I. The Hackensack Meadowlands Initiative

Mallards (*Anas platyrhynchos*) in flight.

I. The Hackensack Meadowlands Initiative

A view of Manhattan from New Jersey (upper); mallards in flight (lower).

Just 7 miles west of Manhattan, the Hackensack Meadowlands represents one of the largest brackish estuarine complexes in the northeastern United States. The Meadowlands ecosystem attracts and variously supports a remarkable diversity and abundance of fish and wildlife, including federal trust resources such as migratory birds (*e.g.*, mallard ducks [*Anas platyrhynchos*] above, and bufflehead [*Bucephala albeola*] on facing page). As one of the largest contiguous areas of open space remaining in the urban Northeast, the Meadowlands has become increasingly important for fish and wildlife species throughout the region.

The U.S. Fish and Wildlife Service has established the *Hackensack Meadowlands Initiative* as a collaboration of federal, State, and local stakeholders to address the problems created by past land use of the Meadowlands and to provide long-term protection for its biodiversity. Working together with partners, the Service envisions a more natural Meadowlands ecosystem, a progressively cleaner environment that sustains healthy species, diverse biological communities comprised predominantly of native fishes and wildlife, and a natural environment that will provide social, recreational, educational and other benefits. Public support that will improve the quality of life for people throughout the urban area is needed to realize this vision.

A view of the Sawmill Creek Wildlife Management Area.

Bufflehead (*Bucephala albeola*) in flight.

I. THE HACKENSACK MEADOWLANDS INITIATIVE

Bufflehead in flight.

I. THE HACKENSACK MEADOWLANDS INITIATIVE

The Mission of the U.S. Fish and Wildlife Service (Service) is to *work with others to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people*. In partial fulfillment of this Mission, the Service has worked in close collaboration with other federal and State agencies, non-governmental organizations, and the public to protect the Hackensack Meadowlands from further degradation. The challenge now is to develop effective partnerships to protect, remediate[1], enhance[2], restore[3], and manage the Meadowlands. Thus, the Service developed *The Hackensack Meadowlands Initiative* (*Initiative*) as a collaborative effort among federal, State, and local stakeholders to coordinate the remediation, enhancement, restoration, and long-term protection of this ecosystem (Figure 1).

The Service presents this document titled *The Hackensack Meadowlands Initiative: Preliminary Conservation Planning* (Plan) to our *Initiative* partners and other stakeholders to provide a framework for restoring and protecting the Meadowlands ecosystem. As documented in the following pages, the Meadowlands has endured centuries of misuse yet still supports substantial fish and wildlife resources. Cleaning up and restoring its wetlands and adjoining uplands will not only help improve the health of fish and wildlife, but will also provide unparalleled opportunities for education and recreation and a better quality of life for people in the region. The Service provides the document to identify critical issues and work toward the common ground to advance restoration and long-term protection of the Meadowlands ecosystem. The purpose of the Plan is twofold: to provide a technical foundation for the restoration of the Meadowlands ecosystem, including its fish and wildlife resources; and to promote the Service's vision for the Meadowlands. The Service's vision for the Meadowlands includes providing for:

(1) a more natural[4] estuarine ecosystem with healthy fish and wildlife resources;

(2) a cleaner environment (progressive reduction in acute and chronic contaminant effects);

(3) diverse wetland and associated communities that sustain local and regional populations of native species, including federal trust fish and wildlife resources; and

(4) public commitment to and diverse social benefits from the Meadowlands.

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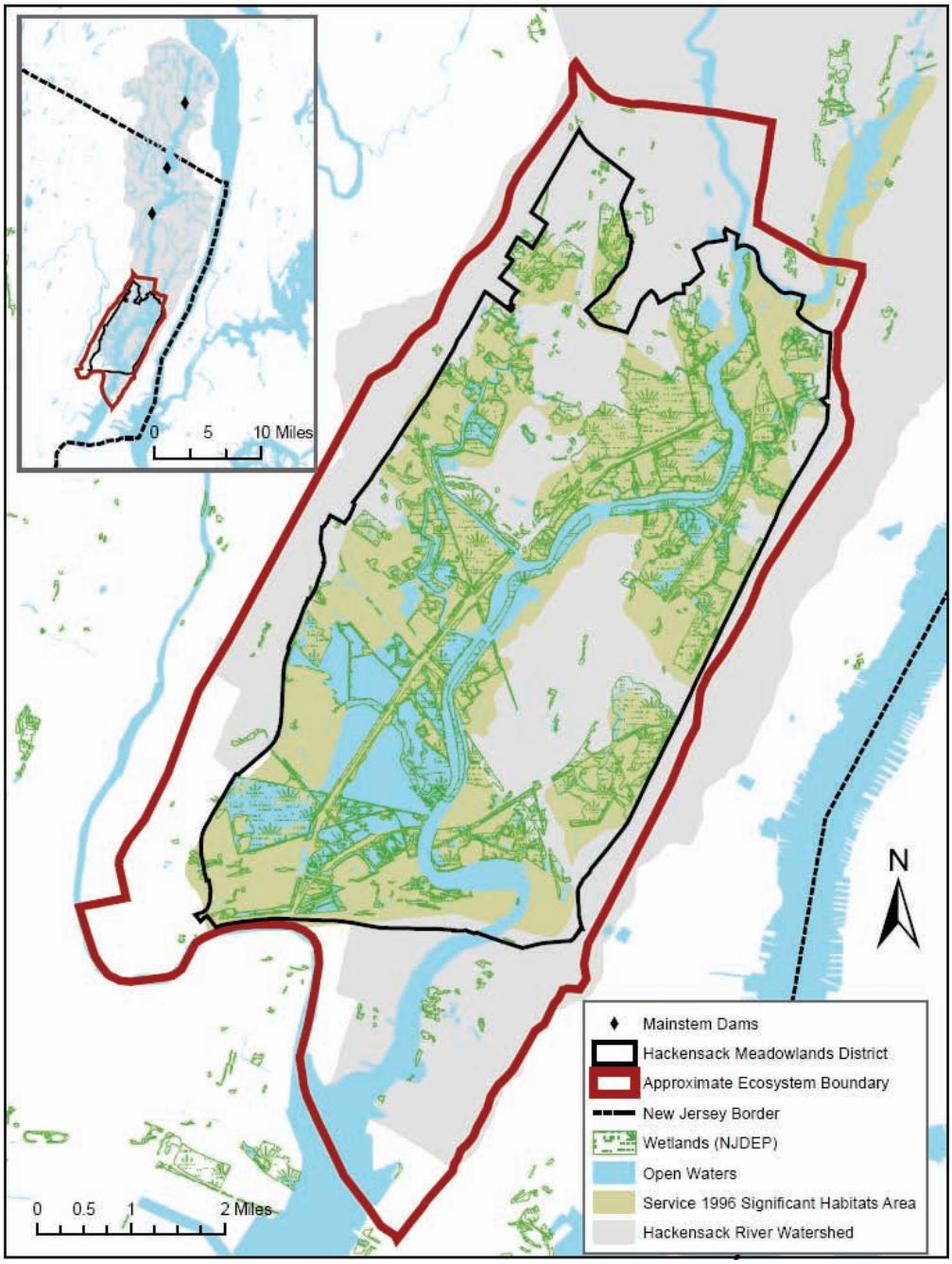
[1] Remediate- to correct or treat pollution, usually by actions that stabilize, contain, entomb, neutralize, remove, or destroy the hazardous material in accordance with specific federal or State regulations. (See the Glossary for additional detail on this and other definitions.)

[2] Enhance- to manipulate the physical, chemical, or biological characteristics of a site for a specific purpose (*e.g.*, invasive species control) or to improve a specific function (*e.g.*, marsh production, habitats for target species).

[3] Restore- to return historical functions and/or conditions (not necessarily functions or conditions that existed prior to human disturbance) to a former or degraded wetland by manipulating its physical, chemical, or biological features.

[4] Natural- as used here, indicating an ecosystem in which diverse conditions (*e.g.*, nutrient concentrations, water quality) and functions (*e.g.*, biogeochemistry, biodiversity) do not reflect extensive human activities or disturbance.

Figure 1. The Hackensack Meadowlands ecosystem. As used throughout this document, the Hackensack Meadowlands ecosystem refers to the open waters (includes both subtidal and intertidal areas), wetlands, former wetlands, and upland buffers along the lower Hackensack River and its tidal tributaries. Though ecosystems lack precise boundaries, this ecosystem roughly corresponds to the area outlined in red below. Note that this area is larger than the State-designated Hackensack Meadowlands District, shown outlined in black, and mostly lies within the Hackensack River watershed, shown in gray in the inset in the upper left.



With this Plan, the Service makes clear that protecting the Meadowlands ecosystem is an essential part of fulfilling the Service's Mission in the northeastern United States.

A. INTRODUCTION

The Hackensack Meadowlands is the largest brackish estuarine complex in the New York-New Jersey (NY-NJ) Harbor and among the largest in the northeastern United States (Tiner *et al.*, 2002). While changes have occurred throughout the 400 years since European colonization and settlement in the Northeast, it is during the past century that most of the Meadowlands has been extensively developed, lost, and seriously degraded, resulting in fragmentation of and functional impairments to the remaining habitats for fish and wildlife. Exotic species, both aquatic and terrestrial, have also proliferated and spread throughout the Meadowlands, further altering its ecosystem functioning and diminishing its biodiversity and value to fish and wildlife. Nonetheless, the Meadowlands remains one of the largest contiguous areas of open space in the urban Northeast that is available to wildlife. The remediation, enhancement, restoration, and protection of its wetlands and adjoining uplands are increasingly important to fish and wildlife resources at local, regional, and larger scales, and thus have become the primary focus of the HMI. Furthermore, *restoration of the Meadowlands to a healthy, productive ecosystem can improve the quality of life for 20 million people in the NY-NJ Harbor area*. These improvements to the quality of life include direct benefits such as the appreciation of land values, recreation, and non-consumptive uses (*e.g.*, wildlife observation, education) of wildlife by the public and indirect benefits resulting from various ecosystem functions, including flood control and improvements to water quality.

Public attitudes toward the Hackensack Meadowlands have changed considerably over the past 45 years. In 1960, the Meadowlands Regional Development Agency (1961) was formed by 14 municipal governments with the charter of "reclaiming" and developing the Meadowlands. Hundreds of acres of the wetlands were filled each year for residential and industrial development, transportation corridors, and other rights-of-way, while land unsuitable for such development had other uses. By 1969, open landfills for garbage occupied nearly 10 percent of the Meadowlands and had greatly degraded the area (Hackensack Meadowlands Development Commission, 1978). Acknowledging a mounting waste-management problem and growing environmental concerns (*e.g.*, poor air and water quality), the State of New Jersey established the Hackensack Meadowlands Development Commission (HMDC) to develop the area, accommodate the disposal of garbage, and protect the "balance of nature."

Beginning with the 1973 decision to prohibit dumping of out-of-state garbage, waste disposal in the Hackensack Meadowlands District (HMD) was gradually reduced. Nonetheless, filling of hundreds of acres of wetlands continued each year through the mid-1980s. Although the filling of wetlands later slowed, pressure to continue filling wetlands for development in the Meadowlands remained strong until the late 1990s. With increasingly vocal public opposition to the filling of wetlands, development, and further encroachment into the Meadowlands, along with a greater public awareness of its considerable fish and wildlife resources, development activities in the Meadowlands began to stall between 2000 and 2001. Recognizing the change in public attitudes and the need to reassess its development mandate, the State of New Jersey

renamed the HMDC in 2001 as the New Jersey Meadowlands Commission (NJMC) to emphasize a renewed commitment to environmental protection.

The Service has long faced challenges in its efforts to protect the Hackensack Meadowlands. In the past, the Service primarily worked within federal statutory authorities (Section D below) to protect fish and wildlife resources in the Meadowlands, largely through review of proposals for activities affecting wetlands under Section 404 of the Clean Water Act (CWA; 33 U.S.C. 1344 *et seq.*) and Section 10 of the Rivers and Harbors Appropriations Act of 1899 (33 U.S.C. 403 *et seq.*). Application of such authorities, although moderately successful, repeatedly placed the Service in a controversial role as an "opponent" to those groups that continued to promote plans to develop the Meadowlands. Now, with broad government and public support for protecting and restoring the Meadowlands, the Service is not only changing but also expanding its role to influence land-use planning. The challenge now is to foster collaboration that will build effective partnerships to remediate, enhance, restore, and ultimately protect the Meadowlands ecosystem.

B. PRELIMINARY CONSERVATION PLANNING: GOAL, OBJECTIVES, AND PRINCIPLES

1. Goal and Objectives

To attain its vision for the Meadowlands, the Service's overall *goal* for the Meadowlands is to sustain and safeguard the Meadowlands ecosystem, including its fish and wildlife resources. This goal will be achieved through conservation partnerships to remediate, enhance, restore, manage, and protect the Meadowlands ecosystem. The broad, major *objectives*[5] of the Service's Plan are to work with its partners to:

(1) promote, and where appropriate, lead efforts for land acquisition, remediation, enhancement, restoration, and management of the Hackensack Meadowlands;

(2) increase scientific understanding to better define successful remediation and restoration and to enhance ecosystem functions and natural dynamic processes, especially through activities that remediate contaminated sites and improve water quality;

(3) establish diverse, native wetland and upland vegetative communities, to include greater acreage and diversity of forest, shrub, grassland, and wetland cover types to support biodiversity at local, regional, and larger scales; and

(4) increase responsible use of, public awareness of, and education about the Meadowlands, including its flora and fauna.

[5] Objective- used here in a broad sense, as a component of a goal. Most objectives identified here are general; more specific (*i.e.*, measurable) objectives will be established by technical stakeholder groups.

This Plan is not a technical blueprint for clean-up and restoration of individual parcels within the Meadowlands, but it provides an initial framework for remediation, enhancement, restoration, and protection based upon the best available information in restoration ecology, ecotoxicology, conservation biology, wildlife management, and related technical disciplines. In many cases, the Plan identifies data gaps where the best available information is insufficient to address the complex problems in the Meadowlands. The Plan does not provide immediate solutions to obvious (*e.g.*, environmental contaminants) or even subtle (*e.g.*, habitat fragmentation) problems that have grown increasingly worse in the Meadowlands over many decades, but does identify critical fish and wildlife resources, prioritizes concerns, and initiates development of common objectives and relevant tasks. Another intent of the Plan is to make its readers aware that *despite serious environmental impacts, the Meadowlands still provides critical ecosystem functions (e.g., biogeochemical cycling of nutrients, flood storage) and supports a remarkable and tenacious biodiversity (e.g., 75 percent of New Jersey's avifaunal species and over 25 State-listed species).* With additional enhancement and other conservation actions, the ecosystem functions provided by the Meadowlands and the value of its habitats to wildlife can be increased.

This Plan presents a technical foundation to inspire and influence future land-use decisions that will sustain and safeguard the Meadowlands ecosystem. Drawing extensively on the Service's and other stakeholder's efforts and products, this Plan identifies the benefits and challenges of restoring the Meadowlands. The remainder of this chapter (Section I) introduces the Service's restoration principles, authorities, responsibilities, and past involvement in the Meadowlands. Section II describes the human use history of the Meadowlands, whereas Section III describes the natural history and identifies important fish and wildlife resources of the Meadowlands. Sections IV through VI identify major technical challenges to restoration; Sections VII through IX present acquisition, restoration, protection, management, and social objectives; and Section X addresses planning and coordination issues. Section XI provides an organized compilation of the recommendations identified in the preceding sections; and finally, Section XII presents the Service's conclusions.

Throughout this Plan, the Service has identified important data gaps and critical issues. The need for additional information to guide decision-making regarding remediation and other activities is a constant theme throughout the Plan. Remediation, enhancement, and restoration can be structured to achieve many different objectives and goals in the Meadowlands. The challenge to achieve *successful* remediation, enhancement, restoration, and ultimately, the protection of the Meadowlands and its fish and wildlife resources is formidable. These actions require a deliberative and iterative approach based on sound information, including numerous kinds and types of information from sites in the Meadowlands, and in some cases, the surrounding region. Whether restoring vegetative cover types, managing regional water supplies and hydrology, addressing impairments to overall water quality, remediating contaminated sites and nearby wetlands, controlling invasive species, or improving the health of species chronically contaminated, collaboratively defined success metrics or performance measures for these activities must be established for comparison with information acquired from regular monitoring of sites throughout the Meadowlands to guide and improve subsequent actions. How all stakeholders work together to address these challenges will be critical. While it is unrealistic to propose that all of the problems of the Meadowlands can be completely eliminated by

remediation, enhancement, and restoration, thoughtful planning, careful implementation, and sound science-based management can improve the Meadowlands for fish, wildlife, and people.

Many dedicated groups and individuals have worked tirelessly to stop further encroachment and degradation of the Meadowlands; this Plan should make clear that the vital work to save the Meadowlands and its biodiversity has just begun and will require substantial effort by many stakeholders.

2. Restoration Principles

Any recommendations, technical assistance, planning, and other actions that the Service promotes and undertakes to achieve its vision, goal, and objectives for the Meadowlands will conform to federal guidance on estuarine restoration. The following restoration principles were drawn from: (1) the *Final Estuary Habitat Restoration Strategy Prepared by the Estuary Habitat Restoration Council* (*Federal Register*, Vol. 67, No. 232, December 3, 2002), which included representatives from the Service, U.S. Army Corps of Engineers (Corps), National Oceanic and Atmospheric Administration (NOAA), U.S. Environmental Protection Agency (EPA), and U.S. Department of Agriculture; (2) the *Principles for the Ecological Restoration of Aquatic Resources* (U.S. Environmental Protection Agency, 2000); and (3) the *National Wetlands Inventory: A Strategy for the 21st Century* (U.S. Fish and Wildlife Service, 2002a). Each principle is integral to the Service's vision, goal, and objectives for the Meadowlands.

(1) Address and prevent ongoing causes of degradation first; eliminate and remediate ongoing stresses, (including their cumulative, indirect impacts) within and surrounding the ecosystem.

(2) Preserve and protect existing resources to provide the biotic diversity and other natural resources (*e.g.*, water) needed for the recovery of impaired systems.

(3) Understand a watershed's past, assess its current conditions and trends, and anticipate future changes (*e.g.*, development, sea level rise) to improve water quality and restore hydrologic structure and function.

(4) Restore ecosystem structure (*e.g.*, habitat, populations) to re-establish ecosystem function, integrity, and sustainability.

(5) Employ a multi-disciplinary team representing federal, State, and municipal agencies, academia, private organizations, and others to develop site-specific remediation and restoration plans that include the following components:

   a. clear priorities and measurable goals;
   b. monitoring before, during, and after projects;
   c. reference sites to gauge restoration success; and
   d. preferential use of passive techniques (e.g., re-establish natural hydrology to promote re-vegetation by native plants), natural bioengineering (*e.g.*, integrating

plants and other living materials into structures), and adaptive management (*e.g.*, integrating experimental design and monitoring into restoration projects).

(6) Integrate good science with sound decision-making, emphasize collaborative problem-solving by meaningful involvement of appropriate public and private stakeholders, and reflect community values and perspectives.

C. MEADOWLANDS ECOSYTEM RESTORATION PRINCIPALS' GROUP

The Meadowlands has endured several centuries of indifference, neglect, and abuse. As will become evident with the information presented in this Plan, the challenges in the Meadowlands confronting stakeholders are complex, costly to address, and will not be solved overnight. Remediating, enhancing, restoring, and protecting the Meadowlands will require substantial commitments by stakeholder groups, considerable financial investments from federal, State, and regional government agencies, and unwavering public support. Careful planning and coordination of the major commitments and diverse component activities will be essential to achieving a successful, comprehensive restoration of the Meadowlands. In recognition of the critical importance of this coordination and the substantial long-term commitments that will be required by federal, State, and regional agencies, a central interagency group, currently referred to as the principals' group, is forming to address and provide for the overall planning and coordination. Furthermore, many issues not under the purview of the Service and other federal or State partner agencies have substantive potential to adversely impact the restoration of the Meadowlands and the sustainability of its biota. The principals' group provides a venue for communicating and coordinating those concerns under the purview authority of other agencies.

D. FEDERAL AUTHORITIES AND SERVICE RESPONSIBILITIES IN THE MEADOWLANDS

1. Key Federal Laws, Executive Orders, and Policies for Service Activities

A number of federal resource laws, executive orders, management plans, and policies provide the capability or guidance for the Service's involvement in the Meadowlands. Most authorities are situational, and apply only to federally funded or authorized activities, to federal lands, or to federally involved remediation and planning activities, and include the following:

- Fish and Wildlife Coordination Act (FWCA; 48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.)*;
- Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*);
- Migratory Bird Treaty Act of 1918 (MBTA; 40 Stat. 755, as amended; 16 U.S.C. 703-712);

- Federal Water Pollution Control Act of 1972 (Clean Water Act of 1977 [CWA]; 33 U.S.C. 1251 *et seq.*), including the National Estuary Program;

- Rivers and Harbors Appropriation Act of 1899 (30 Stat. 1151, as amended; 33 U.S.C. 403 *et seq.*);

- National Environmental Policy Act of 1969 (NEPA; 83 Stat. 852; 42 U.S.C. 4321 *et seq.*);

- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA; P.L. 96-510; 26 U.S.C. 4611-4682; as amended by the Superfund Amendment and Reauthorization Act of 1986, P.L. 99-499; 42 U.S.C. 9601 *et seq.*);

- Resource Conservation and Recovery Act of 1976 (RCRA; P.L. 94-580; 42 U.S.C. 6901-6992; 90 Stat. 2795, as amended);

- Emergency Wetlands Resources Act of 1986 (EWRA; P.L. 99-645);

- North American Wetlands Conservation Act of 1989 (NAWCA; 103 Stat. 1968; 16 U.S.C. 4401-4412; P.L. 101-233, including the North American Waterfowl Management Plan) and the Neotropical Bird Conservation Act of 2000;

- Coastal Wetlands Planning, Protection and Restoration Act of 1990 (104 Stat. 4779; 16 U.S.C. 3951 3956 *et seq.*);

- Magnuson-Stevens Fishery Conservation and Management Act of 1976 (P.L. 94-265; 16 U.S.C. 1801-1882; 90 Stat. 331; as amended);

- Coastal Zone Management Act of 1972 (CZMA; P.L. 92-583; 86 Stat. 1280; 16 U.S.C. 1451-1464; as amended) and the Coastal Zone Management Improvement Act of 1980 (P.L. 96-464; as amended);

- Department of Transportation Act of 1966 (Policy on lands, wildlife and waterfowl refuges, and historic sites, 49 U.S.C. 303);

- U.S. Fish and Wildlife Service Mitigation Policy (*Federal Register*, Vol. 46, No. 15, January 23, 1981);

- Executive Order 11988 on Floodplain Management (*Federal Register*, Vol. 42, No. 26971, May 24, 1977);

- Executive Order 11990 on Protection of Wetlands (*Federal Register*, Vol. 42, No. 26961, May 24, 1977);

- Executive Order 13112 on Invasive Species (*Federal Register*, Vol. 64, No. 25, February 3, 1999); and

- Executive Order 13186 on Migratory Birds (*Federal Register*, Vol. 66, No. 11, January 17, 2001).

Not all of the above are primary Service authorities; however, coordination with the Service may be necessary to fulfill authorities of other agencies. Thus, a brief description summarizing the above legal authorities, policies, and executive orders is provided in Appendix A. These and other operating authorities primarily determine the Service's responsibilities in the Meadowlands, which are identified below.

2. Service Trust Responsibilities

The Service and NOAA are charged with the protection of federal trust resources and, in some cases, the habitats that support trust resources. In the Hackensack Meadowlands, the Service is primarily responsible for:

- all terrestrial and freshwater species that are (1) federally listed as endangered or threatened, (2) candidates for listing, or (3) listed under the Convention on International Trade in Endangered Species;

- migratory birds, especially neotropical migrant landbirds, colonial nesting waterbirds, shorebirds, seabirds, waterfowl, and raptors;

- certain interjurisdictional fishes (*e.g.*, striped bass [*Morone saxatilis*]) and other migratory fishes; and

- impacts from Superfund sites and invasive and exotic species on native fish and wildlife populations.

The NOAA, primarily through the National Marine Fisheries Service (NMFS) Office of Protected Resources and the NMFS Office of Habitat Conservation, is charged with protection and conservation of coastal and marine resources (National Oceanic and Atmospheric Administration, 2004a; 2004b), including the following in the Hackensack Meadowlands:

- endangered and threatened marine species (*e.g.*, shortnose sturgeon, *Acipenser brevirostrum*);

- managed fishery resources (*e.g.*, winter flounder [*Pseudopleuronectes americanus*]);

- diadromous species (*e.g.*, American shad [*Alosa sapidissima*] and American eel [*Anguilla rostrata*]);

- marine mammals (*e.g.*, dolphins and seals); and

- habitats that support those species (*e.g.*, Essential Fish Habitat for managed species).

Additional information about Service responsibilities is provided below.

a. Federally Listed Species

Federally listed species include species designated as endangered or threatened by the Secretary of Interior in accordance with the ESA (see Appendix A). Endangered species are defined as

those species in danger of extinction throughout all or a significant portion of their range, whereas threatened species are those that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

The Hackensack Meadowlands is increasingly used for migrating, foraging, and overwintering by the federally listed (threatened) bald eagle (*Haliaeetus leucocephalus*; Figure 2). Overwintering bald eagles are increasing throughout New Jersey and the Hudson-Raritan estuary (Walsh *et al*., 1999; Smith *et al.*, 2003), including the Meadowlands (Kiviat and MacDonald, 2002). Bald eagles have been observed along the Hackensack River and other large bodies of water in the region, where they roost and forage. A bald eagle that drowned subsequent to a mid-air collision was recovered in October 2000 from the Hackensack River (Ralston, 2000).

Figure 2. Bald eagle (*Haliaeetus leucocephalus*): A federally listed species that is increasingly observed during fall and winter throughout the Hackensack River watershed.

During the 1900s, the Meadowlands and the Hackensack River watershed (HRW) were home to other federally listed species, including shortnose sturgeon, dwarf wedgemussel (*Alasmidonta heterodon*), bog turtle (*Clemmys muhlenbergii*), peregrine falcon (*Falco peregrinus*; formerly listed), and Indiana bat (*Myotis sodalis*). However, with the exception of peregrine falcon, now nesting on bridges and other tall structures within the Meadowlands area, none of the above species has been found recently within the HMD.

In August 1999, the Service removed (de-listed) the peregrine falcon from the list of endangered and threatened species, ending all protections provided to the species under the ESA. However,

section 4(g)(1) of the ESA requires implementation of a monitoring program for a minimum of 5 years. The Service has decided to monitor the peregrine falcon for 13 years in order to provide data that will reflect the status of at least two generations of peregrines. If it becomes evident during this period that the peregrine is not maintaining its recovered status, the species could be re-listed under the ESA. The peregrine will continue to be protected by the MBTA, which prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests except when specifically authorized by the Department of the Interior.

b. Migratory Birds

The Meadowlands is located in the Atlantic Flyway at the juncture of three physiographic areas (Southern New England, Mid-Atlantic Coastal Plain, and Mid-Atlantic Piedmont; Figure 3) and within the hub of several major bird migration routes connecting the eastern Great Lakes, Hudson River Valley, New England, and the coast (Figure 4). The Meadowlands provides increasingly vital migratory stopover and breeding habitats for nearly 40 percent of the migratory bird species that occur in the eastern United States. Approximately 76 percent of the 445 species observed in New Jersey use the Meadowlands as nesting habitat or as a stopover for resting and feeding along historic migration corridors between the Atlantic Ocean and interior regions of the Hudson Valley and the Great Lakes (Dunne *et al.*, 1989; Kane and Githens, 1997). Nearly all of the 65 bird species nesting in the Meadowlands are migratory (Kane *et al.*, 1991). Nearly all migratory birds in the United States are protected under the auspices of the MBTA (see Appendix A). Addressing the loss and degradation of migratory bird habitat and strengthening regional and other partnerships to achieve bird conservation are two of the top three current priorities of the Service's Migratory Bird Program (U.S. Fish and Wildlife Service, 2004a).

c. Interjurisdictional Fisheries

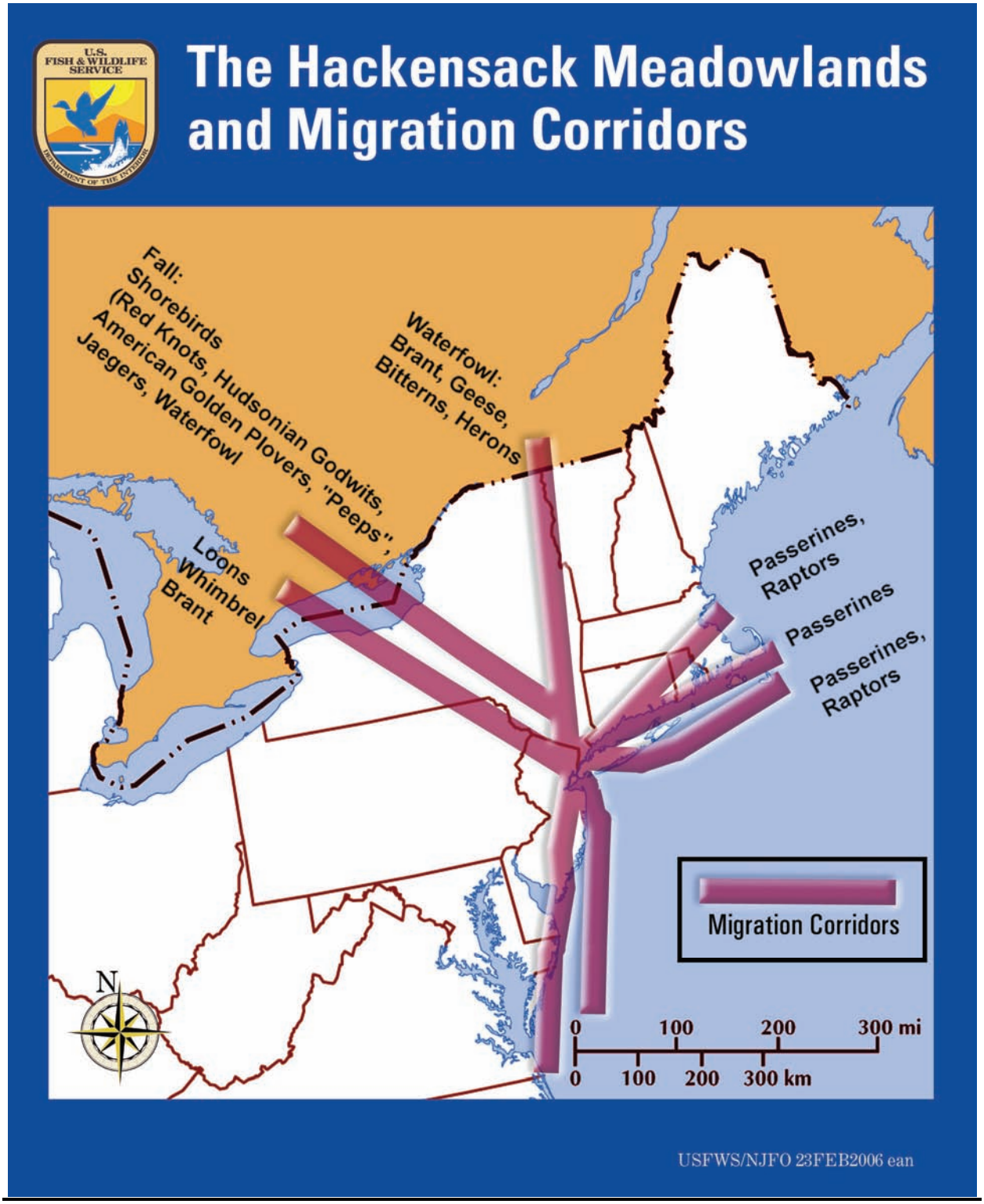
Interjurisdictional fisheries pertain to fishes that traverse state boundaries (*e.g.*, striped bass). In coastal waters, organizations such as the Atlantic States Marine Fisheries Commission were created by Congress to address interstate fisheries issues. Through the Fish and Wildlife Management assistance program, the Service works across state borders to provide a national perspective as well as technical support and coordination services to interstate fisheries commissions. Specifically, the Service participates in stock assessments, research, habitat evaluation and management, and information sharing. With respect to fish species, the Service's focus is on federal trust species, which in this case include species that cross state and national borders or are federally listed under the ESA. Programs that benefit interjurisdictional or listed species benefit other aquatic resources as well. With the Service as a partner, interstate commissions and other interjurisdictional organizations can develop programs for large-scale restoration, conservation, and management of aquatic resources. Development of such programs has the potential to expand the Service's fisheries activities in the HRW. The Service's fisheries program has historically included mussels (*e.g.*, triangle floater [*Alasmidonta undulata*], dwarf wedgemussel; Figure 5) and fishes (*e.g.*, shortnose sturgeon) that are now federally or State listed (New Jersey Department of Environmental Protection, 2004a). Migratory fishes are also protected under the Magnuson-Stevens Fishery Conservation and Management Act, which is administered by the NMFS (see Appendix A).

d. Superfund National Priorities List Sites (Impacts to Native Fish and Wildlife Populations)

The Superfund Program, administered by the EPA under the CERCLA (see Appendix A), seeks to remediate sites where toxic and hazardous wastes have been deposited or spilled. The National Priorities List (NPL) identifies sites that warrant further investigation to assess the nature and extent of the public health and environmental risks associated with the site and to determine what CERCLA-financed remedial action(s), if any, may be appropriate (*Federal Register*, Volume 54, No. 223, November 21, 1989; EPA Rules and Regulations, National

Figure 3. A map of Bird Conservation Regions developed by the North American Bird Conservation Initiative. The juncture of three bird conservation regions (#28: Appalachian Mountains; #29: Piedmont; and #30: New England-Mid Atlantic Coast) near the Hackensack Meadowlands contributes to its diversity of migratory birds. Different management plans for Bird Species of Conservation Concern have been developed for these conservation regions by the Service and its partners.

Figure 4. Major bird migration routes through the Hackensack Meadowlands. New Jersey's latitude, geography, and habitat suitability make it a critical area for bird migration.



Priorities List for Uncontrolled Hazardous Waste Sites; 40 CFR Part 300). Via involvement with the EPA's Biological Technical Assistance Group, the Service's Division of Environmental Quality provides technical assistance in the form of information, data, and guidance to the EPA to ensure that site remediation protects federal trust fish and wildlife resources. The responsibilities of the Service and EPA are often complementary and provide for the protection of human health and safety, and of fish and wildlife resources. The EPA primarily addresses human health and safety and generally does not address off-site contamination of natural resources (*e.g.*, wetland sediments); however, EPA actions do provide some indirect benefits to fish and wildlife resources. The Service's priorities include both on and off-site contaminant impacts and concentrate on the protection of fish, wildlife, and their habitats within contaminated areas. Under CERCLA, the Service also has a role as a trustee for natural resources and thus is authorized to assess and recover damages for injury to, destruction of, or loss of natural resources. Compensation for injuries is accomplished through the Department of the Interior's Natural Resources Damage Assessment and Restoration Program.

Figure 5. Federally and State-listed freshwater mussel species that have historically occurred in the Hackensack River watershed. The dwarf wedgemussel (*Alasmidonta heterodon*, upper photos) is federally and State-listed as endangered. The triangle floater (*Alasmidonta undulata,* lower photos) is State-listed as endangered.

Photos courtesy of the North Carolina Wildlife Resources Commission

e. Invasive Species (Impacts to Native Fish and Wildlife Populations)

Human activities have introduced exotic (*i.e.*, non-native) species into many ecosystems throughout the U.S. and other parts of the world. Under suitable conditions, some exotic species proliferate and spread rapidly, displacing and destroying dominant and highly valued native species. Such *invasive* species often cause considerable destruction to natural ecosystems, communities, and native species and may have diverse adverse impacts upon human health and the economy. For example, the invasive form of common reed (*Phragmites australis* Haplotype M) has displaced other typical marsh plants (*e.g.*, saltmarsh bulrush [*Scirpus robustus]*; Marks *et al.*, 1994; Meyerson *et al.*, 2000) and created a monoculture (Saltonstall, 2002; Figure 6) that differs substantially from the native communities that once characterized the Meadowlands.

The Service is one of many federal and state agencies regionally and nationally working to reduce the spread and impacts of exotic species on native fish and wildlife populations. Increasingly, the Service's activities are being planned and coordinated through the Invasive Species Council (*e.g.*, development of the Chesapeake Bay-wide Management Plan to control common reed; Chesapeake Bay *Phragmites australis* Working Group, 2003). The Service implements programs on and off Service lands to: (a) prevent species introductions (*e.g.*, law enforcement, NWR management, public education), (b) provide biological, chemical and mechanical control of species already introduced (*e.g.*, *Galerucella* beetles for purple loosestrife; glyphosate application for common reed), and (c) restore disturbed and degraded habitats to prevent future introduction and proliferation of exotic species (see U.S. Fish and Wildlife Service, 2004b for an overview of Service concerns and activities regarding invasive species in New Jersey). The Service's *Partners for Fish and Wildlife* program includes habitat restoration efforts to control the spread of invasive species. The National Wildlife Refuge System Improvement Act (P.L. 105-57; 111 Stat. 1253) provides the Service with the authority to control invasive species on NWR lands, whereas the 1981 amendments of the Lacey Act (95 Stat. 1073; 16 U.S.C. 3371-3378) empower the Service to block pathways of invasive species into the United States.

E. SPECIFIC SERVICE ACTIVITIES IN THE MEADOWLANDS

1. Federal Permit Review Program

Pursuant to the FWCA, the Service coordinates with other federal agencies regarding water and associated land resource projects that require a federal license or permit or are under review for federal funding. The federal authorities that apply to activities in the tidal waters and wetlands of the Hackensack Meadowlands are Section 10 of the Rivers and Harbors Appropriation Act of 1899 and Section 404 of the CWA of 1977 (33 U.S.C. 1344 *et seq*.; see Appendix A).

2. Special Area Management Plan and Related Activities

In 1972, the recently formed HMDC introduced its first Master Plan, which called for filling nearly half of the wetlands in the Meadowlands District for development. The Master Plan was not in compliance with the CWA, which happened to be passed that year. Conflicts arose

Figure 6. Two plant species with different population trajectories in the Meadowlands. Saltmarsh bulrush (*Scirpus maritimus*, upper photo), is uncommon throughout the Meadowlands and is State-listed as endangered. Common reed (*Phragmites australis*, a monotypic stand on lower left; diagram of stalk, flower, seed head, and rhizome on lower right) is an invasive species that has spread throughout the Meadowlands.

frequently between land-use planners within the Meadowlands District and various agencies (including the Service) that reviewed permit applications for projects in wetlands. Coordination among federal and State agencies, project sponsors, and the public grew increasingly controversial with each federal permit application requiring wetlands fill. Compounding the controversy was the fact that these proposed projects were non water-dependent, suggesting that upland alternatives were available. Water dependency is specifically emphasized in the CWA Section 404(b)(1) Guidelines (40 CFR 230), which provide the guidance for evaluating and granting CWA Section 404 permits.

a. Advanced Identification

In 1987, the Corps' New York District, EPA's Region II, and the NJMC began a joint study (the "Advanced Identification" or AVID) to guide the use of dredged and other fill material in the Meadowlands. The Service's New Jersey Field Office (NJFO) and other agencies later participated in the study. Using a modified Wetland Evaluation Technique (Adamus *et al.*, 1987), the AVID assigned 7,622 acres of the District's wetlands to one of three categories: generally unsuitable for fill (88 percent, 6,823 ac), potentially suitable for fill (2 to 3 percent, 122 ac), and indeterminate (9 percent, 677 ac; U.S. Environmental Protection Agency, 1992). Although the AVID provided a useful tool for regulatory decision-making, increasing development pressures continued to exacerbate the inconsistencies between the Master Plan and the CWA. The AVID was conducted in part as a prelude to developing a Special Area Management Plan (SAMP) for the Hackensack Meadowlands.

b. Special Area Management Plan

Pursuant to satisfying a former desideratum for development in the Meadowlands and in an effort to rectify perceived inconsistencies with the federal Section 10/404 permit program, the HMDC included the formulation of a SAMP under a Memorandum of Agreement (MOA) between the Corps, EPA, and NOAA in the 1988 revision of its Master Plan. The Service declined to sign the MOA because the agreement would have restricted the Service's ability to participate effectively in evaluating the impacts of wetland loss on fish and wildlife resources. The Coastal Zone Management Improvement Act of 1980 defines a SAMP as a "comprehensive plan providing for natural resource protection and reasonable coastal-dependent economic growth, containing a detailed and comprehensive statement of policies, standards and criteria to guide public and private uses of lands and waters; and mechanisms for timely implementation in specific geographical areas within the coastal zone."

The SAMP's sponsors prepared a draft Environmental Impact Statement (EIS), which eventually addressed seven different land-use scenarios and their impacts. Initially, the SAMP promoted the filling of nearly 1,200 acres of wetlands; later versions reduced the filling to 850 acres and then to approximately 480 acres. Throughout those different versions of the SAMP, the Service continually expressed serious concerns about the extensive filling of wetlands, which was inconsistent with the AVID determinations as well as the intent of the CWA. In its final (1999) proposed form, the SAMP would have "streamlined" federal and State permitting processes, but would have endorsed further degradation and fragmentation of the remaining habitats of the

Hackensack Meadowlands, though to a lesser extent than proposed in earlier versions of the SAMP. The SAMP was abandoned by its sponsors in 2001. A final EIS was never produced.

c. Wildlife Management Plan for the Hackensack Meadowlands

Prior to the abandonment of the SAMP, the Service's review of the SAMP draft EIS cited lack of an inclusive plan to manage fish and wildlife resources. Thus, the SAMP sponsors and the Service agreed to develop an interagency plan, with the Service as lead agency. Although generic and simplified, the resulting *Wildlife Management Plan* (U.S. Fish and Wildlife Service *et al.*, 2000) identified the priority fish and wildlife resources and the diversity of vegetative and aquatic communities that occur in the Hackensack Meadowlands. Some goals and objectives that were identified in the WMP (*e.g.*, retain large contiguous blocks of vegetated areas, eliminate barriers to the movement of fish and wildlife) were clearly inconsistent with land-use activities promoted by the SAMP (*e.g.*, 10 major filling projects that would have further fragmented the Meadowlands). The WMP also emphasized the diverse commitment needed for long-term protection and management of the Meadowlands ecosystem and its priority resources.

3. Meadowlands Interagency Mitigation Advisory Committee

The Meadowlands Interagency Mitigation Advisory Committee (MIMAC) was established by the Interagency Compensatory Wetland Mitigation Agreement for the Hackensack Meadowlands District in August 1997 as an outgrowth of the aforementioned Meadowlands SAMP. Membership of the MIMAC is comprised of the Service, EPA, Corps, NMFS, New Jersey Department of Environmental Protection (NJDEP), and NJMC. The original 1997 agreement identified important wetlands functions, stated the MIMAC's intended compliance with federal and State authorities and policies (*e.g.*, CZMA, CWA Section 404, New Jersey Water Pollution Control Act [N.J.S.A. 58:10A-1 *et seq*.]), established the duties and responsibilities of the MIMAC members, and provided general guidelines and application requirements for the location, development, and use of wetland mitigation sites and banks. The MIMAC was established to ensure appropriate use of any mitigation bank by approving the use of a mitigation bank only when it had been demonstrated that "…there is no practicable alternative to construction in a wetland and all practicable measures to avoid and minimize impacts to wetlands have been incorporated in the project."

The MIMAC members have worked collaboratively over the years to improve assessment of Meadowlands wetlands and consistency in their mitigation requirements. The MIMAC initiated and participated in developing a *Guidebook for Hydrogeomorphic Assessment of Tidal Fringe Wetlands in the Meadowlands* (Louis Berger Group, Inc., 2004a) to provide a standardized method for assessing the hydrologic, biogeochemical, plant habitat, and animal habitat functions of wetlands in the Meadowlands. The Service is an active member of the MIMAC.

4. New York-New Jersey Harbor Estuary Program

Congress established the National Estuary Program in the CWA's 1987 amendments (33 U.S.C. Section 1330, as amended; P.L. 107-303) to develop comprehensive management plans for estuaries of national significance that are threatened by development, pollution, or overuse. In

1988, the NY-NJ Harbor Estuary, which includes the Meadowlands, was designated an "Estuary of National Significance" and the NY-NJ Harbor Estuary Program (HEP; Harbor Estuary Program, 2005a) was established as one of 28 National Estuary Programs (U.S. Environmental Protection Agency, 2004a). The resulting Comprehensive Conservation and Management Plan (CCMP), developed as a product of the HEP, was intended to serve as a blueprint for managing the Harbor Estuary and the New York Bight (Harbor Estuary Program, 1996). The CCMP includes many components: (1) a monitoring plan; (2) intermediate actions and long-term strategies designed to protect, restore, and enhance fish and wildlife habitats; (3) guidance for developing strategies to prevent pollution and reduce inputs of toxins, pathogens, excess nutrients, and floatable debris into the Harbor Estuary; (4) a mechanism to address changes to the dredge material management plans for the NY-NJ Harbor; (5) policy, management, and implementation components; and (6) an estimate of costs for CCMP activities (Harbor Estuary Program, 1996). Information exchange and coordination between the HEP and the NJMC was limited initially but has increased in the last few years.

5. Significant Habitats and Habitat Complexes of the New York Bight Watershed

The Service's Southern New England-New York Bight Coastal Ecosystems Program, in cooperation with the Harbor Estuary Program, produced *Significant Habitats and Habitat Complexes of the New York Bight Watershed* (U.S. Fish and Wildlife Service, 1996a), an extensive ecological assessment focused on identification and description of essential habitats of terrestrial, coastal, and marine species inhabiting the New York Bight watershed, a region which includes the Hackensack Meadowlands. Species distributions and other information, together with background information on the region's geology, hydrology, physiography, and land use were graphically integrated to portray species occurrences in relation to landscape and other features. These analyses of species distributions within the New York Bight resulted in identification of 35 "Regionally Significant Habitat Complexes," including the Hackensack Meadowlands. Fish and wildlife resources, together with general threats and conservation considerations, were then addressed for each complex. This comprehensive assessment was intended to guide ecologically sound land-use decisions and land protection efforts, and emphasized the need for specific conservation measures to protect and restore the identified habitat complexes and their fish and wildlife resources. It was one of the first federal reports to document the extraordinary significance of the Meadowlands to fish and wildlife resources in the Northeast and the threats to its continued existence and function, and to promote its long-term protection and management.

6. Stakeholder Work Sessions (2000-2005) and the Meadowlands Symposium (2003)

During 2000 and 2001, three stakeholder work sessions were conducted by the Service to build stakeholder partnerships and develop strategies to protect and restore habitats in the Meadowlands. The first session (October 17, 2000), hosted by the Service's Northeast Regional Director, was requested by a number of major conservation groups to address options for protection of the Meadowlands, including the Service's interests in and the feasibility of establishing a National Wildlife Refuge. During the second work session (May 23, 2001), representatives of 20 non-governmental organizations (NGOs), the New Jersey Division of Fish and Wildlife (NJDFW), and the Service identified several action items: (1) forming a

subcommittee to investigate development of a conservation trust to receive and retain funds for land acquisition, (2) identifying priority sites to preserve via purchase or conservation easement, (3) promoting legislation that will set aside brownfields as open space, and (4) addressing contaminated site remediation. The third session (October 31, 2001) included Congressional, federal and State agency, National Fish and Wildlife Foundation (NFWF), and NGO representatives. The purpose of this session was to foster collaboration for acquisition, restoration, and management, and strengthen partnerships. A summary of the three stakeholder work sessions is presented in the NJFO's Hackensack Meadowlands Issue of *Field Notes* (U.S. Fish and Wildlife Service, 2002b). A fourth session (June 13, 2005) was co-sponsored by the Service, Corps, NJMC, NJDFW, and the NFWF. The following objectives, established for the fourth session, were achieved: (1) update participants regarding on-the-ground activities as well as conservation planning efforts by various stakeholders; (2) introduce the Service's technical-assistance efforts, including preliminary conservation planning, for the Meadowlands; (3) discuss opportunities and strategies for integrating fish and wildlife conservation into long-term planning and (4) promote the remediation, restoration, protection, and management of the Meadowlands ecosystem.

The Meadowlands Symposium, held on October 9-10, 2003 at the NJMC facilities in Lyndhurst, was a scientific meeting focused exclusively on the Meadowlands and sponsored by Hudsonia, Ltd. (a regional NGO), the Meadowlands Environmental Research Institute (MERI), the Corps, and the Service. Proceedings from this conference have been published online (Brooklyn Botanic Garden, 2004a).

7. A Vision Plan for Fish and Wildlife Resources of the Hackensack Meadowlands (2002)

The NJDFW and the Service (2002) jointly developed a *Vision Plan* for the fish and wildlife resources of the Hackensack Meadowlands (see Appendix B). This plan listed six goals (***e.g.***, improve conditions for all native plant, fish, and wildlife species) and six tasks (***e.g.***, prioritize sites and begin protecting lands either through fee title or conservation easements) to be accomplished. The *Vision Plan* represented an important initial collaboration of the NJDFW and the Service on the restoration and future management of the Hackensack Meadowlands.

8. Ecological Vision Plan for the New York-New Jersey Harbor Estuary (2003)

The Service's Hudson River-New York Bight Ecosystem Team, a regional coordination effort, elucidated its vision for the entire Harbor Estuary in its *Ecological Vision Plan* (U.S. Fish and Wildlife Service, 2003a): ***a healthy, functioning ecosystem that can sustain diverse and viable populations of indigenous plant and animal species to produce maximum benefits for federal trust fish and wildlife resources and ultimately the public.*** For the six major aquatic complexes previously identified (U.S. Fish and Wildlife Service, 1996a) in the NY-NJ Harbor Estuary, the *Ecological Vision Plan* identified the major fish and wildlife populations and their habitats; threats and conservation concerns; and conservation goals, objectives, and strategies.

9. Federal Project Planning, Including the Hackensack Meadowlands Ecosystem Restoration Study

Pursuant to the FWCA, the Service coordinates with other federal agencies regarding potential impacts of proposed federal projects to fish and wildlife resources and their supporting ecosystems. For example, the Service has provided recommendations to the Corps on how to avoid and minimize adverse impacts of various harbor dredging projects to fish and wildlife resources (*e.g.*, U.S. Fish and Wildlife Service, 2003b).

Currently, the Service is advising the Corps on its Hackensack Meadowlands Ecosystem Restoration Study, which is one component of the Hudson Raritan Estuary (HRE) Restoration project (U.S. Army Corps of Engineers, 2003a; 2004a). By providing a source of federal funds and serving as the nexus for the participation of other federal agencies, the Corps project is envisioned to be one of, if not the principal, restoration efforts in the Hackensack Meadowlands. The project's local sponsor is the NJMC, which is already involved in restoration of other sites within the Meadowlands. The Reconnaissance Phase for the HRE Restoration project, including the Meadowlands, began in January 2000; the Project Management Plan for the Meadowlands Restoration was completed in April 2003 (U.S. Army Corps of Engineers, 2003a). Due to budget limitations, the Feasibility Study currently includes detailed plans for restoration of only one site and preliminary planning for three additional high-priority sites. To date, at the Corps' request, the Service (2005a; 2005b) has provided the Corps with reports that include recommendations for remediation and restoration of specific sites or for the Meadowlands overall.

10. Designation of the Hackensack Meadowlands as a Regional Resource Priority

The Hackensack Meadowlands has been designated as a "Regional Resource Priority" in the Service's Northeast Region. A Regional Resource Priority distinguishes a resource issue and locale that has regional importance for sustaining and safeguarding federal trust fish and wildlife resources. The Service's Northeast Regional Director designated the Meadowlands a Regional Resource Priority in August 2004 after touring the Meadowlands and meeting with other Service personnel, State biologists, and other stakeholder representatives. Designation of the Meadowlands as a Regional Resource Priority indicates that the Service's Northeast Region has recognized the regional significance of the Hackensack Meadowlands and will undertake all reasonable measures to facilitate the protection of the Meadowlands ecosystem. The designation also emphasizes a long-term commitment to protect the Meadowlands and elevates opportunities to fund monitoring, assessment, management, and other actions; however, the designation does not allocate specific funding for the Meadowlands.

F. PROLOGUE

The Service has a long history of involvement in the Meadowlands, as well as a commitment to protect this area's fish and wildlife resources. As will be illustrated in the following section, while efforts to protect the Meadowlands go back several decades, the Meadowlands has an even longer history of human use, misuse, and abuse. Perhaps more than any other locale in New

Jersey, the Meadowlands is the harbinger of the Nation's environmental challenges—a bellwether that if we do not take care of our resources now, we will pay even greater costs, financially and socially, in the future. In his book on the Meadowlands, John Quinn (1997) stated it eloquently:

> And so, here it is, in these urban fields of sun and grass, that the probable environmental future of humankind—in all its overwhelming ugliness, yet stark and haunting beauty—may be glimpsed . . . .

The Service accepts the many challenges of the Meadowlands as an opportunity to fulfill its Mission of *working with others to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people*. The Hackensack Meadowlands, though not without difficult challenges, offers a unique opportunity for all stakeholders, fish and wildlife resources, and the American people.