovers, it perpetuated unfavorable nesting conditions for common terns, laughing gulls, and other species. Aside from the relative ineffectiveness of gull control measures used in 1988-1994, the Service believes that an area of unfragmented gull-free habitat (as proposed in Alternative 2 of this EA) would be of greater benefit to other nesting species (including the piping plover) than the current management approach.

The methods proposed for removing nesting herring and great black-backed gulls from the treatment area (DRC-1339 gull toxicant and follow-up harassment techniques) are the same those identified as suitable in the 1988 Master Plan (USFWS 1988).

20. The Service could move eggs to Nauset Beach to divert foxes (72) or let foxes (14, 27) or pigs (153)) feed on gull eggs. What about gulls' natural predators, like coyotes and cormorants (118).

Moving gull eggs to another location for foxes to feed on would be labor intensive and time consuming and would perpetuate a group of foxes that would ultimately be dependent on humans and may be problematical in the future. If mammalian predators were common, or were introduced (in the case of pigs), they would also pose a threat to eggs of other avian species, including terns, plovers, and waterfowl. See also Appendix G of the EA. There are no reports of cormorants preying on gull eggs on Monomoy NWR.

21. Could there be another reason impeding plovers on Monomoy such as habitat (4) or erosion of nesting habitat (123). The estimate of 94 pairs of piping plovers is overly simplistic (120). Only 15 pairs were noted in 1955, while only 5 pair of herring gulls and 0 pairs of great black-backed gulls were present in 1963 (120). Some other uncertainty may affect piping plovers even if gulls are removed (43).

A very thorough review of piping plover habitat and limiting factors on Monomoy was done in 1995. Monomoy has some of the very highest quality plover habitat on the Atlantic Coast, yet the piping plover population lags way behind other nearby sites. Biologists have observed antagonistic interactions between gulls and piping plovers on Monomoy on many occasions during the last 10 years. Large gull colonies have also been linked to absence of piping plovers or substantially lower than expected densities at a number of other Atlantic Coast sites. Also, other threats, such as mammalian predators and human disturbance, are much lower than at other Cape Cod sites. The boat-only access situation means that there are relatively few recreationists on Monomoy (especially during April and early May when plovers establish territories, court, and lay eggs) and nest sites are well posted and patrolled by refuge staff.

It is not known if Griscom's (1995) record of 15 pairs of plovers on Monomoy in 1955 represented as intensive a search effort as has been mounted since the species' listing and/or how the suitability of habitat, which is highly dynamic, may have changed between 1955 and 1995. Up until at least 1949, Monomoy was used by the Airforce as an air to ground target range; jeeps, beach buggies, and other vehicles drove the beaches into the late 1960's. The effects of ORV use on piping plover populations have been well documented. Predators from the mainland such as raccoons, foxes, coyotes and domestic dogs were able to walk to and from Monomoy before the island was separated in the late 1950's. Qualitative assessments suggest that habitat suitability on South Monomoy increased substantially between 1987 and 1995 (A. Hecht, pers. comm., 1996).

One commentator noted major threats include: habitat loss and degradation, human disturbance, and predation, and the importance of increasing and maintaining habitat as numbers of piping plovers increase (125). Another noted Monomoy has some of the best piping plover habitat in MA (124) and almost 5 miles of high quality habitat are underutilized because of the presence of

gulls (125).

22. Gulls haven't been a major factor in the decline of terns (104, 120). Declines may be in part related to gull proximity but this is based on little evidence. Terns are habituated to gulls and defend against them (54). Peak tern numbers coincided with gull populations that were higher than they are today (144, 152). There are no substantial studies directly linking decreasing piping plover nest attempts on Monomoy with gull presence (54, 104, 120). At South Beach and Nauset Beach, populations of piping plovers are increasing despite loafing and non-breeding gulls (120).

The Service believes that occupation by both great black-backed and herring gulls has limited nest site options on the refuge for a number of other species. Observations by Service personnel and various researchers in Massachusetts and Maine suggest that both species contribute to displacement of other nesting birds (see Section III. of EA). Fitch (1985) states clearly in his report that "Black-backed and herring gulls reduce common tern nesting success because of competition for nesting space." All areas where terns historically occurred on the Refuge are now also occupied by herring and great black-backed gulls.

Until 1985, numbers of nesting terns on Monomoy NWR remained comparable to the impressive populations of the early 1970's. This peak did indeed coincide with large numbers of herring and great black-backed gulls (see Appendix A). Productivity of Monomoy's terns, however, began to decline in 1978. Displacement by large gulls may have made the terns more vulnerable to predators by concentrating them in fewer locations. Other formerly used tern colony sites on the islands had become overrun by herring and great black-backed gulls (USFWS 1988). Gulls were also most likely responsible for the displacement of terns on South Monomoy Island in 1971. A variety of predators (Nisbet and Welton 1984), storm-tides and shrinking habitat options may all have contributed to virtually no tern productivity between 1980 and 1994 (Fitch 1985; USFWS, unpubl. repts., 1985-1994).

While the nesting piping plover population on Monomoy is increasing, the rate of growth of Monomoy's plover numbers lags substantially behind that of nearby sites, and all available evidence supports the conclusion that the presence of gulls is the major factor retarding the rate of piping plover recovery on the refuge (See Section I. of EA). Piping plovers nesting successfully on Nauset and South Beaches are in proximity to roosting and loafing gulls, not large numbers of nesting gulls. Experience at a number of sites, shows a notable absence or scarcity of nesting piping plovers on sites where large gull colonies have become established (USFWS 1995).

23. There is little evidence of re-establishment of roseate or arctic terns (54, 72, 144) or an increase of piping plovers (54, 120, 123) or terns (123). "Re-attracting the [terns] that have been lost since 1979 might actually be detrimental to the regional populations unless effective management steps could be taken to improve their

productivity . . . there is undue emphasis on herring gulls and great black-backed gulls as causes of the current wildlife problems and as the primary focus of proposed wildlife management activities . . . if by chance it should be successful in attracting roseate terns back to breed on Monomoy NWR, this would be detrimental to the recovery of the species" (99).

Tern colonies often do shift nesting sites over a period of years. As reported in the Roseate Tern Recovery Plan (USFWS 1989), at least 13 roseate tern colony sites have been abandoned or subject to drastic reductions in numbers since 1920. Although some of the changes were attributable to erosion or predation, the most consistent factor was the occupation of the colony sites by herring gulls and/or great black-backed gulls. This fact is a major contributor to the precariousness of the roseate tern population, approximately 50% of which nested on a single 5 acre island in 1988 (USFWS 1989). Further, while gull removal will not guarantee return of terns to Monomoy, it is relatively certain that common, arctic, and roseate terns will not successfully recolonize gull occupied areas on Monomoy.

Many factors have exerted impacts on tern populations on Monomoy. However, gulls and human disturbance are two identified human-induced problems faced by terns. Further, were it not that gulls have usurped so much of the otherwise suitable tern habitat on Monomoy, the terns would have far more options to relocate their colony elsewhere on the island where endemic predators and storm tides might be less problematic. Thus, loss of nesting sites to gulls may have exacerbated the effects of other predators on terns. There is no way to guarantee that gull free habitat provided on Monomoy will be used by other species, nor that they will be successful if they do nest.

The Service is not implying that all productivity problems are directly caused by gull predation. The proposed project focuses on restoring suitable nesting habitat which may allow terns more nesting options. The Service will not be actively attracting birds to the treatment area. When coupled with predatory pressure from great-horned owls and black-crowned night-herons, loss of suitable nesting habitat may have contributed to tern displacement and lowered tern production on Monomoy. The service will deal with individual predators on a case-by-case basis, using the appropriate permitting procedure and harassment, selective shooting, or productivity suppression techniques. Proposed methods have resulted in successful restorations of seabird colonies and enhancement of avian diversity on several NWR units in Maine since 1984, including Petit Manan Island, Seal Island, and Ship and Trumpet Islands.

.One commentator suggests that reduction in gull populations has had beneficial effects on avian diversity in other cases (73).

24. Even without gulls, plover eggs and chicks are game to other predators: owls, hawks, harriers, crows (72). Great-horned owls, black-crowned night herons (54, 120), and short-eared owls (54) have been major predators, and black-crowned night herons have increased (123). Gull control should be combined with an aggressive

predator control program to assure the successful fledging of plovers (142). There is little evidence of significant impacts of gull depredation on shorebirds (54). Gull removal will increase depredation by other species (152).

The Service's concern about gulls, as opposed to other species such as short-eared owls, is based on the clear distinction that gulls have expanded their range and population as a result of human activities. Other potential predators such as short-eared owls have coexisted with terns, piping plovers, etc. . . since colonial times. Furthermore, gull encroachment on piping plover nesting space, not predation, is the Service's primary concern on Monomoy NWR. However, MacIvor (1986-1988, unpubl. rept.) observed gulls depredating piping plover nests on outer Cape Cod. In fact, gulls were responsible for 100% of nest failures in 1988 on Monomoy NWR. In addition, there is evidence that gulls are major predators of young terns and other birds in some places perhaps where less food is available. There is no evidence to suggest that gull removal will increase depredation by other predatory species.

25. ***This program will not achieve its objective (104, 120, 122, 132, 152). The only effective long term gull control would be refuge wide use of DRC-1339 coupled with egg oiling initially, and yearly destruction of a large percentage thereafter, but there is not adequate evidence to justify the expense and effort (54). Alternative 3 is too large to try with a limited staff and limited funds (142). A slight reduction in gull density in one isolated portion of a nesting colony is going to act like a vacancy sign for members of nearby gull colonies. (54, 152).***

The 1980 gull poisoning effort was quite effective despite late application (which missed most great black-backed gulls) and effected a decline of nesting herring gulls (26% in the treated area), which even in 1981 had not fully recovered (R. Andrews, USFWS unpubl. memo 1981). Had the Service carried out the second planned application of DRC-1339, harassment would then have been used to maintain the area free of new gulls attempting to establish nests.

Although removal of herring and great black-backed gulls refuge-wide was analyzed in this EA (Alternative 3), the Service is not proposing such a large scale project at this time.

According to the 1995 nesting gull survey on Monomoy, herring and great black-backed gulls have declined since 1990. If this trend continues, gull populations on the refuge will likely decline faster than predicted by Griffin and Cavanagh (1990), increasing the likelihood of successfully clearing breeding birds of both gull species from the proposed treatment area. There is no reason to believe an area cleared with DRC-1339 on Monomoy NWR cannot be maintained using the same methods that have been successfully employed elsewhere (See response #2 to J. Arnold). Gull harassment, especially nest destruction, can be an effective means of discouraging pioneering gulls that attempt to establish nests where they do not have a history of successful reproduction. Further, the Service believes that the remaining areas on South Monomoy, where gulls are allowed to nest, will draw recruits, and the gull-free area will draw fewer recruits, as is observed in Maine.

Additionally, the herring and great black-backed gulls that nest outside of the designated treatment area on the north end of South Monomoy are expected to function as "magnets" for any surviving gulls that might be dispersed from the treatment area.

26. There is no certainty that any alternative will work (67). We should dedicate time and money to finding out if killing gulls will have the desired effect (54, 67). An evaluation should be made each year to determine if cost and results justify continuance of the plan, or the need to find other alternatives (90). We need to cite specific protocols (109).

The Service acknowledges that there is no guarantee that any of the alternatives analyzed in the EA will succeed, and agrees that intensive monitoring and evaluation of the effects of any management action taken is important. A draft of the monitoring program proposed has been incorporated into the EA (Appendix F).

27. This is too specific a solution (132). We need to address the issue of overpopulation of humans which is diminishing other species' habitat (116). Poisoning is not a problem solver for the long term because it treats the symptom (92). We need a longer term balance (107). Poisoning wildlife to compensate for a lack of control of human activities that contribute to the problem is not entirely a satisfactory solution from a cost efficiency or ethical standpoint (6). Long-term responsibilities should also include efforts to address the sources of the gull population problem (96), permanently reduce food sources (6, 136), and initiate ongoing studies to document how human activities are continuing to contribute to gull populations (6). We need to control human pollution first (23). Do fishing boats or fish stores dump cleanings near Monomoy (23)?

The service commends all efforts to reduce availability of human-supplied food sources to gulls, as these efforts constitute the best long-term solution to conflicts between gulls and other wildlife. However, this does not obviate the need for shorter term solutions, especially where gulls pose a direct threat to rare species. A discussion of long-term solutions has been incorporated into the EA (See Appendix G).

28. This proposal is a waste of taxpayers money (40, 45, 76, 157) and would give any amount to employ people to protect, conserve and nurture (50) and clean up our environment (111). It's troubling to think that $120,000 of taxpayer money might be spent on a program that is disturbing to so many (80, 129). Spending $120,000 every year is a waste of good money and we will get close to the same (126), or the same results by doing nothing (130). How does the cost of this remain the same from year to year (109). Socioeconomic benefits are peripheral to the issue (109).

The proposed action is Alternative 2 and would cost approximately $30,000 per year. Alternative 3, which involves refuge wide gull removal would cost $120,000 per year. By comparison, Federal, State, local governments, and private organizations spent an estimated $494,000 to protect piping plovers in Massachusetts in 1993 alone (Draft Revised Recovery Plan, USFWS 1995). Socioeconomic benefits are indeed a peripheral issue, however, in keeping with NEPA regulations, a wide variety of environmental consequences must be analyzed as part of the EA.

29. 1996 is an election year, and the piping plover, barrier beaches, and now gulls have all become pawns in a governmental effort to favor ORV lobbyists (102). This is an issue about ORV use (15). Is it true that more plovers will nest on Monomoy by eliminating gulls, while increasing vehicle use in areas where plovers have shown improved nesting and fledgling success (4). Is the extermination of gulls on South Monomoy (to allow other sea birds to live there) justification for the use of land vehicles on mainland beaches where the plovers and their young now nest (79)? It makes no sense to allow an incidental take on plovers in some areas and to try to increase them in others (123). Do not post any more beach closures or, open up areas that were closed last year and are no longer needed (133).

This question mixes up two proposals that affect different sites in Massachusetts. Monomoy NWR includes two undeveloped barrier islands that are accessible only by boat. The refuge is also a designated National Wilderness Area, which effectively precludes the use of any motorized vehicles or equipment on the islands. The Massachusetts Division of Fisheries and Wildlife has applied to the Service for a permit for some very limited changes in management of off-road vehicles (ORV's) and pedestrian recreation on some sites that meet very strict eligibility criteria. In any event, Monomoy is not one of the sites where ORV's will be used. There is no correlation between the two proposals. See also summary response # 18 for information regarding beach closures.

30. ***Didn't a laughing gull die last time from the poison (123)? The past DRC-1339 actually lowered the tern population (123).***

Following the DRC-1339 application in 1980, 2 non-target birds (a mature red-winged blackbird and a subadult laughing gull) were found deceased in the treatment area. The cause of death was unknown. However, procedures for the 1980 application involved placing 7-10 bread cubes in each nest (Atwell, USFWS unpubl. memo, 1980), perhaps to target both birds in one baiting. It is possible that in some cases the first gull back to the nest devoured all the bait, and we now know that gulls will regurgitate the bait if it is in excess. In the proposed 1996 avicide treatments, the Service will be applying 3 bread cubes at a time to each nest, targeting just one bird per baiting.

There is no direct evidence that DRC-1339 gull toxicant caused a decline of terns as a result of

the 1980 treatment. The avicide was used in an area of the refuge (the south end of South Monomoy Island) where terns had already been displaced by herring and great black-backed gulls several years earlier. Between the late 1970's and 1993, nesting terns occurred only on the north end of North Monomoy Island.

31. This project is too large to be successful (108). The only comparable programs have been conducted in Europe and were unsuccessful . . . any gull control program at Monomoy would be more likely to succeed if it were focused on limited areas of suitable habitat, not directed at the entire population (99).

In 1986, The Service distributed DRC-1339 baits at approximately 2,500 gull nests (60% great black-backed, 40% herring) on Seal Island in Maine, removing more than 2,400 gulls. Two additional treatments were made in 1987, and one treatment of 375 remaining nests was made in 1988. The gull control program referenced by the commentator, Isle of May in Scotland,, targeted a population of 15,000 pairs of nesting gulls. The Service's proposed project does focus on a limited area of suitable habitat (where approximately 2,850 pairs of herring and great black-backed gulls, combined, nest); it is not targeting the entire nesting colony on the Refuge.

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April 5, 1996

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Dear Ms. Ware,

This letter is intended to serve as my formal response to the Draft Environmental Assessment: Restoration of Avian Diversity on Monomoy National Wildlife Refuge.

(1) I feel that culling of gulls on the Northern portion of South Monomoy Island may represent the most viable plan to achieve the goal of Refuge management, increasing the availability of nesting habitat for piping plovers, common terns, roseate terns, laughing gulls, and other species of waterbirds. However, I do not feel that the Draft Environmental Assessment provides the appropriate information for the public to support such a proposal, nor do I feel that the proposed action provides an adequate means of evaluating the success of the project. Therefore, I am opposed to the present proposal for the following reasons:

(2) 1.) The examples provided in the assessment, including Petit Manan, Isle of May, and Ram Island represent individual islands in which the gulls on the entire island were culled. These situations are considerably different from the actions proposed at Monomoy National Wildlife Refuge where the target area is buffered on either side by large numbers of nesting gulls. This raises the question as to whether the proposed action will be as successful as previous attempts of gull removal. The remaining gulls may attempt to colonize the newly vacant areas in subsequent breeding seasons, making it necessary to continue gull control by culling in the target area beyond the 5 years presently planned. An alternative result may be the thinning of gulls on the entire island rather than the clearing of a section of land for nesting by other species.

(3) 2.) The proposed culling targets breeding birds, however, breeding populations of gulls are associated with large numbers of non-breeding "loafers". There is no guarantee that by culling breeders, the numbers of loafing gulls on South Monomoy Island will be reduced. In fact, a study by Coulson et al. (1982), showed that culling of breeders actually resulted in the recruitment of younger birds into the breeding population. It is therefore possible that some of the loafing gulls may replace culled breeders.

(4) 3.) The proposal also suggest that predation by gulls on tern eggs and chicks is another problem posed by the large numbers of gulls at Monomoy. I have been unable to find documentation that the gulls on Monomoy are actually predating on terns, which of course means that there is no documentation as to which birds may be the predators. It is commonly known that in areas where predation by gulls is occurring, only a small number of gulls actually participate in the predation of tern eggs and chicks. Management efforts in the Great Lakes for example have focused on the selective culling of the main predators. If predation is occurring at Monomoy, it is possible that the individuals responsible are loafing birds which are not targeted under this plan. An observational study of the nesting colonies of common and least terns would at a minimum provide information as to whether predation is occurring. A larger project involving the banding of all breeding gulls followed by a series of watches, would allow investigators to determine if breeders, or loafers are the source of predation.

(5) 4.) The numbers of gulls nesting on Monomoy have decreased in the past decade. It is possible that their numbers will continue to decrease. The present proposal allows no way to differentiate between the natural decline in numbers and the decline due to culling. I propose that the culling be redesigned in order to determine the cause of the decline. One simple way to do this would be to compare the changes in numbers of breeders in other gull colonies on the Northeastern coast to the changes that occur at Monomoy. A comparison would allow the Service to present the public with hard facts when the success of the culling is being evaluated in 1999.

(6) 5.) The proposal places minimal emphasis on the extent of public outreach. I feel that if the proposed action is taken, it will be necessary to engage in a widespread, long term public outreach program. Such a program will need to include annual progress reports and hard facts, to convince a skeptical public that the action is necessary and successful. Without such a program, public outcry may force the termination of the project prior to completion, resulting in the failure of the project and unnecessary culling of a large number of birds.

In conclusion, I do not support the proposed action, Removal of gulls from part of South Monomoy Island, in its present form. I hope that with the comments provided by myself and other concerned citizens, The U.S. Fish and Wildlife Service will be able to reevaluate the proposed action and design a stronger more informative proposal for gull removal on the Refuge.

Sincerely,

Jennifer M. Arnold

Response to J. Arnold

1. Thank you for your comments. The final EA reflects several of the points you bring up (see Preface to the Final Environmental Assessment).

2. On Petit Manan NWR, the Service targeted both Green Island and Petit Manan Island for gull removal. These islands are joined at low tide. After removing a portion of the gulls nesting on Green Island, gull control was discontinued, while Petit Manan was kept free of herring and great black-backed gulls. Annual maintenance is necessary, however, to keep recruits from inhabiting Petit Manan. Individual management of gulls who have been identified as predators and who nest on Green Island is also necessary.

On Seal Island, Maine, one area of the island is kept free of nesting gulls, while the remaining areas left for gulls to nest. On Ship and Trumpet Islands in Maine, one island is kept gull-free, while the adjoining island is left for nesting gulls.

The natural breaks in habitat and nesting gulls on South Monomoy are analogous to the tide breaks on islands in Maine. Because the herring and great black-backed populations on Monomoy appear to be decreasing, the Service believes that thinning the colony outside of the proposed area is unnecessary.

It is, as you point out, however, imperative that long-term discouragement of gulls continues so that the area is not recolonized. We believe that the remaining areas on South Monomoy, where gulls are allowed to nest, will draw recruits, and the gull-free area will draw fewer recruits, as is observed in Maine. These few recruits in the proposed area will be removed annually, by harassment, selective shooting, or productivity suppression techniques.

3. Loafing gulls are not addressed by the proposed action because evidence suggests that territorial nesting gulls are responsible for the displacement of terns from suitable nesting habitat. Observations of predations by loafing gulls will be addressed on a case-by-case basis, and management will target individuals rather than all loafing gulls.

4. There is, in fact, documentation that Monomoy gulls depredate terns (Nisbet and Forster, 1980), as well as piping plovers (MacIvor 1988). Again, the Service is more concerned that the lack of habitat available to other nesting species is because of usurpation of habitat by herring and great black-backed gulls. Increasingly concentrated populations of nesting terns may make them more susceptible to other factors, such as predation or environmental effects.

5. Please refer to Appendix F for a draft of the proposed action's evaluation.

6. Thank you for your comments regarding outreach; they have been forwarded to Service outreach personnel. As stated in the EA, public outreach will consist primarily of informative news releases and feature articles in the Great Meadows National Wildlife Refuge's quarterly

update Meadows Messenger, as well as local newspapers. In addition, annual progress will be evaluated and written as part of Monomoy National Wildlife Refuge's Annual Narrative. These are unpublished reports, however, they are available for review at the Refuge Headquarters in Chatham, Massachusetts.

Comments on "Draft Environmental Assessment: Restoration of Avian Diversity on Monomoy National Wildlife Refuge" (U.S. Fish and Wildlife Service, February 1996).

By I. C. T. Nisbet, Ph.D., 150 Alder Lane, N.Falmouth, MA 02556.
17 March 1996

1. Introduction and General Comments. The writer is an environmental scientist who has studied the topics discussed in this Draft Environmental Assessment (DEA) for more than 25 years. I studied terns and their interactions with gulls on Monomoy National Wildlife Refuge (MNWR) in each year from 1972 to 1981 and I have visited MNWR periodically since 1981. I took part as an observer in the gull control programs of the U.S. Fish and Wildlife Service (USFWS) in the early 1970s and I have conducted gull control programs on tern colonies in most years since 1970. I have studied terns on and around Cape Cod in each year since 1970 and I am a member of the recovery team for the Roseate Tern (Northeastern Population). Although I made comments on the 1995 proposal as a member of the recovery team and addressed those comments to the team (with later transmission to USFWS), these comments on the 1996 DEA are made as an independent scientist and are addressed directly to USFWS.

2. The DEA gives no specific objectives for the program and gives no criteria for judging its success or failure. The title of the DEA is "Restoration of Avian Diversity on MNWR". The general purpose of the program is stated on p. 1 of the DEA as:

> ....to strengthen ongoing efforts to re-establish a wider diversity of nesting species on [MNWR] and, ultimately, restore the integrity of the Monomoy ecosystem by removing nesting herring and great black-backed gulls from approximately 350 acres on the northern end of South Monomoy Island.

Primary objectives are stated on p. 1 as "(1) to increase piping plover abundance... and (2) to increase habitat availability for [11 other named species]."

These goals and objectives are vague and imprecise. The terms "diversity" and "integrity" are not defined in the DEA and no means of measuring them are either given or referred to. Apparently, "restoration of diversity" means reduction in numbers of gulls, increase in numbers of piping plovers, and increased habitat availability for other species. It is not clear, however, whether it requires actual restoration of breeding populations of these other species. Nor is it clear how "diversity" is to be measured or assessed (e.g., number of breeding species, numerical index of diversity, measure of habitat availability for one or more species, or some other measure). Of the 12 species listed for enhancement, only four do not already breed on MNWR (Appendix A). Of these four species, the Arctic Tern is nearly extinct in Massachusetts and is unlikely to recolonize, the Black Skimmer has always been marginal

at MNWR, and the Roseate Tern has almost vanished from Cape Cod. Hence, only the Laughing Gull is reasonably likely to recolonize.

No numerical goals of any kind are given for the program. No operational criteria for judging its success or failure are given, either for "removing" gulls from the target area, for "increasing" piping plover abundance, or for increasing "habitat availability" for other species. Since gulls are already decreasing rapidly and piping plovers, common terns, and least terns have increased sharply since 1993 (Appendix A), mere continuation of these trends would not constitute evidence that the program had been successful. Some numerical predictions and criteria for judging the success of the program are essential, as well as a subprogram for measuring the outcomes. Otherwise, there will be endless debate about the success of the program between its supporters and detractors.

3. The program and the DEA make no distinctions between Herring and Great Black-backed Gulls. The gull removal program (Alternative 2, pp. 11-13) is to be applied indiscriminately to Herring Gulls (HEGUs) and Great Black-backed Gulls (GBBGs). After page 5, no distinctions are made between the two species. This is unjustified for both scientific and management reasons. The HEGU is already decreasing very rapidly as a breeder at MNWR, so a much stronger (and different) justification would be needed for a program to control it than for a program to control the GBBG. On pp. 5-6, no specific evidence is given to implicate either gull species as a predator or competitor for the more desirable species. This issue should be re-thought and an Alternative comprising control only of GBBGs should be considered.

4. The program is directed exclusively at breeding gulls and not at non-breeders. The gull removal program is directed exclusively at breeding gulls and not at the non-breeding segment of the population. MNWR is noteworthy for the large numbers of nonbreeding gulls, especially GBBGs in immature plumage, that loaf on its beaches and sand-flats. Although it is the breeding gulls that occupy the upland habitats most favored by terns and Laughing Gulls, it is primarily non-breeding gulls that frequent the intertidal areas where shorebird chicks feed. Some consideration should be given to the likelihood that non-breeding gulls pose as much or more threat to the desirable species as do breeding gulls. Indeed, Hecht and von Oettingen (1995, cited in the DEA at p. 3) clearly stated their opinion that the large concentrations of loafing gulls at MNWR were a major factor in deterring plover nest establishment. At Bird Island, also, the only substantial predation by gulls on terns that I have observed is by non-breeding GBBGs on fledgling terns. Because the poisoning program may kill only one bird from many pairs (Table 4), it may actually lead to an increase in non-breeders along the shore and hence increase any adverse effects on shorebirds. This issue should be re-thought and an Alternative comprising control only of non-breeders should be considered.

5. Estimates of the numbers of gulls to be killed are unnecessarily imprecise. The two estimates of the numbers of gulls to be killed under Alternative 2 (Tables 3 and 4) differ by a factor of about 2. Apart from any public policy or public relations implications of this uncertainty, it suggests a deficiency in planning or lack of control of implementation. At the least, the conduct of the control programs at Seal and Ram Islands should be reviewed to determine why about 2.6 birds per initial pair were killed at Seal Island, but only 1.2 birds per initial pair at Ram Island. Apparently, the MNWR program is to include only one baiting per year (p. 11) with very limited rebaiting, so it is likely that the numbers killed per initial pair would be small.

6. The program as described is unlikely to be successful in removing gulls from the target area. Although the information given on the conduct of the program (p. 11) is brief and incomplete, and although the predictions of the number of gulls likely to be killed cover a wide range (see comment 5), the information given in the DEA provides little confidence that it would be successful in its initial goal of "removing" gulls from the target area. Although the program is much smaller than that proposed in 1995, it is still larger in terms of area and number of gulls than most, if not all, of the other U.S. programs cited. Furthermore, the program will involve only one poison treatment in mid-May in each of 4 years, with a second treatment that "may be applied to large gull nests ... in the immediate vicinity of other nesting species in the designated area" (p. 11). In contrast, other control programs that are cited in the DEA as having been successful included intensive follow-up of the poisoning treatments with shooting, harassment, and continuous human presence in the treated area for several succeeding years (see, e.g., footnotes to p. 22). The DEA correctly cites (p. 19) papers by Coulson et al. (1982, 1991) which reported that following a large-scale poisoning program in Scotland, in which about 40,000 gulls (2.7 gulls per initial pair) were killed over a 10-year period, survivors and immigrants spread out to maintain occupancy of almost all suitable habitat on the colony site. Inexplicably, however, the DEA does not acknowledge that this demonstrates that the program failed in its objective to clear habitat for other species. In my opinion, the MNWR program will similarly fail unless it is modified to include intensive follow-up of the poisoning treatments with shooting, harassment, and continuous human presence in the treated area for several succeeding years.

7. The assumed beneficial effects on piping plover populations are conjectural. The DEA states (p. 3) that "the presence of the gulls has been identified as the major factor retarding the rate of plover recovery on the refuge." However, none of the four unpublished letters and memoranda cited in support of this statement gives any actual evidence for this proposition. Hecht (1995) expressed the belief of the Piping Plover Recovery Team that "the presence of large numbers of gulls within suitable plover habitat

is the primary reason why the population remains so low." However, no evidence for this belief was given except for five citations to observations at other sites, which also appear on pp. 6-7 of the DEA. Hecht and von Oettingen (1995) reported observing large concentrations of loafing gulls in plover habitat on the refuge, and expressed the belief "that they are a major factor in deterring plover nest establishment on otherwise highly suitable habitat. We took many photos that illustrate this conflict. At this point, it appears that usurpation of habitat, not direct nest and/or chick predation, is the primary adverse effect of gulls on plovers." However, no evidence other than juxtaposition was mentioned to support this belief. MacCallum (1993, 1996) similarly gave no evidence of any kind for his assertions that "the severe decline in number of nesting plovers on the refuge during the past 30 years is directly related to disturbance, competition, and predation from the large colony of gulls..." and that "The large nesting population of Herring and Great Black-backed Gulls is a current limiting factor in the recovery of Piping Plover at Monomoy." The other citations referred to on pages 6-7 of the DEA similarly give no evidence for effects of gulls on piping plovers, other than juxtaposition and correlation. Although it is possible that some or all these opinions about the effects of gulls on plovers may be correct, they are at best circumstantial and unsupported by scientific evidence. The writers disagree among themselves whether these effects are exerted by breeding or by non-breeding gulls, and whether they are exerted through predation, competition, disturbance, or deterrence. The correlational avidence that piping plovers at MNWR are adversely affected by gulls could equally well be applied to Black-crowned Night-Herons or Northern Harriers. Finally, the number of piping plovers at MNWR increased sharply between 1993 and 1995, making the relationship to gulls even more questionable.

8. The assumed beneficial effects on terns and other species are questionable and the evidence is mis-cited. The statement on p. 20 of the DEA that "Establishing and maintaining the northern portion of South Monomoy Island free of nesting herring and great black-backed gulls would expand opportunities for breeding terns on the refuge or from nearby off-refuge sites to relocate in response to endemic predators and storm-tides" is extremely questionable. Terns (other than Least Terns) have not historically nested in this part of the refuge. The DEA makes no evaluation of the habitat in the target area for terns; this area certainly does not meet the criterion "minimize proximity to...black-crowned night herons" included for tern and skimmer habitat in Table 1. At other sites where gull control programs have led to re-establishment of breeding terns, the gull control programs were followed up with intensive programs to attract, protect, and manage terns.

The statement on page 6 of the DEA that "The effects of displacement by large gulls became apparent on tern populations on Monomoy NWR in 1978 when tern productivity began to decline" is seriously incorrect. This paragraph cites Nisbet and Welton (1984), and Fitch (1985), all of whom made clear that tern productivity

declined because of predation, not displacement by gulls. The same point was made by Holt (Colonial Waterbirds 17:1-6, 1994, not cited in the DEA). I object to the mis-citation of this work, including my own, in the DEA. I repeat the comments I made in 1995:

(8) 3. Reduction in the numbers of gulls would lead to increase in the numbers of terns and other species. No evidence is proffered for this assumption and I know of no evidence that would support it. Although gulls apparently caused the displacement of nesting terns from South Monomoy to North Monomoy in 1971, the subsequent displacement of terns from North Monomoy to Dead Neck and Nauset New Island was associated with owl predation, not interactions with gulls. Terns nested successfully at Monomoy from 1973 to 1977 and unsuccessfully from 1979 to 1984 without any significant interactions with gulls. Those who studied terns on Monomoy in this period identified Great Horned Owls, Short-eared Owls, Black-crowned Night-Herons and Laughing Gulls as significant predators, but not Herring or Great Black-backed Gulls [2,3]. I was watching the Roseate Terns when they deserted Monomoy after egg-laying in 1981 [4]: this was associated with owl predation and I saw no interaction of any kind with gulls (the nearest gulls were nesting half a mile away). In my opinion, terns would not be attracted back to Monomoy by a gull reduction program in the absence of a vigorous and effective program to control predators.

(9) 9. The program as described does not include any follow-up measures to maintain a gull-free zone or to protect desirable species. As described in the DEA, the program would be limited to poisoning gulls in the target area for four years. Even if it were successful in eliminating breeding gulls from the target area (which is unlikely in view of the comments in paragraph 6), the gulls would recolonize the vacant space in succeeding years unless prevented from doing so. As pointed out above, successful programs at other sites have involved intensive follow-up of the poisoning treatments with shooting, harassment, and continuous human presence in the treated area for several succeeding years, as well as positive management of the desirable species. The DEA does not mention any kind of follow-up measures to manitain a gull-free zone, nor measures to attract, protect, and manage desirable species (other than piping plovers).

(10) 10. The program as described does not include any interim assessment of success or provisions to modify the program in the light of results during the first 1-2 years. As described in the DEA, the program would continue in the same way for four years. Because of the many unknowns and uncertainties pointed out in these comments, it should include interim assessments of results (both effects on gulls and on the desirable species) during and after the first two years. Because the populations of both gulls and other species are already changing rapidly, any interim assessment will

(10) have to compare the target (treated) area with one or more untreated areas, in order to provide scientifically valid evidence for the effects of treatment. The program should also include provision for modification of the program in the light of results observed during the first one or two years.

(11) 11. The list of alternatives considered does not include several reasonable and probably preferable alternatives. The list of alternatives considered in the DEA considers only four alternatives: the chosen alternative of gull poisoning over 350 acres, along with three other extreme alternatives (no new action, no action, and refuge-wide poisoning). In my opinion, there are numerous other alternatives which are reasonable to consider; some of these are likely to be simpler, cheaper, and/or more effective than the chosen alternative. I have already suggested several such alternatives for serious consideration:

1. Control only GBBGs.
2. Control only (or additionally) non-breeding gulls.
3. Control for 1-2 years with interim assessment and adaptive modification.
4. Control with follow-up measures and management of desirable species.

In my opinion, a serious problem with the selected alternative is its scale (both areal extent and number of gulls to be poisoned; see comment 6). The main alternative I would recommend is to reduce the scale of the program. According to the photo attached to MacCallum's letter dated January 18, 1996, the area designated A contained only 351 pairs of HEGU and 92 pairs of GBBG in 1995. I suggest that the program should initially be limited to the 92 pairs of GBBGs in this area, combined with interim assessment, follow-up measures, and management of desirable species as in items 3 and 4 above. After 1-2 years, the success of the program could be assessed and a larger program, if justified, could be designed without the uncertainties and questionable assumptions pointed out in these comments.

(12) 12. Destruction of culled gulls without scientific examination would be a waste of a scientific resource. The DEA states that gull carcasses recovered on the island would be promptly buried on-site. Only those recovered on the mainland would be provided to a scientific institution, and then only if requested. This would be a serious loss of a set of specimens with potentially great scientific value. In particular, little is known about morphometrics, pathology, parasitology, etc., of Great Black-backed Gulls, and many good studies could be conducted on a good series of fresh carcasses of this species. The Service was subjected to major criticism in the scientific community for destroying the specimens killed at MNWR in 1981. MDFW did a somewhat better job with the gulls killed at Ram Island, although some opportunities for studies were lost due to poor study designs. I recommend that the Service should reconsider this proposal and should sponsor a serious scientific study of any specimens killed during this program, even if the number is reduced as suggested in my paragraph 11.

Response to I.C.T. Nisbet

1. The Service recognizes your numerous contributions to seabird biology and your expertise in managing burgeoning gull populations on tern nesting islands. We appreciate your constructive comments and have incorporated several of the points you made in the final EA.

2. The proposed action will facilitate progress toward the Massachusetts Division of Fisheries and Wildlife's provisional abundance objective of 94 breeding pairs of Piping Plovers on South Monomoy Island, while contributing to the overall recovery effort for the Atlantic Coast Piping Plover population.

   The final EA was modified to reflect your comments. A draft of the monitoring program proposed is located in Appendix F. The Service's definition of avian diversity was clarified on page 3 of the final EA. While we agree that the Arctic tern may not recolonize in the near future and that the roseate tern has almost vanished from Cape Cod, the Service suggests that the high population of herring and great black-backed gulls on the refuge has had adverse impacts on these and other nesting birds. The 1988 Monomoy National Wildlife Refuge Master Plan specifically calls for the Service to preserve natural diversity of flora and fauna by maintaining areas free of nesting gulls on portions of the refuge.

3. Please refer to Section IV and Appendix G for reasons why the alternative you suggested was not chosen. The gull removal program is directed at both species of gulls because both have limited nesting opportunities for a number of other species on the refuge. Observations by Service personnel on Monomoy and in Maine suggest that both species contribute to displacement of other nesting birds. See page 7 and 8 of the final EA for documented examples of gull predation on Monomoy.

4. Please refer to Section IV and Appendix G for reasons why the alternative you suggested was not chosen.

   We have noted your point on the potential threats of loafing gulls to other nesting seabirds. At this time, the Service intends only to remove gulls with established nests from the proposed area. However, management of non-territorial (loafing) gulls found depredating these species will be reviewed case-by-case. The Service expects that by eliminating nesting gulls, a reduction in the number of loafing gulls to a level that other species can tolerate will be effected.

   The Service intends to target both members of the pair during avicide treatments, and is considering both your and Dr. Hatch's suggestions on appropriate techniques to carry this out.

5. The number of treatments proposed annually is two; the Service fully intends to apply two

treatments of DRC-1339 each year. Several factors may have contributed to the differences between Seal and Ram islands; i.e., climatological, individual colony or implementation differences. However, the two models were reported to clearly depict the effects of DRC-1339 at two colony sites and to use them as a range to estimate likely effects for our efforts on Monomoy.

6. Please see comment #5 regarding treatment applications. Please see Appendix F for a draft of the proposed monitoring plan.

7. Section III of the final EA was clarified to show direct evidence of depredation by herring and great black-backed gulls on the refuge. While the Service realizes that scientific proof of the causal effects gulls exert on piping plover populations on Monomoy should be strengthened, substantial personal observations suggest that herring and great black-backed gulls are limiting piping plover nesting opportunities on the refuge. Further data will be collected to determine if correlations between piping plover abundance and distribution and nesting gulls can be established.

8. The sentence quoted was changed to reflect the Service's hypothesis that removal of large gulls from the treatment area may expand opportunities for breeding terns on the refuge. Plans to attract terns to the gull-free area using decoys and recordings will be reviewed, as will specific predator problems within this area. However, we anticipate that attraction devices will not be required, as terns already occur on South Monomoy. The mis-quote was corrected in the EA to reflect that tern productivity on Monomoy declined because of predation by Black-crowned Night-herons and Great-horned Owls, not because of displacement by gulls. There is evidence that large gulls cause displacement of terns on Monomoy and at other tern colonies.

9. The final EA was modified to reflect your comments; also, please see Appendix F.

10. Please refer to Appendix F for evaluation of the gull removal program on a portion of South Monomoy. While the Service intends to use avicide for a maximum of four years before re-evaluation, annual assessment of the program's effectiveness will be conducted.

11. Please refer to Section IV and Appendix G.

12. It is the Service's full intention to make the culled gulls available for scientific research; the EA was modified to clearly state this intention. A subsample of the culled gulls will be used by Refuge personnel for educational purposes, to develop techniques for externally sexing great black-backed Gulls, and to evaluate the sex ratio of birds killed using the proposed treatment.

Massachusetts Audubon Society

South Great Road
Lincoln, Massachusetts 01773
(617) 259-9500

March 1, 1996

Sharon Ware, Refuge Operations Specialist
Monomoy National Wildlife Refuge
Morris Island, Chatham, MA 02633

Dear Ms. Ware,

Massachusetts Audubon has reviewed the U.S. Fish & Wildlife Service's "Draft Environmental Assessment: Restoration of Avian Diversity on Monomoy National Wildlife Refuge," of February, 1996. The Society's response to the proposed management action is summarized as follows:

1. The Massachusetts Audubon Society strongly supports well-reasoned efforts by the U.S. Fish and Wildlife Service to promote natural biological diversity and the survival of endangered species on National Wildlife Refuges.

2. Massachusetts Audubon has been deeply involved in research and management of coastal waterbirds, and especially gulls and terns, in Massachusetts since the 1950's. Massachusetts Audubon's scientists were instrumental in documenting the relationship between human activities (open landfills and ocean dumping of fish wastes) and the increase in populations of herring and great black-backed gulls. We also conducted much of the baseline research on the population

great black-backed gulls. We also conducted much of the baseline research on the population biology of Massachusetts tern species and have documented the dynamic shifting patterns of colonization typical of those species among the islands of Cape Cod, Buzzards Bay and Nantucket Sound, including the Monomoy islands.

3. Massachusetts Audubon acknowledges that increased gull populations have had detrimental effects on the nesting success of other waterbirds, including roseate terns and possibly piping plovers, and that drastic measures, including the lethal control of predators may, in some instances, be justified to protect populations of rare species.

4. In the light of our past and continuing involvement with these conservation and management issues, the Society opposes any new gull eradication program on Monomoy National Wildlife Refuge for the following reasons:

- Overall Credibility of Purpose and Need. According to the Draft Environmental Assessment (DEA) the Purpose and Need of the proposed alternatives are, "to increase piping plover abundance" and "to increase habitat availability for nesting common, arctic, roseate and least terns; laughing gull; black skimmer; willet; American oystercatcher; spotted sandpiper, American black duck; and Canada goose."

Given the history of the tern populations that have periodically colonized Monomoy since 1961, it is far from evident that the eradication of 2800+ (in the first year) pairs of large gulls on Monomoy would result in recolonization by piping plovers or terns (see below). The case for benefits to other taxa and to the overall biodiversity of the islands in general is weak. The

(5) most credible rationale is that some degree of increased Monomoy piping plover population is a likely consequence of gull eradication.

- Gull Populations. Current USFWS figures indicate that herring gulls and great black-backed gull numbers are decreasing on Monomoy and that the overall regional population of the two species taken together is declining. A decline is consistent with present reduced food sources (6) from open landfills and the reduction of commercial fishing activities. It is difficult to rationalize an eradication program of this magnitude to be undertaken on a declining population. Close monitoring of the gull population, as well as continued monitoring of trends in piping plover and tern populations, for a number of years to more clearly establish the population trend should precede any such intensive control efforts.

- Terms. There is no evidence that reducing gull numbers on Monomoy would result in an increase of nesting terns. The DEA's Appendix A shows that near peak populations of both (7) gulls and terns coexisted on Monomoy in the early 1980's. Furthermore, scientists studying terns on Monomoy during this period saw no significant interaction with herring and great black-backed gulls and attribute desertion of Monomoy by terns to other predator species, especially great horned owls.

(8) Even if it were likely that piping plovers and terns could be lured back to Monomoy by eliminating gulls, it is questionable whether this is a desirable goal, given the previously documented continuous threats of predation by owls and black-crowned night-herons, and the potential threat of mammalian predators (e.g., red foxes at nearby South Beach). At best this scheme would require an intensive predator control program focused on native and protected species.

- Piping plovers. This federally listed threatened species has undergone encouraging population increases in Massachusetts in recent years as the result of intensive protection efforts (see USFWS data). For example, the 1995 breeding season reflected a 100% increase over 1994 populations at Monomoy (i.e., 7 to 14 pairs) under present management practices. (9) These increases appear likely to continue in suitable barrier beach habitat where use by off-road vehicles and other excessive human impacts are prohibited. While it is probable that piping plovers would continue to increase on Monomoy if numbers of nesting and loafing gulls were reduced, and desirable that rare species be favored on natural wildlife refuges, we do not believe that the speculative increase in plover numbers on Monomoy justifies the large scale gull eradication programs described in Alternatives 2 and 3.

- Other Species. Based upon data presented in Appendix A, maximum avian diversity of 13 out of 14 selected breeding bird species appears to have occurred during the period of already declining gull numbers, thus further making the eradication proposal questionable. (10)

While gulls may have had some adverse effect on Monomoy's breeding waterfowl species, the species in question still breed on Monomoy and their significance (e.g., Canada geese) is overstated in the DEA. The inclusion of the feral breeding race of Canada goose as a form targeted for protection under the proposed new management regime is disconcerting.

- (11) To the best of our knowledge, this would be the largest gull eradication program ever undertaken in North America (possibly excluding the laughing gulls shot at Kennedy International Airport in recent years). We also believe that the USFWS underestimates the

(11) logistical problems associated with the rapid death of so many birds and the resulting disposal issues.

- Wilderness Character. The DEA suggestion that the presence of a large gull colony is not consistent with the wilderness character of Monomoy is highly subjective and contestable by anyone fortunate enough to have had broad experience with seabird colonies. Furthermore, the terns which the USFWS hopes may eventually replace the gulls rival or surpass their relatives in their ability to generate unforgettable sights, sounds and smells. (12)

We also question whether an eradication program of the magnitude proposed on native species is consistent with the spirit of the Wilderness Act, even if it conforms to the letter of the law.

(13) The DEA gives the impression that Monomoy was once a paradise of biodiversity, now grossly degraded by hordes of noisome gulls. For Massachusetts Audubon staff who know these islands well, this is a distorted interpretation of the situation. While the anthropogenic gull explosion has unquestionably had impacts, other factors (e.g. owl predation, coastal reconfiguration) have arguably had more influence on changes in Monomoy's biota. In the Society's view, Monomoy has suffered no severe degradation and remains one of the most spectacular wilderness areas and bird refuges on this or any continent.

- Historical Perspective. The DEA implies that changes in gull and piping plover and tern numbers at Monomoy represent a radical shift in a generally stable long-term population structure. This presents a distorted picture of the "history" of seabird colonies in general and especially those situated on constantly shifting barrier beach islands. Herring gulls did not (14)

nest in Massachusetts until 1912. They increased rapidly after the 1930's and then leveled off in the 1960's. During this period they began to nest on Monomoy. Terns, by comparison, were historically abundant, persecuted to the brink of extinction in the late 19th and early 20th centuries and, in recent times, did not nest on Monomoy until it was isolated by winter storms in 1958. The truth is that seabird (and especially tern) colonies are highly dynamic, moving frequently in response to changes in coastal geography, food availability and predation. It is plausible that gull numbers may decline and that piping plovers and terns may continue to increase at Monomoy in the future, but there is no reason to promote such changes as "historically correct." (17)

- Definition of Success. The absence of more specific and detailed objectives, both short-and long-range is disturbing considering that (1) the program will almost certainly require repeated application of avicide over a number of years, and (2) similar programs, e.g. in Europe, have failed with greatly reduced numbers of gulls spreading out to occupy the previously occupied amount of territory. (15)

- In Conclusion. The Massachusetts Audubon Society opposes any new management regime at Monomoy National Wildlife Refuge involving increased gull control, and strongly urges the U.S. Fish and Wildlife Service to follow its proposed Alternative 1: No New Action. (16)

Sincerely,

John J. Clarke

Advocacy Director

Response to Massachusetts Audubon Society

1-4. The Service recognizes and is grateful for MAS' long-standing efforts in support of research and protection of Monomoy. Without MAS, the Service would not have as complete a history of productivity, population trends, distribution and habitat preference of several of the species occurring on Monomoy.

5. Please refer to response #23 regarding recolonization of terns. There is no way to guarantee that gull free habitat provided on Monomoy will be used by terns nor that they will be successful if they do nest, but it is certain they won't recolonize if no habitat is provided.

South Monomoy Island contains some of the very best plover habitat on the Atlantic coast which can potentially support 94 pairs of plovers (MDFW 1996), as stated on pages 14 and 15 of the DEA. Given the likely trend of continuing population increase, indicated by an increase in nesting pairs from 1993-1995, the chance of plovers not "recolonizing" is contradictory to: 1) the Service's best estimate of future trends of plovers, which already occur on Monomoy and 2) MAS statement that "the most credible rationale is that some degree of increased Monomoy piping plover population is a likely consequence of gull eradication".

Finally, the Service feels that the proposed Alternative 2 may benefit various taxa by: 1) reducing depredation of waterfowl broods, 2) increasing availability of habitat for terns, even if only used during times when appeal of more preferred habitat is lessened by predators or environmental fluctuations and 3) substantially enhancing plover abundance on habitat with highly suitable physical characteristics.

6. Please refer to summary response #3 and International Wildlife Coalition response #6 regarding declining gull populations.

7. Please refer to summary responses # 22 and #23 regarding impacts of gulls on terns.

8. The proposed action will make gull-free habitat available and then rely on terns to select best nest sites among available habitat on Monomoy and elsewhere in their range. Please also refer to summary response #24, regarding predation.

9. While encouraging, the rate of growth of the Monomoy plover population lags substantially behind that of nearby sites. Again, Monomoy has some of the highest quality plover habitat on the Atlantic Coast with an estimated capacity of 94 pairs of plovers (MDFW), if it were gull free. An increasing plover population on Monomoy will quickly cease to increase if nest site availability is not accordingly increased.

The Endangered Species Act of 1973 directs federal agencies to carry out programs for the conservation of endangered and threatened species and to conserve the ecosystems upon which these species depend. Recent policy direction from the Secretary of the Interior (USDI 1995) charges Federal agencies with fully meeting their responsibilities for threatened and endangered

species recovery in order to help reduce impacts of endangered species protection on other landowners. The Service believes that recovery plans for species such as piping plovers and roseate terns that may require gull control are compelling justifications for gull control.

10. The Service's definition of species diversity was clarified in the final EA (page 3 of the final EA). While waterfowl species still breed on Monomoy, the brood sizes for species such as mallards, American black ducks, and gadwalls recorded during recent annual surveys are noticeably less than incidental observations of clutch size earlier in the season (D. Burke, E. Moses, and S. Ware pers. comm.). The Service does not believe their significance is overstated in the EA. The Service realizes its error in referring to the Canada goose population nesting on the refuge as belonging to the migratory population; it has been eliminated from the final EA.

11. In 1986, the Service distributed DRC-1339 at approximately 2,500 gull nests (60% great black-backed, 40% herring) on Seal Island in Maine, removing more than 2,400 gulls. Two additional treatments were made in 1987, and 1 treatment of 375 remaining nests was made in 1988. No more than 2,850 gull nests will be treated on Monomoy in 1996. Please also refer to summary response #9, regarding staff and disposal issues.

12. The Service suggests that a natural diversity does not occur on Monomoy, not that terns are somehow better than gulls, or that large numbers of seabirds are not typical of a seabird colony. Current gull populations on Monomoy are a response to human-induced environmental factors and have created intolerable competition with other nesting species. Please refer to summary response #4 regarding the Wilderness Act.

13. The Service agrees that Monomoy remains one of the most spectacular wilderness areas and bird refuges on this or any other continent. However, the Service believes that Monomoy does not offer full potential to other nesting species, in part because of the overabundance of gulls. Growth of the gull colony has been attended by declines in terns, laughing gulls, and a lag in the recovery of the piping plover, as compared to other areas on Cape Cod. While Monomoy has not suffered an irretrievable loss in diversity, the occupance of gulls in virtually all available nesting habitat has undoubtedly added to the direct effects of predators like owls and night herons on species such as terns, laughing gulls, and piping plovers.

The Service believes that loss of nest sites to gulls has played a major role in these declines, both directly and indirectly. Incontrovertible proof of casual relationships between environmental factors and wildlife populations can rarely be established; for example, assertions about effects of human disturbance on wildlife are also subject to questions about other confounding factors. The distinction between gulls and owl predation or coastal reconfiguration is that the former is a consequence of human activity.

14. The Service is cognizant of the inherent dynamics of those species' populations and habitat. Nonetheless, in light of the current suitability of habitat on Monomoy for plovers and terns and habitat loss elsewhere, the Service believes it is important to redress human-induced impacts on habitat available on Monomoy. The loss of so much otherwise suitable tern habitat to gulls on

Monomoy (and elsewhere) has reduced the terns' options to respond to these pressures by relocating their colony elsewhere on the refuge where predators and storm tides might be less problematic. Please also refer to summary response #22.

The Service focuses on gulls (instead of other predators) because they are a relatively recent phenomenon in the local tern environment and their expansion is largely the result of humans. The Service is not promoting to restore a "historically correct" population. The Service does, however, hope that by increasing the terns' and plovers' options for nesting locations, they will be better able to respond to pressures from black-crowned night herons, short-eared and great-horned owls, ants, etc with which they coexisted since before Colonial time.

15. A proposal for the evaluation of the proposed action was amended to the final EA as Appendix F, to reflect your comments. The proposal calls for 4 years of avicide application followed by an evaluation to determine the need for continued use of avicide on the refuge.

The 1980 gull removal attempt on Monomoy was quite effective despite late application (which missed most great black-backed gulls) and effected a decline of nesting herring gulls, which even in 1981 had not fully recovered (Andrews, 1981 unpubl. memo.). Had the Service carried out the second planned application of 1339, harassment would then have been used to maintain the area free of new gulls attempting to establish nests. There is no reason to believe an area cleared with DRC-1339 on Monomoy cannot be maintained using the same methods as have been employed elsewhere (please refer to J. Arnold response #2 for specific examples). DRC-1339 has also been used very successfully to remove gulls in a number of tern and/or puffin projects in Maine and Massachusetts, including Ram Island in Buzzards Bay in 1990 and 1991. Several of the Maine projects have been at the request of the National Audubon Society, and their full board of director has endorsed its "conservative use . . . to restore and protect seabirds."

16. Thank you for your evaluation of the Service's intended action. Several of your comments were helpful in constructing a more well-defined EA. Subsequent to adoption of the current management approach in 1988, it was observed that while scattered areas of gull-free habitat may have provided some benefit for nesting piping plovers, it perpetuated unfavorable nesting conditions for common terns, laughing gulls, and other species. Aside from the relative ineffectiveness of gull control measures used in 1988-1994, the Service believes that an area of unfragmented gull-free habitat (Alternative 2) would be of greater benefit to other nesting species (including the piping plover) than the current management approach (Alternative 1).

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United States Fish and Wildlife Service
Monomoy National Wildlife Refuge
Morris Island
Chatham, MA 02633

4 April 1996

Dear Service Representatives,

This letter is in regards to the draft Environmental Assessment, 'Restoration of Avian Diversity on Monomoy National Wildlife Refuge' program. On behalf of the International Wildlife Coalition, a multi-national wildlife conservation organization and its substantial membership, we urge that the United States Fish and Wildlife Service consider alternative 1, **no new action**, rather than the proposed alternative 2, **removal of gulls from part of South Monomoy Island** (target gull species include the herring gull, *Larus argentatus* and the great black-backed gull, *L. marinus*)

(1) The public meeting in Chatham on March 6, 1996, demonstrated strong public opinion against the proposed control program relying on the avicide, DRC 1339, and later articles in the local newspaper continued this course. These letters served to reaffirm the staunch public sentiment against this program, including pleas from children, from seasonal visitors and from local citizens. Clearly, a pest control program that will produce thousands of dead and dying gulls visible during the important vernal weeks will not foster good will from the public towards the Service. However, in addition to this perceived adverse reaction to the proposed program, analysis of the available data provides evidence contrary to the information provided by the Service in the public presentation.

(2) Indeed, testimony from various researchers at the public meeting cast aspersion on numerous and purported claims, including the number of actual nesting species on the island from 1960-1995, the ability of *Larus* to change avian diversity on an island, the impact of *Larus* on population of other shorebirds, including piping plover, and the pressure from predation by *Larus* on other birds. Similarly, review of the EA, and prior research conducted on Monomoy by Paul Cavanagh and Curtice Griffin, reveals that several aspects of the gull removal alternative are questionable.

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(3) While removal of a significant portion of the *Larus* spp. populations from South Monomoy Island could serve as a temporary favored nesting site for more desirable species, including piping plover and several tern species, it is more likely that recruitment of *Larus* into the treatment area will increase. This assumption is based upon the reported foraging range of over 3,000 square kilometers of marked gulls and the likelihood that niche displacement of various seabirds will continue from the 'regional' *Larus* population. This generates the possibility that additional treatment of gull nests with the avicide will be required in subsequent years of the program, well beyond the target date of 1999. In fact, this assumption is substantiated by prior control programs on Monomoy in 1980.

(4) Avian species including the black-crowned night heron, the great horned owl, the short-eared owl and other nocturnal predators have been documented as contributors to the failure of tern colonies. Their continued presence on Monomoy would likely impact any colonization of desirable seabirds and this factor must be included in a population model. Thus, the increase in numbers of nesting piping plover is relative not only to the number of nesting *Larus*, but also other formidable limiting factors, such as the many local avian predators. Curiously, the examination of stomach contents of both *Larus* species revealed little avian prey items, and of that, only *L. argentatus* was present in the stomach of *L. marinus*.

(5) Data show that the Monomoy population of piping plover, since 1993, is increasing and this rise is significant and must certainly continue. However, the need to generate an accelerated rate of increase is uncertain and the objective speculative. Although the 'carrying capacity' of Monomoy is estimated at 94 breeding pairs, it is curious to note that only 15 pair of piping plover were noted in 1955, while only 5 pair of *L. argentatus* and no *L. marinus* were present in 1963. Clearly, other pressures are contributing to the decline of piping plover on the island.

(6) Examination of the nesting records of the *Larus* species on Monomoy reveals population decline of these species since 1980 (*L. argentatus*) and 1990 (*L. marinus*). If the assigned slopes of the presented graph are continued to the year 2000, the resultant populations are less than 2,000 (*L. argentatus*) and less than 7,000 (*L. marinus*), which are desired population sizes. Again, ongoing directed and indirect control measures are justified in their effect on the gull population and it is likely that the population slopes of the *Larus* species will not rise in the immediate future.

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Finally, the toxicant intended for use against the target species, DRC 1339, has been presented as being a narrow spectrum, relatively benign avicide when in fact, this restricted use pesticide is regulated with the most stringent precautionary measures available. This treatment protocol necessary for its intended use was not factored into budgeting constraints, i.e , the nests must **first** be pre-baited with untreated bread to ensure acceptance of bait (at significant cost) and unconsumed, treated baits must be retrieved within twelve hours (again, at significant cost). Note that label directions are Federal law, and must be followed in any control program to the letter. (7)

In closing, the resurgence of piping plover populations on the East coast is testimony to the organized and focused efforts of the recovery team and is laudable. Further efforts in all sensitive nesting sites must continue, if the recovery is to be successful from a long-term standpoint. We hope that the proposed recovery efforts on Monomoy Island will be reflected in similar control programs on other beaches.

Sincerely,

Dave Simser
Biologist

Daniel J Morast
President

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Response to International Wildlife Coalition

1. Please refer to summary response # 8.

2. The EA was modified to reflect your comments; see page 3 of the EA for a discussion of species diversity. Please also refer to summary responses #22 and #23.

3. Avicide will be applied for 4 years, with annual evaluation. At the end of 4 years, the project will be re-evaluated and compliance with NEPA requirements will be reviewed. In addition, maintenance of the gull-free area will be conducted using harassment, selective shooting, and productivity suppression. Gulls will continue to exist in the southern portion of South Monomoy and on North Monomoy.

The control program initiated in 1980 was terminated prior to completion, so the area was recolonized by herring and great black-backed gulls. Experience at other sites demonstrate that once gulls with a history of nesting on a site are removed, gulls attempting to pioneer can be dissuaded through harassment, especially nest destruction. On six colony sites in Maine, the avicide DRC 1339 was used successfully to restore terns and other seabirds. Follow-up management to discourage gulls from recolonizing is conducted annually at these sites.

4. The Service does not dispute the study by Griffin and Cavanagh, nor does it find it surprising that few avian prey items were found in the stomach contents of a small sample of herring and great black-backed gulls. Rather, this confirms observations at Maine colonies, where individuals are specialists, and prey on terns, laughing gulls, or common eider ducklings. Indeed, on Stratton Island, Maine, a single black-crowned night-heron was responsible for decimating a colony of common terns. Once that individual was removed, the tern colony had the highest productivity recorded in over 10 tern colonies in Maine (Kress, National Audubon Society, pers. comm.). The Service intends to manage predators on a case-by-case basis, as has been done in Maine.

It is well documented that terns will not establish territories in areas overrun with gulls. While evidence is circumstantial on Monomoy for the piping plover, the Service believes that the lag in piping plover numbers on Monomoy is in part attributable to the large numbers of nesting herring and great black-backed gulls.

5. Piping plovers are not in decline on Monomoy. Rather, their recovery lags far behind what has been observed on the rest of the Cape, where nesting gulls do not occur. See also paragraph # 2 of response to J. Hatch and # 14 of response to P. Cavanagh.

6. The Service expects to create an area free of nesting herring and great black-backed gulls on the refuge, so 2,000 and 7,000 pairs, respectively, are not acceptable numbers, as you suggest. In tern colonies where gulls are nesting adjacently, a clear division must be maintained, as is seen on Seal Island, Ship and Trumpet Island, and Petit Manan Island in Maine. Gulls will be allowed to nest on the southern portion of South Monomoy and on North Monomoy, and may

in fact number more than 2,000 and 7,000 pairs. Herring and great black-backed gulls attempting to nest in the treatment area will be removed, and individual predatory gulls will be managed on a case-by-case basis.

7. The Service does not suggest that DRC 1339 is a "benign" avicide; it is highly toxic to gulls and starlings. When used in accordance with the label, there is relatively little danger to non-target species. All Service personnel are closely supervised by ADC personnel and are certified pesticide applicators licensed in the state of Massachusetts.

Collection of unconsumed, treated baits is done at the same time the treatment area is searched for carcasses. Pre-treatment has been factored into the budget and is outlined in the summary section of the EA.

United States Department of the Interior

NATIONAL PARK SERVICE
Cape Cod National Seashore
South Wellfleet, Massachusetts 02663

IN REPLY REFER TO:

N20

April 7, 1998

Monomoy National Wildlife Refuge
Morris Island
Chatham, MA 02633

Dear Staff:

(1) Thank you for the opportunity to offer comments on the Draft Environmental Assessment (EA) for Restoration of Avian Diversity on Monomoy Island. While the National Park Service has different policies regarding management of wildlife species and would not choose gull control as a primary action, we support your efforts to restore avian diversity on Monomoy Island National Refuge. We do have some management concerns about the proposed alternative.

(2) Integrated pest management practices should be followed in undertaking this gull removal program. Although the U.S. Fish and Wildlife Service (Service) has documented the causes of and remedies for declines in the nesting populations for some species, the EA does not carry out the practices on integrated pest management to the fullest extent. For instance, the proposed action does not provide for a specific evaluation of the effectiveness of the program. The species listed as potentially benefitting from gull removal should each be subjected to treatment / non-treatment population monitoring before, during, and long after the gull removal project. In addition, the EA makes no commitment to manage the gull-free area beyond 4 years. No action of this magnitude should be discontinued if it is indeed an effective and necessary action for restoration and maintenance of diversity on the refuge. There is no reason to believe that gulls would not re-colonize the gull-free area if annual removal/discouragement tactics are not employed.

(3) Piping Plovers can, and do, nest in the proximity of Herring and Great Black-backed Gulls in Cape Cod National Seashore. These areas are where there were no nesting plovers for the first several years of the Massachusetts plover recovery, but they have now moved into and successfully fledged young. In addition, many areas that were identified as "A" quality habitat in the MDFW conservation plan (MDFW 1996) and do not have nesting gulls, do not have nesting Piping Plovers. This makes it clear that factors other than the presence of gulls are responsible for a lack of nesting plovers in many "A" quality habitats. It is the experience of National Park Service staff working at Cape Cod National Seashore that a carefully managed Piping Plover program can provide opportunities for increased plover populations in the presence of gulls and other predators.

(4) Carrying capacity estimates for Piping Plovers should be used with extreme caution. The habitat classification carried out in 1995 (MDFW 1996) provided a subjective and qualitative categorization of plover nesting habitat, based on observations of plover nesting on the Atlantic coast since the early 1980s. However, during the same period of time at Cape Cod National Seashore, we have observed dramatic shifts in what appears to be preferred and productive habitat. Since the population appears to be below carrying capacity at almost every nesting site on the Atlantic coast (continuous annual increases in nesting population), it seems premature to use actual estimates of the number of pairs (provisional abundance objectives) that may nest at a specific area to support major federal actions such as the EA proposes.

(5) There was an absence of consideration for other predators on Monomoy presented in the EA. What is the chance of gull removal being effective if Black-crowned Night-Herons or Great-horned Owls replace gulls as the major predator? According to the EA, the Monomoy night-heron population has increased from 12 nesting pairs in 1980 to 201 pairs in 1994 (Appendix A EA). Night-herons are notorious predators of terns, and the increase in the nesting night-heron population should be factored into a program of restoring diversity on the refuge. For example, effective tern management in Maine has occasionally resulted in the removal of an individual owl or heron that has learned to prey on terns, and may warrant mention in a EA targeting increased diversity at the expense of an estimated 4,000 - 7,800 gulls (Tables 3-4 EA).

(6) The EA offers little discussion of the potential impacts of the project on regional populations of seabirds other than gulls. If the gull control program does remove the only predator/competitor for species such as terns, then there is a strong case for the regional tern population to benefit tremendously from this effort. For instance, of 2,000+ nesting pairs of terns in the Nauset Marsh Eastham/Orleans area, there was heavy predation of adults in 1995. Bands were recovered from 12 adults, including one Roseate Tern, and represented at least six nesting colonies from Massachusetts and New York. Clearly, terns need a variety of nesting locations to choose from so that they may move away from natal areas to breed and so they can make adjustments from year to year if limiting factors such as predation drive them out of a particular site.

(7) We are concerned with the statement that "Refuge personnel will be available to pick up any gull carcasses reported on the mainland..." (Pg. 13 EA). The public perception of the entire project would be severely affected by a program that depends on the public to report dead and dying gulls. The Service should aggressively search for dead and dying gulls for removal from mainland areas, particularly areas known to have concentrations of Monomoy gulls (see Cavanaugh 199_). We are also concerned about the presence of carcasses in other areas with nesting terns and plovers, as carcasses are likely to attract additional predators to these sites. For instance, South Beach and North Beach, Chatham, had 30 and 5 nesting pairs of plovers, respectively, in 1995 (Melvin 1998). These areas in particular should be checked daily for several days after treatment and carcasses disposed of in a way that makes them unavailable to scavengers.

Thank you again for the opportunity to comment. If we can be of further assistance please contact Biologist Kyle Jones of my staff at (508) 349-3843.

Sincerely,

for Merle Burke
Superintendent

References

Cavanaugh, P. 1980 Foraging Ecology of Piping Plovers. Ph.D. Dissertation, University of Massachusetts. Amherst, MA.

MDFW. 1986. A conservation plan for Piping Plover in Massachusetts. Massachusetts Div. of Fisheries and Wildlife. Westborough, MA.

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Response to Cape Cod National Seashore

1. We thank you for your comments; several are addressed below.

2. The EA has been amended to reflect your comments; a draft proposal of the treatment evaluation is found in Appendix F. The Service is committed to maintaining the treatment area free from nesting herring and great black-backed gulls. Several techniques already employed on the refuge will be used, including; harassment, selective shooting, and productivity suppression.

3. While piping plovers nest successfully on Cape Cod National Seashore (CCNS), gull presence is primarily roosting and loafing gulls, and does not include large numbers of nesting gulls in proximity to plovers. Furthermore, gull densities on CCNS are much lower than on Monomoy. Experience at a number of sites (draft revised plover recovery plan, page 40) shows a notable absence or scarcity of nesting plovers on sites where large gull colonies have become established.

4. The EA has been revised to clarify that Massachusetts Division of Fisheries and Wildlife's provisional abundance objective is an estimate. However, the Service believes these capacity estimates furnish a useful indicator of actual versus potential habitat use on Monomoy, especially relative to other sites on outer Cape Cod.

5. The Service will review management of other predatory species on a case-by-case basis. However, we believe that by allowing the terns a reprieve from competition with gulls for nesting sites, they will be able to spread out, thus allowing predators such as night-herons less of an opportunity to affect the entire tern colony.

6. The Service agrees that terns need a variety of nesting locations to choose from in order to maintain healthy populations.

7. The Service intends to actively search the Cape Cod mainland (and South and North Beach) for gulls, beginning the day following the first avicide treatment and continuing for at least a week after the end of the proposed treatment. In addition, Service personnel will be available to respond to specific calls for the entire period.

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March 12, 1996

Ms. Sharon Ware
U.S. Fish and Wildlife Service
Monomoy NWR
Morris Island
Chatham, MA 02633

Dear Ms. Ware,

The following comments on the USFWS plans for gull control on Monomoy NWR are written after reading the Draft Environmental Assessment (of Feb. 1996) and then attending the Public Hearing in Chatham (March 7). I have extensive professional experience with gulls, terns and piping plovers and have visited Monomoy several times.

I am not opposed to some control of gulls on the north end of South Monomoy, but I consider that the case for the proposed action is weak, and that the methods suggested may not be the most effective. My comments are directed to making the proposal stronger and the methods more effective; also, to making the results of the cull more readily interpretable and more widely relevant.

Assessment: Criteria for success of the proposed program of gull poisoning are not mentioned - neither in relation to avian diversity, nor numbers of gulls. The appropriate meaning or definition of "diversity" is not identified. It would be more appropriate to identify interim assessments/goals rather then designating a 4-year minimum duration.

(1) From the conclusions presented in the proposal, and the observations mentioned in the public meeting by Mr. Nikula, it would be possible to predict that, during the next few years, gull numbers will decline, plover numbers increase, and the numbers of breeding bird species continue to increase, whatever action the Service takes. The present plan provides no means for separating effects of any proposed cull from continuation of current trends. The basis for the predictions presented is not evident, and the proposed monitoring would not be adequate for establishing a cause - effect relationship.

(2) Terns: The gulls are said to be occupying "all available habitats", but this is stated as a conclusion, without evidence at the appropriate scale to allow for independent evaluation. Terns coexisted with much larger numbers of gulls in the past, and it is not clear that gulls have now occupied that space. The goal of the poisoning is to create a gull-free zone, by clearing all *nesting* gulls from the north part of South Monomoy. No evidence is presented about the numbers of gulls nesting in the tern (and plover) areas, or the extent to which gulls in these areas during the relevant months are loafing non-breeders that may be unaffected by the cull. The distribution of fledgling gulls (in July) may have little relevance to the issues at hand.

(3) Some gulls do certainly eat tern chicks, and my paper (Hatch 1970) is evidence of this, but it is inappropriate to assume that such predation caused terns to leave Monomoy, or even that it occurred there at all. Available evidence suggests that predators other than gulls are primarily responsible for continued low productivity of terns on the Outer Cape: thus, a proposal to clear gulls must address these other predators. (The paper by Nisbet and Welton is inappropriately cited as support for the conclusion about gull predation)

(4) Plovers: While numerous biologists are of the opinion that gulls limit plover numbers on Monomoy, the evidence is only circumstantial. Any cull should be designed to reveal cause-effect relationships. The circumstantial evidence is quite compelling, but appears to ignore the observation that the doubling of plover numbers on South Monomoy in 1995 occurred in areas of high gull density (T. French, pers. comm. at Chatham meeting) rather than low. Direct evidence for predation by gulls is very difficult to obtain: the only case in Massachusetts that I have heard of occurred 2 miles from a gull colony. Furthermore, it is not evident that a cull of *nesting* gulls will have the required effect on gulls that are influencing plovers (or terns) nesting on the adjacent beach. These gulls may be loafing non-breeders. Thus, data should include not only numbers of nests and killed gulls, but also their distribution, and similarly the numbers on the beach. Further, these observations should be part of a designed study including status before and after, with controls.

Procedures for administering baits: The method proposed for creating a gull-free zone is a series of poisonings (2 per year for 4 years) following procedures used with various levels of success elsewhere. I suggest that the proposal does not give sufficient attention to (1) the differences between the various sites, (2) the degree of success achieved, (3) aspects of gull biology that may affect the outcome.

(5) (1) and (2) The proposed area on South Monomoy is in the middle of a long, linear gull colony, not a small island (like Ram, Petit Manan and Eastern Egg Rock). It may be more like the Isle of May (Scotland) where gull numbers were reduced but clearance was not achieved (Mass Audubon identified this as a failure). Is Seal Island a better model, for clearing *part* of a colony? If so, have the key factors been identified?

(3) The design of the poisoning program should be searchingly reexamined, and possibly redesigned on the basis of pilot studies designed to identify effective ways to target both members of each pair at a nest. A culled gull population is sometimes described as spreading out to occupy all available habitat (p. 19) but that "description" is actually an interpretation. An alternative would be that the surviving gulls continue to nest at the same sites and are joined by recruits. This draws attention to several features of gull behavior, and of the results of culls:

(a) males acquire nesting territories and advertise for females
(b) successive nesting attempts (both season and years) tend to be at the same site
(c) many more females than males are poisoned
(d) therefore, the potential exists for killing several females at a nest site while leaving the territoral male to defend the site and attract mates and neighbors, becoming more wary year by year.
(5) (e) conclusion - it is advisable to kill *both* members of every pair that is targeted. This will require rebaiting while the mate is still attached to the nest. To establish the appropriate timetable will require observations of marked gulls at nests before, during, and after delivery of poisoned bait. Such observations will yield valuable information about gull biology as well as guidelines for management techniques that will have relevance beyond Monomoy. (Another factor that is unclear is the need for pre-baiting. Reexamination would lead to reallocation of these efforts to yield more effective results.)

The proposal includes use of harassment techniques following the second poisoning in each year of treatment and (by implication) in subsequent years. However, it is not evident that the appropriate intensity has been considered. Successful clearance might require continuous human presence, frequent visits, or other unfeasible levels of activity. Analysis of other gull-control programs will be appropriate.

Data gathering: Reasons that were noted at the Public Meeting for the existence and activities of the U.S. Fish and Wildlife Service included wise management of populations and understanding of wildlife. A cull provides significant opportunities for increased
(6) understanding of gulls, and of their interactions with other organisms. Some of the information is directly relevant to conducting the cull.

- behavior in relation to poisoning (noted earlier)
- sex ratio (sample, stratified by location and distance from nest).

Other information potentially relates to the health of the gull population and the local environment, or the effects of the cull (see Coulson et al 1982)

- body measurements (and egg size)
- body condition
- diet (stomach contents)
- contaminant loads
- abnormalities (esp. feminization of males).
- parasite loads
- sexual dimorphism (Ms. Teets' proposal for evaluating a method for sexing).

As indicated earlier, some of these data will be needed in advance of any cull, others will accompany the cull and would need the appropriate support.

Sincerely,

Jeremy J. Hatch
Associate. Professor of Biology

Response to J. Hatch

1. The EA was modified to reflect your comments; see page 3 of the final EA for a clear definition of what the Service refers to as species diversity.

Please refer to Appendix F for a draft of the proposed program evaluation. Your comments were most useful in constructing the draft proposal.

2. While the Service realizes that an independent evaluation has not been conducted to determine the exact number of gulls nesting in the tern areas, observations by refuge personnel suggest that gulls have continued to expand their nesting range on the refuge. Some herring and black-backed gulls are now even nesting in amongst the remaining terns on North Monomoy Island. Fitch (1985) states clearly in his report that "Black-backed and Herring gulls reduce Common tern nesting success because of competition for nesting space." Refuge-wide censuses of nesting Herring and Great Black-backed gulls have shown an increase from 1961 of one pair of Herring Gulls to 5,200 pairs in 1995, and from zero pairs of Great Black-backed gulls prior to 1965 to 7,350 pairs in 1995. Because considerable evidence suggests that terns will not move into an area occupied by nesting gulls (refer to page 7 of the EA), the Service plans to remove nesting gulls from a portion of South Monomoy so that opportunities for nesting terns and other species (i.e., habitat free of nesting gulls) will be provided.

The extent to which loafing, non-territorial gulls use the treatment area is not known, as you suggest. Loafing gulls are not addressed in the proposed action because evidence suggests that territorial nesting gulls are responsible for the displacement of terns from suitable nesting habitat. Observations of predation by loafing gulls will be addressed on a case-by-case basis, and management will target individuals, rather than all loafing gulls.

3. Please refer to pages 7 and 8 of the final EA for direct evidence of predation on piping plovers nesting on Monomoy.

The Service wishes to remove nesting gulls from a portion of the refuge so that terns are afforded a wider range of nesting options. The Service believes that by providing more nesting habitat, predation pressure on terns will decrease (see page 25 and 26 of the final EA).

4. Please refer to Appendix F for the proposed evaluation of treatment effects. While the Service agrees that further data must be collected, there is substantial evidence to suggest that other nesting species have been displaced by herring and great black-backed gulls. Also refer to pages 7 and 8 of the EA for direct evidence of predation.

Rather than ignoring the doubling of piping plover pairs on Monomoy, the Service questions why this increase lags far behind the recovery of this species observed on other parts of Cape Cod. For example, from Coast Guard Beach to Provincetown, plovers increased by 600% from 1989 to 1995 (K. Jones, NPS, pers. comm.). The Service believes that the habitat quality on Monomoy

for piping plovers is at least as good as that found on other areas of the Cape, with the benefit of having no mammalian predators. Although circumstantial, as you suggest, it appears that nesting herring and great black-backed gulls are preventing piping plovers from increasing on Monomoy at the same rate as observed elsewhere on Cape Cod.

5. While the Service must work within the confines of the approved uses on the DRC-1339 label, we are grateful for these observations and are taking them into consideration. We agree that targeting both members of the pair may expedite the removal of territorial gulls from the treatment area.

6. Please refer to Appendix F for the proposed use of birds culled during the proposed action. The Service is reviewing research proposals submitted by interested scientists and will attempt to provide all valid requests with necessary specimens.

Paul M. Cavanagh
12 Curtis Street
Apartment 2
Falmouth, MA 02540

30 March, 1996

Mr. Edward Moses
Refuge Manager
Monomoy National Wildlife Refuge
Morris Island
Chatham, MA 02633

Dear Ed,

I am writing as a private individual with an interest in, and knowledge of, the Monomoy gull colonies. I have read the DRAFT ENVIRONMENTAL ASSESSMENT: Restoration of Avian Diversity on Monomoy National Wildlife Refuge, and am taking this opportunity to comment on its contents. I believe that my comments will be useful in evaluating the four Proposed Alternatives, and will be of assistance regardless of the alternative selected. For the sake of clarity I have organized my comments according to the section headings in the Draft EA. I hope that they will be of value in your selection of potential alternatives.

Herring and Great Black-backed Gull Trends

As indicated in the Draft EA, Herring and Great Black-backed Gull populations have declined on Monomoy. These decreases differ from the trends predicted by the Monomoy gull population model (Cavanagh and Griffin 1990) under the "No Control" option. Herring Gull populations have declined faster than predicted; and Great Black-backed Gull populations, which had been predicted to increase, may have begun to decline. I believe that these differences are attributable to changes in population parameters due to changes in refuse disposal on Cape Cod. The population model was based on population and productivity values collected prior to landfill closings on Cape Cod. During the late 1980's, while I was conducting research on Monomoy, landfills were important food sources for both adult and young Herring Gulls. Closure of Cape Cod landfills likely led to decreases in productivity and survival, which have resulted in observed population declines. In contrast, adult Great Black-backed Gulls fed refuse to their young just prior to fledging, and exploited landfills during the non-breeding season. Few adult Great Black-backed Gulls fed in landfills during the breeding season. Observed declines in Great Black-backed Gull populations may represent increases in adult mortality, emigration from Monomoy, or may reflect gull control activities since 1990 and the sampling error associated with 1990 and 1995 gull surveys. Further surveys are necessary to determine if Great Black-backed Gull populations are truly in decline. The apparent declines in both species of gulls have two important

(1)

implications: 1) gull populations will decline faster than predicted without active control; and 2) active control methods will likely be more effective than predicted by the model.

(1)

Interactions Between Gulls and Other Species

Although Herring and Great Black-backed Gulls may prey upon young terns (e.g., Hatch 1970), reproductive failures of Monomoy's tern colonies have historically been caused by other species. Great Horned Owls (Nisbet 1975, Nisbet and Welton 1984), Short-eared Owls (Holt 1994), and Black Crowned Night-Herons (Nisbet and Welton 1984) have all contributed to reproductive failures on Monomoy. In contrast, Common Terns and Laughing Gulls appeared to habituate to large gulls that passed over their colony-site, and selectively mobbed gulls that exhibited behaviors associated with predation (Cavanagh and Griffin 1993.) Although the USFWS believed owl predation on Monomoy to have ceased after 1983 (USFWS 1988), evidence suggested that owls were still impacting tern productivity in 1989 (Cavanagh and Griffin 1993.)

Gulls may prey upon and disturb Piping Plovers. In 1986 I viewed a time-lapse film, taken by Laurie MacIvor, that showed a Herring Gull preying upon a plover nest. I believe this to be the same incident of nest depredation reported by Humphrey (USFWS 1988:49.) This is the only confirmed instance of gulls depredating plover nests on Monomoy or South Beach Island that I am aware of during my three field seasons on Monomoy. It is worth noting that the nest was not exclosed, and the gull was able to walk directly to the nest. I have seen no data that confirm that gull predation is a frequently occurring event or a significant source of chick mortality. Haig (1992), in a review of predation on Piping Plovers, did not provide a single confirmed example of Herring Gull predation on plovers.

(2)

Houghton (in Griffin and Cavanagh 1988) reported one example of disturbance to plovers by large gulls. During one 30-minute period at Inward Point over 1,000 gulls were observed passing within 10 m of a piping plover nest that contained chicks. The large number of flyovers is attributable to the nest being located beneath a gull flight path (Griffin and Cavanagh 1988.) Adult plovers responded to the presence of large gulls by chasing and striking them. Although this is but one observation, it suggests that the presence of large gulls may result in plovers exhibiting aggressive behaviors. Haig (1992) reported that plovers are know to use aggressive threat displays not only against Herring Gulls, but also against Ring-billed Gulls, American Oystercatchers, Willets, Semipalmated Sandpipers, and Dunlin. Many of these species occur on Monomoy during the nesting season and may disturb plovers.

History of Gull Control in the Northeast

To facilitate comparisons between studies identified in the Draft EA I have organized information on the use of DRC-1339 in the northeastern United States into a table (Table 1.) There are four aspects to these data that you should consider: 1) all previous applications of DRC-1339 have taken place on colony-sites far smaller in area than Monomoy; 2) previous efforts were solely for the purpose of restoration of populations of colonial birds (i.e., puffins and terns); 3) numbers of nests treated during previous applications were far less than proposed in the Draft EA; and 4) restoration of colonial bird populations were not achieved solely by removing gulls, but through a combination of gull removal, nest destruction, harassment, and the use of social

(3)

attractants (i.e., use of decoys and vocalizations.) Although the large land area and number of nests to be treated on Monomoy does not preclude successful gull control, it does make it more difficult to achieve. Efforts to restore tern colonies could be enhanced through the use of decoys and playback of vocalizations, activities that you have not indicated will occur on Monomoy. In contrast no similar efforts to the one proposed in the Draft EA have been conducted for Piping Plovers. Because plovers nest singly, or semi-colonially (Haig 1992), and have no social breeding ecology analogous to that of terns, the types of activities successfully used to restore tern colonies in Maine and Massachusetts are not applicable. Because of this, it is improper to generalize about post-control responses of tern and plover populations.

(3)

History of Gull Control on Monomoy NWR

As indicated in the Draft EA, previous efforts to limit gull populations on Monomoy have been unsuccessful. A variety of lethal and non-lethal methods were employed (e.g., Forster 1980, Lortie et al. 1985), none of which had any substantial or long-term impact on gull populations. From 1979 to 1984 the USFWS and Massachusetts Audubon Society killed between 2 and 144 adult gulls per year, destroyed nests and eggs, and harassed adult gulls (Lortie et al. 1985). Although these activities did not limit gull populations, they appeared to "have affects on other avian and mammalian species on North Monomoy Island" (Lortie et al. 1985:13.) The USFWS (1988:55) indicated that harassment "may have affected other wildlife in the vicinity", including Short-eared Owls, Piping Plovers, harbor seals, Canada Geese, Black Ducks, and Brant. Shooting and harassment were discontinued as gull control methods on Monomoy in the late 1980's, and shooting was used solely to obtain specimens for a food habits study in 1988 and 1989 (Griffin and Cavanagh 1988, Cavanagh and Griffin 1989.) Previous gull control activities proposed by the USFWS (1988:vi) specified that they would "create far less disturbance to wildlife and wilderness qualities than did gull control activities conducted on the refuge between 1978 and 1984." The current Draft EA (USFWS 1996) indicates that between 1988 and 1995, up to 7.25 times as many gulls have been killed per year, as were killed during the gull control efforts of the early 1980's (USFWS 1996:20.) Given that the earlier efforts were considered disruptive by USFWS (1988), the increased level of shooting on Monomoy during the 1990's should be evaluated for impacts on other species.

(4)

Alternative 1.

The maintenance of buffer zones, through nest and egg destruction, and the infrequent shooting of those individual gulls that pose a direct threat to plovers and terns are site-specific options that should remain available to refuge personnel. Although these methods may not reduce gull populations, they may alter their distribution (e.g., Lortie et al. 1986) and provide nesting habitat to terns and plovers. As indicated above, I believe that the USFWS should evaluate the impact(s) of current levels of shooting, and adjust management activities accordingly.

(5)

Alternative 2.

The reduction of gull populations through the use of avicides has a number of biological and procedural attributes that were not fully addressed in the Draft EA.

Reductions in gull populations (i.e., culls) at other colony-sites provide insight into the likely responses of Monomoy's gull populations to Alternative 2. Coulson et al. (1982) reported the following responses to large-scale culls: decrease in age at first breeding; increases in body weight and wing length; improvements in the physical condition of surviving gulls; a decrease in emigration; and a possible increase in productivity. Culls also produce reductions in nest density but not nesting area (Chabrzyk and Coulson 1976, Coulson et al. 1982, Wanless and Langslow 1983.) Wanless and Langslow (1983) reported that annual culls of at least 30% were necessary to maintain a Herring and Lesser Black-backed gull colony at post-cull levels. Post-cull nesting densities may be more attractive to Herring Gulls than pre-cull densities, which may lead to rapid immigration from other colonies (Chabrzyk and Coulson 1976.) Chabrzyk and Coulson (1976:201) suggested that for gull control to be effective it "must reduce the density of breeding birds to that level where effectively a new colony has to be formed." Culling studies at the Isle of May, Scotland (Duncan 1978) indicated this level to be less than two pairs per 100 m^2. Gull control efforts at Petit Manan and Ram Island indicate that under the proper circumstances large-scale culls can reduce the density of nesting gulls to the point that potential recruits are no longer attracted to the site. However, cessation of culling before the nest density reaches this point may result in an increase in breeding populations (Duncan 1978.)

(6)

(7)

Procedural problems with the use of DRC-1339 include decreases in bait acceptance, and problems estimating the LD_{50}. Kress (1983:192) reported that "poisoning efforts became less successful on subsequent attempts as the gulls quickly learned the poison dispersal routine and avoided the poison baits." Blodget and Henze (1992) reported a declining efficiency in bait acceptance with each successive treatment of DRC-1339 applied at Ram Island, Massachusetts in 1990. At a Sandusky Bay, Ohio colony-site only one dead or affected gull was found for every ten baits consumed (Woronecki et al. 1989.) The same study (Woronecki et al. 1989) indicated that baits containing 3.7 - 7.4 times the published LD_{50} were not lethal to most captive Herring Gulls living in fresh water. Woronecki et al. (1989) suggested that LD_{50} values for DRC-1339 must be assessed regionally, and in the context of the gulls' access to fresh water. All of these conditions may decrease the efficacy of DRC-1339, reducing the effectiveness of the cull program.

(8)

Implementation of this Alternative would not eliminate problems associated with the movements of large numbers of gulls along flight paths. During the late 1980's, Monomoy gulls moved toward and away from their nests along well defined flight paths (Griffin and Cavanagh 1988.) These paths concentrated birds from the mainland over North Monomoy and along South Beach Island. Flocks of gulls would merge at the south end of North Monomoy, pass over the break between the islands and Inward Point, then separate into two paths, one along each shore of South Monomoy. Plovers nesting along Inward Point, or shores of the areas from which gulls are to be removed under this Alternative, would still be exposed to large numbers of gulls. Such flights, however, would likely have little impact on Common Terns and Laughing Gulls (Cavanagh and Griffin 1993.) Additionally, as indicated in the Assessment, gulls would likely continue to loaf along the shores of the area from which the nesting gulls are removed. Finally, projections (Figures 1 and 2, USFWS 1996) indicate that 700-300 pairs of gulls would remain

(1)

within the area of treatment after four years of applications of DRC-1339; these birds may also fly over, and nest or loaf near, terns or plovers.

Logistics and staffing requirements for this Alternative are also problematic. Assuming that nests are baited at an average rate of one per minute, including breaks, handling time, etc., it would require 23.4 hours of labor per baiting effort. So, for the first year of treatment, which includes two applications each with a pre-bait and an actual application of DRC-1339, over 93 hours of labor are required. This does not include the time required to purchase supplies, prepare baits, travel to and from the site, recover and dispose of carcasses, and evaluate the impacts of this Alternative on gull, waterfowl, tern, and plover populations. I raise this point because, despite the efforts of some fine USFWS employees, Monomoy has traditionally been understaffed. Examination of gull population data in Appendix A of the Draft EA (USFWS 1996:32) illustrates this point. Between 1981 and 1995 only four gull surveys were conducted, and these were performed at irregular intervals. I am familiar with the survey procedures and know that they are labor intensive; labor that has not been available on a regular basis. Successful implementation of this Alternative would require a four-year commitment of funds and personnel to apply the DRC-1339; recover and dispose of gull carcasses; annually evaluate "the effectiveness of the gull management program" (USFWS 1996:10); intensively monitor "the response from, and nesting progress of, other beach nesting birds and waterfowl on both North and South Monomoy Islands" (USFWS 1996:13); and to establish and maintain a program of harassment of surviving gulls on a near-daily basis throughout the breeding season. Alternative 2 indicates that the USFWS is committed to conducting gull control activities for four years. I believe that the Service should guarantee the public that adequate funds and personnel will be provided for the entire four years of the proposed action, or the action will not be initiated. I believe that failure to commit funds and personnel for all four years would "erode the public's perception of the Service's commitment to assisting the recovery of endangered species" (USFWS 1996:28), more than would selection of the No Action Alternative.

Alternative 3.

The Draft EA indicates that it is the USFWS's intention to "re-establish a wider diversity of nesting species on Monomoy National Wildlife Refuge" (USFWS 1996:1). As described in the Assessment, this goal could be achieved "through the complete removal of nesting herring and great black-backed gulls on both North and South Monomoy Islands" (USFWS 1996:13.) Given that the USFWS has defined avian diversity as the number of nesting species, this Alternative would reduce avian diversity by eliminating two species, the Herring and Great Black-backed gull, not increase diversity as stated.

The logistic and biological considerations identified for Alternative 2 also apply here. Given the assumptions indicated in Alternative 2, each prebaiting and baiting would require 204 hours of labor, not including purchase of supplies, preparation of baits, and collection and disposal of carcasses. The logistics and expenses of this Alternative need to be calculated and critically evaluated before beginning a four-year program as described in the Assessment. Gull populations would need to be reduced to those levels identified in Alternative 2.

Alternative 4.

Successful tern and plover management efforts in Massachusetts and throughout New England have involved active management of terns, plovers, and humans. The options of maintaining buffer zones through nest and egg destruction, exclusion of humans from colony-sites, and the infrequent shooting of those individual gulls that pose a direct threat to plovers and terns must remain available to refuge personnel. Such activities may be used on a site-specific basis, and may serve as important and appropriate management tools.

Other Considerations

Determination of the "appropriate" alternative depends on interpretation of recent Piping Plover population estimates and habitat assessments. None of the four Alternatives will increase avian diversity as it relates to plovers, as Piping Plovers have been documented as nesting on Monomoy from 1983-1995 (USFWS 1996:32). However, some of the Alternatives could affect plover population size. It is likely that Monomoy can support more plovers than the 14 pairs recorded in 1995. However, I think the accuracy of the estimated plover capacity has been overstated. The "thorough assessment of refuge beaches conducted by Service and MDFW biologists in 1995" (USFWS 1996:14) used to generate the capacity estimate was a two-day trip to South Monomoy (Hecht and von Ottingen 1995.) Although the evaluating team included individuals with a great deal of knowledge about plovers, the habitat evaluation procedures used (USFWS 1996:14) were coarse in detail and did not quantify biotic and abiotic factors that affect plover populations. I believe that the estimated capacity should be presented as a theoretical maximum rather than a factual carrying capacity. Consider that the 15 pairs of plovers that nested on Monomoy in 1955 (Griscom and Snyder in USFWS 1996:17) does not differ significantly from the 14 pairs recorded in 1995 (USFWS 1986:32.) Additionally, consider that active management of plover nests in Massachusetts, not including gull control, has been so successful that the Massachusetts Division of Fisheries and Wildlife has requested an incidental take permit under Section 10 of the Endangered Species Act. It appears contradictory that the USFWS's desire to implement such an intensive and costly project on Monomoy occurs while protection of mainland plovers is being relaxed. Regardless of Alternative selected, the USFWS should increase its efforts to regularly search all of the shores of both North and South Monomoy for potentially nesting plovers, and to erect predator exclosures around all nests detected. Similar recent efforts by the Monomoy staff likely contributed to observed increases in plover populations in 1994 and 1995.

I believe that minor accommodations by the USFWS could generate valuable scientific information, should Alternatives 2 or 3 be selected. The Draft EA (USFWS 1996:10) indicates that the "effectiveness of the gull management program would be evaluated annually." To do so requires an exact knowledge of gull populations, by species, before each year's applications of DRC-1339. Such census data could be collected in conjunction with pre-baiting. Further, evaluation of the effectiveness of the gull management program requires that exact counts of both the number of nests treated with DRC-1339 and the numbers Herring and Great Black-backed gulls recovered. Accurate record keeping at previous gull control efforts has been problematic (e.g., differing estimates of the number of nests treated on Ram Island (Blodget and Henze 1992)), and accurate data collection on Monomoy would provide useful information on the

efficacy of DRC-1339. As with census data, this information needs to be collected for each application during all four years. Before disposing of carcasses all birds should be carefully searched for bands and transmitters. Such examination may appear obvious, but I have observed USFWS bands on Laughing Gull carcasses being disposed of by ADC employees involved in gull control efforts at John F. Kennedy International Airport. Finally, a sample of several hundred gulls should be made available to researchers for collection of morphological data. Herring Gull carcasses from the Ram Island Roseate Tern restoration effort were used to obtain morphological data that resulted in an equation that can be used by researchers and managers to externally differentiate between male and female gulls (Evans et al. 1995.) Morphological information is needed to generate a similar equation for externally sexing Great Black-backed Gulls; information that could be generated by the gull control activities. Examination of large numbers of gull carcasses would also be useful in identification of interspecific differences in the sex ratios of gulls treated with DRC-1339. Finally, gulls should be examined and measured to determine if the impacts of large-scale culls described by Coulson et al. (1982) take place within the Monomoy colonies. Such information would be useful in understanding how the proposed activities affected gull population dynamics and breeding biology.

(15)

I hope that you have found these comments to be of interest, and of value in selecting the most appropriate Alternative for Monomoy.

Sincerely,

Paul M. Cavanagh

Paul M. Cavanagh

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Table 1. Summary of Use of DRC-1339 to Control Gulls in the Northeast

The letters "nr" indicate that information was not reported.

Location of Use	Size (ha)	Purpose	Year 1, Application 1 # Days Pretreated	Year 1, Application 1 # Nests Treated	Year 1, Application 2 # Days Pretreated	Year 1, Application 2 # Nests Treated	# Years DRC-1339	Other Activities
Eastern Egg Rock, ME[1]	2.9	tern puffin	nr	208	nr	nr	2	shooting; egg, nest, brood destruction; decoys; vocalizations
Petit Manan, ME[2]	3.6	tern	nr	550	nr	nr	2	habitat management; nest destruction; shooting; decoys, vocalizations
Ram Island, MA[3]	0.8	tern	2	661 (+ 71 smashed)	1	563 (+ 20 smashed)	2	shooting; harassment, decoys, social attractants
Ship & Trumpet Islands, ME[4]	nr	tern	nr	nr	nr	nr	nr	decoys; vocalizations
South Monomoy, MA[5]	53	tern	nr	1,406	nr	nr	nr	none
Seal Island, ME[6]	nr	nr	nr	1,106	nr	nr	nr	nr

Table 1, continued on next page.

Table 1. Summary of Use of DRC-1339 to Control Gulls in the Northeast (continued)

Monomoy, MA[6] (Alternative 2)	142	plover tern	nr	2,850	nr	nr	4	shooting; egg, nest, and brood destruction
Monomoy, MA[6] (Alternative 3)	1113	plover	nr	12,550	nr	nr	4	shooting; egg, nest, and brood destruction

1. Kress, 1983. DRC-1339 was applied both at the nest and by casting baits from a trolling boat near the colony-site.
2. Goettel, 1984. Figures represent estimates presented in Environmental Assessment.
3. Blodget and Henze, 1992. Workers ran out of treated baits during both applications, which resulted in the remaining nests being smashed.
4. Megyesi, in USFWS, 1996.
5. Forster, 1980
6. USFWS, 1996.

Response to P. Cavanagh

1. Thank you for your comments regarding landfill closures and implications for continuing gull population declines. Although the nesting population of great black-backed gulls is decreasing on Monomoy, it is currently increasing statewide (15,078 in 1995; B. Blodgett, MDFW, pers. comm.). The area chosen for the proposed action actually has a proportionately lower number of herring gulls to great black-backed gulls within it (USFWS, 1995). We agree that sampling error is a factor that must be considered when looking at trends of wildlife species. If, as you suggest, the proposed action is more effective than predicted, our objective will be met faster than expected.

2. We agree with your comments regarding predators on Monomoy. The Service does not intend to eliminate all predators but will review specific predator problems. MacIvor (1986,1987, 1988, unpubl. repts.) observed herring and great black-backed gulls depredating piping plovers on Cape Cod. In fact, gulls were responsible for 100% of piping plover nest failures in 1988 on Monomoy NWR. The final EA was amended to include these observations (see pages 7 and 8).

3. Thank you for your comments; at this time the Service does not plan to attract terns to the area free of nesting gulls by using decoys and recordings.

We agree that terns and plovers will respond differently to the proposed action. However, it is likely that both species will benefit from removing territorial gulls from the proposed area (see also pages 7 and 8 of the final EA).

4. During periods of shooting in the 1990s, qualified piping plover monitors kept nesting birds under constant surveillance. Monitors were in radio contact with a shooter, and if piping plover distress or disturbance was observed, shooting would have stopped. Disturbance was not observed. There was no disturbance to short-eared owls or seals, as the shooting did not occur in areas where they coexisted. Disruptive effects caused in the 1980s may have been a result of the concentrated efforts of shooting on North Monomoy. Gull control efforts in 1993 and 1994 focused on removing individual nesting gulls from designated gull-free areas and buffer zones dispersed throughout both islands.

5. Current gull management will remain an option if Alternative 2 is selected. The Service plans to maintain the proposed area free of nesting gulls, and to treat individual problem gulls on a case-by-case basis.

6. Coulson et al. (1982) found that third-year birds were being recruited into the colony, though they represented " only a small proportion of the breeding population and recruitment is mainly occurring in older birds." In fact, only 9 of 511 birds culled in the last year of the ten-year treatment were three-year olds. Coulson et al. (1982) assume that these birds are breeders, because they feel that territorial birds would not allow intruders to eat the bait. On Ship Island in Maine, three non-breeding herring gulls were culled as a result of the individuals stealing the bait from great black-backed gull nests (USFWS unpubl. rept).

The intention of the Service is not to rid Monomoy of gulls, as was intended in the Isle of May study; rather it is to create an area free of nesting gulls on one location on South Monomoy.

Whether a specific point in nesting density must be reached before recruits are no longer attracted to northeastern colonies is unknown; new nesters are discouraged annually at Petit Manan, despite your assertion, and the same holds true for Seal Island, Matinicus Rock, Eastern Egg Rock, Ship Island, and Jenny Island in Maine (Megyesi, pers. comm.). Usually, these inexperienced birds can be persuaded to leave the colony using non-lethal methods. The Service intends to follow-up removal of territorial breeding gulls with annual management of the area using harassment, selective shooting, and/or productivity suppression, so that recruits do not re-colonize the area.

7. The Service plans to combine use of DRC 1339 to create a gull-free area and harassment techniques to maintain it. Please refer to Appendix F for a draft of the proposal to evaluate effects of the gull removal.

8. Whether the gulls learned the poison dispersal routine is a subjective observation; there were no marked birds associated with marked nests to document that individuals learned to avoid bait. Another theory could be that the remaining bird is less tightly affiliated with the nest after its mate has been absent for two weeks, and may not return to the nest to eat the bait. Baiting schedules in Maine have typically been placed at least two weeks apart to target peak numbers of herring and great black-backed gulls, rather than to target both individuals at the nest.

The Service is reviewing the baiting schedules used with certified ADC personnel to determine if methods to target both individuals would be more efficient in removing territorial gulls from the proposed area.

9. Thank you for your observations regarding loafing gulls and flight pathways. While plovers nesting on Inward Point may be subject to overflights by gulls, this area was chosen for treatment because of 1) the amount of high quality habitat potentially available for piping plovers, and 2) a natural break in nesting gulls which would facilitate maintenance of a gull-free area. We agree that overflights will likely have little effect on Common and Least terns.

Please refer to pages 26 and 27 of the final EA for a discussion of the Ram and Seal island results and how they relate to the proposed action on Monomoy.

10. We agree that substantial logistical preparation will be required prior to implementation. To this end, assistance from Animal Damage Control, other refuges and several volunteers has been arranged.

11. The final EA was modified to reflect your comments. We are not proposing Alternative 3, as our goal is not to eliminate herring and great black-backed gulls from the refuge. If it were implemented, however, there may actually be a net increase in species, if roseate terns, black skimmers and laughing gulls recolonize, and only herring and great black-backed gulls are lost.

12-13. Thank you for these comments.

14. The EA has been revised to clarify that piping plover carrying capacity figure is an estimate only. It is not known if Griscom's record of 15 pairs of plovers on Monomoy in 1955 represented as intensive a search effort as has been mounted since the species was listed, nor is it known how the habitat may have changed from 1955 to 1995 (vehicles were still driving beaches into the 1970s).

The Massachusetts Division of Fisheries and Wildlife's application for a permit under Section 10 of the Endangered Species Act proposes several activities that would allow slight reductions in productivity of plovers at sites where substantial gains in abundance of nesting pairs have occurred. Furthermore, the Section 10 application contains numerous safeguards to assure continued growth of the Massachusetts plover populations.

The primary threat to plovers posed by the Monomoy gulls is usurpation of habitat, not loss of productivity. If the Massachusetts plover population is to continue to grow, National Wildlife Refuges are the first places that the Service is likely to look for sites where long-term protection can be assured. Increasing the plover population on Monomoy would represent an important and lasting contribution to recovery.

The Service agrees that continued monitoring of plovers and deployment of exclosures on Monomoy is important, and has incorporated these actions into all alternatives presented in the EA and in Appendix F.

15. Please refer to Appendix F for our proposed evaluation of the project. All requests from scientific organizations will be reviewed and provided for if logistically feasible.

Appendix F

Draft of Proposed Methods for Evaluation of Gull Control
on Monomoy National Wildlife Refuge.

Introduction

The purpose of this study is to evaluate the effectiveness of the use of DRC 1339 in removing gulls on Monomoy National Wildlife Refuge and to monitor changes in the abundance and distribution of several species of wildlife in treated and untreated areas. Where baseline information exists (i.e., productivity, distribution and abundance of common and least terns, piping plovers, and herring and great black-backed gulls), comparisons before and after treatment will be made. The following null hypotheses will be tested:

a. The abundance and distribution of laughing gulls, common, Arctic, roseate and least terns, and black-crowned night-herons will not differ between and within treated and untreated sites.

b. Productivity of terns will not increase following the removal of gulls from a portion of South Monomoy.

c. Productivity of piping plovers in treated and untreated areas will not differ.

d. There will be no decrease in population and density of nesting Herring and Great Black-backed gulls between and within treated and untreated portions of South Monomoy.

e. A discriminant function equation cannot be used to predict the gender of great black-backed gulls on Monomoy NWR.

Study Area and Methods

Refer to the final EA for a description of the study area.

Herring and Great Black-backed gulls

Nests will be identified annually, while distributing bait, as Herring or Great Black-backed gull

by using an egg ring (Cavanagh, pers. comm.), or by observing attending adults at the nest. Nests that are well-formed but do not contain eggs will be identified as unknown. All carcasses will be identified by species; the total number of nests baited to birds killed will be calculated.

A sample of great black-backed gull carcasses will be randomly selected, and length of flattened wing chord, culmen, tarsus, depth of bill at gonys, and head/bill and sex determined internally. A discriminant function equation will be derived to predict the gender of each bird measured.

The discriminant function derived for herring gulls on Ram Island, Massachusetts will be used to predict the gender of birds on Monomoy.

All carcasses will be inspected for transmitters and bands.

Four permanent plots will be established in the untreated portion of South Monomoy to serve as a control. Annual comparisons of numbers of nesting pairs and the ratio of great black-backed to herring gulls in the treated and untreated areas will be made.

Terns

The distribution and abundance of common, Arctic, roseate and least terns will be monitored annually. A tern census of the refuge population will be conducted in early June. Protocol for the census is currently being reviewed.

A tern study plot will be established in an area not within 50 m of active piping plover nests. A blind will be used to identify nests to species, and to record the number of chicks hatched and fledged within the plot. If this proves infeasible, a sample of nests will taken along a fixed-width transect during the tern census (early June). The same area will be traversed in mid-June and mid-July.

Piping Plovers

All nests found on South Monomoy Island will be surrounded with predator exclosures and posted as closed areas on the refuge. All nest locations will be mapped annually. Productivity of plovers in similar quality habitat (MDFW 1996) in treated and untreated areas will be compared.

Wading Birds

The number of nesting wading birds (e.g. Black-crowned Night-Herons [Nycticorax nycticorax], Snowy Egrets [Egretta thula]) will be censused annually through a direct nest count. Distribution of nests will be mapped. Productivity of a random sample of black-crowned night-heron nests will be recorded during the heron census and revisited a maximum of weekly until fledging, time

permitting.

Samples of boluses found at the base of Black-crowned Night-Heron nests will be collected throughout the breeding season and analyzed using a hand-lens.

Presentation of Results

Appropriate descriptive, parametric, and non-parametric statistics will be used to test the hypotheses outlined. Reports will be compiled annually and included in the Annual Refuge Narrative.

Appendix G

GULL CONTROL TECHNIQUES NOT ANALYZED IN THIS ENVIRONMENTAL ASSESSMENT

A number of techniques may be used to encourage gulls to abandon an area or to reduce their numbers. Each method has advantages and disadvantages that may affect its usefulness for solving a particular gull problem. For example, a technique that may be highly effective for dispersing gulls loafing near an airport runway may be completely inappropriate if the objective is to open habitat for use by other wildlife species.

Gull control techniques considered during formulation of this project but not analyzed in the EA are described below, along with reasons why they did not receive further consideration. Reasons for rejecting these techniques generally fell into one or more of the following categories:

1. The technique causes unacceptable levels of disturbance or damage to other wildlife species on the site, including the species that this project is intended to benefit.

2. The technique allows breeding herring and great black-backed gulls to continue to nest in the treatment area for the duration of their natural life-span. Since these gull species are long-lived (15 to 20 years), they will continue to occupy habitat and exclude other species. Continued presence of the nesting gulls will also continue to attract new and younger gulls into the colony, perpetuating the problem beyond the life-span of it current occupants.

3. The technique is impractical, especially for implementation on the scale needed to provide gull-free areas that are larger than the small fragmented areas being maintained under the No New Action Alternative (Alternative 1).

Management of garbage and other human-supplied foods to make them unavailable for gulls

The expansion of the nesting range of herring and great black-backed gulls is the result of concentrated human-supplied food sources, particularly landfills. The best long-term solution, therefore, is to change the way we dispose of the food wastes which are the primary cause of the gull population explosion. Finding an alternative to large landfills is complicated and expensive, however, and must be addressed on a regional basis, as studies show that gulls commonly feed at several dumps 50 or more miles apart. Moreover, because of gulls' 15-to-20 year lifespan, many years will elapse before there is a big enough reduction in gull populations to increase availability of habitat for other species at gull nesting sites.

While the Service believes that, in the long-term, reduction of human-supplied food is key to alleviating widespread problems that expanded gull populations cause other wildlife, it does not

solve the immediate problems at specific locales, such as Monomoy. As noted above, gulls are quite long-lived. Furthermore, reductions in total gull numbers, particularly at large colonies, must be very substantial before habitat actually becomes available for use by other species. At Monomoy, for example, the declines in gull numbers during the last ten years have not been attended by any decrease in the acreage of habitat they occupy. Rather, the remaining gulls have merely spread out their nesting territories.

Shooting

Shooting all the gulls nesting in a treatment area is extremely difficult if many gulls are involved, as the birds soon learn to leave the colony whenever people arrive, only to return to the site when the marksmen leave. During protracted shooting, gulls in adjacent areas will also take flight, so that it becomes difficult to distinguish between gulls nesting inside and outside of the treatment area. If the number of gulls to be shot is large and shooting cannot be accomplished early in the season before other bird species return from wintering grounds, then these species may be subject to disturbance from the shooting activities.

Harassment

This includes use of automatic exploders, cracker shells, lights, alarms, distress calls, water spray devices, or scarecrows may chase gulls away from an area. A disadvantage is that the birds become accustomed to the scare devices, which soon lose their effectiveness. At sites where gulls have a history of several years of successful nesting, they are especially likely to persist with their nesting despite harassment.

Harassment must be accompanied by occasional shooting of a few birds to reinforce the scare tactics. These methods must continue throughout a season, with the possibility that displaced birds may become a problem elsewhere.

Another problem with harassment as a gull control method is that intensive use of scare devices is equally disturbing to other birds which may be nesting, feeding or resting nearby. Harassment is most effectively employed to discourage a few nesting pairs of gulls from colonizing a new site or from trying to return when most of their flock has either abandoned or been cleared from an area. In such cases, scare techniques are used early in the season before terns and other nesting species return from their winter range.

Egg and nest destruction

These techniques are sometimes used with shooting to discourage newly invading gulls. Nest destruction is usually futile where gulls are already well established, as they will renest repeatedly. While several nest destruction campaigns during a season will prevent fledging of any new gulls, the adults remain in the area, where they continue to usurp nesting territories and prey on eggs and young of other species. Like harassment, the program must be continued each year until the adult gulls die or forsake the area.

Egg oiling

This is a technique in which gull eggs are sprayed with a mixture of oil, formaldehyde, and water, kills the embryo but preserves the egg. The adults continue to incubate the eggs until it is too late for them to renest. Although the technique only needs to be used once a year, it must be repeated every year until the adult gulls die or abandon the area. A further complication is that the oil must be applied to the egg at the proper time. If it is applied too early in the season, eggs may be missed; if it is applied too late, the eggs may still hatch.

Sudan Black B

The only biochemical method to prevent hatching egg hatching that has shown some promise on gulls is a dye known as Sudan Black B (Weatherbee et al. 1964; Weatherbee 1966). This chemical is only marginally effective, extremely costly to apply, and is not registered for this use. As with egg oiling, Sudan Black B was not considered a viable alternative because gulls would continue to occupy the treatment area until they die or abandon the area, which could be many years, especially as new gulls may continue to establish as nesters on the site.

Physical obstruction using monofilament, cordage, or wires

Access of gulls to nesting sites can be deterred by stringing monofilament lines, stainless-steel wire, or cordage in parallel lines between posts set around the perimeter of the area. In some cases, vertical or horizontal lines are also strung to prevent entrance under the barrier at the perimeter. If the line spacing is appropriate, gulls are reluctant to descend through it to the ground, while other smaller birds may be able to penetrate it. Implementation problems on a large site like Monomoy include the difficulty of setting and maintaining large numbers of posts on a windy, sandy site. Frequent breakage of lines is likely to occur, posing danger of entanglement to nesting birds on the site, as well as disturbance associated with repairing the lines.

Cage traps

Placing cage traps over nests removes gulls that are incubating eggs. But this very time-consuming technique is impractical for controlling large numbers of birds. Live trapping also presents the quandary of what to do with the trapped gulls, since releasing them elsewhere merely moves the problem to a new location.

Introduction of mammalian predators

Predators such as fox and raccoon will eat gull eggs, and they may help disperse a gull colony. Unfortunately the predators do not discriminate between the eggs of gulls and those of other waterbirds, and therefore are not useful for protecting terns, piping plovers, and other ground-nesting birds.

Avitrol

Avitrol or 4-aminopridine is a chemical registered by the Environmental Protection Agency for use as a flock frightening repellent and is not designed to reduce gull numbers. A few treated baits of bread (24 cubes for a flock of 5,000 gulls) are placed with untreated baits so that only a few birds in a flock ingest the chemical. Affected birds emit distress calls and perform aerial distress displays that frighten the other birds in the flock, causing them to leave. Because the distressed birds will frighten away other species as well as gulls, avitrol is not appropriate for repelling gulls where they compete with other wildlife. It is most commonly used to disperse gulls at landfills.

Other

Several commenters on the draft EA suggested conceptual management techniques such as "birth control" or "sleeping powders" to be used on the gulls. However, they did not identify specific techniques or chemicals that are legally approved for use in the wild.