Eastern Shore of Virginia and Fisherman Island
National Wildlife Refuges
5003 Hallet Circle
Cape Charles, Virginia 23310

Federal Relay Service
for the deaf and hard-of-hearing
1 800/877 8339

U.S. Fish & Wildlife Service
http://www.fws.gov

For Refuge Information
1 800/344 WILD

March 2003

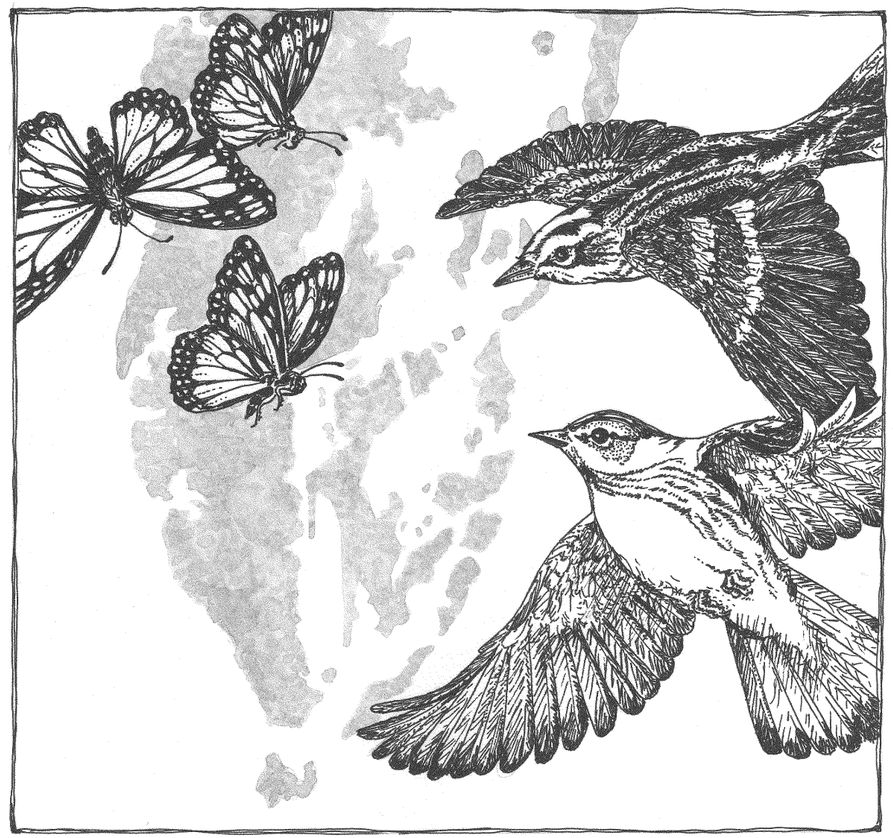
Draft Comprehensive Conservation Plan and Environmental Assessment

Eastern Shore of Virginia and Fisherman Island National Wildlife Refuges

U.S. Fish & Wildlife Service

Eastern Shore of Virginia and Fisherman Island National Wildlife Refuges

Draft Comprehensive Conservation Plan and Environmental Assessment
March 2003



Cover Photo: Drawing of Warblers and Monarch Butterflies
Margaret Barnaby

This goose, designed by J.N. "Ding" Darling, has become a symbol of the National Wildlife Refuge System.

The *U.S. Fish and Wildlife Service* is the principal federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people. The Service manages the 93-million acre National Wildlife Refuge system comprised of more than 535 national wildlife refuges and thousands of waterfowl production areas. It also operates 65 national fish hatcheries and 78 ecological services field stations. The agency enforces federal wildlife laws, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, administers the Endangered Species Act, and helps foreign governments with their conservation efforts. It also oversees the Federal Aid Program which distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state wildlife agencies.

Comprehensive Conservation Plans provide long term guidance for management decisions and set forth goals, objectives, and strategies needed to accomplish refuge purposes and identify the Service's best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

U.S. Fish and Wildlife Service

Eastern Shore of Virginia and Fisherman Island National Wildlife Refuges

Draft Comprehensive Conservation Plan and Environmental Assessment

Vision Statement

Lying at the tip of the Delmarva Peninsula, the Eastern Shore of Virginia and Fisherman Island National Wildlife Refuges are part of a national system of lands managed to ensure the future of wildlife and their habitats. These refuges serve as one of the country's most valuable stopovers for migratory birds. Nestled between the Atlantic Ocean and Chesapeake Bay, the refuges include a variety of habitats such as maritime forest, shrub thickets, grasslands, beaches and tidal wetlands. These habitats provide a vital link for millions of songbirds, raptors, shorebirds and butterflies to rest and refuel before continuing the rigorous journey to their wintering grounds.

Future conservation efforts lie in the refuges' commitment to protecting and enhancing the migration corridor through preserving, acquiring and revegetating hardwood, shrub and grassland areas. Alliances with nearby landowners will increase available habitat, and research will focus on augmenting our knowledge to make biologically sound management decisions.

The thousands of people that annually visit this gateway to the eastern shore of Virginia will gain an appreciation of the refuges' unique ecological role. In partnership with the local community, the refuges will also promote the area as a regional tourist destination that contributes to the economic stability and enhances the quality of life on the eastern shore of Virginia. Visitors will leave with an understanding that this place of incredible diversity and ecological importance is part of a larger network of protected lands within the National Wildlife Refuge System, set aside specifically for wildlife.

U.S. Fish and Wildlife Service
Northeast Regional Office
300 Westgate Center Drive
Hadley, MA 01035

March 2003

Abstract

Type of Action:	Administrative - Development of a Comprehensive Conservation Plan
Location:	Eastern Shore of Virginia and Fisherman Island National Wildlife Refuges, Northampton County, Virginia
Lead Agency:	U.S. Fish and Wildlife Service
Responsible Official:	Richard O. Bennett, Ph.D., Acting Regional Director
For Further Information:	Beth Goldstein, Planning Team Leader Northeast Regional Office 300 Westgate Center Drive Hadley, MA 01035 (413) 253-8564

We fully describe, evaluate and compare four alternative comprehensive conservation plans in this Draft Comprehensive Conservation Plan/Environmental Assessment (Draft CCP/EA) for Eastern Shore of Virginia and Fisherman Island National Wildlife Refuges. Following is a brief overview of each alternative:

Alternative A: This alternative is our No Action alternative required by the National Environmental Policy Act (NEPA) regulations. Selection of this alternative would maintain the status quo; there would be no change to current management practices. Alternative A provides a baseline for comparing and contrasting the other three alternatives.

Alternative B: This alternative represents the Service's Proposed Action, or the alternative currently recommended for approval. Selecting this alternative would expand the Eastern Shore of Virginia Refuge's current land acquisition boundary to include an additional 6,030 acres. Alternative B would increase protection and management of endangered, threatened and other species of concern. This alternative would also increase opportunities for all wildlife-dependent recreational opportunities. Under Alternative B, the refuge would focus management efforts on protecting, restoring, and enhancing habitats for forest and shrub-dependent neotropical and temperate migratory birds.

Alternative C: Similar to Alternative B, this alternative would also expand the Eastern Shore of Virginia Refuge's current land acquisition boundary to include an additional 6,030 acres. Alternative C would also increase protection and management of endangered, threatened and other species of concern. However, the refuge would focus management efforts on protecting, restoring, and enhancing habitat for grassland and open habitat-dependent neotropical and temperate migrant birds. This alternative proposes to expand all wildlife-dependent recreational opportunities except hunting.

Alternative D: Under Alternative D, the refuge would focus management efforts on maintaining and restoring the natural dynamics of the ecosystems of the lower Delmarva Peninsula. Off-refuge land conservation efforts would focus on preservation and/or restoration of the historic vegetative regimes. There is no specified land acquisition proposal in this alternative. Alternative D would not expand hunting or fishing opportunities on the refuges, though it would expand all other wildlife-dependent recreational opportunities.

This Draft CCP/EA also includes 11 Appendices which provide additional information supporting our analysis.

Readers Guide

The U.S. Fish and Wildlife Service planning process for all National Wildlife Refuges involves generally two levels of planning: 1) the development of a broad Comprehensive Conservation Plan (CCP); and, 2) the formulation of more step-down detailed management plans required to fully implement the CCP. Public involvement and compliance with the National Environmental Protection Act (NEPA) have been incorporated into the process at all appropriate stages.

This Draft Environmental Assessment provides NEPA compliance for the future management of the Eastern Shore of Virginia and Fisherman Island National Wildlife Refuges. Following the release of our final NEPA decision document (a Finding of No Signifigant Impact [FONSI] in the case of an environmental assessment) we will release the final CCP for the refuges. The CCP will consist of information currently found in the following sections of this document:

- Chapter 1: Purpose of and Need for Action
- Chapter 2: Alternatives
- Chapter 3: Affected Environment
- Chapter 4: Environmental Consequences
- Chapter 5: Consultation and Coordination with Others
- Appendices
- Maps

The final approved CCP will provide the vision and strategic direction for the Eastern Shore of Virginia and Fisherman Island National Wildlife Refuges. When fully implemented, the CCP will help achieve the refuges purpose, fufill the National Wildlife Refuge System Mission, maintain and/or restore the biological integrity, diversity, and environmental health of the refuges, and meet other mandates. The CCP will also guide management decisions and set forth goals, objectives, and strategies to accomplish these ends. We may also require step-down management plans to provide additional details about CCP goals, objectives, and strategies, and to describe schedules for implementation. The CCP will be based on the principles of sound fish and wildlife management, available science, legal mandates, and other policies, guidelines, and planning documents. It will, above all else, ensure wildlife comes first on the refuges.

For further information on our planning process, please refer to part 602 of the Fish and Wildlife Service Manual, National Wildlife Refuge System Planning.

Table of Contents

Appendices

Maps

Chapter 1

Pelican colony.
Mike R. Bryant

Purpose of and Need for Action

- Introduction
- Purpose of and Need for Action
- Decisions to be Made
- Planning Area
- National and Regional Mandates Guiding the Project
- Other Legal and Policy Guidelines
- CCP Planning Process

Introduction

The purpose of Chapter 1 is to:

Describe the Planning Area;

Describe the need for a Comprehensive Conservation Plan (CCP) for the Eastern Shore of Virginia National Wildlife Refuge (Eastern Shore of Virginia Refuge) and Fisherman Island National Wildlife Refuge (Fisherman Island Refuge);

Identify the National, regional and State plans, guidelines and mandates that influenced this project;

Highlight the purposes for which the refuges were established;

Explain the planning process used for developing this CCP.

The information provided in this Chapter sets the stage for Chapters 2 through 5. Chapter 2 describes alternative strategies for meeting goals and objectives and compares them to current management strategies. Chapter 3 describes the existing physical, biological, and human environment. Chapter 4 evaluates the environmental consequences of implementing each of the proposed management alternatives. Chapter 5 discusses the consultation and coordination process that took place during the project, and provides a list of preparers.

Purpose of and Need for Action

The purpose of this document is to evaluate a reasonable range of alternative management strategies for the refuges. Each alternative was generated with the potential to be fully developed into a CCP. Our intent in this document is to clearly and accurately display the predicted social, economic, physical, and biological impacts of implementing each alternative, as required by the National Environmental Policy Act of 1969 (NEPA). From this analysis, the U.S. Fish and Wildlife Service's (Service) Regional Director will select an alternative to be fully developed into a separate, stand-alone CCP for the refuges.

The CCP is vital to the future management of the Eastern Shore of Virginia and Fisherman Island Refuges. The final CCP will provide strategic management direction over the next 10-15 years by serving to:

Provide a clear statement of the desired future conditions for habitat, wildlife, facilities, and people;

Provide neighbors, visitors, and partners with a clear understanding of the reasons for management actions on and around the refuges;

Hiker on trail.
USFWS photo

Ensure management of the refuges reflects the policies and goals of the National Wildlife Refuge System (Refuge System);

Ensure the compatibility of current and future uses of the refuges;

Provide long-term continuity and direction in management;

Provide a basis for staffing, operations, maintenance, and the development of budget requests.

The need to develop a CCP for each of the refuges is two-fold. First, the National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act) requires all National Wildlife Refuges to have a CCP in place by 2012 to help fulfill the mission of the Refuge System. Second, there is currently no master plan establishing priorities and ensuring consistent and integrated management for the refuges. A vision statement, goals, objectives, and management strategies are needed to effectively manage natural resources. Persistent issues related to structures on the refuges, access to and through the refuges, and habitat management must be resolved with public and partner involvement. Finally, there is a need to establish formal acquisition boundaries to delineate additional lands to be acquired. This would ensure the long-term protection of nationally significant migratory bird resources.

Decisions to be Made

Based on the analysis documented in this Draft Comprehensive Conservation Plan/Environmental Assessment (Draft CCP/EA), the Regional Director of the U.S. Fish and Wildlife Service (Service) will select a preferred alternative to be fully developed into a CCP for the refuges. Selection of the preferred alternative will be made based on an evaluation of the Service's mission, the purposes for which the refuges were established, legal mandates, and response to this Draft CCP/EA. In accordance with NEPA, the Service's Regional Director must also determine whether the selected management alternative will have a significant impact on the quality of the human environment. If there is a significant impact, additional analysis will be required in an Environmental Impact Statement (EIS). If there is no significant impact, we will issue a Finding of No Significant Impact (FONSI), and implementation of the preferred alternative can begin immediately.

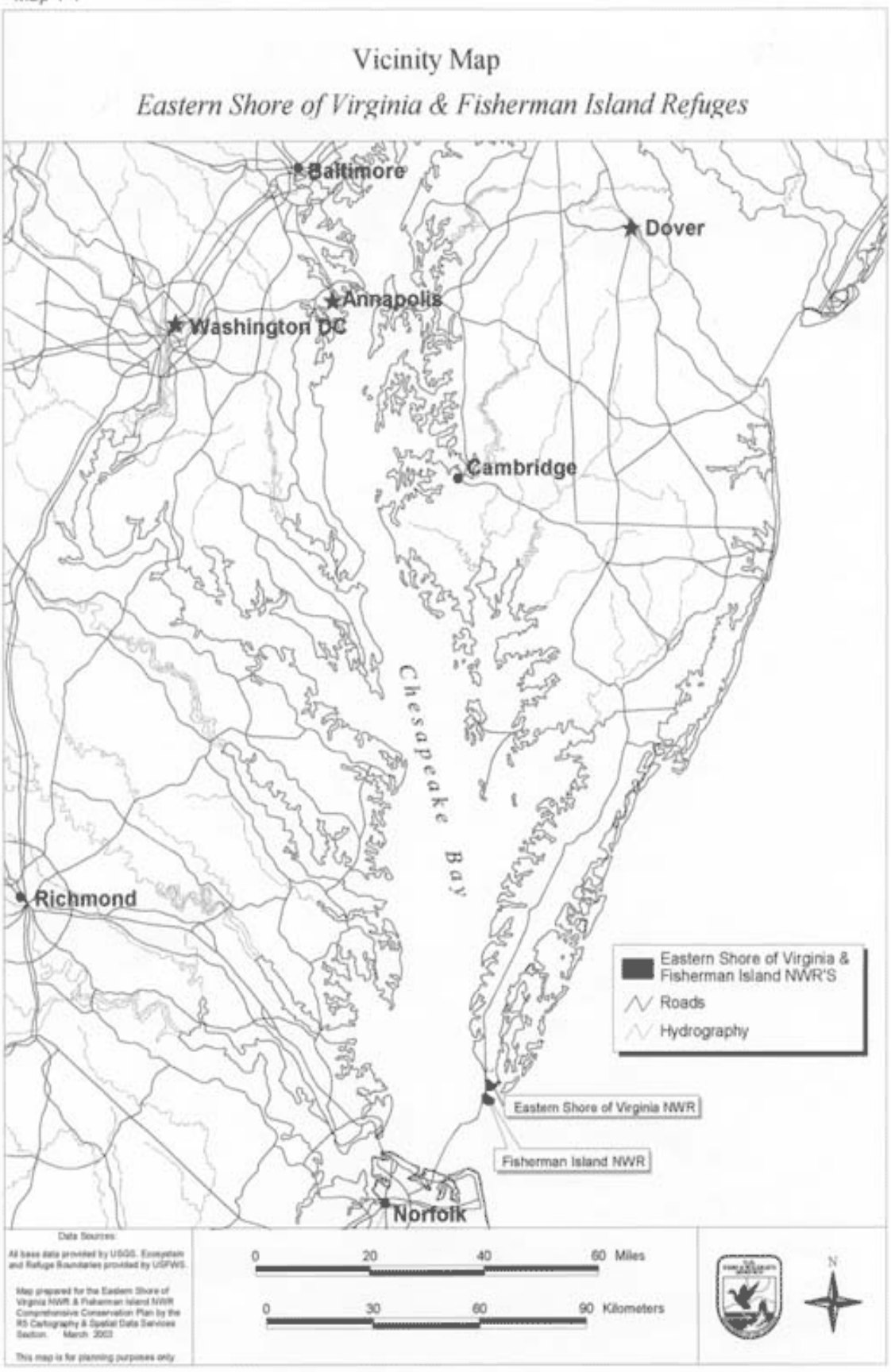
Planning Area

This Draft CCP/EA covers the Eastern Shore of Virginia and Fisherman Island National Wildlife Refuges (refuges) (see Map 1-1).

Eastern Shore of Virginia National Wildlife Refuge

The Eastern Shore of Virginia Refuge consists of 1,120 acres. Of that total acreage, 1,019 acres are located at the southern tip of the

Map 1-1


Vicinity Map
Eastern Shore of Virginia & Fisherman Island Refuges
Baltimore
Dover
Annapolis
Washington DC
Cambridge
Chesapeake Bay
Richmond
Norfolk
Eastern Shore of Virginia & Fisherman Island NWR'S
Roads
Hydrography
Eastern Shore of Virginia NWR
Fisherman Island NWR
Data Sources:
All base data provided by USGS. Ecosystem and Refuge Boundaries provided by USFWS.
Map prepared for the Eastern Shore of Virginia NWR & Fisherman Island NWR Comprehensive Conservation Plan by the R5 Cartography & Spatial Data Services Section. March 2003
This map is for planning purposes only
0 20 40 60 Miles
0 30 60 90 Kilometers
N

1-4

Delmarva Peninsula in Northampton County, Virginia, at the mouth of the Chesapeake Bay (see Map 1-2). The remaining 108 acres are located on Skidmore Island, which lies one mile east of the mainland. The refuge was created in 1984, when 180 acres were transferred to the Service from the U.S. Air Force through the General Services Administration.

The Eastern Shore of Virginia Refuge contains a variety of habitats, such as maritime forest, myrtle and bayberry thickets, grassland, fresh and brackish ponds, tidal salt marsh and beach. The refuge and its adjoining woodlands are regarded as one of the most important migratory bird corridors along the East Coast, comparable to the better known Cape May, New Jersey. This importance stems from the fact that the Delmarva Peninsula acts as a geographic funnel for migratory birds in the fall. It is on the Eastern Shore of Virginia Refuge where millions of migratory birds rest and feed until favorable winds blow to assist them in crossing the Chesapeake Bay.

Fisherman Island National Wildlife Refuge

Fisherman Island is the southernmost barrier island. It is separated from the Eastern Shore of Virginia Refuge by approximately one-half mile of sea called Fisherman's Inlet (see Map 1-3). Accretion continues to expand the island's size, currently estimated at 1,850 acres. Fisherman Island Refuge was established in 1969, and transferred to the Department of the Interior by 1973. It was managed as an unstaffed satellite of Back Bay National Wildlife Refuge until 1984, when management was turned over to the newly established Eastern Shore of Virginia Refuge. The last 25 acres, owned by the U.S. Department of Defense, were transferred to the Department of the Interior in 2000, putting the entire island under one ownership.

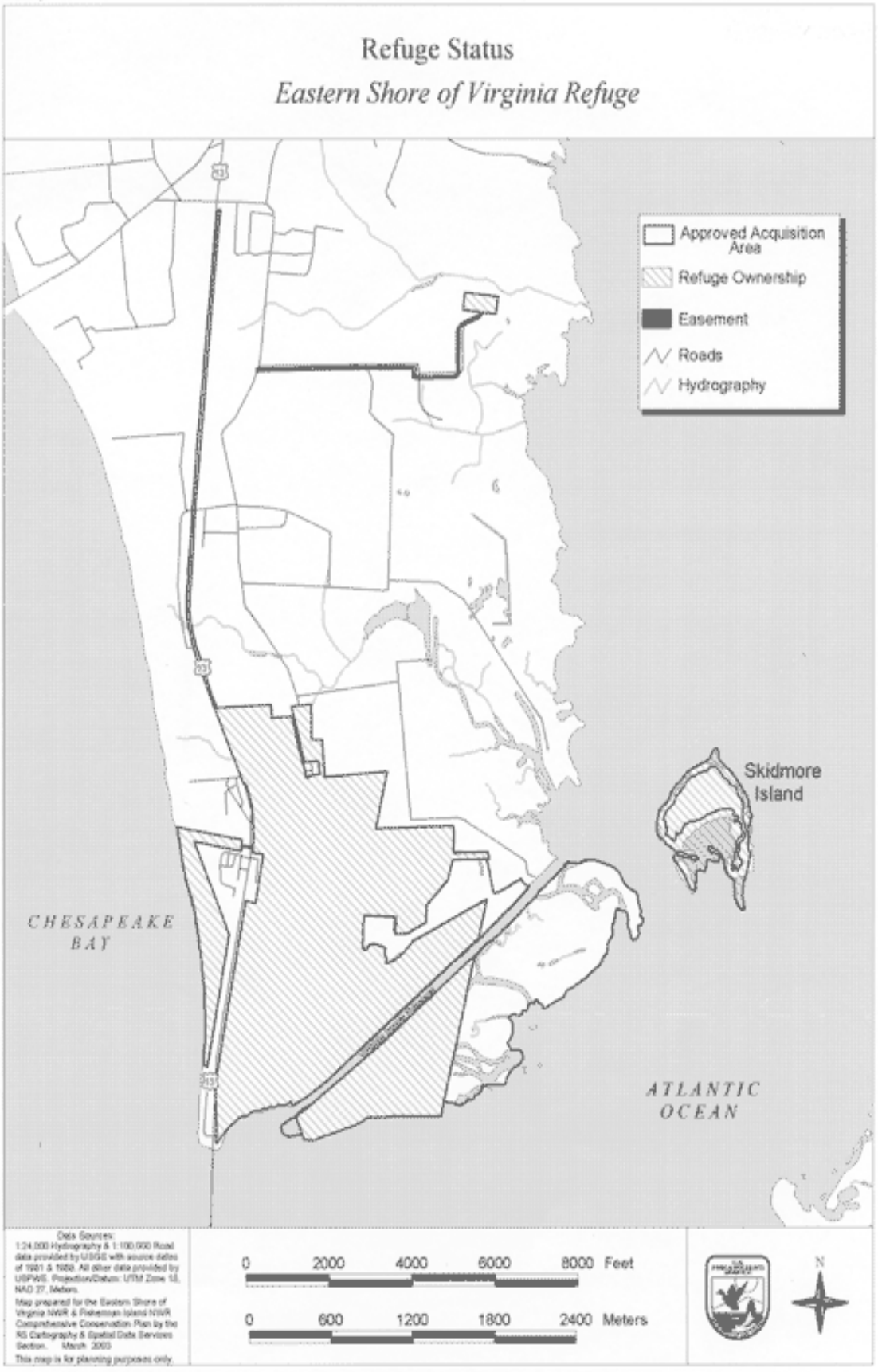
Hardwood Forest.
Kurt Buhlmann

Habitat succession has formed a mosaic of vegetative communities capable of withstanding the harsh conditions present on the island. The variety of habitats combined with the geographic location of the island, the accessibility of food, protective shrub and thicket cover, and minimal human disturbance make this island an important stopover location for migratory birds. Fisherman Island, however, is not undisturbed. The Chesapeake Bay Bridge-Tunnel (Bridge-Tunnel), which links mainland Virginia to the eastern shore, cuts through the western part of the island.

Establishing Legislation

Refuges are established administratively under several authorities or they can be established with specific legislation by Congress. The Eastern Shore of Virginia Refuge was established administratively through the following general legislative authorities:

Map 1-2


Refuge Status
Eastern Shore of Virginia Refuge
Approved Acquisition Area
Refuge Ownership
Easement
Roads
Hydrography
Skidmore Island
CHESAPEAKE BAY
ATLANTIC OCEAN
Data Sources:
1:24,000 Hydrography & 1:100,000 Road data provided by USGS with source dates of 1991 & 1999. All other data provided by USFWS. Projection/Datum: UTM Zone 18, NAD 27, Meters.
Map prepared for the Eastern Shore of Virginia NWR & Fisherman Island NWR Comprehensive Conservation Plan by the RS Cartography & Spatial Data Services Section. March 2003.
This map is for planning purposes only.
0 2000 4000 6000 8000 Feet
0 600 1200 1800 2400 Meters
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1-6

Map 1-3


Refuge Status
Fisherman Island Refuge
To Cape Charles, VA
CHESAPEAKE BAY
Refuge Ownership
Easement for Highway
Roads
Hydrography
13
13
To Virginia Beach, VA
ATLANTIC OCEAN
Data Sources:
1:24,000 Hydrography & 1:100,000 Road data provided by USGS with source dates of 1991 & 1999. All other data provided by USFWS. Projection/Datum: UTM Zone 18, NAD 27, Meters.
Map prepared for the Eastern Shore of Virginia NWR & Fisherman Island NWR Comprehensive Conservation Plan by the R5 Cartography & Spatial Data Services Section. March 2003
This map is for planning purposes only.
0 1000 2000 3000 4000 Feet
0 300 600 900 1200 Meters
N

1-7

Transfer of Certain Real Property for Wildlife Conservation Purposes Act (16 U.S.C. 667b-667d): "authorizing land to be transferred without reimbursement to the Secretary of the Interior if the land has particular value for migratory birds."

Refuge Recreation Act (16 U.S.C. 460k-460k-4): "authorizing acquisition of lands and interests suitable for: 1) fish and wildlife-oriented recreation, 2) protection of natural resources, and 3) conservation of endangered or threatened species..."

Migratory Bird Conservation Act (16 U.S.C. 715-715d, 715e, 715f-715r): authorizing the acquisition of land "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

Fisherman Island Refuge was established administratively through the following legislation:

Transfer of Certain Real Property for Wildlife Conservation Purposes Act (16 U.S.C. 667b-667d): "authorizing land to be transferred without reimbursement to the Secretary of the Interior if the land has particular value for migratory birds."

Migratory Bird Conservation Act (16 U.S.C. 715-715d, 715e, 715f-715r): authorizing the acquisition of land "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

National and Regional Mandates Guiding the Project

This section presents hierarchically, from the national level to the local level, highlights of legal mandates, Service policy, and existing resource plans which directly influenced development of this Draft CCP/EA.

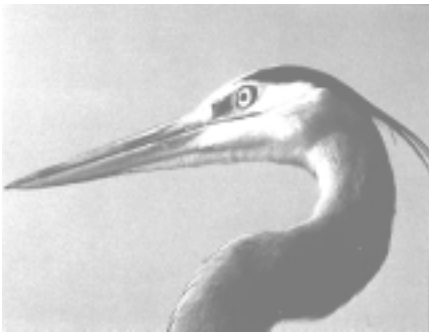
Canoeing.
USFWS photo

U .S. Fish and Wildlife Service and its Mission

National Wildlife Refuges are managed by the Service, part of the Department of Interior. The mission of the Service is:

> *"...working with others, to conserve, protect and enhance fish and wildlife and their habitats for the continuing benefit of the American people."*

National resources entrusted to the Service for conservation and protection are: migratory birds, endangered species, interjurisdictional fish, wetlands, and certain marine mammals. The Service manages the Refuge System and National Fish Hatcheries, enforces federal wildlife laws and international treaties on importing and exporting wildlife, assists with state fish and wildlife programs, and helps other countries develop wildlife conservation programs.



Great blue heron.
USFWS photo

The National Wildlife Refuge System and its Mission

The Refuge System is the world's largest collection of lands set aside specifically for the conservation of wildlife and ecosystem protection. The Refuge System began in 1903, when President Theodore Roosevelt designated three-acre Pelican Island, a pelican and heron rookery in Florida, as a bird sanctuary. Today there are more than 535 National Wildlife Refuges occurring in every state and a few U.S. Territories, totaling more than 93 million acres nationwide. Over 34 million visitors annually hunt, fish, observe and photograph wildlife, and participate in environmental education and interpretive activities on refuges.

In 1997, the National Wildlife Refuge System Improvement Act was passed. This legislation established a unifying mission for the Refuge System, a new process for determining compatible public use activities on refuges, and the requirement to prepare CCPs for each refuge. The Refuge Improvement Act states that first and foremost, the Refuge System must focus on wildlife conservation. It further states that the national mission, coupled with the purpose(s) for which each refuge was established, will provide the principal management direction for each refuge.

The mission of the Refuge System is:

"*...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.*" (National Wildlife Refuge System Improvement Act of 1997, Public Law 105-57)

The Refuge Improvement Act identifies six wildlife-dependent public uses -- hunting, fishing, wildlife observation and photography, environmental education and interpretation -- that should be facilitated on National Wildlife Refuges and shall receive priority consideration in the CCP process. The Act also declares that all existing or proposed refuge uses must be "compatible" with the purposes of the refuge and the mission of the system. The refuge manager determines if an existing or proposed refuge use is compatible by ensuring the use does not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the refuge.

Other Legal and Policy Guidelines

While the Refuge System mission and the purposes for which each refuge was established provide the foundation for management, National Wildlife Refuges are also governed by other Federal laws, Executive Orders, treaties, interstate compacts, regulations and conservation initiatives pertaining to the conservation and protection of natural and cultural resources. Appendix B provides a summary

of some of the more important Federal laws, mandates and other guiding documents related to management of National Wildlife Refuges. Listed below are the ones most pertinent to this CCP.

The U.S. Fish and Wildlife Refuge System Manual and the National Wildlife Refuge System Manual contain Service policies providing guidance on planning and the day-to-day management of a refuge.

Fulfilling the Promise

A 1999 report, entitled "Fulfilling the Promise, The National Wildlife Refuge System: Visions for Wildlife, Habitat, People and Leadership" (USFWS 1999a), is a culmination of a year-long process by teams of Service employees to evaluate the Refuge System nation-wide. This report was the focus of the first ever, National Refuge System Conference held in Keystone, Colorado in October 1998, and attended by almost every refuge manager, other Service employees, and leading conservation organizations. The report contains 42 recommendations packaged with three vision statements dealing with wildlife and habitat, people, and leadership. This Draft CCP/EA deals with all three of these major topics, and we have looked to the recommendations in the document for guidance throughout the plan. For example, the "Fulfilling the Promises" document specifically recommends developing systematic species and habitat monitoring. Across all the alternatives in the CCP, we enforce the need to conduct standardized Region 5 surveys and to use peer-reviewed protocol to collect baseline and trend data on plants and animals located on the Eastern Shore of Virginia and Fisherman Island Refuges. The 1999 report also recommends forging new alliances through citizen and community partnerships, and strengthening partnerships with the business community. One of our goals in the CCP is devoted almost entirely to partnerships, and most of the other goals include at least some objectives and/or strategies which direct the refuge to forge new partnerships or strengthen existing ones.

North American Waterfowl Management Plan

The North American Waterfowl Management Plan (NAWMP), signed by the United States and Canada in 1986 and by Mexico in 1994, offers a strategy to protect North America's remaining wetlands and to conserve waterfowl populations through habitat protection, restoration, and enhancement (USFWS 1988). The plan was updated in 1998 with an emphasis on strengthening the biological foundation, using a landscape approach and expanding partnerships. Implementation of this plan is accomplished at the regional level within 11 regional habitat "Joint Venture" areas. Partnerships involve Federal, state and provincial governments, tribal nations, local businesses, conservation organizations, and individual citizens for the purpose of protecting habitat within Joint Venture Areas. The Eastern Shore of Virginia and Fisherman Island Refuges are located within the Atlantic Coast Joint Venture

Salt marsh.
USFWS photo

area, which covers the entirety of the Atlantic Coast states and Puerto Rico. The goal for the Atlantic Coast Joint Venture is to "Protect and manage priority wetland habitats for migration, wintering, and production of waterfowl, with special consideration to black ducks, and to benefit other wildlife in the joint venture area."

Virginia's eastern shore is one of 10 focus areas identified in the Joint Venture Plan for the State of Virginia. Priority habitats include tidal brackish high marsh bordering the eastern side of the Chesapeake Bay. Those marshes support populations of migrating, wintering and nesting black ducks. Other dabbling ducks use the area during migration and wintering, as do Canada Geese. Associated wetlands are valuable to numerous species of finfish and shellfish as nursery and production areas. The Joint Venture Plan identifies a total of 57,575 acres in Virginia for protection and 2,825 acres for enhancement. Of that total, almost 8,000 acres in Accomack County (just north of the refuge) are slated either for protection or enhancement.

The Atlantic Coast Joint Venture Plan is being revised to reflect the expanded geographic area and vision of the Joint Venture area. The revised plan will have a stronger scientific basis for habitat and population goals. Focus areas have been revised in cooperation with state partners. These focus areas are based on important waterfowl areas but also take into account the needs of other migratory birds. Eastern Shore of Virginia and Fisherman Island Refuges are both within the Delmarva Peninsula Focus Area. Information from the Atlantic Coast Joint Venture Plan will be integrated with information from the other major migratory bird initiatives - Partners in Flight, U.S. Shorebird Conservation Plan, and North American Waterbird Conservation Plan - in the seven Bird Conservation Regions in the Joint Venture area. Those seven Bird Conservation Regions from north to south are Atlantic Northern Forest, Lower Great Lakes - St. Lawrence, New England - Mid Atlantic, Appalachian Mountains, Piedmont, South Atlantic Coastal Plain, and Peninsular Florida. The full revised implementation plan should be available in 2003.

Partners in Flight: Mid-Atlantic Coastal Plain Bird Conservation Plan (Physiographic Area #44)

The Partners in Flight (PIF) Program has developed a draft plan for the Mid-Atlantic Coastal Plain Physiographic Area (USFWS 1999b). The challenge, says the plan, is managing human population growth while maintaining functional natural ecosystems. To meet this challenge, the plan identifies priority land bird species and habitat types, and recommends specific objectives aimed at protecting those species and their breeding habitats. We use the components of this plan as one of the guidelines in directing bird management on the Eastern Shore of Virginia and Fisherman Island Refuges. The plan ranks species conservation importance within a regional area based on a variety of factors including global threats to

the species, high concern for regional or local populations, or responsibility for conserving large or important populations of the species. Examples of high conservation priority species on Fisherman Island include the seaside sparrow, prairie warbler, clapper rail, and American black duck. The Eastern Shore of Virginia Refuge provides breeding habitat for high priority species such as prairie warblers, northern bobwhite, eastern towhee, field sparrow and yellow-billed cuckoo. Our planning objectives and strategies were devised to benefit breeding populations of these species in conjunction with migrant habitat objectives whenever possible.

The PIF draft plan also ranks habitats based on overall conservation priority. Six of the eight habitat types identified in the plan are found currently or historically on the Eastern Shore of Virginia or Fisherman Island Refuges. Those six habitat types are barrier and bay islands, salt marsh, forested wetland, mixed upland forest, early successional, and fresh/brackish emergent wetland.

U.S. Shorebird Conservation Plan

The United States Shorebird Conservation Plan (Brown, et al. 2001) was developed as a partnership between various Federal, state and non-governmental organizations with the purpose of creating conservation goals, identifying critical habitat conservation needs and promoting education and outreach programs to facilitate shorebird conservation. The plan has set goals at the hemispheric, national and regional levels. At the regional scale, the Eastern Shore of Virginia and Fisherman Island Refuges fall into the North Atlantic planning region. Undeveloped wetlands and beaches are rare in this region, causing those habitats to be especially important. Species of concern in the region with a high conservation priority for either breeding, migrating or wintering include piping plover, American oystercatcher, sanderling, whimbrel and American woodcock. Proposed strategies in the CCP, such as increased monitoring on Fisherman Island Refuge, address the need to protect these and other high priority shorebird species identified in the U.S. Shorebird Conservation Plan.

Interns banding royal terns.
USFWS photo

The Neotropical Migratory Songbird Coastal Corridor Study

Repeated accounts of population declines for many neotropical migratory songbird species have sparked widespread concern that has given way to national and international conservation initiatives (Mabey et al., 1993). Although research and protection efforts have largely focused on fragmentation and loss of breeding and wintering habitats, migratory stopover habitats like the southern tip of the Delmarva Peninsula are in need of comparable attention. Migration is a physiological stressful cycle in avian life, when all resources take on added significance.

In fall 1991, the Neotropical Migratory Songbird Coastal Corridor Study (Mabey et al., 1993) examined the distribution and habitat associations of fall migrating landbirds within the coastal regions of four states along the Atlantic Coast - New Jersey, Delaware, Maryland and Virginia. Together, these states make up the Cape May and Delmarva Peninsulas, two areas known for their significant contribution to migratory bird stopover habitat. The study identified clear distribution patterns associated with neotropical migrants, suggesting migrants are more abundant in areas close to coastlines (within 0-0.9 miles) than they are in equivalent areas farther away from the coast, and that bay coastal zones have higher densities of migrants than seaside coastal zones or interior regions. This study was crucial in our decision to choose Alternative B as our Preferred Alternative, since that Alternative focuses on providing neotropical migrants with food and cover habitat on the lower Delmarva Peninsula. We also relied heavily on this study to formulate our land protection strategies in the CCP as well as in the Land Protection Plan, included as an appendix to this CCP.

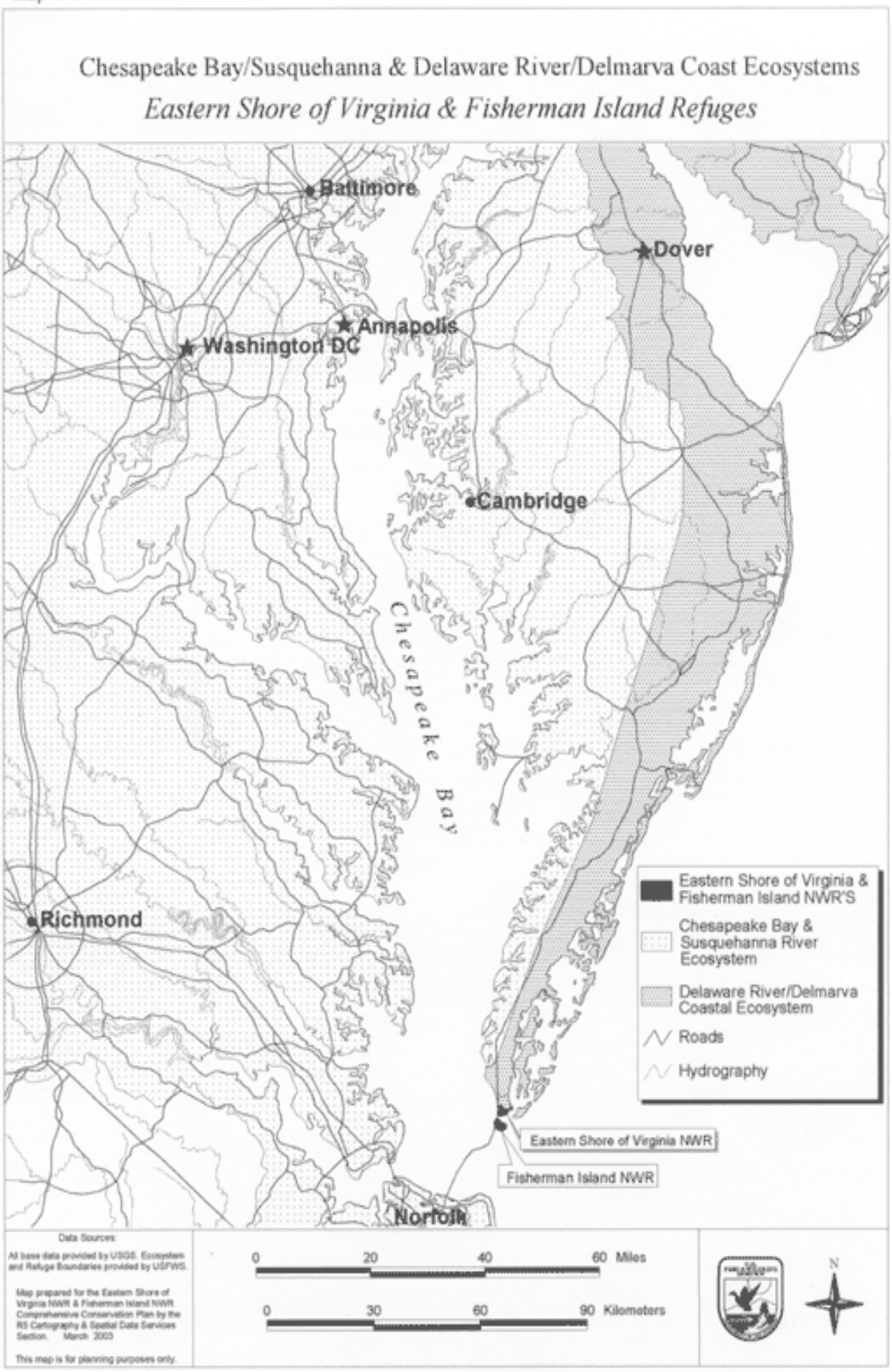
The Ecosystem Approach to Fish and Wildlife Conservation

Throughout the last decade, the Service has placed more emphasis on focusing habitat and wildlife protection on entire ecosystems. To this end, the Service has initiated new partnerships with private landowners, state and Federal agencies, corporations, conservation groups and volunteers. Implementing an ecosystem approach to management is a top national priority for the Service. To further this priority, 52 Ecosystem Teams were formed across the country, typically using large river watersheds to define ecosystems. Individual Ecosystem Teams are comprised of Service professionals and partners who work together to develop goals and priorities for research and management.

The Eastern Shore of Virginia and Fisherman Island Refuges are contained within two ecosystems - the Delaware River/Delmarva Coastal Area and the Chesapeake Bay/Susquehanna River Watershed (See Map 1-4). The Delaware River/Delmarva Coastal Area encompasses more than 16,000 square miles within six states. It includes all areas draining into the Delaware River or the Delaware Bay and all areas draining into the Atlantic Ocean between Cape Henlopen, Delaware and Cape Charles, Virginia, where the Eastern Shore of Virginia Refuge is located. The Delaware River is the last free-flowing major river on the East Coast, and the barrier island system from Assateague Island to Fisherman Island is the largest remaining undeveloped barrier island system along the Atlantic coast.

The Delaware River/Delmarva Coastal Watershed Team developed a plan (USFWS 1996a) based on a set of “Resource Priorities,” or goals, reflecting concern for priority species or groups of species, habitat types of significance to Service trust resources, and

Map 1-4


Chesapeake Bay/Susquehanna & Delaware River/Delmarva Coast Ecosystems
Eastern Shore of Virginia & Fisherman Island Refuges
Baltimore
Dover
Annapolis
Washington DC
Cambridge
Chesapeake Bay
Richmond
Norfolk
Eastern Shore of Virginia & Fisherman Island NWR'S
Chesapeake Bay & Susquehanna River Ecosystem
Delaware River/Delmarva Coastal Ecosystem
Roads
Hydrography
Eastern Shore of Virginia NWR
Fisherman Island NWR
Data Sources:
All base data provided by USGS. Ecosystem and Refuge Boundaries provided by USFWS.
Map prepared for the Eastern Shore of Virginia NWR & Fisherman Island NWR Comprehensive Conservation Plan by the R5 Cartography & Spatial Data Services Section. March 2003
This map is for planning purposes only.
0 20 40 60 Miles
0 30 60 90 Kilometers
N

1-14

geographic focus areas within the ecosystem. Those Resource Priorities are:

Migratory Birds: Protect, restore, and enhance migratory bird habitats and populations, with emphasis on the coastal migration corridor.

Wetlands: Protect, restore, and enhance wetland habitats, with emphasis on Service-owned wetlands and other areas of exceptional values.

Interior Forests: Preserve, manage, and prevent further fragmentation of forest habitats suitable for migratory birds, threatened and endangered species, and other interior forest wildlife.

Endangered and Threatened Species: Protect and enhance populations of threatened, endangered, and candidate species and their habitats.

Interjurisdictional Fish: Protect and enhance populations of interjurisdictional fish and their habitats.

Service-owned lands: Protect, restore, and manage trust resources on Service-owned lands.

The Ecosystem team drafted numerous actions necessary to achieve the above Resource Priorities. Many of those actions directly involve Eastern Shore of Virginia Refuge. For example, one of the actions supporting Resource Priority 1 is to protect key migration stopover areas for migratory birds, with an emphasis on the Eastern Shore of Virginia and Cape May, New Jersey. These two areas function together as critical migration habitat on the mid-Atlantic Coast.

Oystercatcher with young.
USFWS photo

The second ecosystem in which Eastern Shore of Virginia Refuge and Fisherman Island Refuge are contained is the Chesapeake Bay/ Susquehanna River Watershed. This area spans a basin of 64,000 square miles, encompassing portions of Delaware, Maryland, Pennsylvania, New York, Virginia, West Virginia and the District of Columbia. Waters from this expansive landscape flow into the largest estuary in the United States.

Similar to the Delaware River/Delmarva Coastal Watershed Team's plan, the Chesapeake Bay/Susquehanna River Ecosystem Team's 1997 plan (USFWS 1997a) contains goals directed towards migratory birds, wetlands, endangered and threatened species, interjurisdictional fisheries and land protection. The Chesapeake Bay/Susquehanna River Ecosystem Team also included water quality and environmental contaminants as issues to address in its plan.

Regional Wetland Concept Plan B Emergency Wetlands Resource Act, Northeast Region

In 1986, Congress enacted the Emergency Wetlands Resources Act to promote the conservation of our nation's wetlands. The Act directed the Department of the Interior to develop a National Wetlands Priority Conservation Plan identifying the location and types of wetlands that should receive priority attention for acquisition by Federal and state agencies using Land and Water Conservation Fund appropriations. In 1990, the Service's Northeast Region completed a Regional Wetlands Concept Plan (USFWS 1990) to provide more specific information about wetlands resources in the Northeast. The Regional Plan identifies 850 wetland sites that warrant consideration for acquisition. It also identifies wetland values, functions, and potential threats for each site. There are 205 wetland sites for the state of Virginia, four of which are located either on one of the refuges or within our proposed expanded boundary. Those four sites are Butlers Bluff (50 acres), Fisherman Island (1,500 acres), Magothy Bay (1,600 acres), and Plantation Creek (700 acres).

Northeastern beach tiger beetle (*Cincindela dorsalis dorsalis*) Recovery Plan

The Northeastern beach tiger beetle *(Cincindela dorsalis dorsalis)*, a Federal listed species, has been recorded on the Chesapeake Bay side of the Eastern Shore of Virginia Refuge since 1989. The most recent survey (Knisley and Hill, 1999) of the tiger beetle on Virginia's Eastern Shore found 62 adults on the refuge and 18 on a private beach abutting the refuge's property to the north. The refuge, however, has never had enough adult tiger beetles to warrant a larval survey. That survey would determine whether the refuge's tiger beetle population is a breeding population. We include strategies for conducting adult and larval surveys in Chapter 2.

We will follow the management goals and strategies laid out in the Northeastern beach tiger beetle Recovery Plan (USFWS 1994a) to guide actions related to the tiger beetle population on Eastern Shore of Virginia Refuge. The primary objective of this Recovery Plan is to remove the tiger beetle from the Federal List of Endangered and Threatened Wildlife and Plants. Recovery will require reestablishing and protecting viable populations of the species across its former range along the Atlantic Coast -- from Cape Cod to central New Jersey -- and permanently protecting viable populations along Chesapeake Bay beaches in Maryland and Virginia. Despite an increase in the number of known populations in the Chesapeake Bay area, the tiger beetle population there is by no means secure. Few sites are protected and many are threatened by human impacts such as habitat alteration and recreational activities.

Other Recovery Plans

Piping Plover

The Federal listed piping plover (*Charadrius melodus*) was last recorded during the breeding season on Fisherman Island Refuge in 1992. Refuge records show plovers occurred in low numbers (1-3 pair) between 1979 and 1992 except for 1982, 1986, 1987 and 1989, when no breeding birds were recorded. Refuge staff and researchers regularly observed modest numbers (up to six at one time) of feeding plovers during 2002 spring surveys on Fisherman Island Refuge, and sightings of plovers feeding on Eastern Shore of Virginia Refuge have occurred. Reasons for absence of recent nesting activity may include the sparse and declining numbers of breeding birds in this portion of the species' range, sub-optimal (but moderately suitable) habitat, and deterrence of plover courtship activities by roosting herring and great black-backed gulls. Should plovers be found breeding on either refuge, we would implement recommended protection measures from the Revised Recovery Plan (USFWS 1996b).

Seabeach amaranth

Seabeach amaranth was Federally listed as threatened in 1993 by the U.S. Fish and Wildlife Service. The amaranth is native to the barrier islands beaches of the Atlantic Coast. An annual plant, this species appears to need extensive areas of barrier island beaches and inlets, functioning in a relatively natural and dynamic manner, allowing it to move around in the landscape, occupying suitable habitat as it becomes available (USFWS 1996c). It often grows in the same areas selected for nesting by shorebirds such as plovers, terns and skimmers. Threats include beach stabilization efforts (particularly the use of beach armoring, such as sea walls and riprap), intensive recreational use and herbivory by webworms.

Birdwatchers.
USFWS photo

Seabeach amaranth has historically occured in Northampton County. Since Fisherman Island provides habitat for shorebirds, it is also a potential host for seabeach amaranth. In the CCP, we propose strategies for conducting seabeach amaranth surveys on Fisherman Island, and for protecting the plant if discovered.

Delmarva Fox Squirrel

The Eastern Shore of Virginia Refuge is located in the historic range of the Federal listed Delmarva fox squirrel (*Sciurus niger cinereus)*. No fox squirrels are located on the refuge now, and the Delmarva Fox Squirrel Recovery Team has no specific plans to translocate the squirrel to the refuge. However, the Recovery Team is currently involved in discussions regarding if and to where the fox squirrel should be translocated, and the refuge could be a potential site. Generally, fox squirrel thrive in mixed deciduous-coniferous forest with larger overstory trees, higher densities of soft mast-

producing hardwoods, and lower densities of pine (USFWS 1993a). Habitat management strategies in the Proposed Action of the CCP are conducive to those fox squirrel habitat needs. However, it is questionable that the refuge has enough suitable habitat to support a viable fox squirrel population. Other concerns are that the introduced individuals would be genetically isolated on the refuge and probably would not remain a viable population in the long term. Much of the land adjacent to the refuge is inhospitable (i.e. agricultural fields); thus, emigrating fox squirrels would have reduced survivorship. In addition, the grey squirrel population on the refuge would cause inter-specific competition which could decrease the fox squirrels' chance of survival.

Bald Eagle

Although there are currently no bald eagles (*Haliaeetus leucocephalus*) on either refuge, there are active eagle nesting territories within the CCP's proposed expansion area. We would follow the goals and strategies of Recovery Plans if and when eagles occur on refuge lands.

Peregrine Falcons

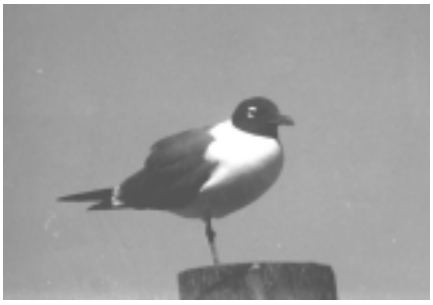
There has been one nesting pair of peregrine falcons *(Falco peregrinus*) on Fisherman Island Refuge in recent years. Although this species was delisted in 1999, we will still look to the Recovery Plan for that species for guidance on ways in which to sustain and increase the number of nesting peregrine falcons on the refuge.

State Recovery Plans

Currently, there are no known recovery plans for State listed species. However, should any such recovery plans become available, we would use them whenever practible to manage State-listed species found on the refuges.

CCP Planning Process

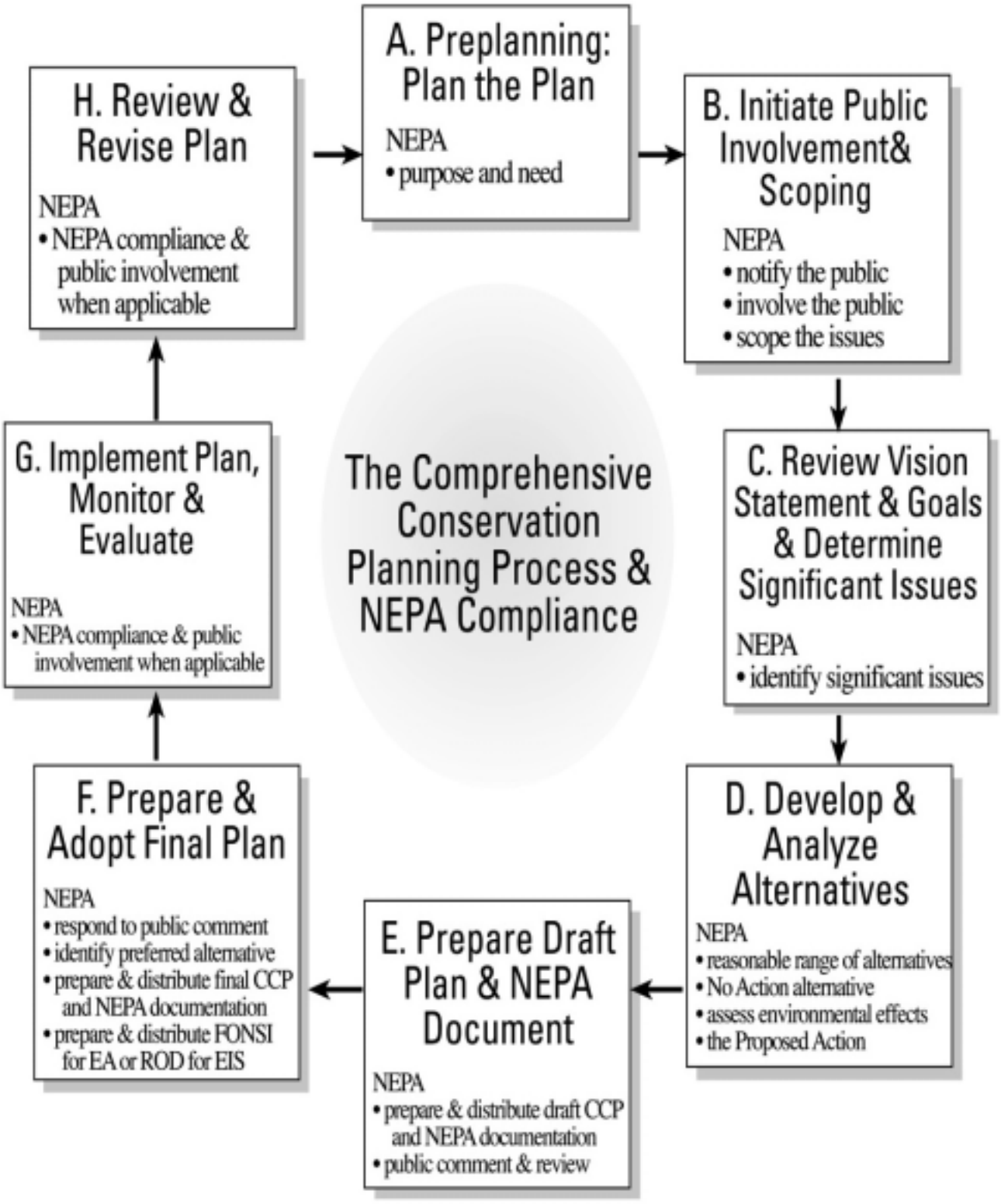
Writing the Plan



Laughing gull.
James Cameron

The CCP is meant to give overall guidance for the protection, use and development of the Eastern Shore of Virginia and Fisherman Island Refuges over the next 10-15 years. NEPA, meanwhile, ensures the Service will also assess the environmental impacts of any actions taken as a result of implementing the CCP. Figure 1-1 describes how the CCP process and the NEPA process have been integrated in this document.

The planning process for the Eastern Shore of Virginia and Fisherman Island Refuges began in March 1999. It was then that the core planning team - consisting of field staff, staff from the Service's Northeast Regional Office, and staff from the Service's


A. Preplanning: Plan the Plan
NEPA
• purpose and need
B. Initiate Public Involvement& Scoping
NEPA
• notify the public
• involve the public
• scope the issues
C. Review Vision Statement & Goals & Determine Significant Issues
NEPA
• identify significant issues
D. Develop & Analyze Alternatives
NEPA
• reasonable range of alternatives
• No Action alternative
• assess environmental effects
• the Proposed Action
E. Prepare Draft Plan & NEPA Document
NEPA
• prepare & distribute draft CCP and NEPA documentation
• public comment & review
F. Prepare & Adopt Final Plan
NEPA
• respond to public comment
• identify preferred alternative
• prepare & distribute final CCP and NEPA documentation
• prepare & distribute FONSI for EA or ROD for EIS
G. Implement Plan, Monitor & Evaluate
NEPA
• NEPA compliance & public involvement when applicable
H. Review & Revise Plan
NEPA
• NEPA compliance & public involvement when applicable
The Comprehensive Conservation Planning Process & NEPA Compliance

Washington Office - began the process of identifying the vision, goals and issues for the refuges. Separate meetings were held to seek input from local and regional biological experts on natural resources.

We compiled a mailing list of more than 900 people made up of diverse individuals and groups including adjacent landowners, sportsmens groups, environmental organizations, State fish and wildlife agencies, local businesses, and other interested and affected people. In August 1999, a newsletter was sent to everyone on the mailing list explaining the CCP process and identifying current issues on the refuges. The newsletter contained a workbook insert that included questions to help collect the public's ideas, concerns, and suggestions on important issues associated with managing the Eastern Shore of Virginia and Fisherman Island Refuges. More than 80 workbooks were completed and returned with responses to the questions.

Three open houses and public information meetings were held on August 24, 25 and 26 in Virginia Beach, Cape Charles and Melfa, Virginia, respectively. Between five and 15 people attended each meeting. Meetings were advertised locally through news releases, paid advertisements, radio broadcasts, and through our mailing list. Each meeting consisted of an "open house" session where people could informally learn of the project and have their questions or concerns addressed. The evening public information meeting sessions usually included a slide show presentation of the refuges, a brief review of the Refuge System and the planning process, and a question and answer session. Participants were encouraged to actively express their opinions and suggestions.

We distributed another newsletter in November 1999 summarizing public comments from the workbook and from public meetings. The planning team held a series of workshops in November 1999 and January 2000 to discuss with partners issues of habitat management and public use, among other things. Individuals and groups participating in the workshops included adjacent landowners, State fish and wildlife agencies, local businesses and other interested and affected people.

Once we firmed up the vision, goal statements and issue statements for the refuges, we created a strategy for alternatives development using the goal statements. This process lasted through December 2000. Finally, we looked at the environmental consequences of each alternative.

After a 45-day public review of this Draft CCP/EA, we will compile and respond to the comments. A decision document will then be issued identifying the preferred alternative. Our response to the public comments will be documented. As required under NEPA, the Service needs to determine whether the preferred alternative supports a Finding of No Significant Impact (FONSI). If no

significant impact is predicted, implementation of the preferred alternative can begin immediately. An evaluation of plan accomplishments will occur each year.

Piping Plover.
USFWS photo

Refuge Vision

The following vision statement was developed by the planning team in order to describe the desired future status of the Eastern Shore of Virginia and Fisherman Island Refuges:

Lying at the tip of the Delmarva Peninsula, the Eastern Shore of Virginia and Fisherman Island National Wildlife Refuges are part of a national system of lands managed to ensure the future of wildlife and their habitats. These refuges serve as one of the country's most valuable stopovers for migratory birds. Nestled between the Atlantic Ocean and Chesapeake Bay, the refuges include a variety of habitats such as maritime forest, shrub thickets, grasslands, beaches and tidal wetlands. These habitats provide a vital link for millions of songbirds, raptors, shorebirds and butterflies to rest and refuel before continuing the rigorous journey to their wintering grounds.

Future conservation efforts lie in the refuges' commitment to protecting and enhancing the migration corridor through preserving, acquiring and revegetating hardwood, shrub and grassland areas. Alliances with nearby landowners will increase available habitat, and research will focus on augmenting our knowledge to make biologically sound management decisions. The thousands of people who annually visit this gateway to the eastern shore of Virginia will gain an appreciation of the refuges' unique ecological role. In partnership with the local community, the refuges will also promote the area as a regional tourist destination that contributes to the economic stability and enhances the quality of life on the eastern shore of Virginia. Visitors will leave with an understanding that this place of incredible diversity and ecological importance is part of a larger network of protected lands within the National Wildlife Refuge System, set aside specifically for wildlife.

Refuge Goals

We have developed the following goals for the Eastern Shore of Virginia and Fisherman Island Refuges. These goals highlight specific elements of our vision statement which will be emphasized in future management. The goals are not in order of priority.

1. Increase the availability of forage and cover habitat for neotropical and temperate migrant birds and migrating monarch butterflies.

2. Maintain the long-term productivity, integrity, and function of the marsh, beach and interdunal communities.

3. Actively participate in the conservation of healthy hardwood, understory, and grassland habitat for neotropical and temperate migratory birds during future development throughout Northampton County.

4. Provide wildlife-dependent recreational opportunities and community outreach with an emphasis on educating the public about the critical role the Delmarva Peninsula serves for neotropical and temperate migratory birds and migrating monarch butterflies.

5. Integrate the refuge into the larger community of the eastern shore and promote awareness of the unique value of the lower Delmarva Peninsula to neotropical and temperate migratory birds and migrating monarch butterflies.

6. Enhance and restore the quality of the soils, waters, and other abiotic components of the refuge and landscape.

Key Issues and Concerns

Key Issues were first identified by refuge staff and then put out for public comment in newsletters and during public scoping meetings. The original issues were then modified based on public input. The above six goals statements, together with the following issues and the range of options on how to resolve them, formed the basis for the development and comparison of the alternatives proposed in Chapter 2. The following issues are in no order of priority:

Boat ramp: The Service purchased in December 2001 the Wise Point in-holding that provides access to deep water through an existing boat ramp. The boat ramp has historically been used by recreational and commercial watermen. The refuge must balance its responsibility to protect sensitive wildlife habitat with its role in providing opportunities for wildlife-dependent recreational uses.

Firearms range: Northampton County maintains a firearms range adjacent to the refuge for law enforcement personnel. The range was built 50 years ago and does not meet current design for contaminant standards. There are elevated levels of lead, arsenic and antimony in the range area and it is unknown if these contaminants have migrated off-site. In addition, noise generated from range use conflicts with the serenity visitors seek while visiting the refuge.

Communications tower: There is a communications tower located on the refuge with a lease that expires in 2007. There has been some interest by private industry and by Northampton County (County) to increase the use of the tower. However, the tower is located in a major migratory bird flight path and may cause a number of bird fatalities.

Contaminant levels: With past military and agricultural uses in and around the refuge, there are known and suspected areas with elevated levels of contaminants.

Land acquisition: The tip of the peninsula is a major migratory bird resting/refueling site recognized by Federal and State resource agencies and the County's own Comprehensive Plan. As the eastern shore develops, the refuge and other natural areas become more critical to these long-distance travelers. The refuge is small in size. Preserving additional lands will help prevent the decline in wildlife. The planning process will identify the role land acquisition will play in our future plans.

Habitat management: Different species have different habitat needs. Due to the small size of the refuge, active management for every type of habitat and species is limited. The planning process will help us make decisions regarding which habitats, and how much, should be emphasized.

Invasive plant species: Non-native, invasive plant species have taken over valuable habitat on the Eastern Shore of Virginia and Fisherman Island Refuges. Japanese honeysuckle, kudzu, fennel, and phragmites are just a few of the invasive species that choke out native food sources for neotropical and temperate migratory birds.

Fisherman Island: Fisherman Island serves as a breeding and nursery area for numerous bird species, including the largest number of nesting royal terns and brown pelicans in Virginia. Our management goals have been aimed at protecting the sensitive natural resources by minimizing human impact to this ecosystem.

Fennel.
Charles Philip

Hunting program: Current objectives are to maintain an annual deer hunt. However, modifications may be needed to increase the take of deer and to improve public safety adjacent to roads and trails.

Beach access: There is a small population of the Federal listed Northeastern beach tiger beetle on a beach located on the Chesapeake Bay side of the Eastern Shore of Virginia Refuge. This beach abuts other beach property that is privately owned and operated by the Sunset Beach Resort. The resort's beach is open for public access, and has seen an increase in use over the past five to 10 years. There is no physical barrier separating the refuge beach from the private beach, and beach-goers have not distinguished one from the other. In order to protect the population of tiger beetles, we must take some action that will discourage or prevent heavy public use on the refuge beach.

Cultural resources: Both refuges are home to many structures, including bunkers and abandoned residences, that house materials and objects. Some of the materials dating back to World War II may have historic value and can be displayed at the Visitors Center

or stored in temperature-controlled rooms. Other items can be donated to public or private organizations for display. Refuge staff need to inventory these items to decide what to keep.

Step-Down Management Plans

The Refuge Manual (Part 4 Chapter 3) lists more than 25 Step-Down Management Plans generally required on most refuges. Step-Down Plans describe specific management actions refuges will follow to achieve objectives or implement management strategies. Some require annual revision, others are revised on a 5- to 10-year schedule. Some require additional NEPA analysis, public involvement, and compatibility determinations before they can be implemented. A status list of refuge Step-Down Plans follows.

These plans are current and up-to-date:

2002 Hunt Plan
2000 Pollution Prevention Plan
1999 Contingency of Operations Plan
1995 Youth Conservation Corp Safety Plan

These plans exist, but we consider them out of date and needing revision:

1991 Wildlife Inventory Plan: A revision of this plan would be incorporated in a proposed Species Inventory and Monitoring Plan (see section below).

1993 Upland Habitat Management Plan: A revision of this plan would be included in a new Habitat Management Plan.

1994 Public Use Management Plan: This plan, to be updated by 2006, would elucidate management direction and priority for public use programs such as Visitor Center operation, environmental education, outreach events, volunteers, and partnerships.

1998 Safety Plan: This plan, to be updated by 2006, would detail the actions required, as per the Department of the Interior and U.S. Fish and Wildlife Service policy, to: 1) provide a safe environment for all employees, volunteers, and for the public when using our facilities; 2) identify and correct unsafe conditions; 3) eliminate unsafe acts; and 4) encourage accident prevention throughout the workforce.

These step-down plans need to be initiated:

Completion or update of the following step-down plans are necessary components for successful implementation for each of the alternatives described in this Comprehensive Conservation Plan. Additional management plans may be required as future Service policy dictates.

Species Inventory and Monitoring Plan (2003): This plan would provide specific guidance for the systematic accounting of temporal and spatial trends in the abundance and diversity of species. Inventories will obtain, at a minimum, information on the abundance and distribution of vascular plants, vertebrates and Federally endangered and threatened species. Monitoring efforts will target carefully chosen species in an effort to convey information about the status of the larger ecological system and the integrity of specific habitats or ecosystem processes. Rigorous and quantitative monitoring will be oriented toward management decision to ensure scientifically-based management with proper feedback for adaptive management decisions.

Invasive Species Management Plan (2005): This plan would describe the control of non-native plant and animal species such as Japanese honeysuckle, fennel, fescue grass, kudzu, autumn olive, phragmites, and other exotic species which pose a threat to refuge habitat and native species. Specific control methods and timing will be detailed for both the Eastern Shore of Virginia and Fisherman Island Refuges.

Habitat Management Plan (2004): Management strategies specific to forest, shrub, and grassland habitats would be detailed with an emphasis on forage and cover requirements for migratory avian species. Management strategies would include maintaining various successional stages of grassland and forest. This relates specifically to the objectives, goals, alternatives, purpose, and vision developed for the Eastern Shore of Virginia and Fisherman Island Refuges.

Prescribed Burn Plan (2004): This plan would describe the use of fire as a management tool to enhance forest understory regeneration and grassland habitat, to remove undesired species such as non-native invasive plants, and to reduce the fire hazard potential. Specific locations, methods, and timing will be described in accordance with U.S. Fish and Wildlife Service policy and will adhere to all Federal, State, and local guidelines and restrictions.

Predator Management Plan (2005): This plan would describe the control of identified problem predators such as gulls, fox, coyote, feral cats, raccoons, and opossum. The areas of concern are colonial seabird nesting colonies on Fisherman Island Refuge and migratory bird habitat on the Eastern Shore of Virginia Refuge. Management strategies will include both live trapping and lethal removal.

Sign Plan (2006): This plan would detail where signs are needed on the refuge and what those signs would communicate. While the refuge currently has some written guidelines for signs, there is no formal plan.

Chapter 2

Egret colony.
USFWS photo

Alternatives, Including the Service's Proposed Alternative

- Introduction
- Formulating Alternatives
- Features Common to all Alternatives
- Alternative A: Current Management
- Alternative B: Emphasis On Forest and Shrub-Dependent Neotropical and Temperate Migrants (Proposed Action)
- Alternative C: Emphasis on Grassland Temperate and Neotropical Migrants
- Alternative D: Maintaining Natural Ecosystem Dynamics, Emphasis on Maintaining and Restoring Historic Conditions
- Alternatives Considered but Eliminated From Further Consideration

This chapter describes four management alternatives for the Eastern Shore of Virginia and Fisherman Island Refuges. Each alternative addresses all aspects of refuge management, including habitat management and public use. The first section describes management actions that are common to all the alternatives and that the Service plans to implement no matter which alternative is chosen. The next section lays out the alternatives in the format of goals, objectives, and strategies. Last is a section that describes an alternative considered but eliminated from further consideration.

At the end of this chapter you will find a matrix that clearly defines the differences among the alternatives. The matrix compares and contrasts the alternatives by their specific management actions and strategies. Generally, the matrix is a summary of the alternatives chapter.

Formulating Alternatives

Alternatives are packages of complementary management strategies and specific actions for achieving the missions of the National Wildlife Refuge System (Refuge System) and the Service, the vision and goals of the refuges, and the purposes for which the refuges were established. They propose different ways of supporting the goals and responding to key issues, management concerns, and opportunities identified during the planning process.

The alternatives were guided in large part by different approaches to habitat management. Alternative A illustrates the current management of the refuge and provides a baseline for comparing and contrasting the other alternatives. Alternative B focuses on managing habitat for neotropical migratory species, which requires more woody and shrub habitat than the other alternatives. Alternative C focuses on managing habitat for temperate migratory species, which requires more grassland habitat. Lastly, Alternative D focuses on restoring habitat to pre-settlement conditions. Public use activities associated with each of these alternatives relate to the focus on habitat management. For example, in Alternative B, we focus educational and interpretive programs on neotropical migratory species, and in Alternative C, the focus is on grassland temperate migrants.

Doe in field.
USFWS photo

Features Common to all Alternatives

Baseline Inventories

The need for baseline information on National Wildlife Refuges has become urgent as more and more species are lost to extinction (Defenders of Wildlife 1998). Without the knowledge of the status, trends, and responses to management of biological systems, refuges cannot be effectively managed for the conservation of fish, wildlife and plants. The development of systematic species and habitat monitoring are also specific recommendations from the Fulfilling the Promises document (USFWS 1999a) which lays out a vision for the National Wildlife Refuge System. Standardized Region 5 surveys call for conducting annual surveys for breeding birds, grassland birds, marsh birds, frogs and toads. In addition to the standardized Region 5 surveys, we will use peer-reviewed protocol to collect baseline and trend data on vascular plants, vertebrates, invertebrates, threatened and endangered species, and trust resources on the Eastern Shore of Virginia (including Skidmore Island) and Fisherman Island Refuges.

Protecting and Managing Cultural Resources

By law, we must consider the effects of our actions on archeological and historic resources. Under all the alternatives, we will comply with Section 106 of the National Historic Preservation Act which requires that "earth moving" projects (projects that require breaking ground) be reviewed for archeological resources prior to commencement. Compliance may require a State Historic Preservation Records survey, literature survey, or field survey.

In all alternatives, the Service will consult with the Virginia Department of Historic Resources (Virginia's State Historic Preservation Office) in evaluating the National Register eligibility of buildings on Skidmore Island. Management alternatives for the buildings will be developed after their eligibility has been determined. Options include documenting and demolishing them, moving them for reuse by another organization, or rehabilitation and adaptive reuse by the refuge or a partner. The refuge will also initiate a structural engineering review of the Winslow Bunker (Battery 12) on Eastern Shore of Virginia Refuge, and install a more effective gate system at that site.

In 2000, the refuge's museum property intern and Outdoor Recreation Planner drafted revisions to the refuge's Scope of Collection Statement. This document is intended to guide the refuge in the future acquisition and management of appropriate museum property. In all alternatives, the refuge will review and

adopt a version of this draft as its current Scope of Collection Statement. In addition, the refuge will continue to implement intern report recommendations about improving the environment of the Environmental Education Building or creating an alternative modular storage area for the collection. Other museum property actions which will be common to all alternatives are:

- Appraise the refuge's decoys and historic objects.
- Address pest infestation of the refuge's mounted specimens and decoys.
- Clean mounted zoological specimens.
- Maintain the refuge's scientifically valuable wet specimens.
- Prepare and implement housekeeping, pest management, and environmental monitoring plans.
- Catalog and label remaining uncataloged documents and historic objects.
- Inspect archaeological artifacts belonging to the refuge but located at the Virginia Department of Historic Resources.

Wilderness Review

The final refuge planning policy published May 25, 2000 requires that a wilderness review be conducted concurrently with the CCP process. However, since this CCP was in preparation prior to the finalization of the planning policy, a wilderness review has not been completed. A cursory wilderness inventory of the Eastern Shore of Virginia Refuge indicates that the 1,850 acres of Fisherman Island may qualify as a Wilderness Study Area. The island is roadless, in that no vehicles actually travel along a road on the surface of the island. Significant bridge abutments, however, occur on the northern tip of the island. Its effect on the naturalness of the area would need further analysis. To comply with refuge planning policy, a wilderness review will be scheduled by the Regional Office and incorporated by the next major revision of this Plan.

A volunteer bands a tern.
USFWS photo

Refuge Revenue Sharing Payments

Annual Refuge Revenue Sharing payments to Northampton County, Virginia will continue under each alternative. Future increases in payments will be commensurate with increases in the appraised fair market value of refuge lands, new acquisitions of land, and new Congressional appropriations.

Volunteer and Internship Opportunities

In all alternatives, the refuge will continue to offer the Workamper and Internship programs. These programs provide education to participants as well as much-needed administrative, public use, and field help to the refuge.

Research

The Service will encourage and support research and management studies on refuge lands that will improve and strengthen natural resource management decisions. The refuge manager will encourage and seek research relative to approved refuge objectives that clearly improves land management and promotes adaptive management. Priority research addresses information that will better manage the Nation's biological resources and are generally considered important to: Agencies of the Department of Interior; the U.S. Fish and Wildlife Service; the National Wildlife Refuge System; and State Fish and Game Agencies, and that address important management issues or demonstrate techniques for management of species and/or habitats.

The refuge will also consider research for other purposes which may not be directly related to refuge-specific objectives, but contribute to the broader enhancement, protection, use, preservation and management of native populations of fish, wildlife and plants, and their natural diversity within the region or flyway. These proposals must still pass the Service's compatibility policy.

The refuge will maintain a list of research needs that will be provided to prospective researchers or organizations upon request. Refuge support of research directly related to refuge objectives may take the form of funding, in-kind services such as housing or use of other facilities, direct staff assistance with the project in the form of data collection, provision of historical records, conducting of management treatments, or other assistance as appropriate.

All researchers will be required to submit a detailed research proposal following Service Policy (FWS Refuge Manual Chapter 4 Section 6). In general, the refuge must be given at least 45 days to review most proposals before initiation of research, and 60 days to review proposals that require collection of wildlife. Proposals will be prioritized and approved based on need, benefit, compatibility, and funding required. Special Use Permits must also identify a schedule for annual progress reports on which decisions for continued research activities will be based. The Regional refuge biologists, other Service Divisions, and State agencies may be

asked to review and comment on proposals. All researchers will be required to obtain appropriate State and Federal permits.

Special Use Permit

Under all alternatives, we will continue to issue Special Use Permits (SUPs) for activities that are not open to the general public (i.e., research, commercial use of boat ramp site, etc.). SUPs for research will be issued according to research protocol listed above.

Communications Tower

There is a 299-foot communications tower located on the Eastern Shore of Virginia Refuge. This tower was constructed in 1957 and presently supports in-house radio communications for Verizon and refuge staff. Verizon has a paging antenna located on this tower. The lease for this tower, which expires in 2007, was transferred to the Service with the property. Since the tower does not conform to current Service guidance on the siting of communications towers, it will be removed once the lease expires. Verizon has other communications towers in the immediate vicinity of the refuge.

Maintaining Existing Facilities

Regardless of which alternative is selected, periodic maintenance and renovation of existing facilities is a critical need to ensure safety and accessibility for refuge staff and visitors. Included as an appendix to this document is the 2001 Maintenance Management System (MMS) database list of backlogged maintenance entries for the refuge (see Appendix G). Future maintenance needs will vary among the alternatives relative to proposed new construction.

Personal Watercraft Use

Under all alternatives, the refuge would not allow personal watercrafts (PWCs) to launch from the Wise Point boat ramp. PWC refers to a vessel, usually less than 16 feet in length, which uses an inboard, internal combustion engine powering a water jet pump as its primary source of propulsion. PWCs include vessels commonly referred to as jet ski, waverunner, wavejammer, wetjet, sea-doo, wet bike and surf jet.

PWCs have the potential to cause disturbance to wildlife. The Wise Point area consists of extensive coastal salt marsh used as migration, wintering and breeding habitat for black ducks, gadwall, Canada geese, mallards and blue-winged teal. It also provides

American oystercatcher.
Paul Buckley

migration and wintering habitat for a diversity of other waterfowl species.

PWCs also have a significant potential to conflict with other visitors' enjoyment of refuge values. The erratic changes in engine pitch, the pulsation of sound produced by jumping wakes, and frequent changes in speed, in addition to the volume of sound, create a noise that is perceived as both irritating and an intrusion on the Refuge experience.

Monitoring and Adaptive Management

The Final CCP will cover a 15-year period. Periodic review of the CCP will be required to ensure that established goals and objectives are being met and that the plan is being implemented as scheduled. In many cases, monitoring techniques are built into the actions and strategies of the alternatives.

We would monitor public use programs by continuing to collect and compile visitation figures and activity levels. In addition, we would establish research and monitoring programs to assess the impacts of public use activities on wildlife and wildlife habitat and to identify compatible levels of public use activities. We would reduce these activities if we determine incompatible levels of public use were occurring.

Collecting baseline data on all wildlife populations and habitats would update existing records of wildlife species using the refuges, their habitat requirements, and seasonal use patterns. This data would also be used to evaluate the effects of public use and habitat management programs on wildlife populations.

We would continually monitor refuge habitat management programs for positive and negative impacts on wildlife habitat and populations, and to determine if these management activities are helping to meet refuge goals and objectives. Information resulting from monitoring would allow staff to set more specific and better management objectives, more rigorously evaluate management objectives, and ultimately, make better management decisions.

ALTERNATIVE A: CURRENT MANAGEMENT

Alternative Concept

The National Environmental Policy Act (NEPA) requires analysis of the No Action Alternative, which can be defined or presented as continued current management activities or as take no action (literally, do not do anything different from current management). In this Draft CCP/EA, Alternative A fulfills the first definition; it continues our current management activities. As mentioned earlier, Alternative A provides a baseline for comparing and contrasting the other alternatives.

Management Focus: In the first 12 years since Eastern Shore of Virginia Refuge was created (1984-1996) refuge management was focused on removing military buildings and restoring wildlife habitat. In that time, maintenance staff removed over 100 structures including a water treatment plant, a bowling alley, single-family dwelling units and other miscellaneous structures. Habitat management has been focused on providing a variety of habitats for a variety of birds. These varied habitats consist of hardwood stands, shrub/scrub habitat and grassland habitat. Wildlife-dependent recreational opportunities include a 1.5-mile trail system, a deer hunt program, guided tours on Fisherman Island Refuge, and environmental education programs.

Rationale behind the management focus: The Eastern Shore of Virginia and Fisherman Island Refuges are located at the southern tip of the Delmarva Peninsula, an area that has been identified as an important migratory bird stopover location along the Atlantic coast. The refuges provide food and cover habitat for neotropical and temperate migratory species to assist in their long journeys north for the summer or south for the winter. Neotropical migrants largely depend on hardwood stands and shrub/scrub habitat, while grassland temperate migrants need more grassland habitat. By providing a diversity of habitat types, we are serving the needs of a broad range of avifauna. See Maps 2-1 and 2-2 for existing habitat management and public use areas on the Eastern Shore of Virginia Refuge. See Map 2-3 for public use areas on Fisherman Island Refuge.

Goal1: Increase the availability of forage and cover habitat for neotropical and temperate migrant birds and migrating monarch butterflies.

Objective A: Hardwood-Dominated Forest

Plant hardwood species in various locations adjacent to existing forested stands.

Rationale for objective: We plant hardwood trees adjacent to already-existing hardwood stands to expand contiguous stands of forest. These contiguous stands of forest provide necessary forage and cover habitat for neotropical migratory species.

Strategies:
1. Increase hardwood habitat on approximately 20 acres in Management Unit (MU) 13.
2. Increase hardwood habitat around the refuge residential area.

Groundsel.
Charles Philip

Objective B: Forest Understory

Encourage a healthy understory by controlling deer browse and planting native fruit-bearing shrubs.

Rationale for objective: Many migratory birds depend on native fruit-bearing shrubs for refueling before continuing their journey north or south. Native shrubs also increase insect abundance, another important food source for migratory birds.

Strategies:
1. To minimize the effects of deer browse on the understory, continue to conduct an annual deer hunt on Eastern Shore of Virginia Refuge.
2. Provide fruit-bearing shrubs and promote natural succession.

Objective C: Upland Shrub

Maintain native shrub-dominated cover.

Rationale for objective: Providing shrub/scrub habitat helps fulfill the forage and cover needs of shrub-dependent birds such as raptors and some warblers. Native shrubs and forbs offer food resources such as fruit and nectar.

Strategies:
1. Allow succession in old fields of MUs 4, 8, and 9.

2. Maintain early succession by hydroaxing in MU 5, 6, 7 (e.g. cherry, cedar).
3. Periodically remove loblolly pines as necessary to maintain shrub habitat.

Objective D: Grassland Management

Maintain existing grasslands on Eastern Shore of Virginia Refuge (MUs 1, 2, 3, 10, 13, 14) by planting and mowing.

Rationale for objective: Grasslands provide feeding and roosting habitat for temperate migratory species such as woodcock. Other grassland bird species depend on grassland habitat for nesting.

Strategies:
1. Periodically remove non-native shrubs in MUs 1 and 2 and in the residential area to maintain grassland habitat and promote a healthier ecosystem.
2. For the benefit of grassland birds, small mammals, and foraging raptors, plant native warm season grasses and maintain by periodic mowing.
3. Mow old farm fields on a rotational (3-5 year) basis to maintain grassland and early successional habitat for migratory, wintering, and breeding grassland bird species.
4. Mow blocks annually through shrub and grassland habitat to enhance raptor and woodcock foraging areas.

Goal 2: Maintain the long-term productivitiy, integrity and function of the marsh, beach and interdunal communities.

Objective A: Beach Dynamics

Beach Erosion.
USFWS photo

Evaluate the natural dynamics of erosion and accretion of the beach community on Fisherman Island Refuge and the southern tip beach.

Rationale for objective: Fisherman Island has dynamic habitats, as do many coastal islands. Accretion has led to significant increases in beach and foredune habitat on the north/northeast and south/southeast portions of the island. Similar increases in salt marsh habitat have occurred in the northern section of the island. Monitoring these habitats will help us understand why certain species use the land, and why others do not.

Strategy:
- Monitor changes in island topography using aerial photos and research projects.

Objective B: Beach and Dune Habitats

Protect avian nesting (e.g., royal tern, American oystercatcher) and migrating (e.g., sanderling) habitat on Fisherman Island Refuge by minimizing disturbance to beach-dependent birds and other wildlife from humans and predators.

Rationale for objective: Disturbance can lead to nest abandonment, chick mortality and predation of nests and chicks during the breeding season (Burger 1991, 1994). Disturbance to staging areas during migration can lead to declines in shorebird abundance (Pfister et al., 1992).

Strategies:

1. Continue to close Fisherman Island Refuge to public use during the nesting season (March 15 through September 30) with the exception of International Migratory Bird Day. Issue Special Use Permits to qualified researchers.
2. Monitor human and predator disturbance on Fisherman Island Refuge to minimize adverse effects on avian nesting productivity and to learn about species behavior.
3. Conduct colonial nesting bird surveys for royal terns, sandwich terns, American oystercatchers and others.
4. Conduct volunteer beach cleanups on Fisherman Island and Eastern Shore of Virginia Refuges.
5. Conduct annual Christmas Bird Counts on Fisherman Island Refuge habitats.

Objective C: Threatened and Endangered Species

Protect Federal listed speciesthat occur or may occur on both refuges.

Rationale for objective: The Northeastern beach tiger beetle is a Federal listed species found on the southern tip beach on the Eastern Shore of Virginia Refuge. It is the only listed species suspected to breed on either of the refuges. The Federal listed piping plover was last recorded on the Fisherman Island Refuge in 1992, when one nest was documented. All federal agencies are required under the Endangered Species Act to use their authorities to carry out programs for the conservation of endangered and threatened species.

Strategies:

1. Continue to close the southern tip beach on the Eastern Shore of Virginia to public use to protect Northeastern beach tiger beetle habitat.

2. Periodically monitor for piping plover activity on Fisherman Island Refuge.
3. Periodically survey the vegetation on Fisherman Island Refuge for endangered plants.

Objective D: Tidally-Influenced Salt Marsh

Monitor and, where possible, enhance the quality and natural function of tidally-influenced salt marsh on both refuges for marsh-dependent birds (e.g., clapper rail, seaside sparrow and sharp-tailed sparrow) and other avian species (e.g., herons, egrets and ibis).

Rationale for objective: Marshes provide important feeding habitat for many birds on both refuges. About 50 percent of Fisherman Island is covered in cordgrass-dominated salt marsh, important habitat for rails and many waterfowl species.

Strategy:

- Periodically spray approved herbicide on non-native phragmites by aerial application on marsh in and adjacent to refuge property.

Goal 3: Actively participate in the conservation of healthy hardwood, understory, and grassland habitat for neotropical and temperate migratory birds during future development throughout Northampton County.

Objective A: Protect Migratory Bird Stopover Habitat through Acquisition

Protect land within the refuge's existing acquisition boundary by obtaining fee title.

Rationale for objective: Protecting more land on the eastern shore of Virginia will provide more wildlife habitat for a variety of species. Furthermore, protecting more land around existing refuge land will create larger blocks of wildlife habitat which are important for many species which are sensitive to human disturbance.

Strategies:

1. Continue to work with willing landowners to acquire 310 acres within our approved acquisition boundary.
2. At the time of acquisition, the refuge manager will evaluate existing public uses and determine whether they are compatible. If no public uses have been established, new tracts remain closed to public use until a formal compatibility determination has been completed.

Photo Blind.
USFWS photo

Objective B: Protect Migratory Bird Stopover Habitat through Partnering

Partner with public and private agencies to ensure that future development does not adversely impact the natural resources of Northampton County.

Rationale for objective: By working with partners, we potentially increase opportunities for land protection on the eastern shore. Furthermore, we play a role in helping to prioritize land protection strategies for Northampton County.

Strategies:

1. Participate in board meetings and public discussions regarding Northampton County (County) planning issues such as land zoning, reducing the toll on the Chesapeake Bay Bridge-Tunnel, communications tower ordinance and other pertinent issues.
2. Work cooperatively on Geographic Information Systems (GIS) analysis of the lower eastern shore with the County, The Nature Conservancy, the State, and Service partners to help identify unprotected lands for future easements or purchase.
3. Facilitate private land protection projects on the eastern shore of Virginia with the Service and the Natural Resources Conservation Service (NRCS) to protect suitable wildlife habitat.
4. Work with the Southern Tip Partners (a group comprised of federal, State, local, non-governmental agencies, and private citizens) to prioritize and identify lands for potential acquisition and to coordinate funding efforts.

Goal 4: Provide wildlife-dependent recreational opportunities and community outreach with an emphasis on educating the public about the critical role the Delmarva Peninsula serves for neotropical and temperate migratory birds and migrating monarch butterflies.

Objective A: Hunting Opportunities

Provide a high-quality, safe deer hunting program and promote special hunt opportunities on Eastern Shore of Virginia Refuge.

Rationale for objective: Providing wildlife-dependent recreational opportunities, like hunting, helps foster an appreciation for wildlife. Although many of the lands on the eastern shore are hunted, most are private lands. By opening the refuge to hunting, we provide public hunting opportunities.

Strategies:

1. Provide an annual deer hunt program for archery and shotgun in designated zones (see Map 2-3) of the Eastern Shore of Virginia Refuge during specific days of the fall and winter (23 hunters per day, 19 days total).
2. Promote hunting on the Eastern Shore of Virginia through participation in the annual National Hunting and Fishing Day.

Objective B: Boating and Fishing Access

Provide access to the County and Wise Point boat ramps for deep water recreational and commercial fishing.

Rationale for objective: The refuge owns the Wise Point boat ramp, the only public seaside boat ramp on the southern 10 miles of the Delmarva Peninsula that provides deep water access. The boat ramp is valuable to the local community for economic, cultural and recreational use. Many commercial watermen have depended on the boat ramp for access to important clamming, crabbing and fishing grounds. The boat ramp has been open to recreational anglers year-round, though recreational use declines dramatically in the winter (January through March).

Strategies:

1. Commercial and recreational anglers will continue to have access to the Wise Point boat ramp under the same rules and regulations that applied when the boat ramp was owned by the Wise Point Corporation.
3. Continue to support a no-wake zone in the Virginia Inside Passage adjacent to the tidal marshes near the boat ramp to minimize wildlife disturbance and erosion.
4. Do not allow personal watercrafts (PWCs) to launch from the boat ramp.
5. Promote fishing on the eastern shore of Virginia by participating in National Hunting and Fishing Day.

Objective C: Wildlife Observation and Photography

Provide opportunities for visitors to view and photograph wildlife and their habitats on the Eastern Shore of Virginia and Fisherman Island Refuges.

Rationale for objective: Providing opportunities for wildlife observation and photography helps foster an appreciation for wildlife and wildlife habitat.

Strategies:

1. Continue to offer guided tours of Fisherman Island Refuge on weekends from October 1 through March 15.
2. Maintain the photo blind on Eastern Shore of Virginia Refuge.
3. Continue to provide an observation window in the Visitor Center overlooking a freshwater pond. Remove invasive cattail in the pond annually to enhance viewing from the observation window.
4. Maintain two overlooks along 1.5 miles of trails on the Eastern Shore of Virginia Refuge.
5. Maintain the butterfly garden adjacent to the Visitor's Center with native nectar-producing shrubs and forbs to provide food sources for butterflies and wildlife observation for visitors.

Objective D: Environmental Education

Provide educational programs to visitors on the importance of the refuge to migratory species and their habitats.

Rationale for objective: Providing school children and teachers with environmental education opportunities increases understanding and support for the relationship between species and their habitats.

Strategies:

1. Continue to annually revise, schedule, cost share, and conduct environmental education (EE) programs for Northampton County elementary school children (kindergarten through fifth-grade) and provide programs for other schools when possible.
2. Continue to conduct teacher workshops with feedback questionnaires to help refine programs to teachers' needs.
3. Continue to conduct periodic EE programs at various schools around Northampton County.
4. Continue to offer the Junior Refuge Manager Program to youth groups and interested youth, throughout the year.
5. Continue to participate annually in the regional high school Envirothon.
6. Continue to conduct a seasonal woodcock educational program for two high schools in Virginia when possible.

Objective E: Interpretation

Provide opportunities for refuge visitors to view and photograph migratory birds and migrating monarch butterflies along trails and existing roads during the fall migration.

Rationale for objective: Providing the public with interpretive information increases public appreciation and support for habitat protection efforts on the southern tip of the Delmarva Peninsula.

Strategies:

1. Continue to provide general brochure and bird checklist.
2. Continue to offer visitors a modern, interactive, and educational Visitor's Center with video presentations, various exhibits, talks, and programs to enhance their Refuge experience.
3. Continue to provide 1.5 miles of trails with interpretive signs and kiosks.
4. Continue to conduct special tours and programs on request (e.g. Scouts, birding clubs, garden clubs).
5. For off-refuge events, continue to use tabletop exhibits with general information about the refuges and bird migration.
6. Continue to coordinate with the Chesapeake Bay Bridge Tunnel (Bridge-Tunnel) Authority to display interpretive material on the bridge. Publicizing interpretive opportunities on the Bridge-Tunnel has the potential to greatly expand visitation.

Goal 5: Integrate the refuges into the larger community of the eastern shore and promote awareness of the unique value of the lower Delmarva Peninsula to neotropical and temperate migratory birds and migrating monarch butterflies.

Objective A: Encourage Responsible Nature-Based Tourism

Cooperate with local organizations to promote responsible, nature-based tourism.

Rationale for objective: Virginia's eastern shore has the potential to offer many recreational opportunities. The Service can provide expertise to ensure these opportunities are consistent with protecting wildlife and wildlife habitat whenever possible.

Strategies:

1. Continue to co-sponsor and participate in local festivals and events to help promote nature-based tourism on the lower Eastern Shore. Major events include Onancock Haborfest, National Hunting and Fishing Day, Earth Day, Chesapeake Bay Bridge Tunnel Walk/Bike Day, Citizen's for a Better Eastern Shore Biking Day, Eastern Shore Birding Festival, International Migratory Bird Day and

National Wildlife Refuge Week.

2. Continue cooperative efforts with conservation groups to promote nature-based tourism in the area by, for example, helping to develop visitor guides such as the Delmarva Birding Guide and the Audubon Guide for Refuges.
3. Continue to educate tour guides on refuge regulations and the fragility of Fisherman Island Refuge's habitats and nesting colonies, especially as kayaking increases in popularity on the lower Delmarva Peninsula.

Objective B: Increase Refuge Recognition and Support

Coordinate with local partners to participate in community events, improve outreach and provide input on local environmental issues.

Rationale for objective: We can reach a broader range of people by working with partners to help spread a conservation message throughout the local community. We also improve our relationships with our conservation partners.

Strategies:

1. Continue to offer outreach programs several times a year to civic groups such as local Garden Clubs, senior citizen groups, and Rotary Club.
2. Continue to serve on the board of directors for the Coastal Virginia Wildlife Observatory (CVWO), a non-profit environmental organization that contributes to migratory bird and butterfly research conducted on the lower eastern shore. The refuge offers year-round housing to help off set costs for the organization.
3. Maintain cooperative planning efforts with Kiptopeke State Park, resulting in contributions to our respective long-term management plans.
4. Continue to share refuge facilities (e.g., conference building) with Federal, State, and local agencies such as the Cape Charles Town Council, Kiptopeke State Park, Natural Resource Conservation Service, and the County Sheriff's Department to promote interagency coordination.
5. Maintain the refuge web site to promote interest in the refuge. Information for visitors, volunteers, interns, and Workampers is available with such listings as a special event calendar, featured species of the month, rare sightings, historical information, and more.

Goal 6: Enhance and restore the quality of the soils, waters, and other abiotic components of the refuge landscape.

Objective A: Contaminants

Determine the extent of contamination on existing refuge lands known or suspected to be contaminated.

Rationale for objective: Both refuges are located on former military land. Oftentimes, military lands contain a number of contaminated areas. Our objective so far has been to identify those areas on the refuge that are contaminated.

Strategies:

1. Interview former military personnel and long-term staff to identify sites of possible contamination.
2. Conduct contaminant surveys on existing refuge properties and on properties identified for acquisition.
3. Remove underground storage tanks and inspect above-ground storage tanks. Follow precautionary measures such as spill prevention and adequate containment.
4. Correctly store and/or dispose of hazardous materials such as flammables and pesticides. Inspect structures for asbestos.

Objective B: Firearms Range

While operating the firearms range in the best interest of the refuge and law enforcement user groups, work with partners to relocate the range.

Rationale for objective: The firearms range is owned by Northampton County but is managed and maintained by refuge staff. The range is located adjacent to the refuge, and close to the environmental education building. We schedule users so as not to conflict with environmental education programs. We have been working with the County to find an alternative site for the range partly because gunshot noise can disturb people and wildlife and partly because the range contains contaminants that may be adversly affecting our trust resources. A new range would have provisions for abating contaminants.

Strategies:

1. Continue to work with partners (e.g., Northampton County, local law enforcement agencies) to find an alternate site for the firearms range (off-refuge) in a less environmentally sensitive location. Consider acquiring the

land now occupied by the firearms range.

2. Continue to administer and maintain the firearms range. Schedule usage so as not to conflict with environmental education programs.
3. Continue to collect and recycle spent brass casings.

Objective C: Contingency Planning for Oil and Hazardous Material Spills

Refuge staff will be prepared to respond to any oil or hazardous material spills on water or on land that threaten the Eastern Shore of Virginia or Fisherman Island Refuges.

Communications tower.
Susan Rice

Rationale for objective: The Eastern Shore of Virginia and Fisherman Island Refuges are located in a vulnerable place, bordered by the Atlantic Ocean on one side and the Chesapeake Bay on the other. Large ships and barges pass by the refuges daily. Also, Route 13, which runs through Fisherman Island and adjacent to the Eastern Shore of Virginia refuge, is a major trucking route. For these reasons, it is important the refuges have an action plan for dealing with a spill in the water or on land.

Strategy:

- Annually update spill and pollution prevention plans.

Objective D: Remove Artificial Structures

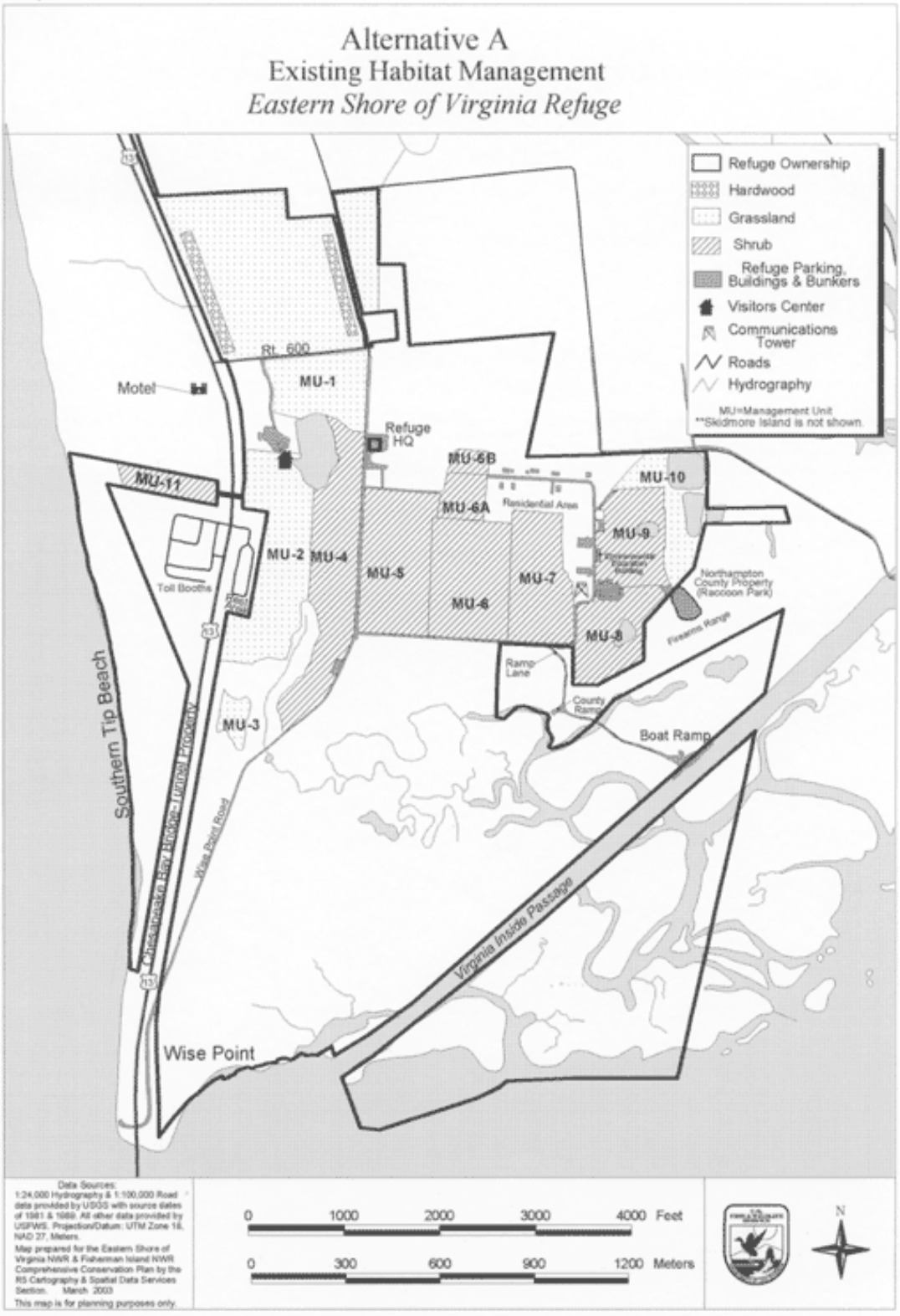
Promote a more natural appearance to refuge landscapes and increase the amount of acreage available as wildlife habitat by removing unnecessary artificial structures that may obstruct views, occupy space, and constitute a direct hazard to wildlife.

Rationale for the Objective: Artificial structures are often considered merely aesthetic or visual problems. There are, however, many ecological reasons for their removal. Communications towers are known hazards to birds. Unoccupied buildings become shelters for rats and raccoons and other predators. Roadways create ecological edge communities that concentrate a diversity of plant species, many of which are invasive. Artificial impoundments create aquatic systems that alter natural biodiversity. Furthermore, the cumulative space occupied by such structures is considerable, making it unavailable as wildlife habitat.

Strategy:

- Verizon Virginia, Inc. will remove the communications tower once the lease expires in 2007.

Map 2-1


Alternative A
Existing Habitat Management
Eastern Shore of Virginia Refuge
Refuge Ownership
Hardwood
Grassland
Shrub
Refuge Parking, Buildings & Bunkers
Visitors Center
Communications Tower
Roads
Hydrography
MU=Management Unit
**Skidmore Island is not shown.
Rt. 600
Motel
MU-1
Refuge HQ
MU-6B
MU-10
MU-11
MU-6A
Residential Area
MU-9
MU-2
MU-4
MU-5
MU-7
MU-6
Toll Booths
Northampton County Property (Raccoon Park)
MU-8
Firearms Range
Ramp Lane
County Ramp
MU-3
Boat Ramp
Southern Tip Beach
Chesapeake Bay Bridge-Tunnel Property
Wise Point Road
Virginia Inside Passage
Wise Point
Data Sources:
1:24,000 Hydrography & 1:100,000 Road data provided by USGS with source dates of 1981 & 1988. All other data provided by USFWS. Projection/Datum: UTM Zone 18, NAD 27, Meters.
Map prepared for the Eastern Shore of Virginia NWR & Fisherman Island NWR Comprehensive Conservation Plan by the R5 Cartography & Spatial Data Services Section. March 2003
This map is for planning purposes only.
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0 300 600 900 1200 Meters
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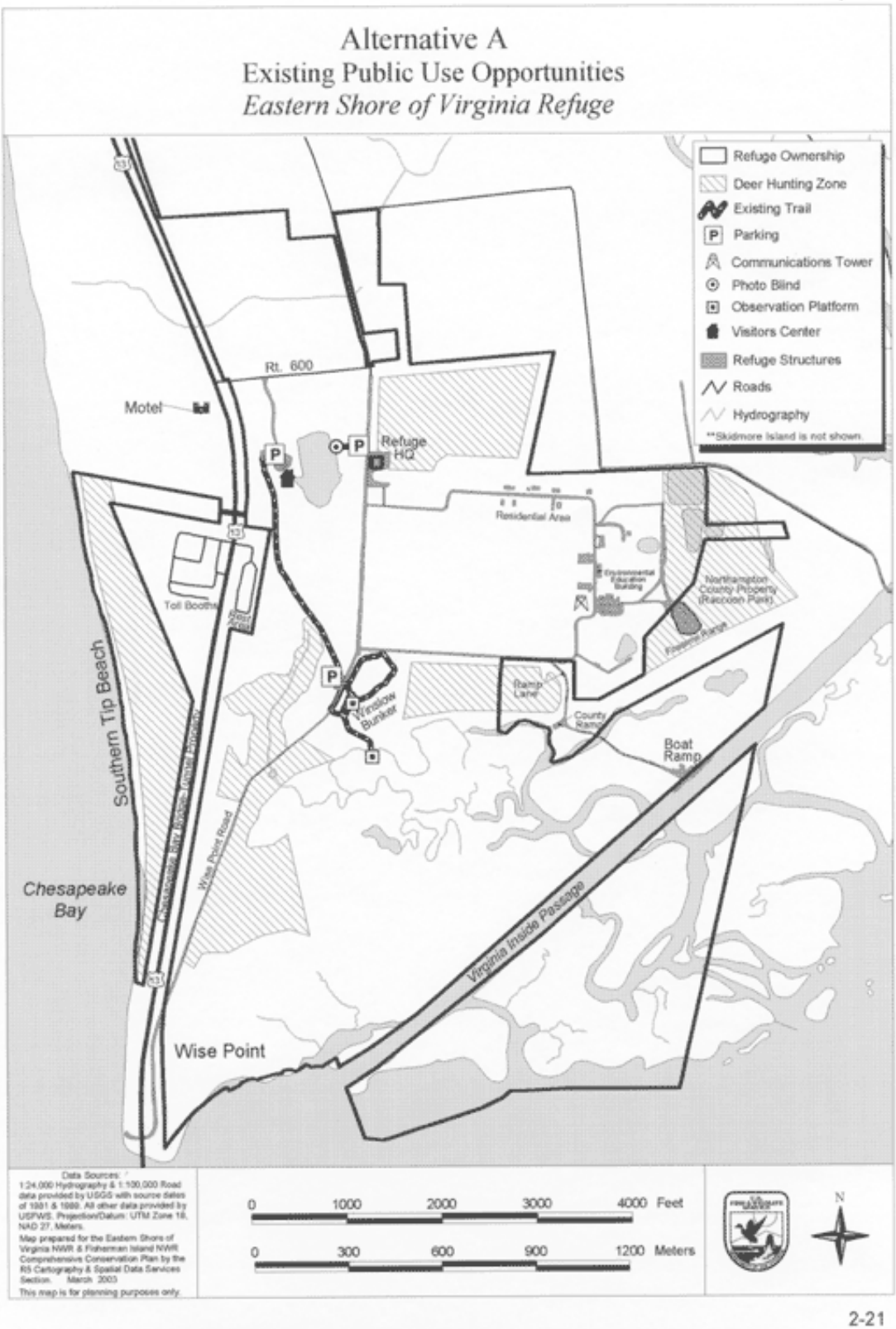
2-20

Map 2-2


Alternative A
Existing Public Use Opportunities
Eastern Shore of Virginia Refuge
Refuge Ownership
Deer Hunting Zone
Existing Trail
Parking
Communications Tower
Photo Blind
Observation Platform
Visitors Center
Refuge Structures
Roads
Hydrography
**Skidmore Island is not shown.
Rt. 600
Motel
Refuge HQ
Residential Area
Toll Booths
Southern Tip Beach
Chesapeake Bay Inside Channel
Wise Point Road
Winslow Bunker
Ramp Lane
County Ramp
Boat Ramp
Northampton County Property (Raccoon Park)
Chesapeake Bay
Virginia Inside Passage
Wise Point
Data Sources:
1:24,000 Hydrography & 1:100,000 Road data provided by USGS with source dates of 1991 & 1999. All other data provided by USFWS. Projection/Datum: UTM Zone 18, NAD 27, Meters.
Map prepared for the Eastern Shore of Virginia NWR & Fisherman Island NWR Comprehensive Conservation Plan by the R5 Cartography & Spatial Data Services Section. March 2003
This map is for planning purposes only.
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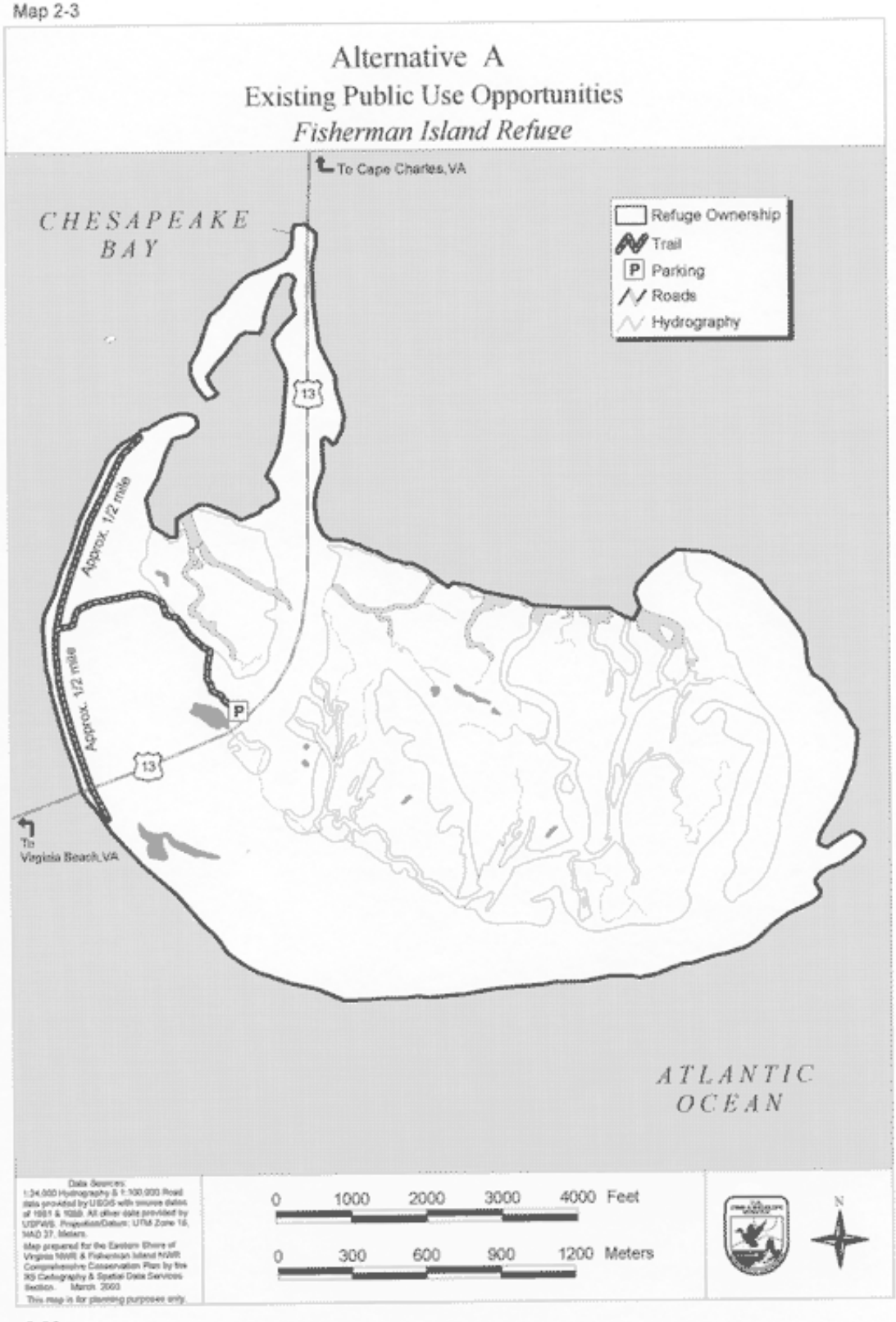
Map 2-3


Alternative A
Existing Public Use Opportunities
Fisherman Island Refuge
To Cape Charles, VA
CHESAPEAKE BAY
Refuge Ownership
Trail
P Parking
Roads
Hydrography
13
Approx. 1/2 mile
Approx. 1/2 mile
P
13
To Virginia Beach, VA
ATLANTIC OCEAN
0 1000 2000 3000 4000 Feet
0 300 600 900 1200 Meters
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2-22

ALTERNATIVE B: EMPHASIS ON FOREST AND SHRUB-DEPENDENT NEOTROPICAL AND TEMPERATE MIGRANTS

Alternative Concept

Management Focus: Under this alternative the refuge would focus its management efforts on protecting, restoring, and enhancing habitat for forest and shrub-dependent neotropical and temperate migratory birds, while promoting compatible wildlife-dependent recreational opportunities in support of these efforts.

Rationale behind the management focus: The lower Delmarva Peninsula is hemispherically important to migrating songbirds. The narrowing peninsula provides a geographic bottleneck for over a hundred southward migrating avian species concentrating millions of birds into this small area. Adequate cover and food along the migratory route are essential for the long-term viability of these species. Unfortunately, wildlife habitat on the peninsula is becoming fragmented with increased waterfront development and clearing of forest and shrub habitat, threatening the migration corridor. Virginia, Maryland, Delaware and New Jersey have experienced up to 60 percent declines in neotropical songbird numbers in recent history (Mabey et al., 1993). In light of these population declines and habitat losses, increased emphasis is needed to protect, restore, and enhance the lower Delmarva's critically located habitats with a focus on conserving hardwood forests and fruit-producing shrubs for these avian migrants.

See Maps 2-4 and 2-5 for proposed habitat management and public use strategies on the Eastern Shore of Virginia Refuge. See Map 2-6 for proposed public use strategies on Fisherman Island Refuge.

GOAL 1: Increase the availability of forage and cover habitat for neotropical and temperate migrant birds and migrating monarch butterflies.

Objective A: Hardwood-Dominated Forest

To provide additional sources of high-quality forage for neotropical and temperate migrants, increase the amount of contiguous hardwood habitat (oaks, hickory, maples, and sweet gum) on the Eastern Shore of Virginia Refuge by converting existing open grassland habitat adjacent to forested stands.

Rationale for the Objective: Hardwood-dominated forests have a high food value for neotropical and temperate migrants because of the diverse understory associated with these habitats (Watts and Mabey, 1994).

Strategies: (Strategies are listed in five-year increments following the plan's approval)

1-5 years:

1. Determine appropriate hardwood management techniques including the number and variety of trees to be planted, planting location and schedule, and evaluation of deer impacts. Include proposed techniques in the habitat management plan.
2. Establish 10 x 10-meter plots to test treatment regimes for eliminating Japanese honeysuckle and kudzu encroaching on existing hardwood stands.
3. Plant two acres of mixed hardwoods in MU 6 as specified in the habitat management plan (may include deer exclosure fencing).

6-10 years:

4. Plant 15 acres of mixed hardwoods in MU 8 as specified in the habitat management plan.
5. Convert two acres of grassland to mixed hardwoods and shrubs in the refuge housing area (areas between individual houses) through natural succession and plantings.
6. Develop an agreement with the Chesapeake Bay Bridge Tunnel (Bridge-Tunnel) Authority and Sunset Beach Resort to plant hardwoods on their property in areas contiguous to forested stands.

11-15 years:

7. Plant 10 acres of mixed hardwoods within the old railroad right-of-way as specified in the habitat management plan.

Objective B: Forest Understory

Increase the density and abundance of the forest understory in closed canopy pine stands (i.e., stands 20-80 years old) to provide forage for frugivorous and insectivorous neotropical and temperate migrants.

Rationale for the Objective: Establishing native shrubs and vines in forest openings increases fruit and insect abundance, thereby benefitting migratory birds (Blake and Hoppes, 1986). We would create an experimental plot to determine the specific management practices necessary to create optimum fruit and insect abundance for birds throughout the migration and winter seasons.
In addition to Alternative A:

Loblolly pine.
Charles Philip.

1-5 years:

1. Thin loblolly pine on Wise Point. To thin, we would use a chain saw on a 0.25-acre test plot within the 30 acres of forest at Wise Point. Only small sections would be thinned as the majority of the existing pines on Wise Point are of low vigor and would not respond to thinning and are likely to succumb to salt intrusion, sensescence, and pine beetle infestation (Mallett 2001). Subsequent adjustments to thinning would be based on test plot results.
2. Leave standing dead trees (≥15.2 cm diameter-breast-height, or dbh) within the 30-acre forest at Wise Point to increase the availability of forage (insects) for avian migrants (e.g., black-and-white warblers, ruby-crowned kinglets). In addition, snags would fulfill avian cavity nest site size requirements of species occurring on the refuge.
3. Develop a 15-year monitoring plan that outlines protocols for monitoring fruit production of forbs (pokeweed), shrubs and saplings (black cherry, viburnum) and vines (greenbrier, Virginia creeper, poison ivy). The monitoring plan would outline pre- and post-management monitoring to measure understory response to thinning.
4. Monitor the effects of deer on browse species and forage availability for neotropical migrants through the use of exclosures and control plots on both refuges.
5. Burn about 35 acres of loblolly pine stands at Wise Point to encourage a productive understory and kill pine seedlings.

6-10 years:

6. Manage loblolly pine stands that are approaching closed canopy conditions by removing trees as indicated above under Strategies 1-3.
7. Continue monitoring for fruit production and understory response to thinning. Based on monitoring results, manage stands where the canopy becomes closed.

11-15 years:

8. Continue monitoring understory growth. Based on monitoring results, manage stands where the canopy becomes closed.

Objective C: Upland Shrub

Maintain and increase native shrub-dominated cover (e.g., bayberry, chokeberry, sumac, viburnum) and nectar-producing forbs (e.g., pokeweed, goldenrod) on the existing mid-successional management units (MU 2-6, 6A, 7, 9-11, 14 and Wise Point tip) to increase the availability of feeding and resting habitat for shrub-

dependent migratory birds, including raptors, that rely on these resources.

Rationale for the Objective: Fruiting shrubs provide a fuel source for numerous fall migratory birds that migrate through the lower Delmarva Peninsula during their southern migration. Struthers et al. (2000) observed fall migrants using shrub habitats more than wooded sites; as trees encroached and shaded fruit-bearing shrubs, bird use declined. In addition, because abundant numbers of fall migrating raptors hunt these shrub habitats, they also provide an indirect food source. Increased nectar availability would also benefit migrating monarch butterflies.

1-5 years:

1. Establish experimental plots to control invasive plants (e.g., Japanese honeysuckle, fennel and kudzu) and evaluate the vegetative response to various treatment methods (e.g., mowing, prescribed burning, application of herbicides) prior to their widespread use. Monitor existing conditions prior to treatment.
2. Remove, using a chain saw or hydroaxe, approximately seven acres of loblolly pine adjacent to and encroaching on wax myrtle shrub habitat on the southern tip of Wise Point.
3. Remove, using a chain saw or hydroaxe, loblolly pine (< 25.4 cm dbh) from MUs 4, 5, 6, 6A, 7 and 10, leaving some scattered pines to provide winter and roosting cover.
4. While cutting loblolly pine in 6A, cut autumn olive shrubs and treat stumps with an approved herbicide to prohibit invasion once the area has been opened.
5. Allow grasslands in MUs 9, 10 and 11 to convert to shrub through natural succession.
6. Monitor the effects of deer on browse species and forage availability for neotropical migrants through the use of exclosures and control plots.
7. Assess breeding use by landbirds with Partners in Flight (PIF) priority (e.g., prairie warbler, field sparrow) using maritime shrub thickets.

6-10 years:

8. Burn cut areas on Wise Point (Strategy 2) and MUs 4, 5, 6, 6A, 7 and 10 (Strategy 3) to maintain newly created shrub habitats.
9. Monitor fruit production of forbs (pokeweed), saplings and shrubs (black cherry, bayberry, wax myrtle) and vines (greenbrier, Virginia creeper, poison ivy) using the same protocol developed in the fruit monitoring plan for forest understory (Objective B, Strategy 3).
10. Cut Management Units when pines and larger hardwoods

(dbh > 15.2 cm [Denmon 1998]) invade. Cut fields in 14-acre rotational blocks (Berdeen and Krementz, 1998) so fruiting shrub habitat is always available. Conduct monitoring on two plots: one each in MUs 5 and 7 to ascertain senescence and determine cutting schedule.

11. Develop an agreement with the Bridge-Tunnel Authority to manage pines on their property in the Wise Point area that are encroaching on wax myrtle shrub habitat.

11-15 years:

12. Remove regenerating loblolly pine, using a bushhog or hydroaxe, to facilitate shrub growth in MU 10.
13. Continue to monitor and control invasives and suppress loblolly pine invasion on MUs 2-6, 6A, 7, 9-11, 14 and Wise Point tip.

Objective D: Grasslands

Establish a large contiguous block (78 acres) of native warm season grasses in MUs 1 and 13 to provide food sources, perches and escape cover for grassland-dependent temperate and neotropical migratory birds. Vegetative cover would consist of 65-90 percent warm season grasses (e.g., little bluestem, Indian grass), 10-35 percent forbs (e.g., goldenrod, pokeweed) and 10-20 percent scattered native shrubs (e.g., groundsel, bayberry).

Rationale for the Objective: Size is a required element of breeding habitat for many grassland bird species (Vickery et al. 1994). While few studies exist, size is also believed to play a role for migrating and wintering grassland-dependent birds (Watts 2000). Many species of grassland birds are declining throughout their range due to habitat loss (Askins 1993); therefore, the refuge seeks to provide migrating and wintering grassland bird habitat where feasible. Grassland management would only occur where large contiguous grassland habitat can be established on the refuge without depleting existing shrub or forested habitat.

Field habitat.
Charles Philip

1-5 years:

1. Maintain existing grasslands (over the life of the plan) using a variety of techniques including mowing, prescribed burning, and discing.
2. Establish experimental plots in MU 1 to control invasive plants and evaluate the vegetative response to various treatment methods (e.g., mowing, discing, application of herbicides) prior to their widespread use. Monitor existing conditions prior to treatment.
3. Remove hedgerows and autumn olive between MUs 1 and 13.

6-10 years:

4. Eradicate 20 percent of the existing Japanese honeysuckle population per year over a five-year period based on the results of Strategy 2 using invasive control measures such as mowing and the application of herbicides.
5. Eliminate 10 percent of the existing fennel population per year over a 10-year period using appropriate control techniques (e.g., deep discing, plowing, herbicides) based on the results of Strategy 2.
6. Eliminate the feral cat population on the Eastern Shore of Virginia Refuge. Refuge staff would live trap animals and transfer them to a shelter for adoption. Refuge staff would continue to manage the feral cat population as needed.

11-15 years:

7. Continue to monitor and control invasives and manage for grasslands on MU 1 and 13.

GOAL 2: Maintain the long-term productivity, integrity and function of the marsh, beach and interdunal communities.

Objective A: Beach Dynamics

Maintain the natural dynamics of erosion and accretion of the beach community on Fisherman Island Refuge by allowing these coastal areas to grow and erode with passing storms and water currents.

Rationale for the Objective: Fisherman Island is a unique example of an undisturbed, mid-Atlantic coastal barrier island. Like many coastal islands, it consists of several dynamic habitats, such as beach, dune and tidally-influenced salt marsh. Accretion has led to significant increases in beach and foredune habitat on the north/northeast and south/southeast portions of the island. There have been similar increases in salt marsh habitat in the northern section of the island. Monitoring these habitats will help us understand why certain species use the island, and why others do not.

In addition to Alternative A:

1-15 years:

1. Monitor sand accretion and erosion on Fisherman Island at least every two years using accepted protocols.
2. Evaluate vegetation in royal tern nesting area; investigate the need to remove vegetation to enhance tern nesting habitat and deter nesting gulls.

Objective B: Beach and Dune Habitats

Enhance the quality of nesting (e.g., royal tern, American oystercatcher) and migrating (e.g., sanderling) habitat on Fisherman Island Refuge by minimizing disturbance to beach-dependent birds and other wildlife from humans and predators.

Rationale for the Objective: Disturbance can lead to nest abandonment, chick mortality and predation of nests and chicks during the breeding season (Burger 1991, 1994). Disturbance to staging areas during migration can lead to declines in shorebird abundance (Pfister et al., 1992).

In addition to Alternative A:

1-15 years:

Minimize Human Disturbances

1. Focus interpretive and educational tours on Fisherman Island Refuge along the entrance road and within a quarter of a mile of where the entrance road reaches the beach.
2. Complete weekly avian surveys from Feb. 1 to Oct. 31 to assess when target birds (e.g., American oystercatchers, royal terns) are in the area. Complete bimonthly surveys the remainder of the year.
3. Update flora survey of Fisherman Island Refuge.
4. Use exclosures and control plots to determine if there are significant deer browse impacts on the refuge.
5. Install closure signs on Fisherman Island Refuge to inform boaters the island is closed to the public. A Sign Plan would contain details of where the signs would be placed and what they would say.
6. Hire a law enforcement officer to educate the public about the sensitive nature of barrier islands and nesting bird colonies and to enforce area closures, particularly during the nesting season.

Ringbilled gull.
James Cameron

Minimize Predator Disturbance

7. Establish track stations every two years near colonial nesting bird sites to monitor for mammalian predator activity; continue quarterly predator transect surveys on Fisherman Island beaches and marshes.
8. Monitor colonial nesting bird sites each nesting season for the presence of mammalian predators, avian losses, and predator/prey relationships.
9. Determine and evaluate productivity for the following

species: brown pelican, royal tern, American oystercatcher, laughing gull, herring gull, and great black-backed gull.

10. Implement a zero tolerance policy for red fox, coyote and feral cats by immediately removing these predators using appropriate humane methods such as padded leg-hold traps and/or lethal means.
11. Implement gull control measures if colonial nesting or beach nesting bird numbers are in decline because of predation, competition or displacement by gulls. We would assess and implement the use of non-lethal control methods, such as harrassment, before implementing lethal methods, such as destroying nests/eggs, addling eggs or killing adults.

Objective C: Threatened and Endangered Species

Protect and maintain beach habitat on the refuges in an unimpaired condition for Federal listed species, and other species and habitats of special concern.

Rationale for objective: Three listed species -- Northeastern beach tiger beetle, piping plover and seabeach amaranth -- either occur or historically have occured on the refuges. When State recovery plans become available, we would use them whenever practical to manage State listed species found on the refuges.

Northeastern beach tiger beetle

The Northeastern beach tiger beetle is a Federal listed species found on the southern tip beach of the Eastern Shore of Virginia Refuge. It is the only listed species suspected to reside on either of the refuges. The Sunset Beach Resort owns property abuting the southern tip beach. Cooperation with resort owners is necessary for the beetles' protection.

1-5 years:

1. Monitor beach width annually on the southern tip beach to determine the beach nesting habitat available for tiger beetles.
2. Survey adult tiger beetles between the end of June and the beginning of July to determine breeding population status (Knisley 2001).
3. Conduct weekly adult tiger beetle surveys for 3-5 years in the summertime, beginning in June, to look at fluctuations in populations.
4. Assess trespassing (e.g., number of people and type of activity) on the southern tip beach.

5. Coordinate with Sunset Beach Resort to protect the tiger beetle population on the refuge and to educate the public about tiger beetle life history requirements.
6. Install interpretive signs on the southern tip beach to provide information about tiger beetles.

6-10 years:

7. Using genetic tests, determine which subspecies of Northeastern beach tiger beetle exist on the southern tip beach.
8. Depending on results from adult tiger beetle surveys, conduct tiger beetle larval surveys on the southern tip beach for a minimum of three years to determine if tiger beetles breed on the refuge.

Piping plover

The piping plover was last recorded nesting on Fisherman Island in 1992. Reasons for absence of recent nesting activity may include the sparse and declining numbers of breeding birds in this portion of the species' range, sub-optimal (but moderately suitable) habitat, and deterrence of plover courtship activities by roosting herring and great black-backed gulls. Frequent surveying and monitoring is imperative for the plover to establish itself on the island again.

1-5 years:

9. Conduct semi-weekly (twice a week) surveys of piping plovers during spring migration (approximately March to early May) and fall migration (August to mid-September) to determine the importance of the site for migration.
10. Conduct weekly surveys of breeding plovers in late May, June and July.
11. Conduct semi-monthly (twice a month) surveys of piping plovers the rest of the year (October-February). Note locations of piping plover with Global Positioning System (GPS) and note micro-habitat characteristics to determine if patterns exist where plovers are observed foraging. Use this to determine and locate the best potential nesting areas. Report sightings of color-banded birds.
12. If plovers are found nesting on Fisherman Island Refuge, maximize potential production by providing intensive protection from predators.

6-10 years:

13. Use GPS to map locations of nesting American oystercatchers on Fisherman Island Refuge to assist in

determining potential sites for breeding piping plovers. (Oystercatchers and plovers use similar habitat).

Seabeach amaranth

Seabeach amaranth was Federally listed as threatened in 1993 by the Service. An annual plant, the amaranth often grows in the same areas selected for nesting by shorebirds. Threats include beach stabilization efforts, intensive recreational use and herbivory by webworms. The plant has historically occured in Northampton County. More intense surveying is needed to assure the plant's protection should it become established on Fisherman Island Refuge.

1-15 years:

14. Survey once a month, in July and August, for seabeach amaranth. Surveying can be completed from a vehicle.
15. If found, establish a 10-foot buffer of engineering tape or other type of obvious barrier around the plant.

Objective D: Tidally-Influenced Salt Marsh

Monitor, and where possible, preserve the quality and natural function of tidally-influenced salt marsh on the refuges for marsh-dependent birds (e.g., clapper rail, seaside sparrow) and other avian species.

Rationale for the Objective: Marsh and wading bird species are a group of migratory birds that include species of regional and national management concern. Baseline data regarding the status of marsh and wading birds that occur on Fisherman Island and Eastern Shore of Virginia Refuges are needed. Data would be used to determine species presence, abundance and distribution, and would aid in monitoring temporal impacts of salt marsh habitat changes (i.e., rise in sea level).

1-5 years:

1. Continue annual marsh breeding bird callback surveys according to Service regional protocol to assess the use of salt marsh habitat by breeding birds.
2. Conduct an annual breeding bird survey of the heron rookeries.
3. Continue to conduct and expand regional marsh bird surveys.
4. Determine the extent of the phragmites invasion on both refuges through aerial photos and ground investigations.
5. Conduct baseline studies in the vicinity of the boat ramp

related to marsh-dependent species, water quality, and habitats.

6-15 years:

6. Control phragmites according to the Invasive Species Management Plan. This may include the use of herbicides in late summer and prescribed burning in late fall/early winter.
7. Continue surveys in Strategies 1-5.

Goal 3: Actively participate in the conservation of healthy hardwood, understory and grassland habitat for neotropical and temperate migratory birds during future development throughout Northampton County.

Objective A: Protect Existing Forest/Shrub Migratory Bird Stopover Habitat

Maintain unprotected forest and shrub habitat within the lower 10 km of the Delmarva Peninsula to reduce the rate of loss of stopover habitat for neotropical and temperate migrants.

Rationale for the Objective: Because of its geographic configuration, the lower Delmarva Peninsula provides important stopover habitat for large concentrations of migrant land birds. Studies have identified the highest priority lands as those within the southernmost 10 km of the peninsula, within a 1.5-km-wide zone (10k zone) bordering bayside and seaside coastlines (Mabey et al. 1993, Watts and Mabey 1994). Due to this concentration effect, and rapidly increasing development pressures, protection or restoration of migration habitat of any size or configuration at the southern tip of the peninsula is critical. See the Draft Land Protection Plan (Appendix K) for more details.

In addition to Alternative A:

1-5 years:

1. Protect existing forest and shrub habitat through purchase of fee title or conservation easements within the 10k zone (see Map 2-7). Lands would be acquired from willing sellers within a proposed 6,030-acre acquisition area, which includes approximately 1,800 acres of forested habitat important to migrants. The area extends from the tip of the peninsula north along the bay shoreline to Plantation Creek, and north along the seaside shoreline up to Walls Landing Creek, and is bounded by Routes 600 on the east and 645 on the west. Much of the remaining forest occurs in low, wet riparian areas along creek drainages or on hydric soils too wet to farm, and is surrounded by farm land.

2. Work with local realtors to monitor the availability of high-priority lands for purchase.
3. Coordinate Geographic Information System (GIS) analysis of the lower Eastern Shore with Northampton County officials, The Nature Conservancy (TNC), State, and Service partners to further support cooperative land protection efforts on the lower Delmarva Peninsula.
4. Assist State, County and private partners in obtaining grants to protect high-priority lands through a variety of land protection strategies (e.g., direct purchase, conservation easements).
5. Coordinate with the Northampton County Planning Commission, Accomack-Northampton Planning District Commission and others to identify private lands within the County that are suitable for conservation easements.

6-10 years:

6. Coordinate with partners to develop a training course on conservation easements for Refuge, State and County employees.
7. Encourage and support the development of a land trust by local citizens to protect high-priority wildlife habitat in Northampton County.

Objective B: Acquire and Restore Agricultural Lands to Forest/Shrub Migratory Bird Stopover Habitat

Acquire and restore agricultural lands to hardwood forest and shrub migration habitat in the lower 10 km of the Delmarva Peninsula to increase the availability of high-quality staging and stopover habitat for neotropical and temperate migrants.

Rationale for the Objective: Same as Objective A.

1-5 years:

1. Acquire and restore agricultural lands within the 6,030-acre proposed acquisition area to hardwood forest and shrub habitat to widen/reconnect the vegetated migration corridor where possible. The project area includes approximately 3,315 acres of agricultural land, or about 55 percent of the total land area proposed for acquisition. Land would be acquired from willing sellers, as available funding allows.
2. Work through our Partners for Wildlife Program and with other partners, such as the Natural Resources Conservation Service, to establish conservation easements on agricultural lands not protected through acquisition within and outside the 6,030-acre proposed acquisition

area. Focus particularly on restoration of vegetated riparian buffers along creek drainages and on marginal agricultural soils.

Goal 4: Provide wildlife-dependent recreational opportunities and community outreach with an emphasis on educating the public about the critical role the Delmarva Peninsula serves for neotropical and temperate migratory birds and migrating monarch butterflies.

Objective A: Hunting Opportunities

Offer high-quality, safe opportunities for archery and shotgun deer hunting on existing or new refuge lands to provide wildlife-dependent recreational opportunities and to enhance the quality of the understory for neotropical and temperate migrants.

Rationale for the Objective: Hunting is identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use. Also, studies have shown an overabundance of deer can have a significant detrimental effect on the forest understory. Such habitat is of particular importance to neotropical and temperate migratory birds. A deer hunting program would help prevent serious habitat degradation of the forest understory.

Bow hunter.
USFWS photo

In addition to Alternative A:

1-5 years:

1. Work with State and Federal partners to determine if the number of hunters per refuge hunt zone is within safe limits given the proximity of the hunt to refuge housing and public roads.
2. Work with State partners to modify the hunt program at Eastern Shore of Virginia Refuge to increase the take of deer.
3. Work with State partners to assess the health of the deer population on Fisherman Island Refuge.
4. Open a portion of the former Wise Point property to deer hunting.
5. Provide waterfowl hunting opportunities by boat only on a portion of the former Wise Point property. Waterfowl hunt season dates and bag limits would fall within the parameters of the State's waterfowl season and would be administered in a way that would cause the least amount of disturbance to neotropical migratory birds. This may mean starting the season later, which would also mitigate conflicts between waterfowl hunting and other wildlife-dependent recreational activities.

6-10 years:

6. Open a portion of Fisherman Island Refuge to an archery deer management hunt. A management hunt means the hunt is open to the public but is conducted for biological reasons and does not have to be conducted every year. Hunters would be allowed to take antlerless deer only.
7. Allow deer and small game hunting on lands to be acquired provided there would be minimal disturbance to neotropical migratory species. Hunting would fall within the parameters of the State hunting seasons, and would be administered so as to minimize disturbance to neotropical migrants. Deer hunting would start after December 1. Hunting would be allowed only on forested tracts measuring 75 acres or more in size. No pursuit dogs would be allowed.
8. Allow waterfowl hunting on marsh blocks to be acquired that are 200 acres or larger. Most waterfowl hunting would take place on any seaside marsh areas we would acquire. Waterfowl hunting on new lands would be subject to the conditions mentioned in Strategy 5 above.

Objective B: Boating and Fishing Access

Accommodate the needs of commercial and recreational fishermen and recreational boaters by providing deep water access to fishing and hunting grounds on the Atlantic Ocean and Chesapeake Bay.

Wise Point Boat Ramp.
USFWS photo

Rationale for the Objective: The Wise Point boat ramp is located on the deep waters of the Virginia Inside Passage which was constructed in the 1950's and bisects the refuge. Despite miles of shoreline in Northampton County, public deep water access is very limited. There are six public boat access points in the county (not including Wise Point), with the closest ramp on the Atlantic Ocean located 10 miles north (Oyster). On the Chesapeake Bay the closest public ramp is 3.5 miles away (Kiptopeke State Park). Both of these ramps are used beyond capacity during certain summer days and other popular fishing times. Additionally, the Wise Point site is ideal because of its proximity to the Chesapeake Bay Bridge Tunnel, a popular fishing location. The ramp location also affords a relatively safe harbor because of the islands and marshes to the east which provide protection to boaters during storms and high winds.

There was limited use of the boat ramp by recreational and commercial users before the area became part of the refuge. Because of both the demand and limited suitable sites for boat launching in the County, there is an expectation that this site be available to the public. Additionally, there were 21 commercial

Environmental Education Group.
USFWS photo

watermen paying for and using this site on a commercial basis. Many of these commercial watermen have Commonwealth-leased grounds and permits for locations in close proximity to the Wise Point ramp. These watermen have a vested interest in gaining access that is proximate to their established work sites. Northampton County, which has little revenue from industrial and manufacturing businesses, is trying to balance maintaining the rural atmosphere of the county and their fiscal needs. The Wise Point boat ramp will bring dollars to the County through use by recreational boaters, ecotourism and commercial watermen in the form of job opportunities, taxation on commercial catch, and purchase of fuel, food and lodging.

1-5 years

1. Conduct baseline studies in the vicinity of the boat ramp related to marsh-dependent species, water quality, and habitats.
2. Secure a right-of-way agreement with Northampton County.
3. Improve and widen the entrance road, and improve and enlarge the parking lot. Cap parking at 75 spaces, reserving 12 spaces for commercial watermen.
4. Construct a two-lane boat ramp, commercial dock and a commercial off-loading site. Provide support facilities such as restrooms, lighting, an electric gate, overflow/satellite parking and signage.
5. Minimize impact to permitted commercial watermen by allowing access during construction as much as possible.
6. Once improvements are made, open the ramp daily to recreational anglers and boaters and commercial watermen during normal refuge hours (½ hour before sunrise to ½ hour after sunset) with extended hours during certain seasons. Open the ramp for 24-hour access to a limited number of permitted commercial watermen that were using the area on a commercial basis and paying a commercial rate at the time of Service purchase (Dec. 26, 2001). The refuge may be closed at certain times, (e.g., gun hunt, prescribed burning) impacting access to the boat ramp at those times.
7. Charge $10 for recreational day-use permits and $120 for an annual recreational pass (rates will change with inflation). Users that were commercially using the area and paying a commercial rate when the Service purchased the site will pay an annual fee of $1,500 for those who dock their boats and $600 for those who do not dock their boats (no new docking privileges will be granted). New commercial users and commercial users that were not paying a commercial fee when the Service purchased the

property will be allowed to use the site commercially and will be charged $400 annually. These new commercial users will not be granted use of the docks, reserved parking, nor 24-hour, 7 days-a-week access. However, they will be allowed to use the unloading area for commercial catch.

8. Boat docking will be phased out over time. Once the commercial watermen (those that met certain criteria when the land was purchased) retire or terminate commercial fishing from this site their docking rights will be relinquished. However, their other special rights (24-hour access, reserved parking) may be passed on to one heir who is a named individual (not a business) and is actively participating in commercial fisheries from the site. All special rights terminate after the second generation.
9. Cap the number of canoes and kayaks to two per vehicle; any vehicle operator with more than two kayaks must obtain a Special Use Permit.
10. After improvements are completed, contract with a concessionaire to manage the site. If no concessionaire is found, manage the site through the refuge fee program.
11. Do not allow pets in the boat ramp area.
12. Do not allow personal watercrafts (PWCs) to launch from the boat ramp.
13. Partner with the State to extend the no-wake zone in the Virginia Inside Passage, adjacent to the refuge.
14. Provide opportunities for shoreline and other fishing on new refuge lands acquired on the bayside of the Delmarva Peninsula provided that such opportunities would not harm or harass existing tiger beetle populations.

Objective C: Wildlife Observation and Photography

Expand opportunities for visitors to engage in compatible wildlife-dependent recreation on the Eastern Shore of Virginia Refuge by providing additional opportunities to view and photograph neotropical and temperate migrants along trails and existing roads.

Rationale for the Objective: Wildlife observation and photography are identified in the National Wildlife Refuge System Improvement Act of 1997 as priority public uses. Providing increased opportunities for the public to participate in these activities on the refuge promotes visitor appreciation and support for refuge programs as well as habitat conservation efforts on the southern tip of the Delmarva Peninsula.

In addition to Alternative A:

1-5 years:

1. Allow pedestrian access to the Wise Point Road trail for wildlife observation and photography. The .6-mile trail will run along the road and then extend to the salt marsh, where we would construct a 200-foot boardwalk leading to a marsh overlook with associated interpretive panel. There would be limited access (i.e., tours) to the trail during fall migration to curb disturbance to migratory species.
2. Establish a 0.2-acre butterfly garden at the refuge office and initiate a volunteer "Adopt-a-Garden" program to ensure refuge butterfly gardens are maintained.
3. Conduct weekly butterfly walks in October to educate visitors about the monarch migration.
4. Establish links on photography websites to promote the refuge as a good place to view and photograph wildlife, particularly neotropical and temperate migratory birds during the fall migration.

6-10 years:

6. Conduct an annual photography workshop incorporating both classroom and field activities that focuses on refuge wildlife, particularly neotropical and temperate migrants.
7. Promote wildlife viewing and photography on the refuge website by posting a series of new photographs and species information monthly.
8. Establish a 0.2-acre butterfly garden at the wildlife trail parking lot.
9. Provide opportunities for wildlife observation and photography on lands to be acquired wherever those opportunities would least disturb migratory species. We would provide between three and six new trails if we acquired all 6,030 acres on the lower Delmarva Peninsula. There would be at least one but no more than two trails each on the bayside, the southern tip, and the seaside of the Delmarva Peninsula. At least one trail on the bayside would have beach access; there is no potential for beach access on the seaside because of the extensive marshlands.

Objective D: Environmental Education

Focus 85 percent of the content of educational programs on the importance of the Eastern Shore of Virginia Refuge to forest and shrub-dependent neotropical and temperate migrants to promote awareness among Northampton County students and other program participants of the refuge's role in the conservation of migratory birds and their habitats.

Rationale for the Objective: Environmental education is identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use. It also serves as a valuable tool in the protection of our nation's wildlife and habitat resources. Educating young people about wildlife conservation fosters an appreciation of the important role the refuge plays in support of these efforts and hopefully motivates individuals to make responsible environmental decisions in the future.

In addition to Alternative A:

1-5 years:

1. Develop three lesson plans focusing on neotropical and temperate migrants and which follow State Standards of Learning guidelines.
2. Develop an additional Junior Refuge Manager Program that targets fifth- to seventh-graders and which emphasizes habitats important to neotropical and temperate migrants.
3. Educate all third graders in Northampton County about migrating monarch butterflies and familiarize them with the "Monarch Watch" program and website.
4. Develop four interpretive programs for summer day camps from both the Eastern Shore and Hampton Roads areas that focus on the importance of the refuge to neotropical and temperate migrants.
5. Work with partners to develop and conduct one environmental education program per year, taught in Spanish, aimed at educating the Eastern Shore's Hispanic population about local conservation issues, with an emphasis on the importance of the refuge to neotropical and temperate migrants.

6-10 years:

6. Conduct one on-site teacher workshop annually that focuses on fall migration. Develop workshops in conjunction with an accredited university so teachers can obtain continuing education units.
7. "Adopt" a classroom at Kiptopeke Elementary School. This would include developing a series of monthly environmental education programs for a specific class throughout the school year that focuses on the refuge and its importance to neotropical and temperate migrants.
8. Work with local partners like the Barrier Island Museum, The Nature Conservancy (TNC) and Kiptopeke State Park to support an annual Elderhostel program focusing on improving habitat for neotropical and temperate migrants.
9. Develop three lesson plans on migration that can be used by teachers in the classroom.

11-15 years:

10. Design and construct an outdoor environmental study area consisting of a half-mile trail, three teaching stations, and a pavilion to educate students from the Delmarva Peninsula and nearby areas on the importance of the refuge to neotropical and temperate migrants.
11. Renovate the Environmental Education building to include a wet lab, indoor classrooms, hands-on exhibits and teacher resource library.

Objective E: Wildlife Interpretation

Promote awareness among refuge visitors and residents of the lower Delmarva Peninsula regarding the refuge's role in the conservation of migratory birds and their habitats. Focus 85 percent of interpretive materials, signs, and exhibits on the importance of the Eastern Shore of Virginia Refuge to forest and shrub-dependent neotropical and temperate migrants.

Rationale for the Objective: Wildlife interpretation is identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use. Providing the public with a wide variety of interpretive information about neotropical and temperate migrants would greatly increase public understanding and support for habitat protection efforts on the southern tip of the Delmarva Peninsula.

In addition to Alternative A:

1-5 years:

1. Revise refuge brochure and website to focus more attention on the importance of the refuge to neotropical and temperate migrants.
2. Create a diorama in the Visitor Center that depicts the important neotropical and temperate migrant habitats on the lower eastern shore and the species associated with them.
3. Develop two permanent interpretive displays for the wildlife trail kiosk that focus on the refuge as a staging area for neotropical and temperate migrants.
4. Develop a portable/traveling exhibit that emphasizes the importance of the refuge to neotropical and temperate migrants. The exhibit would be used for off-refuge festivals and events and could be displayed at various public buildings.
5. Work with partners (e.g. Coastal Virginia Wildlife Observatory) to enhance and expand, from March to May,

Pesticide spraying.
USFWS photo

the interpretive bird banding program for the general public and students.

6-10 years:

6. Design three interpretive trail signs to address the importance of the refuge to neotropical and temperate migrants.
7. Conduct a monthly fall interpretive walk that focuses on neotropical and temperate migratory bird identification and habitat needs.
8. Conduct a monthly interpretive program (e.g., "owl hoots") in the late fall during evening hours that focuses on field identification of owls.
9. Provide interpretive signs along new trails where appropriate. Signs on bayside trails could interpret the importance of the beach area to the Northeastern beach tiger beetle; signs on a southern tip trail could interpret the importance of the area to neotropical migrants; signs on the seaside could interpret the importance of the salt marsh to water birds.

11-15 years:

10. Produce an interpretive video that describes hardwood and understory management, with an emphasis on habitat management practices that benefit neotropical and temperate migrants.
11. Install a camera at an active osprey nest platform and broadcast the image on a monitor at the Visitor Center. Place pictures from the camera on the refuge website.

GOAL 5: Integrate the refuges into the larger community of the eastern shore and promote awareness of the unique value of the lower Delmarva Peninsula to neotropical and temperate migratory birds and migrating monarch butterflies.

Objective A: Encourage Responsible Nature-Based Tourism

Communicate to the local service industry (e.g., tourism guides; employees of hotels, bed and breakfasts, restaurants) the ecological importance of the Eastern Shore of Virginia and Fisherman Island Refuges, and encourage the use of responsible resource stewardship practices to promote the lower Delmarva Peninsula as a nature-based tourism destination.

Rationale for the Objective: Working with partners to draw attention to the importance of the refuge and surrounding lands as critical stopover and staging habitat for neotropical and temperate migrants could potentially generate a broad base of support for

habitat conservation efforts in the lower Delmarva Peninsula. Tour guides would be taught how to minimize the impacts of their activities so they can showcase the area's natural resources without adversely affecting wildlife or its habitats. Increased nature-based tourism would also provide additional recreational opportunities for visitors and economic benefits to the local community.

In addition to Alternative A:

1-5 years:

1. Support the Coastal Virginia Birding Trail by developing an interpretive site on the refuge and promoting other coastal sites on the refuge website.
2. Work with the Virginia Institute of Marine Sciences and other universities and agencies to develop a certification course for commercial tour guides that focuses on minimizing the environmental impacts of nature-based tourism.
3. Work with partners to develop the Virginia Kayaking Trail along the eastern shore.

6-10 years:

4. Establish closer relationships with the local business community to promote responsible nature-based tourism. This includes educating tour guides about the area's sensitive natural resources and encouraging responsible behavior around sensitive wildlife habitats and populations with emphasis on neotropical and temperate migrants.

11-15 years:

5. Work with partners (e.g., Chamber of Commerce, Citizens for a Better Eastern Shore, bed and breakfasts, local restaurants) to develop nature-based tourism "packages" (lodging, transportation, meals) that highlight refuge resources through organized tours and workshops.
6. Work with the Bridge-Tunnel Authority to develop and install four new interpretive signs on the bridge islands, overlook and rest areas. The signs would focus on neotropical and temperate migrants.
7. Develop a three-mile bike trail with two pull outs and interpretive panels that focus on the importance of the lower Delmarva Peninsula to neotropical and temperate migrants.

Objective B: Increase Refuge Recognition and Support

Increase efforts to build recognition and support for the refuge by improving communication with local and national constituents and the interested public (e.g., Congress, conservation organizations, local communities, news media, and corporations).

Rationale for the objective: Fostering relationships with community leaders, local politicians, and the news media would strengthen support for the refuge and its programs. Special events improve community relations and awareness and provide benefits to the local economy. Volunteer efforts and establishment of a Friends Group would help broaden refuge support in neighboring communities.

In addition to Alternative A:

1-5 years:

1. Institute an annual field workshop for government and non-government partners that focuses on wildlife management issues on the refuge, with emphasis on forest and shrub-dependent neotropical and temperate migrants.
2. In cooperation with partners (e.g., Northampton County Chamber of Commerce, State agencies and private landowners), continue planning International Migratory Bird Day activities on the refuge and work together on other special events (e.g., Birding Festival).
3. Form a refuge Friends Group to work both on and off the refuge. Off-refuge work would focus on developing partnerships in the local community and educating local landowners about Service land protection programs. Refuge staff would partner with the National Wildlife Refuge Association to train, mentor, support, and expand this new Friends Group.
4. Meet with Congressional representatives at least annually to provide an update on refuge operations and programs.
5. Increase efforts to invite television, newspaper, radio, and other media to major refuge events throughout the year (e.g., International Migratory Bird Day, Birding Festival, National Wildlife Refuge Week, etc.).

6-10 years:

6. Work cooperatively with the Audubon "Refuge Keepers" program and/or other local environmental organizations to establish a vibrant volunteer corps to promote community stewardship of the refuge and increase public understanding of local conservation issues. This new group would also assist with expansion of corporate partnerships

to increase financial support of refuge programs.

7. Conduct a tour of the refuge during the fall Harvest Festival that emphasizes the importance of the eastern shore to neotropical and temperate migrants.
8. Provide refuge information to participants of the Virginia State Fair and similar events emphasizing the important role the refuge serves for neotropical and temperate migrants.
9. In conjunction with partners, expand corporate sponsorship of refuge-related events such as International Migratory Bird Day, National Wildlife Refuge Week Celebration, and National Fishing Week.

Objective C: Deliver a Conservation Message

Deliver a conservation message to those involved in land use and development. The message would emphasize practices beneficial to forest and shrub-dependent neotropical and temperate migrants.

Rationale for the Objective: This objective is aimed at raising the ecological awareness of those individuals actively involved in local land use and development such as building contractors, agricultural extension agents and local nurseries. It would also encourage landowners to improve the habitat value of their property for neotropical and temperate migrants. Successful achievement of the objective would foster a broader base of support for the refuge and resource conservation efforts on the lower Delmarva Peninsula.

In addition to Alternative A:

1-5 years:

1. Work with cooperating organizations (e.g., local nurseries, garden clubs, agricultural extension office) to educate landowners on how to improve the value of their property as habitat for neotropical and temperate migrants.

6-10 years:

2. Develop a demonstration plot on the refuge to educate homeowners about landscape practices that benefit neotropical and temperate migrants.
3. Coordinate with a local garden club to highlight "wildlife friendly" landscape practices on one to three homes in the County, focusing on the benefits to neotropical and temperate migrants.

11-15 years:

4. Develop a program to certify building contractors as "wildlife-friendly" in their practices so contractors can market this attribute to potential customers.
5. Work with the National Wildlife Federation to promote their backyard wildlife habitat program which educates homeowners about "wildlife friendly" land use practices they can undertake on their property.
6. Develop and promote, in conjunction with the local Chamber of Commerce, a garden tour focusing on fall nectar-producing flowers and stressing the important role the eastern shore plays for migrating monarch butterflies.
7. Develop a brochure for local residents regarding the importance, care and maintenance of landscaping with native nectar-producing plants.
8. Work with private landowners to create five demonstration gardens in Northampton County for local residents to learn first hand how to develop their own butterfly garden using native nectar producing plants.

Objective D: Assess Economic Impact of Nature-Based Tourism

To foster support for the refuge and its programs in nearby communities, deliver a positive message to area businesses and residents of Northampton County regarding the impact the refuge and its visitors have on the local economy.

Rationale for the Objective: Community leaders, business owners and local residents would better understand how the refuge and nature-based tourism benefits the local economy and helps maintain the quality of life in Northampton County.

6-10 years:

1. In partnership with the local community, assess the economic benefits of the migratory bird resource to Northampton County.
2. Using the publication *Banking on Nature* and similar resources, promote to the local community the economic contribution of the refuge to Northampton County.

Goal 6: Enhance and restore the quality of the soils, waters, and other abiotic components of the refuge landscape.

Objective A: Contaminants

Determine the extent of contamination, if any, on existing refuge lands known or suspected to be contaminated, and the effects of those contaminants on wildlife and plants.

Rationale for the Objective: A 1998 report (U.S. Environmental Protection Agency) was prepared to document levels of contaminants in ground water, surface water, soils and sediments on the Eastern Shore of Virginia Refuge. Sampling conducted for the report, however, was limited in design. Results indicate that at several locations on the refuge, organochlorine (pesticide) contamination may be impacting plants and animals. Since the extent of the contamination throughout the habitat is not adequately described by the sampling that was conducted for the 1998 report, and the results are not adequate to evaluate the risk to plants and animals, the Service recommends more thorough sampling.

County firearms range.
Susan Rice

In addition to Alternative A:

1-5 years:

1. For heavy metals and organochlorine pesticides, work with Northampton County to conduct thorough sampling of sediments and surface waters of the firearms range and the wetlands beyond it, Raccoon Creek and its drainages, and groundwater flow from the former landfill and sewage lagoons.
2. Biotic sampling may be conducted based on the interpretation of results from the recommended media sampling above.

Objective B: Firearms Range

While operating the firearms range in the best interest of the refuge and law enforcement user groups, work with Northampton County to monitor impacts of spent ammunition on wildlife habitat.

Rationale for the Objective: Although the firearms range has safety berms on three sides, it is not lined to prevent leachate from percolating the soil or assisting in future contaminant isolation and cleanup. All proposed actions would include close cooperation with Northampton County.

In addition to Alternative A and in cooperation with the County:

1-5 years:

1. Conduct media sampling beyond the firearms range berm to evaluate ecological risk to biotic elements.
2. Design and implement engineering mechanisms to control surface runoff and leachate.
3. Implement current practices for firearms range management such as periodic removal of contaminated soils.

Objective C: Contingency Planning for Oil and Hazardous Material Spills

Assist with protecting the environmental quality of the lower Delmarva Peninsula by serving as an active participant in contingency planning and response to oil and hazardous material spills in the Atlantic Ocean and Chesapeake Bay.

Rationale for the Objective: Due to its geographic location, the southern Delmarva Peninsula and its surrounding salt marshes are especially vulnerable to threats from oil and hazardous material spills. Time and planning are critical factors for mitigating spill impacts on the Eastern Shore of Virginia and Fisherman Island Refuges.

In addition to Alternative A:

1-5 years:

1. Maintain close communication and coordination with the Bridge-Tunnel Authority to achieve early spill notification.
2. Maintain close communication with the spill response coordinator at Chincoteague National Wildlife Refuge.
3. Provide current sensitive area maps of both refuges to the Bridge-Tunnel Authority and familiarize them with access points for deploying spill control equipment.
4. Encourage the Bridge-Tunnel Authority's participation in the Mid-Atlantic Coastal Area Planning Committee for spill response, control and prevention purposes.
5. Provide spill response training for refuge staff.
6. Ensure staff are familiar with the Service's spill response chain of command in Virginia and for the Delmarva Peninsula.

6-10 years:

7. With the Service's Field Response Coordinator, explore with the U.S. Coast Guard and the Mid-Atlantic Coastal Area Planning Committee the idea of conducting a mock spill drill in the area of the southern Delmarva Peninsula.

Objective D: Remove Artificial Structures

Promote a more natural appearance to refuge landscapes and increase the amount of acreage available as wildlife habitat by removing unnecessary artificial structures that obstruct views, occupy space, and in some cases constitute direct hazards to wildlife.

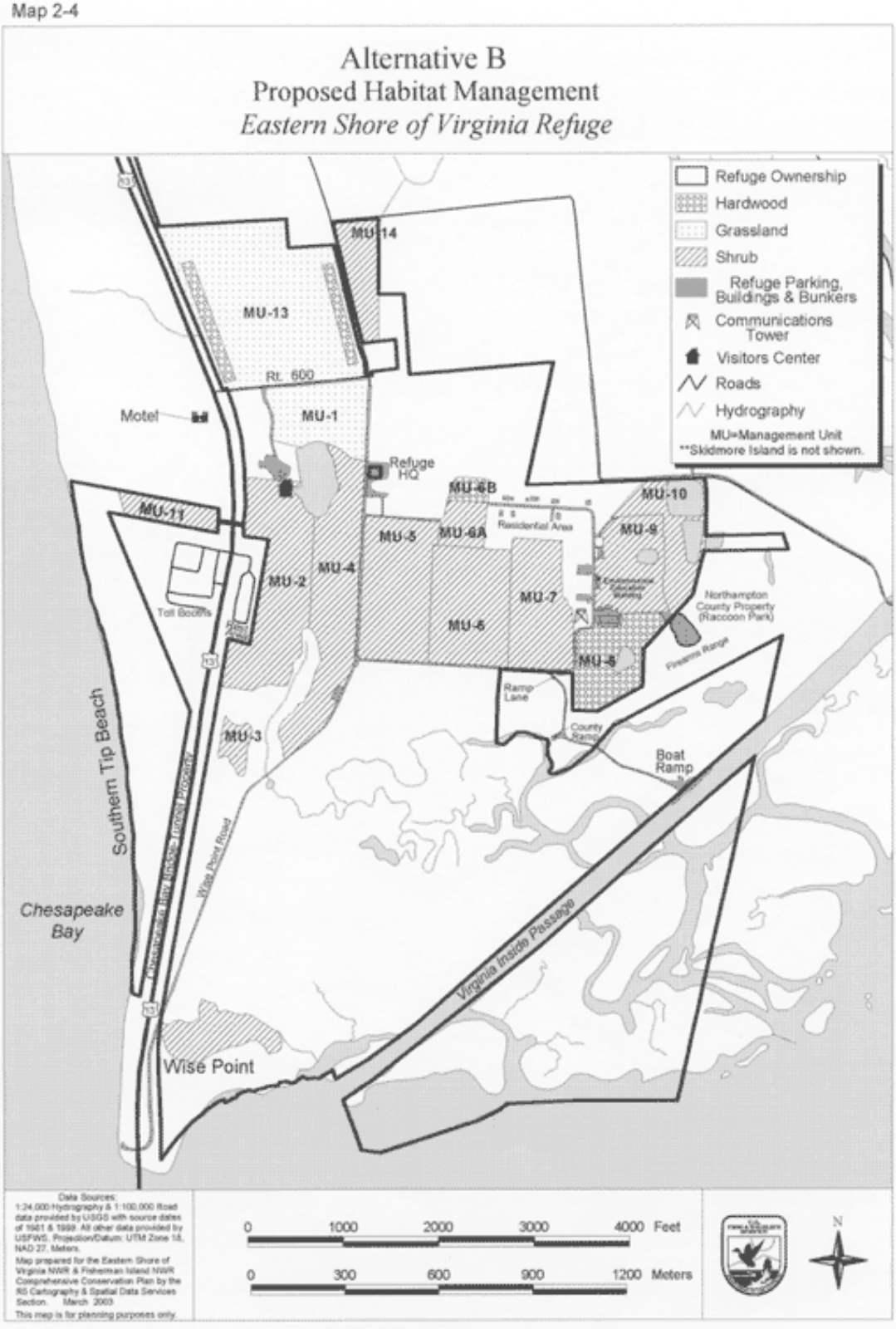
Rationale for the Objective: Artificial structures are often considered merely aesthetic or visual problems. There are, however, many ecological reasons for their removal. Communications towers are known hazards to birds. Unoccupied buildings become shelters for rats and raccoons and other predators. Roadways create ecological edge communities that concentrate a diversity of plant species, many of which are invasive. Artificial impoundments create aquatic systems that alter natural biodiversity. Furthermore, the cumulative space occupied by such structures is considerable, making it unavailable as wildlife habitat. Structures that require maintenance from non-refuge staff are best located on the perimeter of the refuge to assist in the operation of the site and to enhance the security of refuge headquarters.

In addition to Alternative A:

1-5 years:

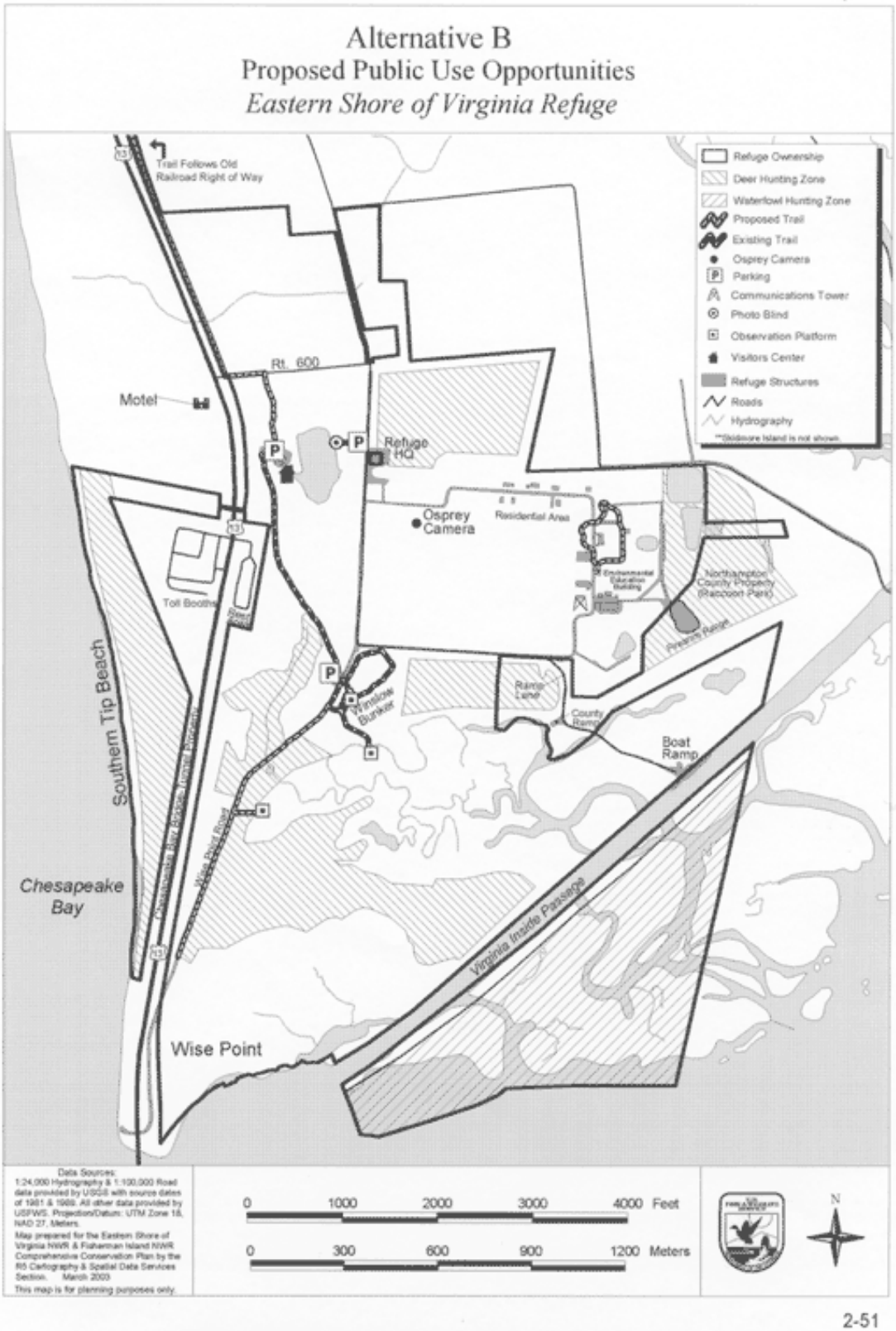
1. Remove the old water tower in the maintenance area, taking precautions regarding the presence of lead-based paint.
2. Verizon Virginia, Inc. would remove the communications tower once the lease on that structure expires in 2007. In the meantime, the refuge would work with Verizon to assess the need for continued use of the switching station on refuge property. Consideration would be given to relocating this building to an area that is more readily accessible to communication employees, provides more direct routing of service and is sited in a more appropriate location. If better alternatives are not identified, the refuge would work to develop a Memorandum of Understanding (MOU), a compatibility determination and a new lease agreement for the switching station that facilitates optimum operation of the site.

Map 2-4


Alternative B
Proposed Habitat Management
Eastern Shore of Virginia Refuge
Refuge Ownership
Hardwood
Grassland
Shrub
Refuge Parking, Buildings & Bunkers
Communications Tower
Visitors Center
Roads
Hydrography
MU=Management Unit
**Skidmore Island is not shown.
MU-14
MU-13
Rt. 600
Motel
MU-1
Refuge HQ
MU-6B
MU-10
MU-11
MU-5
MU-6A
MU-9
Residential Area
MU-4
MU-2
MU-7
Toll Booths
MU-6
Northampton County Property (Raccoon Park)
MU-8
Firearms Range
Ramp Lane
County Ramp
MU-3
Boat Ramp
Southern Tip Beach
Chesapeake Bay Bridge-Tunnel Property
Kiptopeke Road
Chesapeake Bay
Virginia Inside Passage
Wise Point
Data Sources:
1:24,000 Hydrography & 1:100,000 Road data provided by USGS with source dates of 1981 & 1999. All other data provided by USFWS. Projection/Datum: UTM Zone 18, NAD 27, Meters.
Map prepared for the Eastern Shore of Virginia NWR & Fisherman Island NWR Comprehensive Conservation Plan by the R5 Cartography & Spatial Data Services Section. March 2003
This map is for planning purposes only.
0 1000 2000 3000 4000 Feet
0 300 600 900 1200 Meters
N

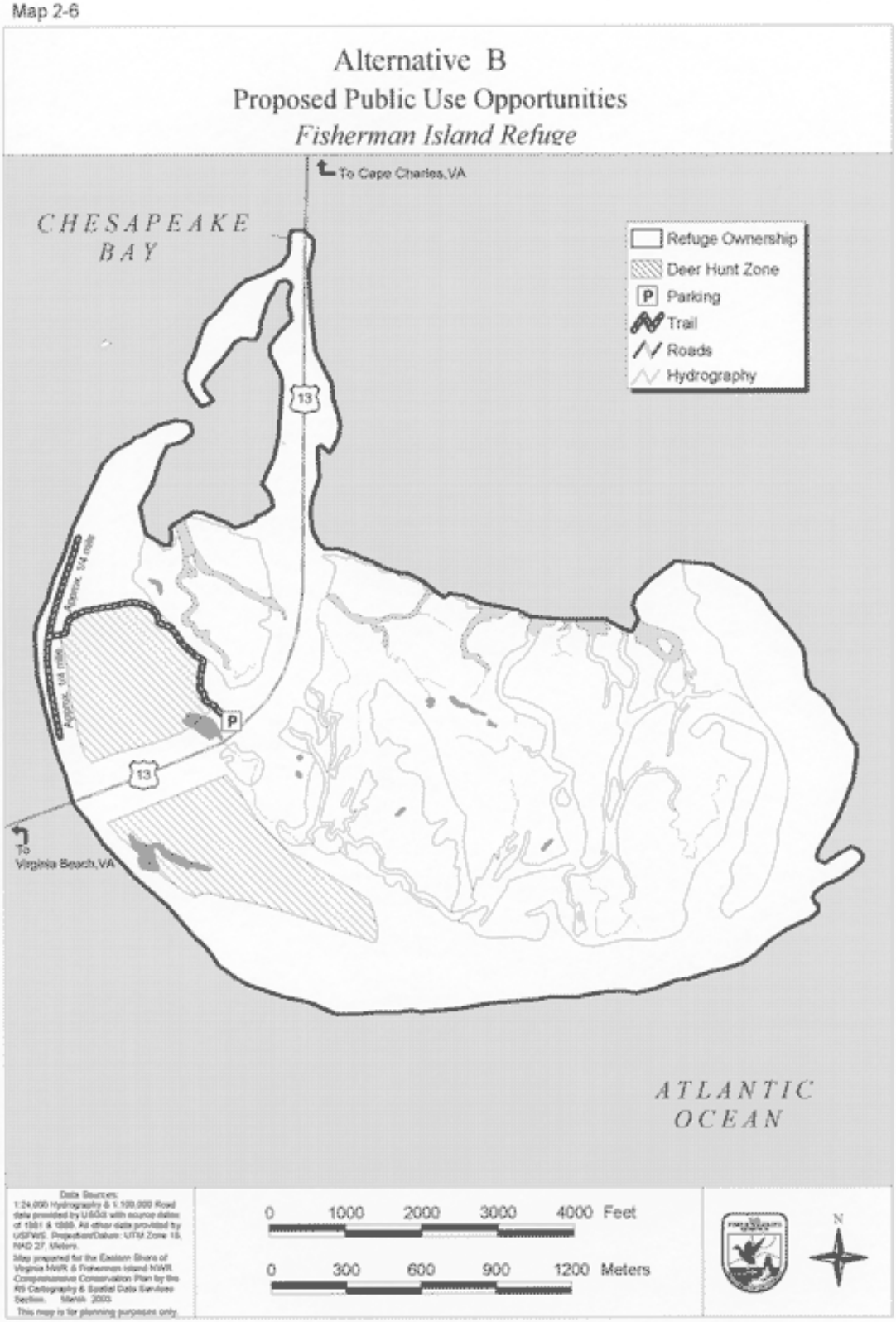
2-50

Map 2-5


Alternative B
Proposed Public Use Opportunities
Eastern Shore of Virginia Refuge
Refuge Ownership
Deer Hunting Zone
Waterfowl Hunting Zone
Proposed Trail
Existing Trail
Osprey Camera
Parking
Communications Tower
Photo Blind
Observation Platform
Visitors Center
Refuge Structures
Roads
Hydrography
**Skidmore Island is not shown.
Trail Follows Old Railroad Right of Way
Rt. 600
Motel
Refuge HQ
Osprey Camera
Residential Area
Toll Booths
Southern Tip Beach
Chesapeake Bay
Wise Point
Virginia Inside Passage
Boat Ramp
Data Sources:
1:24,000 Hydrography & 1:100,000 Road data provided by USGS with source dates of 1981 & 1989. All other data provided by USFWS. Projection/Datum: UTM Zone 18, NAD 27, Meters.
Map prepared for the Eastern Shore of Virginia NWR & Fisherman Island NWR Comprehensive Conservation Plan by the R5 Cartography & Spatial Data Services Section. March 2003
This map is for planning purposes only.
0 1000 2000 3000 4000 Feet
0 300 600 900 1200 Meters
N

2-51

Map 2-6


Alternative B
Proposed Public Use Opportunities
Fisherman Island Refuge
To Cape Charles, VA
CHESAPEAKE BAY
Refuge Ownership
Deer Hunt Zone
Parking
Trail
Roads
Hydrography
13
Approx. 1/4 mile
Approx. 1/4 mile
P
13
To Virginia Beach, VA
ATLANTIC OCEAN
0 1000 2000 3000 4000 Feet
0 300 600 900 1200 Meters
N

2-52

Map 2-7


Draft Land Protection Plan
Eastern Shore of Virginia Refuge
Northampton County, Virginia
Proposed Acquisition Boundary
Northampton County, Virginia Tax Parcels
Data Sources:
Digital Tax Map data produced and provided by Northampton County, VA.
All other data provided by U.S. Fish & Wildlife Service.
Projection/Datum:
UTM Zone 18, NAD83, Meters.
Map prepared by the R5 Cartography & Spatial Data Services Section.
March 2003
This map is for planning purposes only.
0 1 2 3 Miles
0 1 2 3 4 5 Kilometers
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2-53

ALTERNATIVE C: EMPHASIS ON GRASSLAND TEMPERATE AND NEOTROPICAL MIGRANTS

Alternative Concept

Management focus: Under this alternative the refuge would focus its management efforts on protecting, restoring, and enhancing habitat for grassland and open habitat-dependent neotropical and temperate migrant birds, while promoting compatible wildlife-dependent recreational opportunities in support of these efforts.

Rationale behind the management focus: The North American Breeding Bird Survey suggests that grassland and open habitat species are experiencing dramatic annual population declines, especially in eastern North America (Sauer et al., 2000). These avian population declines are attributed in part to marked declines in early successional habitats, which during migration, provide rest and refueling locations to grassland and open habitat-dependent migrants during their journey either to the tropics or the southeastern United States (Hagan et al., 1992).

The availability of grassland habitat within the mid-Atlantic Coastal Plain has declined dramatically throughout the 20th century due to suppression of natural disturbance and loss of agricultural land to development. Open farmlands have declined by nearly 80 percent within the mid-Atlantic region since the 1940s (U.S. Department of Commerce 1981). Additionally, the transition to more intensive farming practices has resulted in a loss of idle grassland habitat.

Each autumn large numbers of migrant landbirds are concentrated on the lower Delmarva Peninsula. The Partner's in Flight Mid-Atlantic Coastal Plain Bird Conservation Plan (USFWS 1999b) has identified 16 open habitat-dependent species of concern, of which all but one, the Bachman's sparrow, are known to migrate through the refuge. Due to its geographic location, the refuge is considered a significant stopover habitat for open habitat migrants within the mid-Atlantic region (Paxton and Watts, 2000). Thus, our conservation potential for these trust species is unique.

See Maps 2-8 and 2-9 for proposed habitat management and public use strategies on Eastern Shore of Virginia Refuge. See Map 2-10 for proposed public use strategies on Fisherman Island Refuge.

GOAL 1: Increase the availability of forage and cover habitat for neotropical and temperate migratory birds and migrating monarch butterflies.

Monarch butterflies in tree.
Mark Garland

Objective A: Hardwood-Dominated Forest

To provide additional sources of high-quality forage for neotropical migrants, increase the amount of contiguous forested habitat (oaks, hickory, maples, and sweet gum) on the refuge by converting existing open grassland habitat adjacent to forested stands.

Rationale for the Objective: Vegetation can be used to enhance the visual quality of the refuge by screening housing and other structures from view. The railroad right-of-way and housing area are two sites where the visual quality of the landscape could be improved. Both these tracts are too small (<25 acres in size) to be of significant value as habitat for grassland birds. Hence, both areas would be converted to hardwood forest to benefit forest-dependent neotropical migrants. Hardwood-dominated forests have a high food value because of the diverse understory associated with these habitats (Watts and Mabey, 1994).

Strategies are listed in five-year increments following the plan's approval.

1-5 years:

1. Determine appropriate hardwood management techniques including the number and variety of trees to be planted, planting location and schedule, and evaluation of deer impacts. Include proposed techniques in the habitat management plan.
2. Establish 10 x 10-meter plots to test treatment regimes for eliminating Japanese honeysuckle and kudzu encroaching on existing hardwood stands.
3. Plant 10 acres of mixed hardwoods within the old railroad right-of-way as specified in the habitat management plan.
4. Convert two acres of grassland to hardwood/shrub habitat in the refuge housing area (areas between individual houses) through natural succession and plantings.

6-10 years:

5. Develop agreements with the Bridge-Tunnel to plant hardwoods on their property in areas contiguous to forested stands.

Objective B: Upland Shrub

Establish native shrub-dominated cover (30-85 percent; [Struthers et al., 2000]) comprised of fruit-bearing species (e.g., bayberry,

sumac) in MUs 6A, 6B and 8-11 and on Wise Point to provide cover and a quick energy source for migratory and wintering birds.

Rationale for the Objective: Shrub habitat benefits shrub-dependent and some wintering grassland bird species. Therefore, providing shrub habitat in several small management units on the southern tip of the Delmarva Peninsula would benefit a wide variety of avian species. Due to the monotypic closed canopy pine stands (i.e., stands 20-80-years-old) of invading loblolly pines on Wise Point and MU 6A, food resources and structural diversity are lacking. The majority of the existing pines on Wise Point are of low vigor and would not respond well to thinning and are likely to succumb to salt intrusion, senescence and pine beetle infestation (Mallett 2001).

1-5 years:

1. Eradicate and control invasive species (e.g., phragmites, Japanese honeysuckle, kudzu, fennel) in MU 6B, 11, 14 and on Wise Point. Monitor the success of these efforts and continue to implement control measures over the life of the plan.
2. Cut loblolly pine on the east side of the road within the 30 acres of forest at Wise Point. Control invading phragmites using approved herbicides. Conduct pre- and post-management vegetation monitoring to evaluate phragmites coverage and shrub response. Undertake cuts in small (one-acre) experimental patches to evaluate treatment effectiveness and risk of phragmites establishment.
3. Leave dead and dying loblolly pines ($\geq$15.2 cm dbh) within the cut area of Wise Point (refer to Strategy 2), to increase the availability of forage (insects) for avian migrants (e.g., black-and-white warblers, ruby-crowned kinglets). In addition, snags will fulfill avian cavity nest site size requirements of species occurring on refuge.
4. Cut loblolly pine on MU 6A using either a chain saw or hydroaxe. Conduct pre- and post-management monitoring to measure the response to cutting by native and invasive species.
5. While cutting loblolly pine on MU 6A, cut autumn olive shrubs and treat stumps with an approved herbicide to prohibit invasion once the area has been opened.
6. Allow natural shrub succession to occur in MUs 6B, 9, 10, and 11 and monitor vegetative composition and avian use to determine the optimum successional stage preferred by grassland and shrub-dependent temperate fall migrants.
7. Maintain MU 8 in shrub.

6-10 years:

8. Burn cut areas on Wise Point (Strategy 2) and MU 6A (Strategy 4) to maintain newly created shrub habitats.
9. Monitor the effects of deer on browse species and forage availability for migrating grassland species through the use of exclosures and control plots.
10. Monitor fruit production and establish a cutting/burn schedule that would maintain maximum shrub productivity over the life of the plan.
11. Cut fields in 14-acre rotational blocks (Berdeen and Krementz, 1998) so fruiting shrub habitat is always available. Remove invading trees from shrub-dominated areas over the life of the plan, leaving soft mast-producing hardwood saplings (e.g., black cherry) until reaching pole stage (dbh >15.2 cm [Denmon 1998]).

Deer browse.
USFWS photo

11-15 years:

12. Maintain MU 6A, 6B and 8-11 and Wise Point in a mid-successional stage through the use of a hydroaxe, mowing or burning.
13. Develop an agreement with the Bridge-Tunnel Authority to manage pines on their property in the Wise Point area that are encroaching on wax myrtle shrub habitat.

Objective C: Grasslands

Establish large contiguous blocks (200 acres total) of native warm season grasses in MUs 1, 2, 4-7, 13 and 14 to provide food sources, perches and escape cover for grassland-dependent temperate and neotropical migrant birds. Vegetative cover would be comprised of 65-90 percent warm season grasses (e.g., little bluestem, Indian grass, switch grass), 10-35 percent forbs (e.g., goldenrod, pokeweed), and 10-20 percent scattered native shrubs (e.g., groundsel, bayberry).

Rationale for the Objective: Patch size is a required element of breeding habitat for many grassland bird species (Vickery et al., 1994). While few studies exist, size is also believed to play a role for migrating and wintering grassland-dependent birds (Watts 2000). Many species of grassland birds are declining throughout their range due to habitat loss (Askins 1993); therefore, the refuge seeks to provide migrating and wintering grassland bird habitat where feasible. Grassland management would only occur where large contiguous grassland habitat ($\geq$ 10 hectares) (Watts 2000) can be established.

1-5 years:

1. Maintain existing grasslands using a variety of techniques including mowing, prescribed burning and discing.
2. Establish experimental plots and monitor, according to Regional protocols, the vegetative response to various invasive species treatment methods (e.g., mowing, discing, application of herbicides) prior to their widespread use.
3. Eradicate invasive species (e.g., Japanese honeysuckle, fennel, kudzu) using treatment methods pursuant to the results achieved in Strategy 2.
4. Partially remove the hedgerows south of Route 600 leaving only one row of shrubs to increase the effective grassland area (Sample and Mossman, 1997). Loblolly pine and some autumn olive would be removed.
5. Remove shrubs and saplings and plant native warm season grasses in MUs 5-7.
6. Mow MUs 1, 2, 4-7, 13 and 14 in rotational blocks greater than 14 acres (Berdeen and Krementz, 1998) on a four- to five-year schedule to maintain grassland habitat.
7. Conduct a test burn on MU 13 in accordance with an approved prescribed fire management plan. Continue to burn as prescribed to reduce litter buildup, increase soil nutrients and control woody invasive species. Once woody growth is controlled, alternate the burn schedule with a mowing schedule.

6-10 years:

8. Incorporate other management units into the burn plan dependent upon the results of Strategy 7.

11-15 years:

9. Mow or burn MU 1, 2, 4-7, and 14 according to the treatment schedule outlined in Strategy 7.
10. Continue to control invasive species in MU 1, 2, 4-7, 13 and 14 using treatment methods pursuant to the results achieved in Strategy 2.

GOAL 2: Maintain the long-term productivitiy, integrity and function of the marsh, beach and interdunal communities.

Objective A: Beach Dynamics

Strategies are same as Alternative B

Objective B: Beach and Dune Habitats

Strategies are same as Alternative B

Objective C: Threatened and Endangered Species

Strategies are same as Alternative B

Objective D: Tidally-Influenced Salt Marsh

Strategies are same as Alternative B

Goal 3: Actively participate in the conservation of healthy hardwood, understory, and grassland habitat for neotropical and temperate migratory birds during future development throughout Northampton County.

Objective A: Protect Existing Forest/Shrub Migratory Bird Habitat

Strategies are same as Alternative B

Objective B: Acquire and Restore Agricultural Lands to Grassland/Shrub Migratory Bird Habitat

Work to restore agricultural lands to grassland and associated shrub habitats on the lower peninsula, south of Cape Charles, to increase the availability of high-quality stopover habitat for grassland and shrub-dependent neotropical and temperate migrants. Grassland restoration sites would be 10 hectares (25 acres) at a minimum.

Rationale for the Objective: In addition to the need for protecting remaining existing habitat for forest and shrub dependent bird species, there is a need to provide habitat for declining grassland bird species. Grassland species are suffering from habitat loss due to changing land use and agricultural practices. Recommendations from expert biologists, such as wildlife researchers and natural resource managers, include restoration of grassland acreage on the lower peninsula. Restoration sites must be 25 acres or larger to be used by grassland-dependent bird species.

1-5 years:

1. Acquire and restore agricultural lands within the 6,030-acre proposed acquisition area to grassland/shrub migration habitat. The project area includes approximately 3,315 acres of agricultural land, or about 55 percent of the total land area proposed for acquisition. Land would be acquired from willing sellers, as available funding allows.
2. Work through our Partners for Wildlife Program and with other partners, such as the Natural Resources

Conservation Service, to establish conservation easements on agricultural lands not protected through acquisition within and outside of the 6,030-acre proposed acquisition area.

Goal 4: Provide wildlife-dependent recreational opportunities and community outreach with an emphasis on educating the public about the critical role the Delmarva Peninsula serves for neotropical and temperate migratory birds and migrating monarch butterflies.

Objective A: Hunting Opportunities

To help facilitate compatible wildlife-dependent recreation on refuge lands, provide the public with additional opportunities to participate in safe and high-quality hunting at both the Eastern Shore of Virginia and Fisherman Island Refuges.

Rationale for the Objective: Hunting is identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use. Consequently, it should be facilitated where compatible with the purposes of the refuge and the Refuge System mission.

Strategies are same as Alternative B except:

1. We would not open Fisherman Island Refuge to an archery management deer hunt.
2. We would not open Wise Point to waterfowl hunting.

Objective B: Boating and Fishing Access

Strategies are same as Alternative B except:

1-5 years:

1. Open southern tip beach to surf fishing if adult and larval tiger beetle surveys show a stable and healthy population.
2. Design a two-lane boat ramp and cap parking at 35 parking spaces, seven of which would be reserved for permitted commercial watermen.

Farming.
Robert Wilson

Objective C: Wildlife Observation and Photography

Expand opportunities for visitors to engage in compatible wildlife-dependent recreation on the refuge by providing additional opportunities to view and photograph grassland temperate and neotropical migrants along trails and existing roads.

County boat ramp.
Susan Rice

Rationale for the Objective: Wildlife observation and photography are identified in the National Wildlife Refuge System Improvement Act of 1997 as priority public uses. Providing increased opportunities for the public to participate in these activities promotes visitor appreciation and support for refuge programs as well as habitat conservation efforts on the southern tip of the Delmarva Peninsula.

Strategies are same as Alternative B except:

1-5 years:

- Allow pedestrian access to the Wise Point road and extend trail to the beach, provided there are no Northeastern beach tiger beetles on this beach.

6-10 years:

- Develop two vehicle interpretive pull outs along refuge roads to view and photograph grassland birds. Install interpretive panels describing grassland management techniques.

Objective D: Environmental Education

Focus 70 percent of the content of educational programs on the importance of the refuge to grassland temperate and neotropical migrants to promote awareness among Northampton County students and other program participants of the refuge's role in the conservation of these species and their habitats.

Rationale for the Objective: Environmental education is identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use. It also serves as a valuable tool in the protection of our nation's wildlife and habitat resources. Educating young people about wildlife conservation fosters an appreciation of the important role the refuge plays in support of these efforts and hopefully motivates individuals to make responsible environmental decisions in the future.

In addition to Alternative A:

1-5 years:

1. Develop two lesson plans that focus on grassland habitats and which follow State Standards of Learning guidelines.
2. Educate all local third-graders in Northampton County about migrating monarch butterflies and familiarize them with the "Monarch Watch" program and website.
3. Develop three interpretive programs for organized groups from summer camps from both the eastern shore and

Hampton Roads areas that focus on the importance of the refuge to grassland birds.

4. Work with partners to develop and conduct one environmental education program per year, taught in Spanish, aimed at educating the Eastern Shore's Hispanic population about local conservation issues, with an emphasis on the importance of the refuge to grassland birds.

6-10 years:

5. Conduct one teacher workshop per year that focuses on late fall migrant and winter resident bird species. Develop workshops in conjunction with an accredited university so teachers can obtain continuing education units.
6. "Adopt" a classroom at Kiptopeke Elementary School. This would include developing a series of monthly environmental education programs for a specific class throughout the school year that focus on the refuge and its importance to grassland birds.
7. Work with local partners like the Barrier Island Museum, The Nature Conservancy (TNC) and Kiptopeke State Park to support one Elderhostel program per year that focuses on improving grassland bird habitat.

11-15 years:

8. Renovate the Environmental Education building to include a wet lab, indoor classrooms, hands-on exhibits and teacher resource library.

Objective E: Wildlife Interpretation

To promote awareness among visitors and residents regarding the plight of grassland bird species, focus 70 percent of the refuge's interpretive materials, signs, and exhibits on the importance of the refuge to grassland birds and their habitats.

Rationale for the Objective: Wildlife interpretation is identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use. Providing the public with a wide variety of interpretive information about grassland temperate and neotropical migrants would greatly increase public understanding and support for habitat protection efforts on the southern tip of the Delmarva Peninsula.

In addition to Alternative A:

1-5 years:

1. Revise refuge brochure and website to focus on the

importance of the refuge to grassland temperate and neotropical migrants and its protection of declining grassland habitats.

2. Conduct one interpretive walk per month in the late fall that focuses on grassland bird identification and habitat needs.
3. Conduct interpretive programs during January that focus on the American woodcock.

6-10 years:

4. Develop a portable/traveling exhibit that emphasizes the importance of the refuge to grassland bird species and their habitats.
5. Provided it is structurally sound, open the Winslow Bunker (Battery 12) to public tours and expand interpretive displays on the history of the refuge as the former Fort John Custis military base.

11-15 years:

6. Produce an interpretive video focusing on grassland birds and their habitats, with an emphasis on habitat management practices that benefit them.
7. Create an exhibit in the Visitor Center that focuses on grassland bird species and their habitats on the lower eastern shore.

Goal 5: Integrate the refuge into the larger community of the eastern shore and promote awareness of the unique value of the lower Delmarva Peninsula to neotropical and temperate migratory birds and migrating monarch butterflies.

Objective A: Encourage Responsible Nature-Based Tourism

Strategies are same as Alternative B except:

- The refuge would extend the nature-based tourism season late into the fall by working with partners such as Kiptopeke State Park, The Nature Conservancy (TNC) and others to offer a variety of environmental education programs and activities each weekend between the October birding festival and Thanksgiving. All programs would emphasize the importance of the refuge and surrounding habitats to migratory species, with some programs focusing specifically on grassland bird identification and habitat management practices, or on particular grassland species such as woodcock.

- Migratory bird exhibits would not be installed on bridge-tunnel islands.
- Interpretive panels on the bike trail would focus on the protection of habitat for neotropical and grassland temperate migrants, rather than all temperate migrants.

Objective B: Increase Refuge Recognition and Support

Strategies are same as Alternative B except outreach activities would emphasize neotropical and grassland temperate migrants, rather than all temperate migrants.

Objective C: Deliver a Conservation Message

Strategies are same as Alternative B except:

- Outreach activities would focus on neotropical and grassland temperate migrants, rather than all temperate migrants.
- There would be no demonstration plot on the refuge to educate homeowners about landscape practices that benefit neotropical and temperate migrants.

Objective D: Assess Economic Impact of Nature-Based Tourism

Strategies are same as Alternative B

Goal 6: Enhance and restore the quality of the soils, waters, and other abiotic components of the refuge landscape.

Objective A: Contaminants

Strategies are same as Alternative B

Objective B: Firearms Range

Strategies are same as Alternative B

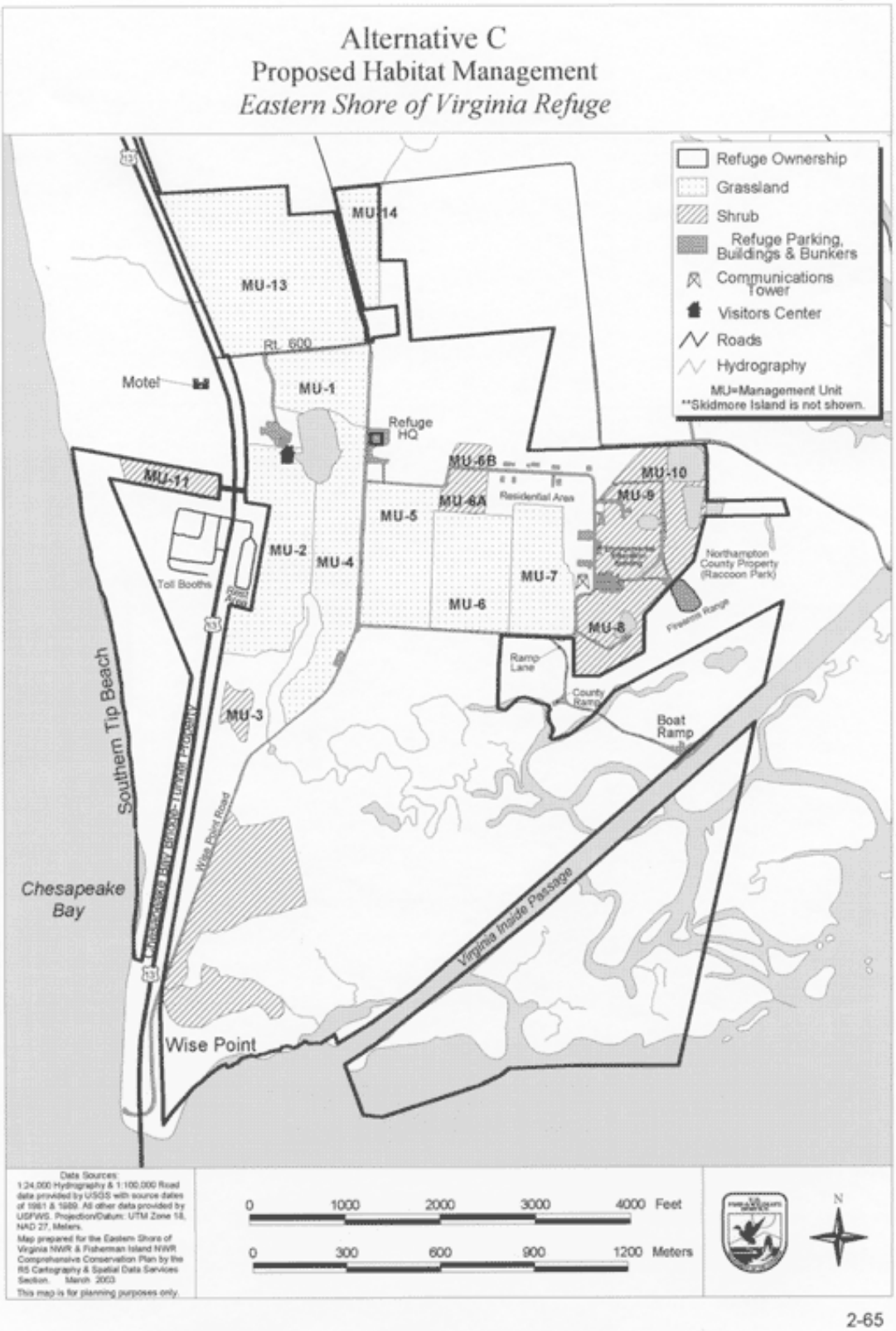
Objective C: Contingency Planning for Oil and Hazardous Material Spills

Strategies are same as Alternative B

Objective D: Remove Artificial structures

Strategies are same as Alternative A

Map 2-8


Alternative C
Proposed Habitat Management
Eastern Shore of Virginia Refuge
Refuge Ownership
Grassland
Shrub
Refuge Parking, Buildings & Bunkers
Communications Tower
Visitors Center
Roads
Hydrography
MU=Management Unit
**Skidmore Island is not shown.
MU-14
MU-13
Rt. 600
Motel
MU-1
Refuge HQ
MU-6B
MU-10
MU-11
MU-6A
Residential Area
MU-9
MU-5
MU-2
MU-4
MU-7
Toll Booths
Northampton County Property (Raccoon Park)
MU-6
MU-8
Firearms Range
Ramp Lane
County Ramp
Boat Ramp
MU-3
Southern Tip Beach
Wise Point Road
Chesapeake Bay
Virginia Inside Passage
Wise Point
Data Sources
1:24,000 Hydrography & 1:100,000 Road data provided by USGS with source dates of 1981 & 1989. All other data provided by USFWS. Projection/Datum: UTM Zone 18, NAD 27, Meters.
Map prepared for the Eastern Shore of Virginia NWR & Fisherman Island NWR Comprehensive Conservation Plan by the RS Cartography & Spatial Data Services Section. March 2003
This map is for planning purposes only.
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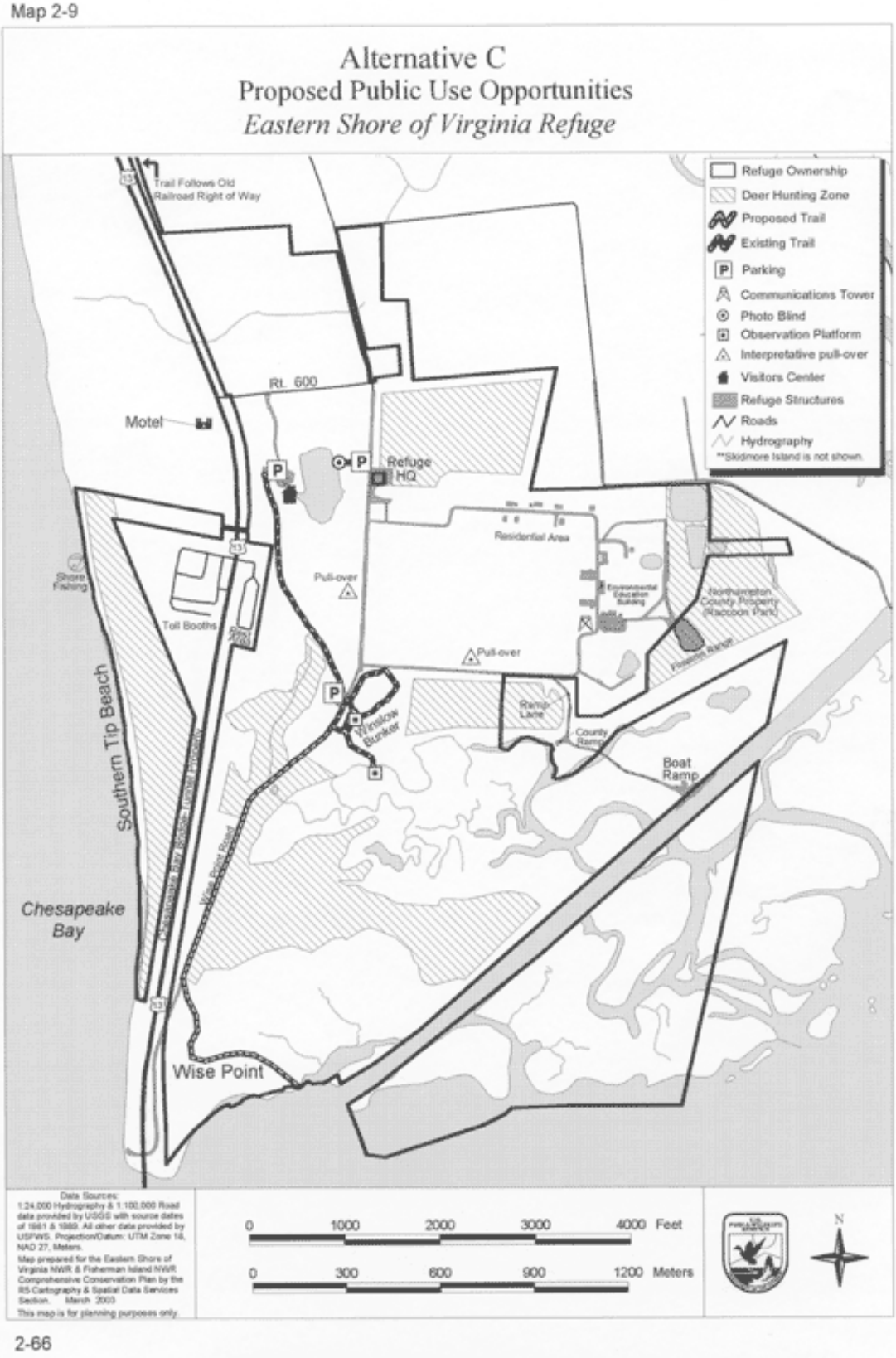
2-65

Map 2-9


Alternative C
Proposed Public Use Opportunities
Eastern Shore of Virginia Refuge
Refuge Ownership
Deer Hunting Zone
Proposed Trail
Existing Trail
Parking
Communications Tower
Photo Blind
Observation Platform
Interpretative pull-over
Visitors Center
Refuge Structures
Roads
Hydrography
**Skidmore Island is not shown.
Trail Follows Old Railroad Right of Way
Rt. 600
Motel
Refuge HQ
Residential Area
Pull-over
Toll Booths
Shore Fishing
Southern Tip Beach
Chesapeake Bay
Wise Point Road
Wise Point
Wireless Bunker
Ramp Lane
County Ramp
Boat Ramp
Northampton County Property (Raccoon Park)
Environmental Education Building
Data Sources:
1:24,000 Hydrography & 1:100,000 Road data provided by USGS with source dates of 1981 & 1989. All other data provided by USFWS. Projection/Datum: UTM Zone 18, NAD 27, Meters.
Map prepared for the Eastern Shore of Virginia NWR & Fisherman Island NWR Comprehensive Conservation Plan by the RS Cartography & Spatial Data Services Section. March 2003
This map is for planning purposes only.
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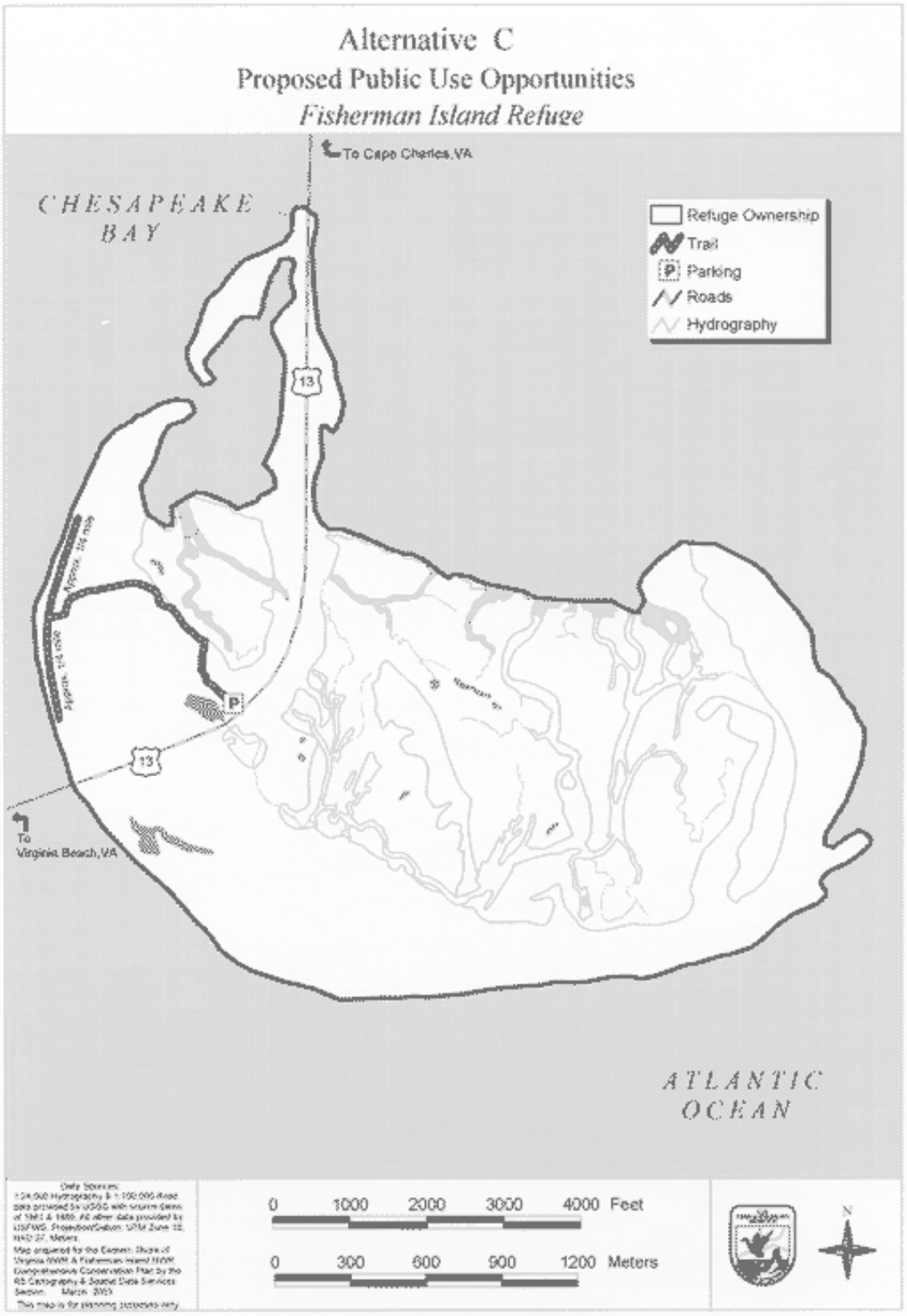
Map 2-10


Alternative C
Proposed Public Use Opportunities
Fisherman Island Refuge
To Cape Charles, VA
CHESAPEAKE BAY
Refuge Ownership
Trail
Parking
Roads
Hydrography
13
P
13
To Virginia Beach, VA
ATLANTIC OCEAN
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2-67

ALTERNATIVE D: MAINTAINING NATURAL ECOSYSTEM DYNAMICS: EMPHASIS ON MAINTAINING AND RESTORING HISTORIC CONDITIONS

ALTERNATIVE CONCEPT

Management Focus: Under this alternative the refuge would focus management efforts on maintaining and restoring the natural dynamics of the ecosystems of the lower Delmarva Peninsula. Where necessary, restoration of some historic vegetative communities, primarily upland hardwoods, would occur. However, subsequent maintenance of those communities, as well as management of wetland and beach communities, would primarily allow natural succession to occur. As necessary, prescribed fire and timber clearing would be used to replicate the historic forest disturbance factors such as wildfires, hurricanes, and disease. Off-refuge land conservation efforts would focus on preservation and/or restoration of the historic vegetative regimes. Compatible wildlife-dependent recreational opportunities, as well as off-refuge outreach programs, would promote education and awareness among the local citizenry of the natural history and the importance of historic ecological communities to migratory birds.

Rationale behind the management focus: The hemispheric importance of the Delmarva Peninsula as a staging and resting area for over a hundred species of southward migrating birds is well documented (Mabey et al., 1993; Watts and Mabey, 1994). Degradation and loss over the last 400 years or so of the peninsula's historic habitats (e.g., mixed deciduous-pine forests dominated by white oak, the maritime pine forests, and coastal shrub communities dominated by wax myrtle) critical to these birds has compounded population declines of many of these species. Degradation has included forest cutting or burning for logging and development, agriculture, establishment of lawns, invasion of non-native plants, and understory loss due to unnaturally high densities of white-tailed deer. The natural dynamics of beach/dune communities have also been disrupted by docks and jetties and other structures, dredging and spoil deposition, vehicles on beaches, and high populations of predators like red fox and gulls. Coastal wetlands have been negatively impacted by ditching for vector control, dredging, and invasive phragmites.

This alternative uses knowledge and supposition of the historic ecosystem dynamics to guide management decisions. The general reference would be ecological processes as they might have occurred prior to significant forest clearance and other disturbance

that followed European settlement. Strategies focus on maintaining and restoring the refuge to its historic condition prior to European settlement (pre-1620) (Goodwin et al., 1989), to the extent feasible.

The basis for this approach is the Service policy, *Biological Integrity, Diversity, and Environmental Health* (601 FW 3). This policy promotes protection and restoration, where appropriate, of historic landscapes, including historic vegetative communities and natural wildlife communities, where such actions are feasible and do not conflict with a refuge's purpose(s). Alternative D involves investigating historic ecosystem processes - such as fires, storms, coastal dynamics, vegetative community succession, soil and hydrological regimes - to decide which ecological communities are most appropriate for the refuge. Restoration and/or maintenance of target communities would then occur using or mimicking the historic natural processes. Rather than focus conservation energies on a guild of species (e.g., forest-dependent songbirds), this alternative emphasizes restoration of historic ecological communities and successional dynamic.

This alternative also embraces the existence and development of Fisherman Island as a naturally occurring habitat, despite its apparent origination from a shipwreck. Service integrity policy (601 FW 3) promotes maintenance and preservation of intact natural habitats where they exist. Barrier islands are a common occurrence along the Atlantic coast, and were occurring long before ships moved along that shoreline. Whatever the genesis of the island, the processes which formed it and continue to shape it were natural processes.

See Maps 2-11 and 2-12 for proposed public use strategies for Eastern Shore of Virginia and Fisherman Island Refuges.

GOAL 1: Increase the availability of forage and cover habitat for neotropical and temperate migratory birds and migrating monarch butterflies.

Objective A: Mixed Deciduous-Pine Forest

To replicate the presumed biological function and diversity of forest resources of about 400 years ago, and to promote a natural diversity of forest-dwelling species, restore all upland management units to a mixed deciduous-pine forest dominated by white oak and hickory.

Rationale for the Objective: Historically, the predominant vegetative community on and around the refuge was a mixed deciduous-pine forest. White oak, which was cut for shipbuilding or burned for tobacco farming, was likely the dominant species. Forest management would include replication of natural forest dynamics such as fire and blow-downs which create openings for transient grassland and shrub communities. It would deer management to promote a healthy and natural understory structure.

1-5 years:

1. Hire a contractor to conduct a detailed investigation, including mapping, of the historic composition, distribution and dynamics of vegetative communities within the refuge and the lower 10 km of the peninsula as they might have appeared about 1600 AD. Information would be derived from early written reports, predictive maps of soils and hydrology, pollen cores, aerial photos, and other historical information. Document changes in ecological communities and processes over the last 400 years, and use these results as a basis for developing the habitat management plan.
2. Based on results of the detailed investigation (Strategy 1), use plantings, natural succession, regeneration, and other appropriate techniques to replicate historic vegetative communities on refuge lands. Changes in ecosystem dynamics (e.g., hydrology, topography, capabilities of soils) may, in some cases, require management for alternative communities.
3. Leave some girdled trees standing to create snags and some fallen trunks to create deadfall as larger loblolly pines ($\geq$ 15.2 cm dbh) are removed or other forest thinning occurs to favor hardwoods. This would create forage sites for avian migrants and generally promote a more complex food web within forest habitats.
4. Use a chainsaw or hydroaxe to remove loblolly pine in MUs 6A and 10.
5. Establish experimental plots in MUs 4 and 5 to control invasive plants (e.g., honeysuckle, fennel, kudzu, and phragmites) and evaluate the vegetative response to various treatment methods (e.g., mowing, burning, application of herbicides) prior to their widespread use. Monitor existing conditions prior to treatment. Incorporate results into the invasive species management plan.
6. Initiate control of non-native vegetation using appropriate treatment methods based on the results of Strategy 5.
7. Maximize deer removal through increased harvest (and

other means, if necessary) throughout the life of the plan to provide accelerated understory restoration and to facilitate the survival of hardwood plantings. Use creative hunt programs favoring the removal of does and increased hunter success. Erect deer exclosure fences around some fields (MU 6B) targeted for eventual hardwood restoration.

6-10 years:

8. Eradicate 20 percent of the existing Japanese honeysuckle population per year over a 5-year period using appropriate treatment methods based on the results of Strategy 5. Prioritize areas planned for habitat restoration or that pose the most immediate threat to sensitive resources.
9. Eliminate 20 percent of the existing fennel population per year over a 5-year period using appropriate treatment methods based on the results of Strategy 5. Prioritize areas planned for habitat restoration or that pose the most immediate threat to sensitive resources such as endangered species.
10. Based on results from the detailed investigation of historic vegetative communities and processes (see Objective A, Strategy 1), employ a contract forester to plan and implement management of the existing deciduous-pine forest to replicate natural species composition. This would include planting of diminished species such as white oak, and selective removal of invasive species such as loblolly pine. Continue to create snags and deadfall. Include establishment of transient grassland/forb and shrub habitats (see Objective F, "Grassland Management" and Objective D, "Upland Shrub Management"). Incorporate forest management practices into the habitat management plan.
11. Based on results from the detailed investigation of historic vegetative communities and processes (see Objective A, Strategy 1), determine habitat restoration efforts appropriate to the remaining non-forested upland units currently in grass or shrub. Map and prioritize restoration units, including species to be established, establishment techniques, and target species compositions. Create transient grassland/forb and shrub habitats (see Objective F, "Grassland Management" and Objective D, "Upland Shrub Management") from 1-5 hectares in size in alternating units every 5-10 years. Incorporate management practices into the habitat management plan.
12. Employ a contract forester to implement hardwood forest restoration efforts on non-forested tracts pursuant to the habitat management plan.
13. Pursue agreements with the Bridge-Tunnel Authority and

Sunset Beach Resort to undertake forest restoration on their properties.

11-15 years:

14. Plant 10 acres of mixed hardwoods within the old railroad right-of-way as specified in the habitat management plan.
15. Monitor and manipulate forest structure throughout the life of the CCP pursuant to the habitat management plan.

Objective B: Forest Understory (Not Applicable to Alternative D)

A diverse understory is a natural component of a healthy hardwood forest ecosystem. It generally consists of a variety of forbs, grasses, and low-growing shrubs and trees that produce berries and browse for a variety of wildlife. It also provides structure important to the resting and nesting needs of forest-dependent avifauna. Management to enhance the understory component is appropriate to those alternatives that focus on forest-dwelling birds. Under Alternative D, however, which focuses on replicating the historic structure and ecological function of the hardwood forest community of 1600 AD, selective manipulation of a particular forest component such as understory is not appropriate. Instead, management would attempt to restore a natural mix of species thought to occur in a climax forest of that period, the historical hardwood community, and imitate the occurrence of forest openings which occurred due to fire and storms. The understory component would be allowed to develop naturally incidental to these activities.

Objective C: Upland Shrub (Not Applicable to Alternative D)

In the historic landscapes of the Delmarva Peninsula, the upland shrub component is thought to have occurred in the transition edge adjacent to hardwood or pine forests; as part of the forest understory; or as a successional sere in forest openings resulting from fire and storms. Under this alternative, existing upland shrub communities would be converted to hardwood-pine forest and there would be no emphasis placed on attempting to maintain shrub communities per se. Instead, upland shrubs would occur incidentally as under historic conditions, i.e., in transitional zones, as forest understory, and as successional growth in forest openings. This approach would change if the investigation of historic vegetative communities (see Objective A, Strategy 1) suggests there was a permanent shrub component not associated with climax forest systems that occurred within the lower Delmarva Peninsula.

Objective D: Coastal Shrub

Identify and maintain coastal wax myrtle communities on Eastern Shore of Virginia and Fisherman Island Refuges to provide forage habitat for migrants and to preserve the natural physiognomy of the coastal vegetative community.

Rationale for the Objective: Wax myrtle communities are a naturally occurring component of coastal beach/dune ecosystems on the lower Delmarva Peninsula. They are extremely salt tolerant, and occur in high salinity transitional areas between salt marsh and dune communities and uplands. On the refuge and surrounding area, wax myrtle plays a critical role in providing escape, resting and feeding cover for a variety of migratory songbirds. Under Alternative D, wax myrtle stands would constitute the primary and only permanent shrub component on the refuge, making these stands far more critical than in other alternatives. Currently, the only known threat to this shrub component is encroachment by loblolly pines and other invasives.

1-5 years:

1. Using results from the detailed investigation of historic vegetative communities and processes (see Objective A, Strategy 1) delineate and map the historic and existing distribution of wax myrtle communities, including Fisherman and Skidmore Islands. Also determine and map where loblolly has invaded.
2. Investigate the natural dynamics of the wax myrtle communities as part of the changing coastal beach and dune communities.
3. Assess threats to these communities, including encroachment by invasive loblolly pines.
4. Initiate loblolly pine control if and where appropriate, using a hydroaxe or chainsaw to fell trees and remove them from the shrub community.
5. Address other threats, including other invasives, and initiate control as appropriate.

6-15 years:

6. Monitor for threats, including continuing loblolly encroachment, and address as appropriate.

Objective E: Grasslands (Not Applicable to Alternative D)

Rationale for the Objective: Grasslands are not believed to have been a permanent, major component of historic vegetative communities of the Delmarva Peninsula. Most likely they occurred as transient mixed grass/forb/shrub communities in forest

openings that resulted from fires or storm blow-downs. Under this alternative, grasslands would not be intentionally created or maintained, but instead would occur incidentally as the refuge creates artificial forest openings in an attempt to replicate the historic occurrence of fire and storm damage. This approach would change if the investigation of historic vegetative communities (see Objective A, Strategy 1) suggests there was a permanent grassland component that occurred within the lower Delmarva Peninsula.

GOAL 2: Maintain the long-term productivity, integrity and function of the marsh, beach and interdunal communities.

Objective A: Beach Dynamics

Strategies are same as Alternative B except:

- Designate Fisherman Island and Skidmore Islands as Research Natural Areas.

Objective B: Beach and Dune Habitats

Enhance the quality of nesting (e.g., royal tern, American oystercatcher) and migrating (e.g., sanderling) habitat on Fisherman Island Refuge by minimizing disturbance to beach-dependent birds and other wildlife from humans and predators.

Rationale for the Objective: Disturbance can lead to nest abandonment, chick mortality and predation of nests and chicks during the breeding season (Burger 1991, 1994). Disturbance to staging areas during migration can also lead to declines in shorebird abundance (Pfister et al., 1992). Moreover, intact beach communities that possess a full complement of wildlife are rare in areas where high levels of beach-oriented recreation is common. An intact beach community not only provides productive habitat for beach-dependent birds, but also opportunities to study a naturally functioning, biologically diverse community.

In addition to Alternative A:

Minimize Human Disturbance

1-5 years:

1. Hire a law enforcement officer to educate the public about the sensitive nature of barrier islands and nesting bird colonies and to enforce area closures, particularly during the nesting season.

1-15 years:

2. Focus interpretive and educational tours along the entrance road and within one-quarter of a mile where the entrance road reaches the beach.
3. Complete weekly avian surveys from Feb. 1 to Oct. 31 to assess when target birds (e.g., American oystercatchers, royal terns) are in the area. Complete bimonthly surveys the remainder of the year.
4. Conduct an annual breeding survey of the heron rookeries.

Objective C: Restore Natural Predator-Prey Relationships

Restore predator-prey relationships on Fisherman Island Refuge to more natural levels to promote the biological diversity of the interdunal community and to benefit beach-nesting migratory birds (e.g., royal terns, American oystercatchers).

Rationale for the Objective: Unnaturally high numbers of avian (e.g., gull, crow) and mammalian (e.g., red fox, raccoon) predators have the potential to disrupt the natural balance between predator and prey populations. Beach nesting birds are particularly vulnerable to increased nesting losses when such an imbalance occurs.

1-15 years:

1. Collect historical data on the presence, abundance, and predator species present in the lower Delmarva Peninsula at the time of European settlement. Use this information to develop a predator management plan that outlines procedures for approximating and maintaining natural, historic predator-prey relationships.
2. Establish track stations every two years near colonial nesting bird sites to monitor for mammalian predator activity.
3. Monitor colonial nesting bird sites each nesting season for the presence of mammalian predators, avian losses, and predator/prey relationships. Determine if gulls and crows are protecting the royal tern nesting site from predators.

Objective D: Threatened and Endangered Species

Same as Alternative B

Objective E: Tidally-Influenced Salt Marsh

Monitor, and where possible, preserve the quality and natural function of tidally-influenced salt marsh on the refuges for marsh-

dependent birds (e.g., clapper rail, seaside sparrow) and other avian species.

Rationale for the Objective: Undiked, nearly intact salt marsh communities are rare along the eastern seaboard. The overall lack of tidally-influenced wetlands in this region heightens the value of this habitat on the Refuge, both for scientific study and the benefit of wildlife species that depend on it.

Strategies are same as Alternative B

Objective F: Compile Information on Coastal Communities

Compile information from a variety of sources (e.g., scientific literature, unpublished refuge data, professional expertise, field research) to aid refuge staff in managing salt marsh, beach and interdunal habitats and associated species.

Rationale for the Objective: Because most salt marsh along the mid-Atlantic coast has been ditched or otherwise significantly impacted, there are few undisturbed areas suitable for study. There is still much to be learned about the function of these communities and their importance to fisheries and other wildlife that use these habitats.

1-5 years:

1. Compile information regarding the function of salt marsh, beach and interdunal communities and associated species and use this information to guide management of these habitats.
2. Map areas of existing salt marsh, beach and interdunal communities on the refuge as well as similar habitats in Northampton County.

Goal 3: Actively participate in the conservation of healthy hardwood, understory, and grassland habitat for neotropical and temperate migratory birds during future development throughout Northampton County.

Objective A: Protect Existing Mixed Deciduous-Pine, Coastal Shrub and Beach Dune Habitats

To slow the accelerating loss of native habitats throughout the peninsula's southern tip and contribute to the preservation of the area's historic biodiversity, identify and work to maintain intact and unprotected deciduous-pine, maritime pine forest, coastal shrub, and beach-dune habitats wherever they occur within the lower 10 kilometers of the Delmarva Peninsula.

Rationale for Objective: Because of its geographic configuration, the lower Delmarva Peninsula provides critical stopover and staging habitat for large concentrations of migrant land birds. While other alternatives emphasize land protection for the benefit of particular types of migrants (i.e., short and long distance), this alternative focuses on protecting and replicating the area's historic diversity of habitats to help address life history requirements for the full range of migratory species that occur here. It also provides benefits to the diversity of terrestrial vertebrates and invertebrates found on the southern tip. Because of rapidly increasing development pressures, protection or restoration of habitat blocks of any size and configuration within the lower 10 kilometers of the peninsula is critical.

In addition to Alternative A:

1-5 years:

1. Protect, through fee acquisition or easement, existing tracts of any of the four target habitat types within the 6,030-acre acquisition area identified in Alternative B. Land would be acquired from willing sellers, as available funding allows.
2. Work with local realtors to monitor the availability of high-priority lands for purchase.
3. Coordinate Geographic Information Systems (GIS) analysis of the lower Eastern Shore with Northampton County officials, TNC, State, and Service partners to further support cooperative land protection efforts on the lower Delmarva Peninsula.
4. Assist State, County and private partners in obtaining grants to protect high-priority lands of any of the four target habitat types through a variety of land protection strategies (e.g., direct purchase, conservation easements).
5. Coordinate with the Northampton County Planning Commission, Natural Resources Conservation Service, Accomack-Northampton Planning District Commission and others to identify private lands that possess any of the four target habitat types within the County that are suitable for conservation easements.

6-10 years:

6. Coordinate with partners to develop a training course on conservation easements for refuge, State and County employees.
7. Encourage and support the development of a land trust by local citizens to protect valuable wildlife habitat in Northampton County.

Objective B: Acquire and Restore Agricultural Lands to Deciduous-Pine, Maritime Pine Forest, Coastal Shrub, and Beach/Dune Habitats

To complement the land protection efforts of Objective A and contribute to the preservation of the peninsula's historic biodiversity, work to restore agricultural and other converted or severely degraded lands to deciduous-pine, maritime pine forest, coastal shrub, or beach-dune habitats throughout the lower 10 km of the Delmarva Peninsula.

Rationale for the Objective: Same as Objective A above.

1-15 years:

1. Acquire and restore agricultural lands within the 6,030-acre acquisition area to any of the four target habitat types, as appropriate.
2. Work through our Partners for Wildlife Program and with other partners, such as the Natural Resources Conservation Service, to establish conservation easements on agricultural lands not protected through acquisition inside and outside the 6,030-acre proposed acquisition area.

GOAL 4: Provide wildlife-dependent recreational opportunities and community outreach with an emphasis on educating the public about the critical role the Delmarva Peninsula serves for neotropical and temperate migratory birds and migrating monarch butterflies.

Objective A: Hunting Opportunities

Maximize deer hunting opportunities on the refuge to help restore the historic vegetative structure and composition of the forest understory and to provide high quality forage for frugivorous and insectivorous neotropical and temperate migrants.

Rationale for the Objective: The refuge's deer herd is overpopulated, as evidenced by browse lines and other sign. Past experience with refuge hunts has shown hunter success to be relatively high (23% success rate, with approximately 68 hours of hunter effort per deer), but there have been insufficient numbers of hunters to meaningfully reduce the refuge deer population. Furthermore, the open nature of the refuge promotes easy ingress of deer, causing a continual replacement of harvested animals. Studies have shown that overpopulated deer have a significant detrimental effect on the forest understory (Augustine and Jordan, 1998; Tilghman, 1989), which on the refuge provides valuable foraging habitat for neotropical and temperate migrants.

Strategies are same as Alternative C

Objective B: Boating and Fishing Access

Provide deep water access to fishing and hunting grounds and restore some natural wetland values at the site of the existing boat ramp that provides deep water access for commercial watermen and recreational boaters.

Rationale for the Objective: The Wise Point boat ramp is located on the deep waters of the Virginia Inside Passage. Public deep water access is limited in Northampton County. Additionally, some commercial watermen have Commonwealth-leased grounds for aquaculture located close to the Wise Point ramp. These watermen have a vested interest in gaining access that is proximate to their work sites. Also, fishing is identified in the National Wildlife Refuge Improvement Act of 1997 as a priority public use. Because of these reasons, the boat ramp will remain open, despite the general emphasis of this alternative on promoting environmental health by removing artificial structures. However, in keeping with the spirit of this alternative, some wetland restoration will occur and access hours will be more limited to protect wetland habitats and minimize wildlife disturbance.

Strategies are same as Alternative B except:

- Upgrade the boat ramp area to include a one-lane ramp and cap parking at 25 spaces.
- Reserve five parking spaces for permitted commercial watermen.
- Install moors instead of a dock for commercial fishing boats.
- By 2018, eliminate docking at the boat ramp.

Objective C: Wildlife Observation and Photography

Strategies are same as Alternative B except:

- To avoid potential disturbance to neotropical migratory birds, we would not open the Wise Point Road for wildlife observation and photography.

Objective D: Environmental Education

Focus 85 percent of the content of educational programs on the natural history of the Delmarva Peninsula and Northampton

County, including historical landscapes and natural communities to promote awareness of the ecological impact of development.

Rationale for the Objective: Environmental education is identified in the National Wildlife Refuge System Improvement Act of 1997 as a priority public use. It also serves as a valuable tool in the protection of our nation's wildlife and habitat resources. Educating young people about the impact of development on wildlife, particularly migratory birds, helps foster an appreciation of the important role the refuge plays in support of wildlife conservation and hopefully motivates individuals to make responsible environmental decisions in the future.

In addition to Alternative A:

1-5 years:

1. Develop three lesson plans that follow State Standards of Learning guidelines and which focus on neotropical and temperate migrant habitats, emphasizing the loss of such habitats due to development on the eastern shore.
2. Develop an additional Junior Refuge Manager Program that targets 5th to 7th grades and which emphasizes habitats important to neotropical and temperate migrants and how they are impacted by development.
3. Educate all third graders in Northampton County about migrating monarch butterflies and familiarize them with the "Monarch Watch" program and website.
4. Develop three lesson plans that can be used by teachers in the classroom and which focus on the impact of development on neotropical and temperate migrants.

11-15 years:

5. Coordinate with Kiptopeke State Park for use of their environmental education facilities, eliminating the need to develop similar refuge facilities.

Objective E: Wildlife Interpretation

Focus 85 percent of interpretive materials, signs and exhibits on the natural history of the Delmarva Peninsula and Northampton County, including the presumed historic landscapes and ecological processes of about 1600 AD and vegetative communities to promote awareness of the impacts of development on migratory birds and other natural resources.

Rationale for the Objective: Accelerated development within Northampton County and the southern tip of the Delmarva Peninsula threatens wildlife generally, but particularly those

neotropical and temperate migrant birds that depend on the area for a critical part of their life histories. Migratory birds are already in marked decline, largely due to habitat loss. Raising the awareness of area residents and the local business community about the critical importance of the lower Delmarva Peninsula to migratory birds could help initiate a dialogue among competing interests regarding economic growth and resource protection.

In addition to Alternative A:

1-5 years:

1. Revise refuge brochure and website to focus more attention on the unique ecological values of the refuge and lower Delmarva Peninsula including its historic landscapes and natural biodiversity.
2. Create a diorama in the Visitor Center that depicts the important wildlife habitats on the lower eastern shore and the species associated with them, emphasizing the importance of the southern tip as a staging area for neotropical and temperate migrants.
3. Develop two permanent interpretive displays for the wildlife trail kiosk that focus on the refuge as a staging area for neotropical and temperate migrants.

GOAL 5: Integrate the refuge into the larger community of the eastern shore and promote awareness of the unique value of the lower Delmarva Peninsula to neotropical and temperate migratory birds and migrating monarch butterflies.

Objective A: Encourage Responsible Nature-Based Tourism

Communicate to the local service industry (e.g., tourism guides; employees of hotels, bed and breakfasts, restaurants) the ecological importance of the Eastern Shore of Virginia and Fisherman Island Refuges, and encourage the use of responsible resource stewardship practices to promote the lower Delmarva Peninsula as a nature-based tourism destination.

Rationale for the Objective: Working with partners to draw attention to the importance of the refuge and surrounding lands as critical stopover and staging habitat for neotropical and temperate migrants could potentially generate a broad base of support for habitat conservation efforts in the lower Delmarva Peninsula. Tour guides would be taught how to minimize the impact of their activities so that they can showcase the area's natural resources without adversely affecting wildlife or its habitat. Increased nature-based tourism would also provide additional recreational

opportunities for visitors and economic benefits to the local community.

In addition to Alternative A:

1-5 years:

1. Support the Coastal Virginia Birding Trail by developing an interpretive site on the refuge and promoting other coastal sites on the refuge website.
2. Work with the Virginia Institute of Marine Science and other agencies and universities to develop a certification course for commercial tour guides that focuses on minimizing the environmental impacts of nature-based tourism.

6-10 years:

3. Work with partners to develop the Virginia Kayaking Trail along the eastern shore.
4. Establish closer relationships with the local business community to promote responsible nature-based tourism. This includes educating tour guides about the area's sensitive natural resources and encouraging responsible behavior around sensitive wildlife habitats and populations with emphasis on neotropical and temperate migrants.

11-15 years:

5. Participate with partners (e.g. Chamber of Commerce, Citizens for a Better Eastern Shore, bed and breakfasts, local restaurants) to develop nature-based tourism "packages" (lodging, transportation, meals) that focus on the ecological importance and historic biodiversity of the lower Delmarva Peninsula.
6. Work with the Bridge-Tunnel Authority to develop and install four new interpretive signs on the bridge islands. The signs would focus on the ecological importance and historic biodiversity of the lower Delmarva Peninsula.

Objective B: Increase Recognition and Support of the Refuge

Increase efforts to build recognition and support for the unique ecological values and natural biodiversity of the refuge and lower Delmarva Peninsula by improving communication with local and national constituents and the interested public (e.g., Congress, conservation organizations, local communities, news media, and large corporations).

Rationale for the Objective: Fostering relationships with community leaders, local politicians and the media would

undoubtedly strengthen support for the refuge and its programs as well as resource protection efforts in the lower Delmarva Peninsula. Special events also contribute greatly to improved community relations and awareness and provide benefits to the local economy. Volunteer efforts and establishment of a Friends Group would help broaden refuge support in neighboring communities.

Strategies are same as Alternative B except:

- The tour of the refuge during the fall Harvest Festival would emphasize the natural history of the eastern shore and Northampton County, particularly the unique ecological values of the area.
- Information about the refuge at the Virginia State Fair would emphasize the unique ecological values of the refuge and the lower Delmarva Peninsula.

Objective C: Deliver a Conservation Message

Deliver a conservation message regarding migratory birds, butterflies, and other wildlife to those involved in land use and development. The message would focus on the unique ecological values of the lower 10 km of the Delmarva Peninsula.

Rationale for the Objective: Raising the ecological awareness of those individuals actively involved in land use management and development in the area (e.g., building contractors, agricultural extension agents, realtors, local nurseries) would have positive benefits on wildlife, particularly migratory species. Educating landowners on how to improve the habitat value of their property for neotropical and temperate migrants would help mitigate habitat losses off-refuge. In addition, such efforts would foster a broader base of support for the refuge and resource conservation efforts in the lower Delmarva Peninsula.

Strategies are same as Alternative B

Objective D: Assess Economic Impact of Nature-Based Tourism

Strategies are same as Alternative B

Goal 6: Enhance and restore the quality of the soils, waters, and other abiotic components of the refuge landscape.

Ojective A: Contaminants

Strategies are same as Alternative B

Ojective B: Firearms Range

Strategies are same as Alternative B

Objective C: Contingency Planning for Oil and Hazardous Material Spills

Strategies are same as Alternative B

Objective D: Remove Artificial Structures

Promote a more natural appearance to refuge landscapes and increase the amount of acreage available as wildlife habitat by removing unnecessary artificial structures that obstruct views, occupy space, and in some cases constitute direct hazards to wildlife.

Rationale for the Objective: Artificial structures are often considered merely aesthetic or visual problems. There are, however, many ecological reasons for their removal. Communications towers are known hazards to birds. Unoccupied buildings become shelters for rats and raccoons and other predators. Roadways create ecological edge communities that concentrate a diversity of plant species, many of which are invasive. Artificial impoundments create aquatic systems that alter natural biodiversity. Furthermore, the cumulative space occupied by such structures is considerable, making it unavailable as wildlife habitat.

In addition to Alternative B:

1-5 years:

1. Evaluate the necessity of all refuge fences and remove those that are unnecessary.

6-10 years:

2. Remove all unused roads and restore to appropriate habitats as determined by the detailed investigation of historic vegetative communities (see Goal 1, Objective A, Strategy 1).
3. Assess the ecological function of all artificial freshwater

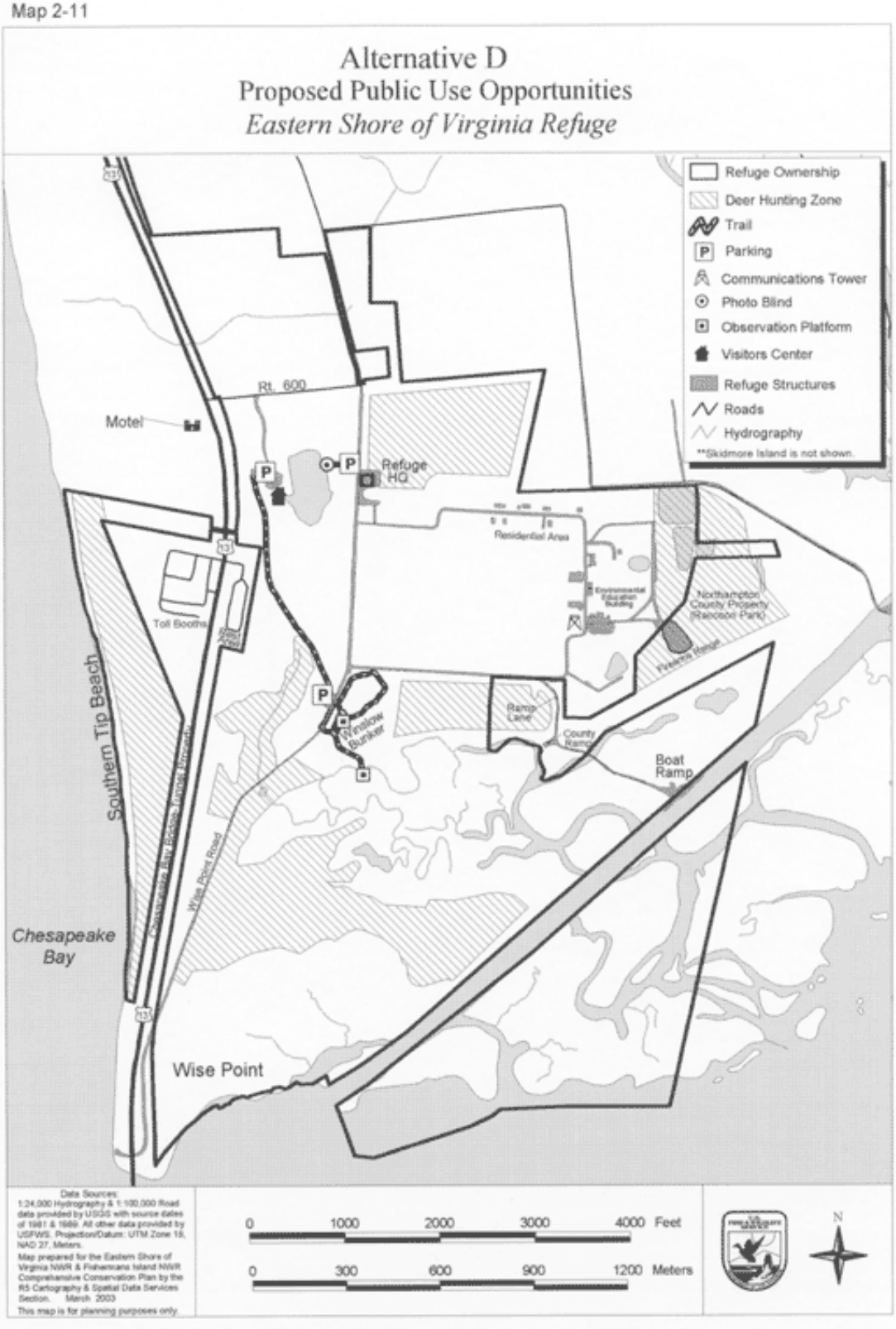
ponds on the refuge, eliminating those with minimal ecological benefits and restoring sites to appropriate habitats as determined by the detailed investigation of historic vegetative communities (see Goal 1, Objective A, Strategy 1).

4. Work with partners (e.g., Commonwealth of Virginia, other federal agencies, county) to transfer ownership or administration of the GATR site (e.g., land exchange, coordination area, surplus) for habitat of equal monetary value.

11-15 years:

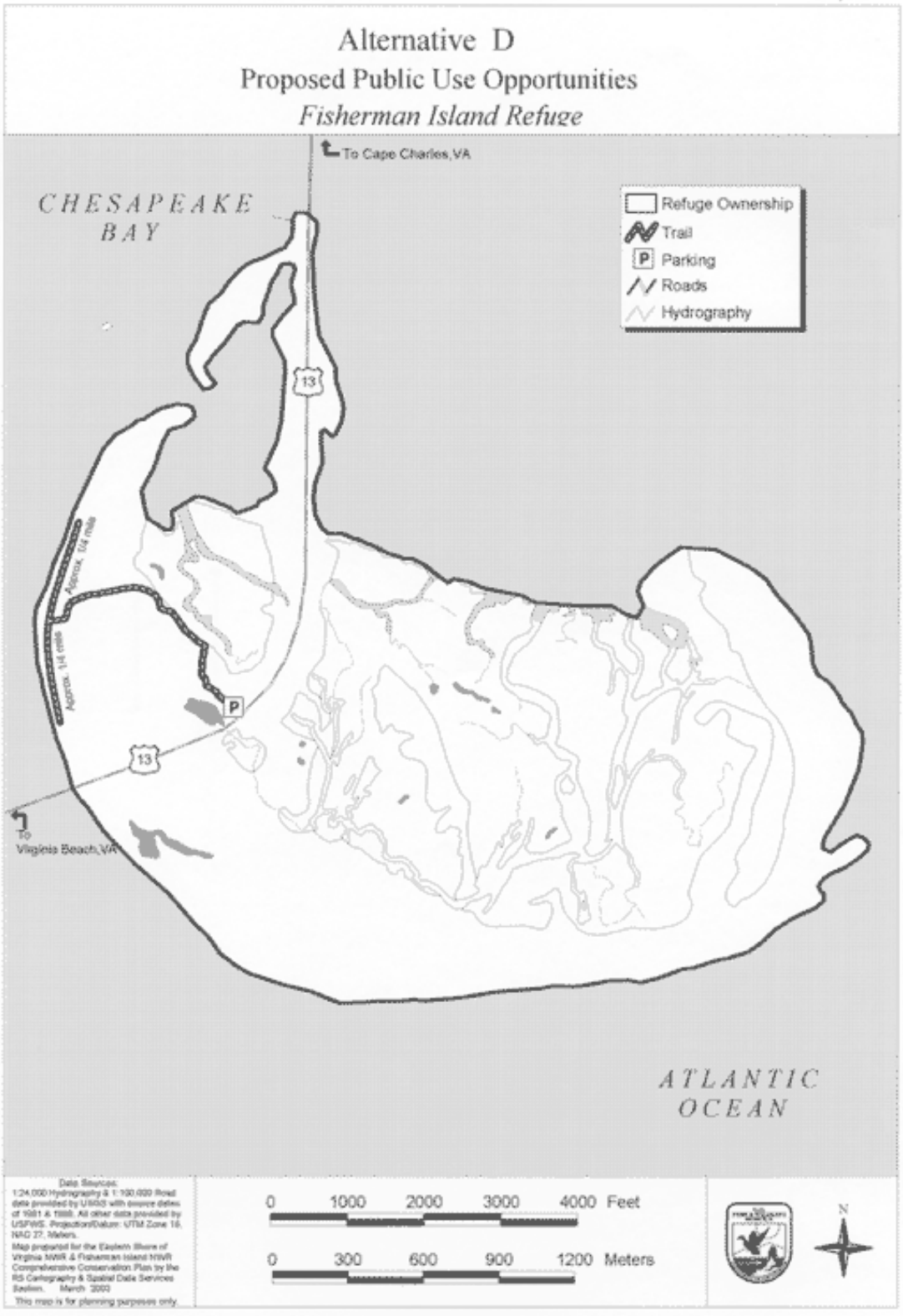
5. Locate and remove all concrete foundations and other building remnants on both refuges.

Map 2-11


Alternative D
Proposed Public Use Opportunities
Eastern Shore of Virginia Refuge
Refuge Ownership
Deer Hunting Zone
Trail
Parking
Communications Tower
Photo Blind
Observation Platform
Visitors Center
Refuge Structures
Roads
Hydrography
**Skidmore Island is not shown.
Rt. 600
Motel
Refuge HQ
Residential Area
Toll Booths
Southern Tip Beach
Chesapeake Bay Bridge-Tunnel
Wise Point Road
Northampton County Property (Ransom Park)
Ramp Lane
Boat Ramp
Chesapeake Bay
Wise Point
Data Sources:
1:24,000 Hydrography & 1:100,000 Road data provided by USGS with source dates of 1981 & 1989. All other data provided by USFWS. Projection/Datum: UTM Zone 18, NAD 27, Meters.
Map prepared for the Eastern Shore of Virginia NWR & Fisherman Island NWR Comprehensive Conservation Plan by the R5 Cartography & Spatial Data Services Section. March 2003
This map is for planning purposes only.
0 1000 2000 3000 4000 Feet
0 300 600 900 1200 Meters
N

2-86

Map 2-12


Alternative D
Proposed Public Use Opportunities
Fisherman Island Refuge
To Cape Charles, VA
CHESAPEAKE BAY
Refuge Ownership
Trail
Parking
Roads
Hydrography
13
Approx. 1/4 mile
Approx. 1/4 mile
P
13
To Virginia Beach, VA
ATLANTIC OCEAN
0 1000 2000 3000 4000 Feet
0 300 600 900 1200 Meters
N

2-87

Alternatives Considered but Eliminated from further Consideration

Relocating or closing the Wise Point Boat Ramp

We considered closing the Wise Point boat ramp or relocating it off refuge. Upon further discussion, however, we decided neither of these were reasonable alternatives. Closing the boat ramp would eliminate our ability to provide access to fishing and waterfowl hunting (as proposed in Alternative B) on the Eastern Shore of Virginia Refuge. These are two of the six wildlife-dependent recreational activities the Improvement Act encourages refuges to provide for the public. Closing the boat ramp would also have a significant adverse economic impact on the local community, as at least a dozen commercial watermen and their families depend on the boat ramp for their livelihood. Many other local people who use the boat ramp for recreational fishing buy equipment at local stores and eat at local restaurants. The boat ramp also contributes to cultural resources on the eastern shore of Virginia, where commercial and recreational fishing have been a way of life for generations.

Relocating the boat ramp is also not a reasonable alternative since there is no comparable relocation site available. Although there is a ramp at Kiptopeke State Park, three miles north of the refuge, that ramp is on the Chesapeake Bay and is not a safe launch site for users wanting to access the Atlantic Ocean. The next closest ramp on the ocean side is 10 miles north in Oyster. This is a long distance for users who need access to the southern tip of the peninsula. Finally, it is not the general practice of the National Wildlife Refuge System to build boat ramps off refuge. Given these circumstances, we decided relocating the boat ramp is not a reasonable alternative because it is not economically or technically feasible. Therefore, we will not consider this alternative any further.

Question 1: How would the refuge provide more forage and cover habitat for migratory species?

Alternative A, *Current Management*	**Alternative B,** *Proposed Action*	**Alternative C**	**Alternative D**
Allow natural succession on 20 acres in MU 13 and around the refuge residential area	Plant mixed hardwoods on 27 acres and allow natural succession in residential area and MUs 9, 10 11	Plant mixed hardwoods on 10 acres and allow natural sucession in residential area and MUs 6B, 9, 10, 11	Plant mixed hardwoods on 10 acres of refuge land
Continue the public deer hunt program to control deer browse on vegetation	Develop agreements with the Bridge-Tunnel Authority to manage forest on properties contiguous to refuge land	Develop agreements with the Bridge-Tunnel Authority to manage forest on properties contiguous to refuge land	Investigate historic vegetation communities (upland, coastal, etc.) and patterns and replicate them on the refuge to the extent possible
Provide fruit-bearing shrubs and promote natural succession	Develop a 15-year monitoring plan for fruit production and forest understory	Establish test plots for controlling invasive species in hardwood, upland shrub and grassland habitat	Develop agreements with the Bridge-Tunnel Authority to plant hardwoods and manage pines on properties contiguous to refuge land
Allow succession in MUs 4, 8 and 9	Establish test plots for controlling invasive species in hardwood, upland shrub and grassland habitat	Eradicate and control invasive species in MUs 6B, 11, 14, and Wise Point	Establish test plots in MUs 4 and 5 for controlling invasive species in hardwood stands
Hydroaxe to maintain early successional habitat for MUs 5,6,7	Eradicate from grassland habitat 20% of Japanese honeysuckle population annually over 5 years and 10% of fennel population annually over 10 years	Remove loblolly pine from MU 6A and on eastern side of road on Wise Point; burn cut areas to maintain shrub	Eradicate 20% of Japanese honeysuckle population and fennel population annually for 5 years
Periodically remove loblolly pines on Wise Point to maintain shrub habitat	Remove loblolly pine from the southern tip of Wise Point and from MUs 4, 5, 6, 6A, 7 and 10; burn cut areas to maintain shrub	Maintain shrub habitat by cutting fields in rotational blocks	Assess threats to beach and dune communities
Periodically remove non-native shrubs from grassland (MUs 1, 2) and in residential area	Maintain shrub habitat by cutting fields in rotational blocks	Partially remove hedgerows and autumn olive south of Route 600	Remove loblolly pine in MUs 6A and 10; initiate loblolly pine control elsewhere, where appropriate
Plant native warm season grasses and maintain by mowing	Remove hedgerows and autumn olive between MUs 1 and 13	Remove shrub/saplings and plant warm season grasses in MUs 5-7	Maximize deer removal
Mow old farm fields on a rotational basis	Maintain grasslands by mowing, burning, discing,	Conduct a test burn on MU 13; based on results, mow or burn MU s 1, 2, 4-7 and 14 to maintain in grassland	
Mow strips annually through shrub and grassland to enhance raptor and woodcock foraging areas		Maintain grasslands by mowing, burning, discing,	

Question 2: How would the refuge protect and enhance federal trust resources and other species and habitats of special concern?

Alternative A, *Current Management*	**Alternative B,** *Proposed Action*	**Alternative C**	**Alternative D**
Continue to close southern tip beach to public use to protect Northeastern beach tiger beetle habitat Periodically monitor for piping plover activity on Fisherman Island Refuge (FSH) Periodically survey vegetation on FSH for endangered plants Conduct surveys for colonial nesting birds on FSH Conduct Christmas Bird Counts on FSH Use aerial photos and research projects to evaluate the natural dynamics of erosion and accretion on FSH Conduct volunteer beach cleanups on FSH and on Eastern Shore of Virginia Refuge (ESV) Periodically spray herbicide to control phragmites Continue to close FSH to public use during the avian nesting season (March 15-Sept. 30) Monitor human and predator disturbance on FSH to minimize adverse effects to avian nesting and behavior	In addition to Alt. A: Conduct adult tiger beetle surveys for 3-5 years in the summer; conduct larval surveys if needed Assess trespassing on southern tip beach and install interpretive signs Survey for piping plovers biweekly during spring and fall migration; weekly during nesting season; and bimonthly in the winter Survey for seabeach amaranth; if found, erect a buffer zone around plants Conduct weekly avian surveys on FSH from Feb. 1 to Oct. 31, and bimonthly the rest of the year Install closure signs on FSH Monitor colonial nesting bird colonies for predators Determine and evaluate productivity for target species Evaluate vegetation in royal tern nesting area Implement a zero tolerance policy for red fox, coyote and feral cats Implement gull control measures if gulls are found predating on colonial or beach nesting birds	*Same as Alternative B*	*Same as Alternative B except*: Designate Fisherman and Skidmore Islands as Research Natural Areas Develop a predator management plan using historical data on predators from the time of European settlement Map areas of existing salt marsh, beach and interdunal communities on the refuge as well as similar habitats in Northampton County

Question 3: How would the refuge help protect migratory bird stopover habitat on the lower Delmarva Peninsula?

Alternative A, *Current Management*	**Alternative B,** *Proposed Action*	**Alternative C**	**Alternative D**
Continue to work with willing landowners to acquire 310 acres within our approved acquisition boundary Continue to participate in discussions on County planning Continue to work with public and private partners on GIS analysis of the lower eastern shore Continue to coordinate private land protection projects with the Service and Natural Resources Conservation Service (NRCS) Continue to participate in the Southern Tip Partners group to prioritize and identify lands for protection	In addition to Alt. A: Protect, through fee acquisition or easement, existing forest/shrub habitat within a proposed 6,030-acre acquisition area Acquire and restore agricultural lands within the proposed acquisition area to hardwood forest and shrub habitat Work with partners to establish conservation easements on agricultural lands not protected through acquisition within and outside the proposed acquisition area Work with partners to help identify lands for purchase or for conservation easements Assist partners in obtaining grants to protect high priority lands Coordinate with partners to develop a training course on conservation easements for refuge, State and County employees Support the development of a local land trust	*Same as Alternative B except*: Restore agricultural land within the proposed acquisition area to grass-land habitat instead of hardwood forest or shrub habitat	In addition to Alt. A: Protect, through fee acquisition or easement, existing tracts of any of the four target habitat types (mixed deciduous-pine, maritime pine, coastal shrub, beach/dune) within the proposed 6,030-acre acquisition area Acquire and restore agricultural lands within the proposed acquisition area to any of the four target habitat types Work with partners to help identify lands for purchase or for conservation easements Assist partners in obtaining grants to protect high priority lands Coordinate with partners to develop a training course on conservation easements for refuge, State and County employees Support the development of a local land trust

Question 4: What types of hunting and fishing opportunities would the refuge provide?

Alternative A, *Current Management*	**Alternative B,** *Proposed Action*	**Alternative C**	**Alternative D**
Continue to provide an annual deer hunt program for archery and shotgun Continue to participate in local hunting and fishing events	Continue to provide an annual deer hunt program for archery and shotgun on ESV and work with State partners to increase the take of deer Expand the ESV deer hunt onto a portion of the former Wise Point property Work with State partners to assess the health of the deer population on FSH Open a portion of FSH to an archery management deer hunt Open a portion of the former Wise Point property to migratory bird hunting by boat only Provide additional opportunities for hunting deer, small game and waterfowl on acquired lands where compatible	*Same as Alternative B except:* Do not open FSH to an archery management deer hunt Do not open Wise Point to waterfowl hunting Open the southern tip beach on ESV to surf fishing if adult and larval tiger beetle surveys show a stable and healthy population	*Same as Alternative A*

Question 5: How would the refuge manage the boat ramp area?

Alternative A, *Current Management*	**Alternative B,** *Proposed Action*	**Alternative C**	**Alternative D**
Commercial and recreational fisherman would continue to have access to the Wise Point boat ramp under the similar rules and regulations that applied when the boat ramp was owned by the Wise Point Corporation Continue to provide Special Use Permits for recreational and commercial watermen to access the Wise Point boat ramp outside refuge hours	Improve entrance road and parking lot; cap parking at 75 spaces, reserving 12 spaces for permitted commercial watermen Construct a boat ramp, commercial dock and commercial off-loading site Minimize impact to commercial watermen by allowing access during construction when feasible Once improvements are made, open ramp to the public during normal refuge hours; charge $10 daily and $120 annually Commercial watermen paying a commercial rate at the time the Service purchased the boat ramp would retain 24-hour access; charge $1,500 annually for docking boats and $600 for no docking New commercial users would pay $400 annually Phase out docking, 24-hour access and reserved parking through attrition Contract a concessionaire to manage the site Cap canoes and kayaks to two per vehicle Provide opportunities for fishing on new refuge lands where appropriate	*Same as Alternative B except:* Design a two-lane boat ramp with a 35-space parking lot; seven parking spaces would be reserved for permitted commercial watermen	*Same as Alternative B except*: Design a one-lane ramp and a 25-space parking lot; five spaces would be reserved for permitted commercial watermen Replace docks with mooring space for up to seven commercial fishing boats

Question 5: What types of wildlife observation, wildilfe photography, education and interpretation opportunities would the refuge provide?

Alternative A, *Current Management*	**Alternative B,** *Proposed Action*	**Alternative C**	**Alternative D**
Continue to offer weekend guided tours of FSH from Oct.-March Maintain the photo blind on ESV Continue to provide an observation window in the Visitor Center Continue to maintain two overlooks along the refuge's 1.5 miles of trails Continue to maintain the butterfly garden adjacent to the Visitor's Center Continue to provide environmental education programs on- and off-refuge for local elementary school children Continue to conduct teacher workshops Continue to offer the Junior Refuge Manager program Continue to participate in the Envirothon	In addition to Alt. A: Open a new 0.6-mile trail on ESV with an overlook Establish two additional butterfly gardens on ESV and conduct weekly butterfly walks in October Focus new environmental education programs on neotropical and temperate migrants; new programs would include lesson plans for local teachers, an additional Junior Refuge Manager Program, a "Monarch Watch" program for third-graders, an annual Spanish-taught program, an annual on-site teacher workshop, interpretive programs for summer camp groups and an Elderhostel program Design and construct an environmental education (EE) study area with a trail and a pavilion; renovate the EE building Revise and develop new interpretive materials and programs to focus on neotropical and temperate migrants Provide opportunities for wildlife observation, wildlife photography, education and interpretation on lands to be acquired, where feasible	In addition to Alt. A: Open a new 1-mile trail on ESV leading to the beach Establish two additional butterfly gardens on ESV and conduct weekly butterfly walks in October Focus new environmental education programs on grassland temperate migrants; new programs would include lesson plans for local teachers, a "Monarch Watch" program for third-graders, an annual Spanish-taught program, an annual on-site teacher workshop, interpretive programs for summer camp groups and an Elderhostel program. Renovate the EE building Revise and develop new interpretive materials and programs to focus on grassland temperate and neotropical migrants and their habitat needs Open the Winslow Bunker to public tours and expand interpretive displays on the history of ESV as a former military base Provide opportunities for wildlife observation, wildlife photography, education and interpretation on lands to be acquired, where feasible	In addition to Alt. A: Focus new environmental education programs on neotropical and temperate migrant habitats, emphasizing the loss of such habitats due to development on the Eastern Shore; new programs would include lesson plans for local teachers, an additional Junior Refuge Manager Program, a "Monarch Watch" program for third-graders, an annual Spanish-taught program, an annual on-site teacher workshop, interpretive programs for summer camp groups and an Elderhostel program. Revise and develop new interpretive materials and programs to focus on the unique ecological values of the refuge and lower Delmarva Peninsula including its historic landscapes and natural biodiversity

Question 6: How would the refuge reach out to the local community?

Alternative A, *Current Management*	**Alternative B,** *Proposed Action*	**Alternative C**	**Alternative D**
Continue to co-sponsor and participate in local festivals and events Continue cooperative efforts with local public and private conservation groups to promote local nature-based tourism Continue to offer outreach programs several times a year to local civic groups Continue to serve on the Board of the Coastal Virginia Wildlife Observatory Continue to share Refuge facilities with Federal, State and local agencies for wildlife-related and law enforcement activities Maintain the refuge web site to promote interest in the refuge	In addition to Alt. A: Participate in local and regional trails programs Work with local groups to promote responsible nature-based tourism Install exhibits on Bridge-Tunnel islands, increase media outreach efforts, distribute literature at State Fair, and expand special events Develop a three-mile bike trail with pull-offs and interpretive panels Institute annual field workshop for public and private partners focusing on wildlife management issues Help establish a Friends group Work with partners to expand corporate sponsorship of refuge events Offer special events and literature to local homeowners and others on how to make their property more wildlife-friendly Assess economic benefits of the migratory bird resource on the local economy Promote the refuge's contribution to the local economy	*Same as Alternative B except:* Exhibits and outreach activities would emphasize neotropical and grassland temperate migrants	In addition to Alt. A: Participate in local and regional trails programs whenever possible Work with local groups to promote responsible nature-based tourism Install exhibits on the Bridge-Tunnel islands Offer special events and literature to local homeowners and others on the natural history of the eastern shore and Northampton County, focusing on the unique ecological values of the area Offer special events and literature to local homeowners and others on how to make their property more wildlife-friendly Assess economic benefits of the migratory bird resource on the local economy Promote the refuge's contribution to the local economy

Question 7: How would we improve soils, waters and other abiotic components of the refuge?

Alternative A, *Current Management*	**Alternative B,** *Proposed Action*	**Alternative C**	**Alternative D**
Identify sites of possible contamination Remove underground storage tanks and inspect above-ground storage tanks Correctly store/dispose of hazardous materials Continue to work with partners to find an alternate, off-refuge site for the firearms range Continue to administer and maintain the firearms range; schedule usage so as not to conflict with environmental education programs Continue to collect and recycle spent brass casings Annually update spill prevention plans Verizon Virginia, Inc. would remove the communications tower once the lease expires in 2007	In addition to Alt. A: For heavy metals and organochlorine pesticides, conduct sampling on potentially contaminated areas of the refuge; depending on results, conduct biotic sampling While searching for an alternative firearms range site, implement modern practices for firearms range management such as controlling surface runoff and leachate from the berm and removing contaminated soils Maintain close communication with Bridge-Tunnel Authority officials and familiarize them with sensitive area maps and access points for deploying spill control equipment; encourage local officials to participate in a committee for spill response, control and prevention Explore the idea of a mock spill drill in the area and provide spill response training for refuge staff Verizon Virginia, Inc. would remove the communications tower once the lease expires in 2007; the refuge would work with Verizon to find an alternative site for the switching station or formalize a new agreement at the existing site	*Same as Alternative A*	*Same as Alternative B except*: Evaluate necessity of refuge fences and remove accordingly Remove all unused roads and restore to appropriate habitat Assess ecological function of artificial freshwater ponds; fill those with minimum ecological benefit Work with partners to transfer ownership or administration of the GATR site (e.g., land exchange, coordination area, surplus) for habitat of equal monetary value Locate and remove all concrete foundations and other building remnants on both refuges

Chapter 3

Tern colony.
USFWS photo

Description of the Affected Environment

- Refuge Administration
- Physical Environment
- Biological Resources
- Socio-Economic Factors
- Cultural Resources

Refuge Administration

Staffing and Budget

Annual appropriations vary from year to year, depending on the Service's overall budget and on how the refuge's needs and requests rank regionally and nationally with other refuges. Table 3-1 summarizes budget and staffing levels from 1996-2000. Fluctuations reflect funding for special projects. For example, the maintenance budget for 1999 includes $47,000 for Visitor Center repairs.

Table 3-1. Refuge Complex staffing levels and budgets between 1996-2000.

Fiscal Year	Operations	Maintenance	Full-time Staff	Part-time Staff
1996	347,200	77,800	6	0
1997	440,900	58,100	6	0
1998	416,600	25,100	7	0
1999	461,900	91,00	8	0
2000	522,200	75,600	9	0

Land Acquisition Policy

The Service acquires land and waters consistent with legislation or other congressional guidelines and Executive Orders for the conservation of fish and wildlife and its related habitat, and to provide wildlife oriented public use for educational and recreational purposes (USFWS 1982). Land acquisition planning typically identifies important wildlife habitat in need of some protection. Such protection could be obtained by Service acquisition or through the efforts of other agencies, interests or individuals. Acquisition of a new refuge or major additions to existing refuges normally requires an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) in order to comply with NEPA. The EA or EIS process establishes an acquisition boundary, with approval to acquire land within that boundary. This plan implements the EA process and therefore complies with NEPA. The Director of the Service approves all lands to be acquired.

Refuge Land Acquisition History

A transfer of land from the U.S. Air Force established the Eastern Shore of Virginia Refuge in 1984. The most recent land acquisition activity was the purchase of the Wise Point Corporation property (376 acres) in 2001. Also, in 1995 the Chesapeake Bay Bridge-Tunnel Authority (Bridge-Tunnel Authority) conveyed a 70-acre tract to the United States of America, for administration by the Service. This was done in compliance with a requirement of mitigation for the parallel crossing of the Chesapeake Bay Bridge-Tunnel. In 1997 the Bridge-Tunnel Authority exchanged with the U.S. a 66-foot-wide abandoned railroad bed (19 acres) in return for a four-acre parcel on Fisherman Island. The parcel on Fisherman Island was used to construct the piers for the new Chesapeake Bay Bridge-Tunnel. Total acreage for the refuge is now 1,120 acres.

Although established in 1969, Fisherman Island Refuge was actually transferred from the Navy to the Department of Interior in 1973. Recent land acquisition activities have included the acquisition of Fisherman Island's eastern half (825 acres) in 1998, and transfer of the remaining 25 acres from the U.S. Navy in 2000 to complete the refuge. Total acreage for Fisherman Island Refuge is now estimated at 1,850 acres, though that number fluctuates with accretion and erosion events.

Resource Protection and Visitor Safety

Law enforcement officers, with full authority to enforce federal regulations, are required to ensure resource protection and visitor safety. The refuge manager has been assigned collateral duties for law enforcement.

Special Use Permits

Special Use Permits (SUPs) are issued to individuals, organizations, and agencies requesting the use of refuge facilities or resources beyond what is available to the general public. SUPs are issued with special conditions and restrictions to minimize or eliminate disturbance to wildlife. They are also issued for variable time periods ranging from one day to one year depending on the request. The largest groups of permit holders are researchers and watermen. An average of 16 research projects per year (based on a previous three-year time period) have received SUPs for studies on northern saw-whet owls, royal terns, monarch butterflies, diurnal avian spring migrants, birds of prey, and rare plants on Fisherman Island Refuge. During 2002,

21 commercial watermen and about 50 recreational anglers purchased an annual $35 SUP for access outside refuge hours to docks and a boat ramp on the former Wise Point property.

Other Special Use Permits issued include use of refuge facilities for law enforcement training and access to leased facilities such as the communications tower and U.S. Customs transceiver. We issue an average of eight of these permits per year.

Research

Research has greatly increased our understanding of the critical role the Eastern Shore of Virginia and Fisherman Island Refuges play in avian migration. The refuge facilitates biological research by providing funding and housing for groups such as the Center for Conservation Biology at the College of William and Mary, the Coastal Virginia Wildlife Observatory and Hampton University. Currently, at least seven on-going research projects are being conducted on the Eastern Shore of Virginia and Fisherman Island Refuges. Most research projects focus on migrant stop-over ecology, habitat requirements, and predator impacts on nesting colonies. The knowledge gained has led to many recommendations being included in this plan. Much research is left to be done to adequately understand the resource requirements necessary to benefit the greatest number of our avian species of concern.

Refuge managerial responsibility also lies with trust resources beyond migratory birds, such as with the Federal listed Northeastern beach tiger beetle. In addition, refuge staff collects data from sea turtle strandings to contribute to the Virginia Institute of Marine Sciences' state sea turtle stranding database. Staff also collects marine mammal stranding data which contributes to the Virginia Marine Science Museum's State marine mammal stranding database.

Bander with raptor.
Charles Philip

Refuge Facilities and Maintenance

Existing facilities include the Visitor Center, refuge headquarters, an Environmental Education building, a conference building, four maintenance buildings, and seven refuge residences (including three houses for university researchers and four houses for refuge staff.) The maintenance staff is responsible for repairs and upkeep of all these facilities, though some upkeep of the university housing is the responsibility of the respective university.

We also have a photo blind, a kiosk, trails, three water control structures, roads, gates, and signs such as boundary signs. Maintenance staff is also responsible for the upkeep of these facilities. Responsibilities include periodically posting or replacing refuge boundary signs, mowing trails, and repairing the photo blind or kiosks.

There are also several ponds on the refuge. We pump freshwater into the Visitor Center pond to create wildlife observation opportunities showcasing migratory waterfowl, waterbirds, and shorebirds. We also annually remove invasive species such as cattail from that pond to enhance wildlife habitat and maintain the water level. Storm water runoff provides fresh water to the northern pond. Four other refuge ponds are naturally fed.

Adjacent to the communications tower is a switching station that houses communications lines which cross the Chesapeake Bay Bridge-Tunnel and head north to Cape Charles. Although there is an above-ground building associated with the switching station, the lines run underground with several small pedestals. The switching station is owned and maintained by Verizon, Inc.

Roadways

We own and maintain 2.1 miles of paved roads on the Eastern Shore of Virginia Refuge. About 1.5 miles of road provide safe and easy public vehicular access to such areas as the Visitor Center, refuge offices, environmental education building, and conference center.

Volunteer and Intern Programs

Northampton County is a rural community with a population of approximately 13,000 and is one of the poorest counties in Virginia. Over a million people live in the Hampton Roads area which is only 25 miles south of the refuge but is separated from the refuge by the Chesapeake Bay, and consequently, the Chesapeake Bay Bridge-Tunnel. Although the Hampton Roads area is a prime place to recruit volunteers, most volunteers are unable or unwilling to pay the round-trip toll to cross the Bay Bridge-Tunnel.

As a result, over half the volunteer hours each year come from people participating in long-term volunteer programs, such as the Intern or Workamper programs. Advertisements for interns are placed on several websites and in local publications. These volunteers receive housing and a $1,200 stipend for 12 weeks of volunteer service. Among some of the work volunteers do is staff

the Visitor Center, conduct environmental education programs, build bluebird houses, conduct bird surveys, and band and mark wildlife.

The refuge advertises for the Workamper Program in "Workamper Magazine" for volunteers who travel in recreational vehicles. In 1997, the refuge installed three RV hookups with water, electricity and sewage disposal. Workampers agree to provide at least 20 hours of service weekly and stay at the refuge for at least a month. They perform many of the same duties assigned to interns.

During an average year, seven people participate in the Intern Program and four to six in the Workamper Program. In all, volunteers contributed a total of 8,000 hours in 2000.

Cooperating Association/Friends Group

The Chincoteague Natural History Association (CNHA), a Cooperating Association, was established in 1987. Its bylaws were amended in 1992 to include Eastern Shore of Virginia Refuge. The primary purpose of CNHA is to promote a better understanding and appreciation of the natural history and natural environment of Virginia's eastern shore and Assateague Island, and in particular Chincoteague and Eastern Shore of Virginia Refuges.

CNHA has a sales outlet at the refuge's Visitor Center that is primarily managed by refuge staff. Twenty-five percent of gross sales are returned to the refuge annually. Gross sales for 2000 were around $32,000. The refuge submits a wish list of funding needs each year, and CNHA chooses which items to fund. In 2001, CHNA provided funds for environmental education, the volunteer program, special events, and stipends for interns.

Workamper sites.
USFWS photo

Physical Environment

Land Use

Land use history on the Eastern Shore of Virginia

The Eastern Shore of Virginia lies on the southern tip of the Delmarva Peninsula. The peninsula is bordered on the east by the Atlantic Ocean and on the west by the Chesapeake Bay. This area has long been a rural agricultural area. Prior to colonization, however, the eastern shore was almost entirely forested in deciduous mixed hardwood (Wesler et al., 1981). Anthropologists believe the indigenous people of the area were hunters and gatherers described as having a "pattern of transient hunting camps in the upland and perhaps base camps on the river terraces, correlated with a generalized foraging economy" (Wesler et al., 1981). This type of land use changed with the arrival of Europeans.

During the exploration and early settlement period of the 17th and 18th centuries, forests were cleared to make way for land that could be farmed. Colonists on the lower Delmarva Peninsula cultivated grain, raised livestock, and to a lesser extent, grew tobacco on relatively small farms. Records indicate the land upon which the Eastern Shore of Virginia Refuge currently sits was purchased by the Simkin family in 1766 and then sold to another farming family, the Custis', in 1803. The Custis' sold the land to the Hallett family in 1807. The land changed hands several times beginning in 1895, but by 1940 it was back under the ownership of the Halletts.

Soon after the Halletts reclaimed ownership, the majority of the farmland became Fort John Custis Army Base, later becoming the Cape Charles Air Force Base. Some land remained in agriculture through 1990. Aerial photographs show land on the western portion of the base that was farmed from the 1960's to 1990 (Mata L., 1997). Crops farmed prior to establishment of the refuge in 1984 were mainly grains such as wheat, barley, and soy beans. The refuge administered a cooperative farming program on approximately 75 acres from 1984 to 1990. Grains such as sorghum, millet, milo, and sunflower were planted and rotated with legumes (i.e., red clover) for wildlife consumption (Spady, 2000). Farming was discontinued on the refuge in 1990 and the fields were left fallow.

With the establishment of the Eastern Shore of Virginia Refuge in 1984 began the removal of structures to create habitat supportive

Kudzu.
Charles Philip

of migrating birds and other wildlife. Residences, communication towers, a non-commissioned officer's club, a tennis court, a swimming pool, a bowling alley and over one hundred excess military structures were removed from the premises. Most of the land once developed has revegetated via natural succession, thus increasing the acreage of seedling loblolly pine and shrub habitat. Unfortunately, non-native plant species such as Japanese honeysuckle, fescue grass, phragmites, and kudzu have established themselves throughout much of the disturbed acreage of the former base and farm land. Other invasive species include autumn olive, multiflora rose, mustard, fennel and lespedeza.

Land use history on Fisherman Island

The earliest documentation of Fisherman Island is from navigational charts of the Chesapeake Bay in 1815. Local people claim the island was originally named Linen Island after a ship carrying a load of linen went aground in the early 19th century.

In 1886, the federal government leased and subsequently purchased Fisherman Island from its owner William Parker for an immigrant quarantine station. The quarantine station consisted of barracks for up to a thousand people and included a kitchen, mess hall, artesian well, and keeper's residence. Records indicate the station was only used once in the treatment of yellow fever victims from the ship Despa in 1893. At the advent of WWI in 1914, soldiers from the Fourth Company of the Virginia Coastal Artillery National Guard were stationed on the island with two 5-inch guns.

The National Audubon Society tried unsuccessfully in 1932 to influence Congress to transfer Fisherman Island to the Department of Agriculture. However, a letter sent by the War Department and signed by the Secretary of War on Sept. 2, 1933 granted a permit for the period of five years, "revocable at will by the Secretary of War, to use as a migratory bird refuge, Fisherman Island Military Reserve, Virginia." The Navy used the island as a harbor defense unit and at U.S. entry into World War II, it was used as a submarine detection base. In 1943, the permit to use the island as a refuge was terminated by the Navy. Later, nearly 300 mines were controlled by cables from the island and four radar-controlled 90 millimeter guns were installed in 1943. The artillery station was deactivated in 1944 and the land was transferred from the Army to the Navy, who maintained a LORAN radar navigation station on the island until 1969. Fisherman Island Refuge was established in 1969 and transfered to the Department of the Interior in 1973.

The remainder of Fisherman Island (the Isaacs and Adams islands which had merged, split, and re-merged with Fisherman Island in the early 20th century) was purchased from private land owners by the Department of the Interior in 1998. The last 25 acres owned by the Department of Defense was transferred to the Department of the Interior in 2000, putting the entire island under Service ownership.

Today, this southernmost barrier island in Virginia is separated from the Eastern Shore of Virginia Refuge by Fisherman's Inlet, a half-mile-wide body of ocean water. Onshore sand bar movement (accretion) continues to expand the island's size, currently estimated at 1,850 acres, and reduce the distance between Fisherman Island Refuge and the Eastern Shore of Virginia Refuge.

The Virginia barrier island chain including Fisherman Island Refuge is classified as a "Wetland of International Importance" under the RAMSAR Convention, one of only 17 sites so designated in the United States.

Current land use trends

Residential construction on the eastern shore of Virginia is on the rise. Personal communication with land use planners on the eastern shore of Virginia has revealed a development trend in Northampton County emphasizing the construction of second homes for retired persons (McGowan, 2000), thus reflecting the demographic trend of an aging population. In the spring of 2000, construction of an "Adult Community" (Wilbur Smith Associates, 1999, p. 2-6) was beginning on a 2,000-acre tract of land. The development, located south of the Town of Cape Charles on the Chesapeake Bay side of the eastern shore, is a 15-year build-out plan for up to 4,000 residences, plus two golf courses and other amenities. Some of the units will be condominiums, but most will be houses. The development site is located in the immediate vicinity of the recently constructed Sustainable Technologies Industrial Park. Second home and recreational developments such as these pose the greatest threat to loss of valuable shore habitat on the Chesapeake Bay of both Accomack and Northampton Counties, the southern-most counties on the Delmarva Peninsula.

One possible reason for the recent development boom was speculation that the Chesapeake Bay Bridge-Tunnel (Bridge-Tunnel) toll would be reduced. As of March 1, 2002, that speculation has become reality. Previously, two-axle, four-tire vehicles paid $10 to cross the bridge one way. This $20 round trip

toll staved off development on the eastern shore, since it was cost-prohibitive for most people to commute from their jobs on the other side of the bridge. However, a new 24-hour round trip commuter toll allows two-axle, four-tire vehicles to pay $10 for the original crossing and $4 for any return crossing within 24 hours. This reduces the round trip toll to $14. Now that the toll has been reduced, the eastern shore is likely to see an even more dramatic change in its landscape.

At the same time, Northampton County is in desperate need of economic development. Cape Charles, with the largest population in Northampton County, has suffered from a shrinking population and a shrinking employment base for many years (Wilbur Smith Associates 1999). Between 1960 and 1990, the population within Cape Charles declined from about 2,040 to the present 1,400, representing a 30 percent drop. The town's commercial district currently has a high number of vacancies. A tourism push could bring money, jobs, and people back to the area.

Roadways

As land use development on the eastern shore intensifies, future traffic growth is anticipated. In July 1999, a consulting company working for the Accomack-Northampton Planning District Commission completed a "U.S. Route 13 Corridor Plan" (Wilbur Smith Associates 1999) for the eastern shore of Virginia. U.S. Route 13 is the principal north-south highway that traverses Virginia's eastern shore. In addition to its role as the primary corridor for travel on the eastern shore, Route 13 also serves as an alternative route for through travel between the Carolina's, southeastern Virginia and the Northeast. The study examined the 68-mile corridor of Route 13 that extends between the Maryland/ Virginia state line south to the Bridge-Tunnel, and including both Accomack and Northampton counties.

The goal of the plan was "to develop a regional consensus for the future of U.S. Route 13 in order to ensure its long-term viability as a safe and efficient regional transportation facility, one that enhances the regional economy and conserves environmental and cultural resources" (Wilbur Smith Associates 1999). The report found that since the completion of the Bridge-Tunnel in 1964, traffic on Route 13 has grown at an average annual rate of 2.7 percent. Traffic volumes vary within the corridor, with a low of about 8,000 vehicles per day at the corridor's southern end (where the refuge is located) and about 20,000 vehicles per day at the corridor's northern end. Truck traffic represents between 12 and 15 percent of total vehicular volume, a relatively high percentage for such a rural area.

The plan laid out several options for the traffic problems plaguing Route 13. In the end, it recommended upgrading the existing road to provide "a well designed four-lane divided highway, with appropriate turning lanes, with access management throughout its entire 68 miles" (Wilbur Smith Associates, p. ES-10, 1999).

Air Quality

The eastern shore currently has attainment status for air quality as required by the Federal Clean Air Act of 1970, which was amended in 1977 and again in 1990 (Wilbur Smith Associates 1999). Attainment status refers to whether a particular area meets, or "attains" the National Ambient Air Quality Standards (NAAQS), as set by the Federal government in the Clean Air Act of 1970 (Gaba 1994). Those standards specify the concentrations of pollutants that may be present in the ambient air outside of buildings. As traffic volumes increase, roadway improvements will be needed to offset increased air pollution that could cause the eastern shore to slip into "non-attainment" status, meaning the area would exceed allowable levels of specified pollutants.

Climate

The climate of the eastern shore of Virginia is mild and humid (USFWS 1984). The Atlantic Ocean and the Chesapeake Bay moderate temperatures, with a January average of 42 degrees and a July average of 77 degrees Fahrenheit. Precipitation averages 43 inches annually and is generally well distributed throughout the year with a slight increase during the summer months. Numerous rapidly moving polar fronts from the northwest dominate the weather pattern during the winter, while the summer pattern is characterized by little frontal activity and the domination of the "Bermuda High," which brings moist air from the south.

Red-spotted purple.
Nancy Biegel

The region is subject to two major storm types, northeasters and hurricanes, that bring high tides, strong winds, and heavy precipitation (USFWS 1984). Northeasters generally occur during the fall, winter and early spring and are characterized as slow moving low pressure systems that move up the Atlantic coast, generating strong northeast winds. Hurricanes occur from June through November and may pass offshore in the Atlantic, directly along the coast, or inland. A hurricane's tract will determine the extent of flooding and erosion in this area. Although the region does not usually experience the extreme effects of hurricanes that occur further south along the Atlantic and Gulf coasts, storm damage can be significant. The U.S. Army

Corps of Engineers has reported that 11 major storms (four northeasters and seven hurricanes) have struck this area during the 20th century.

Geology and Topography

Eastern Shore of Virginia Refuge

The Delmarva Peninsula lies in the Atlantic Coastal Plain, a seaward sloping province bounded on the west by a fall line and on the east by the Atlantic Ocean (USFWS 1984). The peninsula extends about 200 miles in a north-south direction and includes the State of Delaware and the eastern shores of Maryland and Virginia. The Virginia portion of the peninsula is approximately 70 miles in length and has an average width of six to eight miles. The peninsula was formed during the last glacial retreat when rising sea levels filled the large valley of the lower Susquehanna River, which became the Chesapeake Bay, thus isolating the area from the mainland. The extensive barrier island and marsh-lagoonal system along the eastern side of the Delmarva Peninsula was formed over the past several thousand years by broad sea level fluctuations, however, the exact method of island formation has not been determined.

The region experienced earthquakes in 1844, 1899, and 1918. There is also some evidence of recent uplifting of the Delmarva Peninsula, which is being offset by a rise in sea level. A study on elevation changes that have occurred during the past 30 years indicates sea level is rising at an annual rate of 1.2 millimeters per year in the vicinity of the former Wise Point property (USFWS 1984).

Topographically, the region is nearly flat, indicating the past influence of the ocean and the more recent leveling effects of winds. Elevations of the lower Delmarva Peninsula are generally less than 20 feet, with the highest areas along the interior of the peninsula and bluffs along the Chesapeake Bay reaching elevations of 40 to 50 feet. Numerous tidal creeks extend inland and are fed by intermittent freshwater streams with bottomland forests. Many of the creeks have been dammed at their upper ends to create impoundments used for irrigation. Extensive salt marshes are found within the barrier island lagoonal system and fringing marshes occur along tidal creeks.

Within the refuge, the upland section is flat with elevations between 5 and 20 feet (USFWS 1984). Low bluffs, 20 feet or less in height, and a narrow (20 to 50 feet wide) beach are present along the Chesapeake Bay shoreline. Low-lying woods, intertidal

wetlands and numerous small tidal creeks and ponds are found along the eastern side of the peninsula.

The location of the refuge relative to the Chesapeake Bay and Atlantic Ocean exposes the area to the effects of winds, waves, and currents, causing erosion and accretion of the shoreline. The shoreline along the Chesapeake Bay experiences moderate, non-critical erosion, which is slightly greater near the south end. The marsh-island complex of the refuge has exhibited little erosion since 1938.

Fisherman Island Refuge

Fisherman Island has changed dramatically over the years because of geological processes. In his latest study of the island Dr. George Oertel (1999) of Old Dominion University says:

> "the onshore migration of offshore sand bars was the main process affecting the development of Fisherman Island. The bars appeared to come in from the southeast, and wrapped around to the north. The attachment of bars to the shoreline was spaced over relatively long time intervals. In the 89-year interval between 1863 and 1952 only three major bars welded to the island, an average of only one major event every 30 years. During the 45 subsequent years between 1952 and 1997, five additional major "bar-attachment" events took place. The interval between major events was more frequent at about one major event per 10 years. After each attachment event, a portion of the sand in the bar migrated laterally along the shoreline. However, sand was often transported in opposite directions due to wave refraction at the ends of the bar. The bimodal transport of sand effected the development of the eastern and western ends of Fisherman Island in distinctly different ways. The sand distribution to the west side of the island produced closely spaced beach-dune ridges that developed into sets of secondary dune ridges. The sand distributed to the east side of the island produced hammocks that were separated by wide reaches of marsh". (pp. 10-11).

Soils

The soils of the Delmarva Peninsula are predominantly made up of sand, silt and shell fragments, and comprise six major soil associations, including Bojac, Munden, Nimmo, Newhan, Beaches and Sulfaquent (USFWS 1984). The upland areas at the north end

of the refuge are predominantly Mundane sandy loam and Bojac sandy loam, which have a 0-2 percent slope and are moderately well drained. Both of these soil types are classified by the Soil Conservation Service as prime farm land. The southern end of the mainland consists primarily of Fisherman and Carteret fine sands. Tidal marshes are of the Sulfaquent and Natraqualf associations and include Chincoteague silty loam in the low marshes and Magotha fine sandy loam in the high marshes. Beaches with fine to medium sands are found along the exposed shorelines of the western and southern ends of the mainland and the barrier islands.

Hydrology

Northampton County is somewhat unique with respect to hydrology because it has no major perennial free-flowing streams. The hydrology of the area can be discussed, therefore, in relation to the estuarine surface waters and groundwater.

Surface Water

The Chesapeake Bay is the largest estuary in North America, encompassing about 2,500 square miles (U.S. Department of Transportation 1994). From its 11-mile-wide mouth between Cape Henry and Cape Charles, it extends north about 195 miles almost to the Pennsylvania border. Along with the Delaware Bay estuary to the east, the Chesapeake Bay defines the Delmarva Peninsula. The distinguishing characteristics of the Chesapeake Bay, and all estuaries, are its daily tides and its salinity regime.

Biologically, the Chesapeake Bay is among the most productive bays in the world. Historically, its harvests of shell and finfish have been the highest of any North American estuary. This productivity is rooted in the large number of freshwater tributaries (150) that provide a regular influx of freshwater containing detritus and minerals to facilitate circulation of oxygen and nutrients, and gently sloping borders that allow productive marshlands an opportunity to grow (U.S. Department of Transportation 1994).

Numerous small tidal streams with freshwater headwaters are found on both the Chesapeake Bay and the ocean sides of the peninsula. Rainwater percolates into the soil or runs off into natural or man-made drainage swales and ditches with flow into the tidal creeks and their headwaters. Surface drainage is generally east and west. The bayside of the peninsula drains to numerous creeks and ultimately into the Chesapeake Bay. The seaside of the peninsula drains to tidal creeks, backwater bays

Raccoon creek.
USFWS photo

and estuaries behind the coastal barrier islands, and ultimately into the Atlantic Ocean (Wilbur Smith Associates 1999). There are brackish ponds within the marshes adjacent to the mainland.

Groundwater

The geology of Virginia's eastern shore (Accomack and Northampton Counties) has led to a complete reliance on groundwater resources for agricultural and residential use (Wilbur Smith Associates 1999). The communities on the eastern shore draw water from four aquifers. The upper aquifer (Columbia aquifer) is used primarily by the agricultural community, which draws 800,000 gallons per day (GPD) from this source. In addition, up to 4.4 million GPD are drawn from farm ponds, which often mix with underlying aquifer waters. Both the Columbia aquifer and individual farm ponds have been identified as having elevated levels of nitrogen. This is a common occurrence in agricultural areas.

The remaining three aquifers (upper, middle, lower Yorktown aquifers) are used as a water source for residential and industrial consumption. Water withdrawals by both public supply systems and private wells account for approximately 3.5 million GPD, with about two-thirds of the total consisting of private wells. Private industrial withdrawals account for an additional 3.3 million GPD, primarily in association with poultry and shellfish processing.

In recent years, increasing concerns have been expressed regarding the impact of current and future activities on potable groundwater. As part of the U.S. Route 13 corridor study, a non-point source pollution assessment study was conducted for the eastern shore of Virginia (Wilbur Smith Associates 1999). Non-point sources of pollution generally come from roadway run-off and agricultural activity in a predominantly undeveloped environment. The three primary non-point source pollutants within Accomack and Northampton counties are nutrients, such as decomposing organic materials and airborne fertilizer particles; silt/sediment, such as dirt and soil washed off from fields or roads by storm water; and toxins, such as antifreeze, oil and other materials dumped, dripped or spilled from vehicles and equipment. If found in high enough concentrations, these pollutants could prove detrimental to wildlife and people.

Specific threats include the aquaculture industry, which has experienced recent growth on the eastern shore (Wilbur Smith Associates 1999). The concern for this type of industry is untreated run-off and toxic spills. Recent studies of shellfish hatcheries, which draw water directly from the creeks both on the

seaside and bayside, have found greater evidence of waterborne pollutants. Die-offs of larvae and elevated levels of pollutants following heavy rain have increased concern over the need to reduce non-point sources of pollution.

Flood Plain

The mean tidal range in the area is four feet and the tidal waters are well mixed. Much of the area is subject to tidal flooding (U.S. Department of Transportation 1994). The Federal Emergency Management Agency (FEMA) defines the 100-year flood plain as that area that has a one percent chance of being flooded in any given year, or as the area where the land is less than nine feet above sea level on the seaside of the peninsula and eight feet above sea level on the Bayside. In 1982, the 100-year flood plain was revised to include the effects of wave action. The maximum 100-year wave crest elevation has been reestablished to an elevation range of 11-13 feet above mean sea level.

Northampton County, which is estimated to contain about 22,500 acres of land in the flood plain (Wilbur Smith Associates 1999), participates in the National Flood Insurance Program. This program, administered by FEMA, requires habitable structures to be constructed with a first floor elevation above the 100-year flood plain and places limitations on other construction and alterations within the flood plain.

The area is also subject to minor rain-induced flooding in low lying areas with poorly drained soils, primarily at the southern end of the peninsula.

Wetlands

The eastern shore has a wealth of wetlands. Most of these are tidal wetlands comprised of salt marshes and tidal flats on the seaside and salt marshes on the bayside (Wilbur Smith Associates 1999). Freshwater wetlands occur at higher elevations than the tidal wetlands and, on the peninsula, are associated primarily with streams and creeks. The most comprehensive mapping of wetlands in Accomack and Northampton counties comes from the Service's National Wetlands Inventory maps. The evaluation of wetlands within the study area shows the relative abundance of tidal (estuarine) wetlands, such as deep water tidal habitats and adjacent tidal wetlands, tidal creeks, salt/brackish marshes, and mud flats on the edges of the peninsula. Fingers of estuarine wetlands reach inland into the peninsula along the stream channels to the limit of salt/brackish water intrusion.

The next most abundant wetland type on the mainland portion of the eastern shore is the inland freshwater wetland (palustrine). Freshwater wetlands include marshes, fens, swamps, bogs, wet meadows, etc. and also include small shallow ponds or lakes. Many of the freshwater wetlands are adjacent to streams and creeks.

A relatively small amount of Lacustrine wetlands occur within the study area, indicating permanently flooded lakes and reservoirs. The least common wetland type in the study area is the Riverine type, found along fresh water streams and creeks.

Table 3-2. Wetland Types within Accomack & Northampton counties.

Type	Subcategory	Total Acreage
Tidal (Estuarine)		145,000
Freshwater	Palustrine	62,250
	Lacustrine	250
	Riverine	49

Contaminants

Eastern Shore of Virginia Refuge

Many of the contaminants issues on eastern shore of Virginia are related to past activities. Eastern Shore of Virginia Refuge was owned by the Department of Defense in the 1930's and operated as Fort John Custis until the 1950's. Thereafter, the facility was operated as Cape Charles Naval Air Station and in 1984 was transferred to the U.S. Fish and Wildlife Service.

In 1999 the Service completed a Contaminant Assessment Process (CAP) for the Eastern Shore of Virginia Refuge (USFWS 2001a). This process involves gathering information regarding environmental contaminants that may impact a National Wildlife Refuge. The CAP process reviews information available on the ecological and physical characteristics of the refuge and surrounding area relative to possible contaminants issues. The CAP may provide recommendations for additional work to more definitively assess ecological risk to the refuge and biotic

receptors. The information summarized through the CAP can also provide the basis by which land managers select options to reduce contaminant impacts on species and their habitats.

According to the CAP for Eastern Shore of Virginia Refuge, the primary contaminant issues are:

Green tree frog.
USFWS photo

- Identify baseline sampling locations in the event of future spills. Spills may occur along U.S. Highway 13/Bridge-Tunnel transportation route or from vessels in the Chesapeake Bay and the Atlantic Ocean. Spilled materials may affect the surface waters, marshes, coastline and the species that use these habitats around the Eastern Shore of Virginia Refuge.
- Address remaining ecological risk issues due to military disposal practices at Fort John Custis and Cape Charles Naval Air Station.
- Characterize and control the contaminants related to the active firearms range in-holding which is owned by Northampton County and managed by the Service.

Baseline Sampling Locations

The prime baseline sampling area identified is Raccoon Creek. Raccoon Creek consists of a tidal creek and marsh habitat that would be preliminarily sheltered from immediate effects of a spill to the Chesapeake Bay, Atlantic Ocean, or along U.S. Route 13 (including the Bridge-Tunnel). Although a perennial wetland channel to Raccoon Creek has been impacted by organochlorine pesticides (contaminants of concern which were used historically), an oil or hazardous material spill today would not be characterized by organochlorines. Raccoon Creek is accessible by water from launch locations at Kiptopeke State Park (three miles north of the refuge), from the Wise Point boat ramp, and from the Dixon Dock (a private access point). Raccoon Creek provides habitat for a bay crab nursery and supports numerous small mammals and aquatic species including, but not limited to, catadromous and anadromous fish. Productive wetlands serve as foraging, loafing and nesting habitat for migratory birds, waterfowl and shorebird foraging. Piscivorous birds also forage and nest on and near the refuge.

Ecological Risk

The U.S. Environmental Protection Agency (EPA) prepared a Modified Site Investigation Narrative Report in 1998 to document levels of contaminants in groundwaters, surface waters, soils and sediments. The EPA report sets forth the agency's preliminary evaluation of the associated human health risks.

Osprey.
USFWS photo

The EPA report discovered levels of arsenic measuring 8.3 parts per million in the soils around the occupied refuge residences. This level exceeds three times the background arsenic level and the EPA Region III human health risk-based screening levels. The EPA report recommended a site-specific health risk assessment for the residential area. In September 2000, the Service requested the EPA evaluate the human health risk, as recommended in the report. By letter dated November 27, 2000, to the Service, EPA Region III stated that it "does not recommend a site-specific health risk assessment be conducted on the soils around the residences" based on the fact that the EPA normally recommends a clean-up goal for arsenic of 17 to 20 parts per million for protection of human health.

The EPA report also found that sediment samples from the perennial wetland channel receiving discharges from the former on-site landfill and on-site lagoon contained levels of the organo-chlorine pesticide, DDE. The EPA concluded DDE was impacting the wetlands.

Although the EPA report was limited in design, results indicate that at several locations within the refuge, organo-chlorine contamination may be impacting ecological receptors such as plants and wildlife. The extent of the contamination throughout the habitat is not adequately described by the sampling that was conducted and the results are not adequate to evaluate the ecological receptor risk. The Service's Virginia Field Office is currently working with the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers and the Virginia Department of Environmental Quality to procure funding to conduct sampling that will provide data to thoroughly evaluate ecological risk to wildlife from past military activities. This activity would include identification, characterization, and location of remaining sources of contamination.

Firearms Range

The firearms range, located as an in-holding to the Eastern Shore of Virginia Refuge, is owned by Northampton County, but managed and maintained by the refuge. Refuge staff schedule use of the range and try to minimize overlap between range use and environmental education programs conducted in a building located one-eighth of a mile away. Refuge maintenance staff mows the grass to maintain the firing lines and maintains the general appearance of the range. The staff also maintains a trailer on the property, used to store targets and other equipment. In the past staff has collected and recycled spent brass casings.

Users of the firearms range include the U.S. Coast Guard, Northampton County Sheriff's Office, Bridge-Tunnel Police, U.S. Navy, Federal Bureau of Investigation, Virginia Marine Patrol, Virginia Department of State Police, and the U.S. Fish and Wildlife Service (see Table 3-3).

Table 3-3. Firearms Range Users from January-December 1999

Firearms Range Users in 1999	Number of Days
U.S. Coast Guard	17
Northampton County Sheriff's Office	11
Chesapeake Bay Bridge-Tunnel	14
U.S. Navy	6
Federal Bureau of Investigation	4
Virginia Marine Patrol (VMRC)	3
V.A. Department of State Police	2
U.S. Fish and Wildlife Service	1

The small firearms range berm contains elevated levels of lead and several other metals. EPA sampling showed that sediment in the swale which drains the firearms range contained the organochlorine DDT, its breakdown product, DDE and alpha-chlordane. Although the levels documented did not exceed human health risk-based concentrations, the EPA concluded these organochlorines were "impacting the wetlands on and around the site." Levels exceed ecological risk screening values. In August 2002, the Service conducted sampling on the marsh located directly behind the firearms range and on the Virginia Inside Passage. Lead shot was not detected in any of the samples (n=12), therefore the risk to ecological receptors due to lead shot is presumed to be insignificant. The results of the metals and organics analyses for these 12 samples are under review.

Fisherman Island Refuge

The Service also conducted a CAP for Fisherman Island Refuge (USFWS 2001b). Similar to the Eastern Shore of Virginia Refuge, the CAP states that most of the contaminants issues on Fisherman Island Refuge fall into two major categories: 1) past military-related contaminant issues, and 2) potential impacts from spills.

Contaminants Issues Related to Military Use

Contaminant issues on Fisherman Island Refuge related to military use were resolved in 1996, when cleanup activities at Fisherman Island Refuge were concluded. Completion of those cleanup activities followed recommendations in the Final Corrective Action Plan (USFWS 1994b) for the refuge. Cleanup activities included the removal of fuel tanks, tank vaults (emptied and decontaminated), pipelines, and contaminated soils. In 1995, a hot spot site (less than one-quarter-acre in size and limited to a top few inches of soil) of organochlorine pesticide (DDT) contamination referenced in the Final Corrective Action Plan was remediated.

Threats and Potential Impacts from Spills

Similar to Eastern Shore of Virginia Refuge, spills on Fisherman Island Refuge could result from vehicular accidents on U.S. Route 13. Although transportation of hazardous materials on the Chesapeake Bay Bridge-Tunnel is limited, small quantities of fuels, gases, and various combustibles and flammables can be transported. If a spill occurred in the vicinity of the refuge, or if a vehicular accident caused a fuel spill, the refuge habitat could be impacted. The impact of the spill would depend on the proximity of the spill to the refuge, the material spilled, timeliness of spill response and control, and the volume of the material spilled. The Bridge-Tunnel Authority is trained in spill response management. Limited spill equipment is readily available at the Bridge-Tunnel District Offices.

Spills could also arise from vessel accidents in the Chesapeake Bay. Depending on where a spill occurs in the Atlantic Ocean, hazardous materials could drift toward and impact the refuge. Spills in the Chesapeake Bay could be devastating to both habitat and species (particularly nesting species) on the refuge or in the vicinity of the refuge. The CAP says vigilant attention to spill preparedness will be the first and most important line of defense to maintain and protect the refuge from a major catastrophic contaminant event. The extent of impact to the refuge would depend on the same factors listed above for a spill on U.S. Route 13, plus direction of flow and dilution.

Other Contaminant Threats Today

The CAP also identifies other contaminants threats currently present on Fisherman Island Refuge. Presently, a residence remains on the island with an empty residential fuel tank and affiliated fuel line. As exists with many unstaffed, isolated

locations, there is always the threat of small sources of contamination from boaters arriving from smaller vessels who may come ashore. Most beaching vessels would be recreational boaters and threat from contaminants is expected to be minimal and limited to small fuel spills, which would be a rare event. Also, it is possible a small aircraft could jettison material over the refuge. Such materials would most likely be fuel or pesticides related to agricultural spraying activities further north on the Delmarva Peninsula.

Baseline Sampling Locations

Fisherman Island Refuge is accessible from U.S. Route 13, which traverses it. Baseline sampling can be conducted either from small boats coming ashore at almost any location along the shoreline or by beach access using a four wheel drive vehicle on the old military road.

Biological Resources

Threatened and Endangered Species

Northeastern Beach Tiger Beetle

One Federal listed species is currently known to occur on the Eastern Shore of Virginia Refuge -- the Northeastern beach tiger beetle. The beetle can be found on the refuge's southern tip beach, which is located on the Chesapeake Bay side of the refuge. A 1999 survey conducted by the Service (Knisley and Hill, 1999) found 62 adult beetles on refuge property. Another 18 adults were found on the abutting property to the north, which is owned by the Sunset Beach Resort.

Larger populations of this threatened subspecies occur along western facing beaches of Northampton County. According to the 1999 survey, Pickett's Harbor and Cape Charles beach (South), located north of the refuge, had population sizes 2,412 and 512, respectively. Large populations occur all the way up to Parker's Marsh in Accomack County.

Piping Plover

The Federal listed piping plover previously has nested on Fisherman Island, although refuge records dating from 1975 show nesting to be sporadic at best with the maximum number of five adults recorded in a breeding season occurring in 1979, 1980 and 1983 during the annual colonial waterbird survey. State records indicate one nesting pair occurred between 1991 and 1992. No breeding individuals have been observed on Fisherman Island since 1992. Occurrence during migration is likely.

Red-shouldered hawk.
Dwight Dyke

In Virginia, piping plovers have historically nested on barrier beaches of Accomack and Northampton Counties from Assateague Island south to Fisherman Island, where they may sometimes compete for nesting habitat with Wilson's plover. Watts et. al. (Undated) found that piping plovers nesting on 13 barrier islands in Virginia from 1986 to 1988 were not evenly distributed along the islands. Beach segments used by plovers had wider and more heterogenous beaches, fewer stable dunes, greater open access to bayside foraging areas, and closer proximity to mudflats. They also note the characteristics of beaches selected by plovers are maintained by storms.

Needed improvements in breeding population numbers in Virginia have not been realized, despite protective efforts, and volatility and uneven distribution have characterized recent plover numbers (Terwilliger and Cross, 1999). Census records from 1986-1999 indicate a declining trend in the breeding population from Parramore Island south to Fisherman Island. The 2001 Virginia piping plover census only recorded two breeding pairs on these southern islands, down from 30 pairs recorded in 1988. The combination of low recruitment in the southern Virginia barrier islands and limited availability of optimal nesting habitat on Fisherman Island may explain the absence of breeding birds (Terwillinger 2001).

The breeding history for the entire Southern Recovery Unit (Delaware, Maryland, Virginia, and North Carolina) also reflects fluctuating low numbers. A very steep decrease in the North Carolina population (from 52 pairs in 1997 to 23 pairs in 2001) exacerbates concerns regarding the decline on the southern Virginia islands. The Piping Plover Recovery Team set a minimum target of 400 pairs of piping plovers for the Southern Recovery Unit. However, 2000 census figures reported 183 pairs, which is just 46 percent of the recovery goal (USFWS 2000a). The Southern Recovery Unit average productivity in 2000 was 1.04 chicks per pair. This was substantially lower in 1997-99 than in 1993-96, and is still well below the 1.5 chicks/pair threshold needed to maintain a secure population. This decline is of particular concern given the small number of breeding pairs, and their distribution over a large geographic area within the Southern Recovery Unit. Thus, neither the population nor the productivity goal for the Southern Recovery Unit is being met, and the small piping plover population in these four states remains vulnerable to further declines.

There are currently several areas of suitable breeding piping plover habitat on Fisherman Island, and dynamic coastal formation processes are likely to cause increases and decreases in the quantity and quality of breeding piping plover habitat over time. Even with suitable habitat, however, breeding activity will depend on availability of dispersing breeding birds in southern Virginia and North Carolina. The presence of roosting herring and great black-backed gulls may also function as a deterrent. Since maximizing piping plover productivity and repairing gaps in their breeding range is critical to their recovery, our increased monitoring effort, which will allow us to detect presence of breeding pairs and implement prompt protection (particularly from predation) is of vital importance to the coastwide recovery program (Hecht 2001).

Should breeding piping plovers occur on Fisherman Island, our increased monitoring efforts should allow us to detect the presence of breeding pairs and protect them according to Recovery Plan guidelines.

State Listed Species

When State recovery plans for State listed species become available, we will use them whenever practical to manage State listed species found on the refuges.

Plant Communities

The Delmarva Peninsula is part of the Mid-Atlantic Coastal Plain and is located along Virginia's southeast coast, an area characterized as an overlap between the north and south temperate zones where numerous northern plant species reach their southern limit and conversely many southern species reach their northern limit. The Chesapeake Bay is a natural barrier to plant dispersal. Species more common further south in the Carolinas and southeastern Virginia are not found on the Delmarva Peninsula.

The ecosystem on the Delmarva Peninsula is classified as the southeastern mixed forest province (Bailey 1995). The climax vegetation on the Delmarva Peninsula is dominated by loblolly pine and a variety of hardwoods including oaks, hickory, red maple, yellow poplar, sweet gum, and black gum. Clearing activities since European settlement in the 1600's have resulted in the creation of several successional habitat types, including grasslands, shrubs, agricultural fields, and monotypic loblolly pine stands.

Field habitat.
Charles Philip

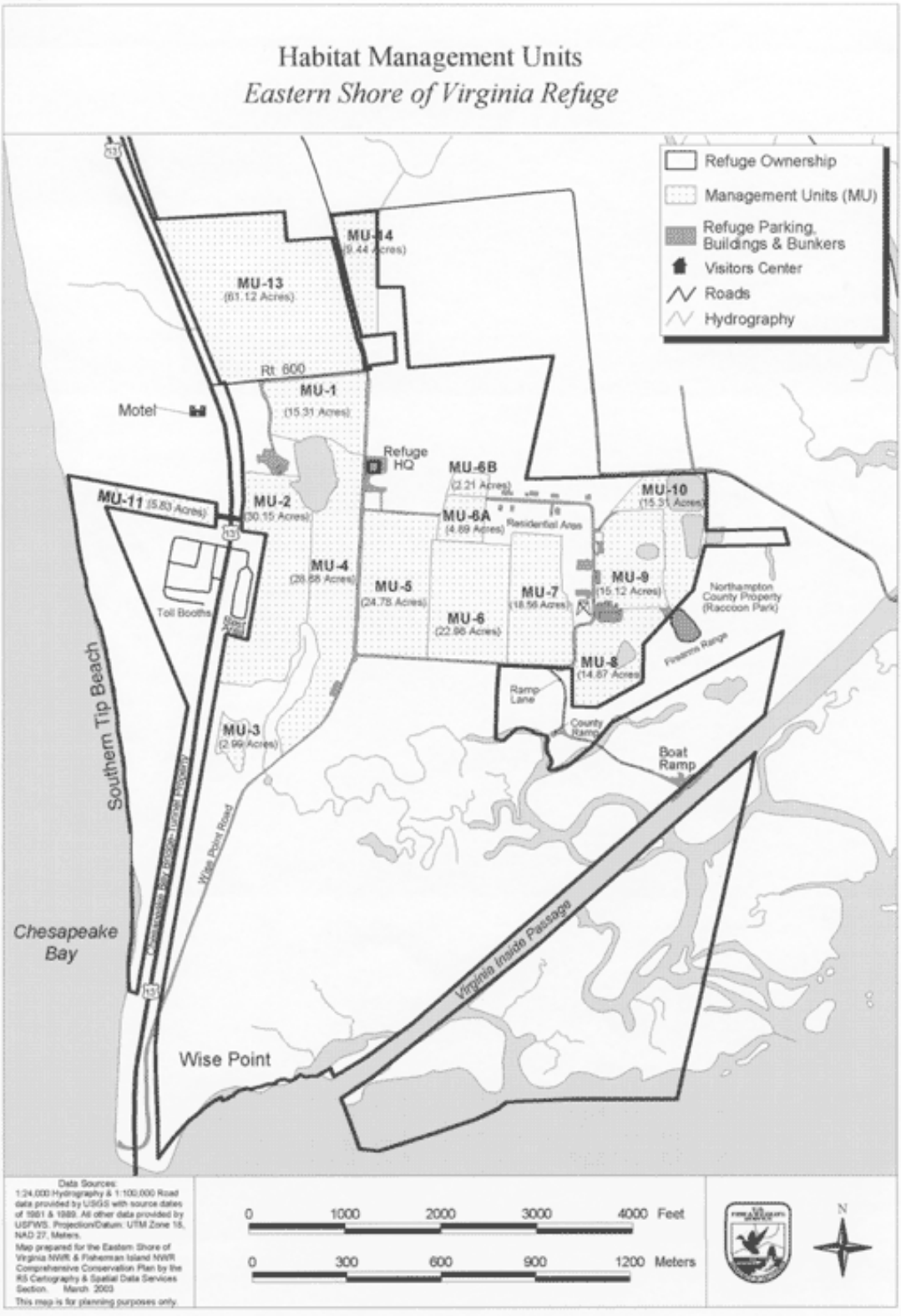
Eastern Shore of Virginia Refuge

The refuge consists of about 185 acres of grassland and shrub/scrub habitat, most of which is concentrated to the south and southwest of refuge headquarters. Much of this land was either previously developed or farmed. The rest of the approximately 935 acres is either forest, beach, marsh or cleared land with buildings. The grassland and shrub/scrub habitat has been divided up into 15 Management Units (MU's) (see Map 3-1). Appendix C contains a complete list of vegetative communities.

Coniferous Forest

The two largest forested tracts of land on the Eastern Shore of Virginia Refuge are both dominated by loblolly pine. Approxim-

Map 3-1


Habitat Management Units
Eastern Shore of Virginia Refuge
Refuge Ownership
Management Units (MU)
Refuge Parking, Buildings & Bunkers
Visitors Center
Roads
Hydrography
MU-14 (9.44 Acres)
MU-13 (61.12 Acres)
Rt 600
MU-1 (15.31 Acres)
Motel
Refuge HQ
MU-6B (2.21 Acres)
MU-10 (15.31 Acres)
MU-11 (5.83 Acres)
MU-2 (30.15 Acres)
MU-6A (4.69 Acres)
Residential Area
MU-4 (28.66 Acres)
MU-5 (24.78 Acres)
MU-7 (18.56 Acres)
MU-9 (15.12 Acres)
Toll Booths
MU-6 (22.86 Acres)
Northampton County Property (Raccoon Park)
Firetower Range
MU-8 (14.87 Acres)
Ramp Lane
County Ramp
MU-3 (2.99 Acres)
Boat Ramp
Southern Tip Beach
Wise Point Road
Chesapeake Bay Bridge-Tunnel (closed)
Chesapeake Bay
Virginia Inside Passage
Wise Point
Data Sources:
1:24,000 Hydrography & 1:100,000 Road data provided by USGS with source dates of 1981 & 1989. All other data provided by USFWS. Projection/Datum: UTM Zone 18, NAD 27, Meters.
Map prepared for the Eastern Shore of Virginia NWR & Fisherman Island NWR Comprehensive Conservation Plan by the R5 Cartography & Spatial Data Services Section. March 2003
This map is for planning purposes only.
0 1000 2000 3000 4000 Feet
0 300 600 900 1200 Meters
N

3-26

Fruiting shrub.
Charles Philip

ately 118 acres of pine forest are located on Wise Point and 77 acres of pine forest are located along the Chesapeake Bay shoreline, on the refuge's western boundary. Both these forests are exposed to the harsh maritime influences of wind and salt spray; therefore, the vegetative community is unlike the climax vegetation found in more upland areas of the peninsula. The understory is dominated by Japanese honeysuckle, green-briar, poison ivy, Muscadine grape, fox grape, Virginia creeper, trumpet creeper, and blackberry. A similar species composition can be found in the understory of all the forested acreage on the refuge.

Mixed Coniferous/Hardwood Forest

The largest block of mixed coniferous/hardwood forest on the refuge is located on the former Wise Point Corporation property. This approximately 53-acre block consists of forested "hammocks" dominated by loblolly pine mixed with oaks, black cherry, sassafras, wax myrtle, greenbriar, poison ivy, virginia creeper, and some American holly. This forested area mainly occurs on old dredge spoil sites. There are also two blocks of mixed forest, each about 23 acres, located north of the refuge headquarters. This forest type is dominated by loblolly pine and Virginia pine and includes deciduous species such as white oak, southern red oak, black oak, willow oak, sweet gum, black gum, black cherry, red maple, flowering dogwood, yellow poplar, and hickories.

Deciduous Forest

Deciduous forest covers about 60 acres north of the refuge headquarters. This habitat is oak dominant, consisting of white oak, southern red oak, black oak, and willow oak. An additional 40 acres north of the Winslow Bunker are dominated by black cherry, black locust, sassafras, American holly, devil's walking stick, and yaupon holly.

Shrub/Scrub

There are about 185 acres of upland shrub/scrub habitat on the Eastern Shore of Virginia Refuge. About 130 acres are located in the central and eastern portions of the refuge in Management Units 4-9. This habitat is expanding via natural succession into the grassland Management Units. Commonly found species include wax myrtle, black raspberry, blackberry, Eastern red cedar, Japanese honeysuckle, multiflora rose, autumn olive, willow, shining sumac, and common nightshade. Another 35 acres of shrub/scrub habitat occurs on the former Wise Point Corporation land, at the highest elevations of intertidal marsh,

where it transitions to upland forest. Vegetation is typically dominated by the salt-tolerant high-tide bush and groundsel bush, grading into wax myrtle and ultimately forest.

Shrub/scrub habitat can also be found on about 20 acres of the Wise Point property, on the southern tip. The dominant species there is wax myrtle, bayberry, shining sumac groundsel tree, and black needlerush. This habitat is slowly decreasing in acreage due to an adjacent stand of loblolly pine that is increasing in size and blocking sunlight.

Mixed Forb/Grassland

There are about 230 acres of mixed forb/grassland habitat on the refuge, concentrated mostly in the western part of the refuge in Management Units 1, 2, 3, 10, 13 and 14. Most of these grassland areas consist of mixed forbs and grasses dominated by horseweed, ragweed, pigweed, goldenrod, common fennel, pokeweed, broomsedge, crab grass, goose grass, and patches of black raspberry and blackberry (Watts 2000). These fields are heavily impacted by non-native fescue grass. Eastern red cedar seedlings commonly sprout throughout these open-habitat areas.

MU 13 has a different composition of mixed forb/grassland. In the spring of 1999, the refuge planted warm season grasses in this management unit. Species planted included big bluestem, indiangrass, switchgrass, eastern gammagrass, and coastal panicgrass. These drought-tolerant grasses are considered to be a good source of food and cover for both resident and migrating wildlife. During the first two growing seasons, these fields were inundated with weedy species dominated by mustard in the first season and horseweed in the second season.

Timothy grass.
Charles Philip

Salt Marsh

The former Wise Point Corporation tract includes about 290 acres of salt marsh along Raccoon Creek and the Virginia Inside Passage. The marsh is dominated by typical Atlantic coast marsh species such as salt marsh cordgrass, salt marsh hay, black needlerush and scattered high-tide bush. Tidal creeks and mudflats occur throughout the tract, which serve as feeding areas for waterfowl, wading birds and shorebirds.

Fisherman Island National Wildlife Refuge

Habitat succession has formed a mosaic of vegetative communities capable of withstanding the harsh conditions present on Fisherman Island Refuge. The variety of habitats combined with

the geographic location of the island, accessibility of food, protective shrub and thicket cover, and minimal human disturbance all make this island an important stopover location for migratory birds. Accretion has led to significant increases in beach and foredune habitat on the north/northeast and south/southeast portions of the island with similarly significant increases in salt marsh habitat in the northern section of the island. A complete list of vegetative communities can be found in Appendix C.

Beach/Foredune

This highly dynamic habitat occurs along the south and east perimeters of the island in a relatively narrow zone of 15-30 meters. It is composed of plants able to withstand dry soil conditions, high amounts of salt spray and low ground nutrient content (Oertel 1999). Vegetation is primarily composed of grasses such as salt meadow hay, running panic grass, American beach grass and sand spur. Other plants include Russian thistle, seabeach orach, cocklebur, and searocket (Oertel 1999).

Seabeach knotweed, a globally rare plant, was recently discovered in the beach/foredune habitat on the southern end of the refuge in early August 2000. Forty plants were found on the southeastern end of the island, just east of the largest tidal pond. In addition, two populations of dune ground cherry were discovered, a plant rare to Virginia. Approximately a hundred plants were found on the northeast side of the island and a much larger population was found on the southwest side of the island.

Primary Dune Ridge

Landward of the beach/foredune zone along crests of low ridges lies the primary dune ridge. Vegetation is usually sparse or clumped and mainly colonized with grasses that have the ability to propagate via rhizomes and can withstand deep burial in the sand. The predominant species are American beach grass, running panic grass, salt meadow hay, and salt grass. These grasses extend into the primary swale where they tend to be more dense. The primary swales also have sparsely distributed shrub seedlings, mainly wax myrtle and bayberry.

Secondary Dune Ridge

The older secondary dune ridges are inland of the primary dune ridge and consist of a mosaic of species, including the grasses described above, with the addition of seaside goldenrod, switchgrass, prickly pear cactus, groundsel tree, and occasionally

Atlantic white cedar. There are a few occurrences of spike grass. Even rarer is seabeach amaranth which has not been found in the area since the early 1970's.

The older secondary dune ridges are often filled with stands of woody vegetation such as myrtle, groundsel tree, black needle-rush, eastern red cedar, and Atlantic white cedar. This zone also includes pioneers of sassafras, black cherry, willow, loblolly pine, cottonwood and tooth-ache tree. As this vegetation community stabilizes, natural succession leads to the growth of thickets and mature woods.

Thicket

This habitat extends landward of the secondary dune ridges and consists of dense stands of primarily myrtle with scattered cherry, sassafras, tooth-ache and groundsel trees, and sumac. This community frequently includes several woody vines such as Virginia creeper, Japanese honeysuckle, and poison ivy. Thicket habitat is found on sites ranging from wet depressions to dry ridges. On wet sites, groundsel tree and marsh elder are significant components of this community.

Deciduous Forest

Nearly all of the forested community is in a large contiguous area west of the Bridge-Tunnel. Cherry and sassafras dominate with scattered sumac, American holly, and tooth-ache tree along with many woody vines. Most of the forested habitat is characterized by a relatively open understory; however, shrubs (primarily myrtles) are gradually shaded out by canopy closure.

Southern beach spurge, a plant rare to Virginia, was discovered in early August 2000, on the edge of the forest habitat in the northern interior of the island.

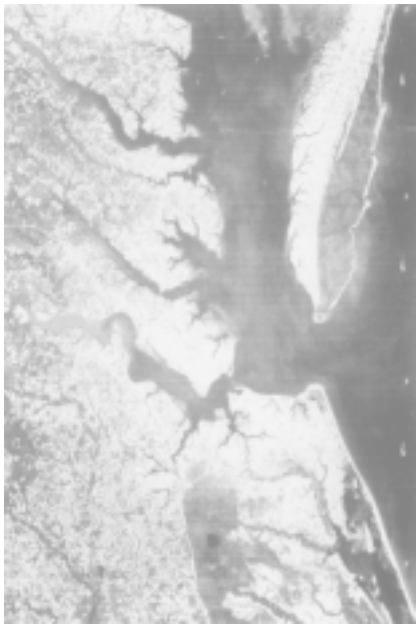
Low Marsh

Frequently called tidal or salt marsh, these areas are subject to bi-modal daily inundation. This habitat is characterized by a monotypic stand of salt marsh cordgrass and saltwort in slightly higher elevations. There has been an increase in low marsh habitat on Fisherman Island Refuge due to accretion along the protected north and northeastern sides of the island.

High Marsh/Transition

This habitat type encompasses the diverse areas between low

marsh and various dune communities. This complex includes high marsh, marsh transition, salt panne, and most areas of the dune-marsh boundary. Component communities are sometimes very narrow (often only a few feet wide), discontinuous, and ephemeral due to periodic overwash, wind, and natural plant succession. Common plants include salt marsh hay, saltwort, black needle-rush, sea oxeye, salt grass, groundsel tree, marsh elder, foxtail, seaside goldenrod, and phragmites. As with the low dune community, these are dynamic areas which are continuously succeeding into other communities and are colonizing newly formed land.



Satellite image of the Delmarva Penninsula.
USFWS photo

Freshwater Marsh

This habitat type occurs in several small isolated depressions within a thousand feet of the Bridge-Tunnel in the southwestern section of the refuge. Small areas of open water are found in these depressions. Species such as salt meadow hay, threesquare, beardgrasses, smartweeds, and phragmites are found in these areas. Encroachment by the thicket community and phragmites invasion continues to alter the character of this habitat in many areas.

Wildlife Resources

Avifauna

The southern tip of the Delmarva Peninsula has been identified as an important migratory bird stopover location along the Atlantic coast (Mabey et al., 1993). In the mid-Atlantic region, migratory birds are influenced by three major water bodies - the Delaware Bay, the Chesapeake Bay, and the Atlantic Ocean. The narrow peninsulas created by these water bodies form a funneling effect on the birds as they fly south, down the peninsulas. Once the birds reach the southern tip of the Delmarva Peninsula they are faced with crossing a large body of open water, the Chesapeake Bay. The Eastern Shore of Virginia and Fisherman Island Refuges, fortuitously located at the southern tip, provides critical stop-over areas where the birds can rest and feed before resuming their migration.

Birds that breed in the northern parts of North America migrate south during the late summer through fall into Central and South America (neotropical) to areas where food supplies are more abundant and weather conditions are more favorable for survival. Migrations of several hundred to thousands of miles are stressful and hazardous to these animals which expend a considerable amount of energy during these journeys. While migration routes of individual species sometimes vary, it is generally believed that

most land birds and raptors have specific migration corridors which are defined by weather patterns and geographic influences. Prevailing winds from the west push birds southeastward as they migrate. Major geographical features such as mountain ranges and coastlines provide a combination of visual navigational references and favorable air currents.
The first southward migration for juvenile birds can be particularly stressful due to lack of previous navigational experience and because juveniles are not as strong as adult birds. For those reasons, juveniles are pushed further eastward during migration along the Atlantic coastline to a much greater extent than adult birds. Indeed, the majority of the birds passing through the lower Delmarva Peninsula during the fall migration are juveniles (Hodnett 1998).

Royal tern colony.
USFWS photo

In this section, avifauna are separated into five categories: colonial nesting waterbirds, shorebirds, waterfowl, raptors, and land birds. Each category will contain information about the location, habitats and seasonalities of certain species belonging to that category. As a general rule, colonial nesting waterbirds, shorebirds, and waterfowl are more likely to be found on Fisherman Island Refuge, while a large abundance of diverse land bird species are known to exist on Eastern Shore of Virginia Refuge. One notable exception is the raptor category. All avian species, along with their scientific names, can be found in Appendix D.

Colonial Nesting Waterbirds

Fisherman Island Refuge, the southernmost barrier island along the Virginia coast, supports various colonial and beach-nesting waterbirds such as herons, egrets, gulls, terns, ibis, skimmers, and oystercatchers, most of whom use the island to breed. Virginia's barrier islands have historically supported large numbers of colonial nesting waterbirds. In recent years many of these colonies have suffered dramatic losses, presumably from mammalian predation and habitat loss.

Exceptions to the recent population declines in colonial nesting birds along Virginia's barrier islands are the populations on Fisherman Island Refuge. The refuge continues to support large royal tern and brown pelican nesting colonies with over 1,600 and 1,000 pairs respectively (2002). Forster's tern, common tern, and sandwich terns commonly nest on Fisherman Island in small numbers of less than 28 nesting pairs per species. Laughing, herring and great black-backed gulls nest in close proximity to the tern and pelican colonies with over 2,200 pairs of gulls on the island recorded in 2000.

Long-term research on the demographics and distribution of royal terns is currently in progress. Royal tern chicks have been banded at their natal site on Fisherman Island Refuge for 33 years with a total of 69,559 royal tern chicks banded between 1957 and 2000. Annual banding totals approximate chick production. Numbers have fluctuated between a low of 908 and a high of 4,628 between 1980 and 2000.

Shorebirds

Large numbers of shorebirds migrate along the barrier island chain of the Delmarva Peninsula. During March through May these birds are moving northward to their breeding grounds; they travel south to their wintering areas from July through October. Many of these shorebirds stop to rest and feed on Fisherman Island. Common species include black-bellied and semipalmated plover, greater and lesser yellowlegs, solitary sand piper, spotted sandpiper, whimbrel, ruddy turnstone, red knot, semipalmated and least sandpiper, dunlin, short-billed dowitcher, and common snipe.

Marbled godwit populations concentrate on the eastern shore, along the mudflats just west of Smith Island. This bird is considered to be one of the more uncommon of the migratory shorebird species. Other shorebird species found on Fisherman Island Refuge include the upland sandpiper, buff-breasted sandpipers, and golden plovers.

Some of these migrating shorebirds also breed on Fisherman Island Refuge. Relatively small numbers of American oystercatcher nests have been found dispersed along the perimeter of the island. Twenty American oystercatcher nests were found in 2000 (Terwilliger 2000). Thirty-four pairs of American oystercatchers were found in 2001 and 2002. Historically, black skimmers nested on Fisherman Island in relatively large numbers throughout the 1970's but have not been recorded since 1980. Wilson's plover and piping plovers have nested on the island in past years but have not been recorded since 1992.

Marsh birds such as the Virginia rail, clapper rail, and sora can be found breeding in the cordgrass dominated saltmarsh which comprises approximately 50 percent of Fisherman Island Refuge. The clapper rail is a year-round resident; some may be migratory.

Waterfowl

The barrier island bays and wetlands of Virginia, such as the ones found on Fisherman Island Refuge, are important to the Atlantic

Flyway because they provide feeding and resting habitat for waterfowl during the fall and spring migration. This habitat also serves as the wintering grounds for many species of waterfowl. Waterfowl that winter on Fisherman Island Refuge include snow goose, Canada goose, green-winged teal, and northern pintail. Tidal ponds are also attractive wintering habitat for red-throated and common loon, and the horned grebe.

During the summer months, black ducks and gadwalls use the marsh and brackish ponds on Fisherman Island Refuge for breeding.

Accipiters and Falcons

Researchers and volunteers from the Center for Conservation Biology at the College of William and Mary and the non-profit Coastal Virginia Wildlife Observatory have conducted raptor banding on the refuges for many years. Sixteen species of raptors (see Appendix D) are annually caught and banded using mist nets, bow traps, and various live bird lures. Relatively large numbers of sharp-shinned hawks, Cooper's hawks, peregrine falcons, and red-tailed hawks are banded each year. Researchers and volun-teers have banded record numbers of merlin on the lower eastern shore over the last few years. Approximately 95 percent of the 857 birds captured on the lower Delmarva Peninsula in 1999 were juvenile or hatch-year birds (birds that hatched a year ago or less). This trend is consistent with previous years indicating a divergence in migration routes between adults and juveniles.

In 1994 the Center for Conservation Biology discovered a significant autumn migration of northern saw-whet owls moving down the lower Delmarva Peninsula. Although saw-whet owls are year-round residents throughout much of the breeding range, some populations migrate to wintering areas at lower latitudes (Weir et al., 1980). During the fall of 1999, a total of 700 saw-whet owls were captured from three sites located on the lower peninsula. Data indicates a bimodal migration pattern down the eastern shore with most hatch-year birds moving through the lower Delmarva in early- to mid-November and a greater proportion of after-hatch-year birds moving through in late November and early December (Paxton and Watts, 2000). Two other wintering owl species detected on Eastern Shore of Virginia Refuge are the short-eared and long-eared owl.
Ospreys nest on artificial nest platforms. A pair of peregrine falcons are resident to Fisherman Island Refuge and often nest on the island's hacking tower.

Migrant Land Birds

Many of the land birds found on Virginia's eastern shore are migrants which pass through the refuge during either the spring or fall seasons. Researchers and others have observed these land birds spend relatively short time periods (days or weeks) resting and feeding before continuing their journeys. There are two types of migratory birds that visit the refuges - temperate and neotropical. Temperate migrants leave their breeding grounds in the northern latitudes of North America in the fall to spend winters in the more mild mid-Atlantic and southern United States. Neotropical migrants also summer in the United States, but winter in Central and South America.

The warbler's taxonomic family, emberizidae, is the largest family of migrants to visit the lower eastern shore. Warblers use the forested stands and shrub thickets of the Eastern Shore of Virginia and Fisherman Island Refuges for food and cover. Their diet consists mainly of arthropods, fruit, and nectar, but they will also eat mollusks (small snails, slugs) and worms (Dunn and Garrett, 1997). Fruit from the Eastern Shore of Virginia Refuge's bayberry and poison ivy thickets sustain many warblers during the fall migration, especially the abundant yellow-rumped warbler.

Temperate migrants tend to move through the area in three general migration waves and at later times than the neotropical migrants (Paxton and Watts, 2000). Early temperate migrants are comprised of species such as the yellow-rumped warbler, common snipe, eastern meadowlark, and grasshopper sparrow. The later wave of temperate migrants consists primarily of American gold-finch, white-throated sparrow, white-crowned sparrow, chipping sparrow, and orange-crowned warbler. Other sparrow species (i.e., savanna, swamp, song and field) also occur throughout the migration season.

Thrushes observed migrating are the veery, gray-cheeked, Bicknell's, hermit, wood, and Swainson's thrush. Migrating swifts and swallows include the chimney swift, rough winged, bank, and cliff swallows. Flycatchers observed migrating through the Eastern Shore of Virginia Refuge are the acadian flycatcher, willow flycatcher, and eastern phoebe.

Breeding Land Birds

A variety of land birds breed in the diverse forest, shrub, and grassland habitats of the Eastern Shore of Virginia Refuge during the spring and/or summer months. These breeding land birds

include the northern bobwhite, field sparrow, song sparrow, and rufous-sided towhee.

Breeding warbler species include the pine and prairie warblers and the yellow-breasted chat. Other nesting species on the refuge include the indigo bunting, blue grosbeak, yellow-billed cuckoo, and ovenbird.

The swallows and thrushs that breed on the refuges are the purple martin, tree swallow, barn swallow, eastern bluebird, and the wood thrush.

Winter Resident Land Birds

These avian species are temperate migrants that spend part or all of the winter on the Eastern Shore of Virginia Refuge. One of the most studied of these species is the American woodcock. The woodcock is found in high numbers in the lower Delmarva Peninsula during the fall migration. Woodcock follow a fall migration pattern where they concentrate at Cape May, New Jersey, then move southward through the Northampton County area, and then on to wintering areas in the coastal plain of the South Atlantic states. The peak woodcock migration on the Delmarva Peninsula is from late November to early December. The Eastern Shore of Virginia Refuge provides important woodcock habitat both during migration and for wintering, when woodcock stay during mild winters until they migrate to their breeding grounds in mid-February. Woodcock use low lying woods and shrub areas for food and cover during the day, while open grassland fields are used at night for feeding and roosting. Woodcock will also nest throughout the Delmarva Peninsula where suitable habitats exist. Sparrows and warblers also winter on the refuge.

Downy woodpecker.
James Cameron

Year-round Resident Land Birds

Year-round residents, as the name implies, spend their life in one general area. Year-round residents on the Eastern Shore of Virginia Refuge include the Carolina wren, northern mockingbird, bald eagle, American kestrel and killdeer. The wild turkey, which was reintroduced to the lower Delmarva Peninsula, also spends all year on the refuge. Year-round resident woodpeckers include the red-bellied, downy, hairy, and pileated woodpeckers and the Northern flicker.

Predators

One of the most serious predator problems are threats of mammalian and avian predation on the colonial waterbird nesting colonies on Fisherman Island Refuge. Evidence of mammalian

predation on Fisherman Island Refuge appeared limited and significantly lower than other barrier islands in Virginia (Truitt 2000). Red fox is the greatest perceived mammalian threat to the Refuge's colonial seabird nesting colonies.

Flying squirrel.
Nancy Biegel

Diurnal observations of predation on Fisherman Island Refuge identified no serious problems requiring immediate action. Still, the potential threats from gulls, including predation, competition and displacement, are our most imminent concerns. Researchers conducted weekly monitoring of bird colonies on the refuge in 2000 to determine the extent of predation and interspecific behavioral patterns between nesting terns and their perceived predators such as raccoon, fox, otters, and gulls. Researchers observed avian predation on tern chicks and eggs by herring and great black-backed gulls, but there was no conclusive evidence. Adult tern mortality was documented early in the nesting season but direct evidence of the cause was not determined.

The most serious predator problem on Eastern Shore of Virginia Refuge is feral cat predation on migratory birds and small mammals. Feral cat predation has been directly observed by refuge residents and researchers and is generally considered to have a significant impact on trust resources.

Mammals

Thirty-four mammal species are known to the lower Delmarva Peninsula, and are also likely to be found on the Eastern Shore of Virginia Refuge. Those mammals include the gray fox, red fox, river otter, American mink, muskrat, eastern cottontail, southern flying squirrel, and northern short-tailed shrew.

Nine species of bats are likely to be found on the Eastern Shore of Virginia Refuge, but additional research is needed to confirm their presence. Those bats species are the big brown bat, silver-haired bat, eastern red bat, hoary bat, yellow bat, little brown myotis, northern myotis, eastern pipistrella, and the evening bat.

Comprehensive mammal surveys are not available for Fisherman Island Refuge. Large mammal species are more likely to have colonized Fisherman Island than small mammals. Therefore, a subset of the mainland small mammal population is assumed to be present on Fisherman Island Refuge.

Reptiles and Amphibians

Modern herpetofauna on Virginia's eastern shore has been affected by the loss and alteration of natural habitat, such as the

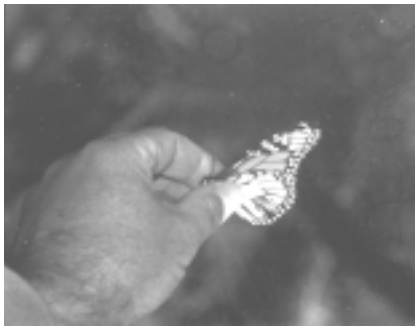
effect on freshwater wetlands caused by agricultural practices. Natural sources of surface fresh water in Northampton County are limited in part because of the historical loss of pocosin-like wetlands (Pettry et al., 1979).

Very few amphibians or reptiles have been studied in any depth on the eastern shore (e.g., Dunson, 1986, Scott, 1986, Hrantiz et al., 1993). None have been studied from the perspective of population size and dynamics, life history traits, or movement ecology (Mitchell 1999).

According to the 2001 Region 5 anuran survey, the frogs and toads that can be found on the Eastern Shore of Virginia Refuge include the northern spring peeper, southern green frog, southern leopard frog, Fowler's toad and eastern narrow-mouthed toad.

The freshwater and estuarine turtles which inhabit Eastern Shore of Virginia Refuge are the eastern painted turtle, spotted turtle, eastern mud turtle, northern red-bellied cooter, eastern box turtle, eastern snapping turtle, and the estuarine northern diamond-backed terrapin.

Four species of salamanders are likely to be found on the refuge, although more research is needed to confirm their presence. Only one species of salamander - the red-backed salamander - is commonly found. Other species include the spotted salamander, marbled salamander, and the red-spotted newt. The Eastern Shore of Virginia Refuge supports four species of lizards and 11 species of snakes.



Tagged monarch butterfly.
Charles Philip

Insufficient records have been compiled to make an accurate and comprehensive reptile or amphibian species list for Fisherman Island Refuge. Baseline inventories and basic natural history information is needed for herpetofauna on both the Eastern Shore of Virginia and Fisherman Island Refuges. A list of all reptiles and amphibians suspected to occur on the refuge can be found in Appendix D.

Invertebrates

Researchers have conducted butterfly surveys in the area since 1997. Sixty-four species of butterflies and skippers have been confirmed to frequent the Eastern Shore of Virginia Refuge (see Appendix A). In 1999, a volunteer from the Coastal Virginia Wildlife Observatory tagged a total of 955 monarch butterflies from both refuges and from nearby roosts in hopes of identifying and protecting the major roosting sites on the lower Delmarva

Peninsula. It is estimated that during the height of the 1999 migration, 50,000 monarchs were seen roosting in one evening. The volunteer also discovered roosting locations of migrating monarch butterflies on Fisherman Island. Roosts were found on the southern end of the island with estimates ranging from 10,000 to 50,000 individuals. During one evening in early October 1999, an estimated 100,000 individuals were discovered on various trees on the southern portion of Fisherman's Island. The monarch butterfly research projects continued in 2000, when 715 butterflies were tagged in the fall.

Baseline inventories for invertebrate species other than lepidopterans on the Eastern Shore of Virginia and Fisherman Island Refuges are not available.

Aquatic Resources

The shallow estuarine waters surrounding Fisherman Island are highly productive. Algal phytoplankton and detritus produced by the extensive wetlands dominated by saltmarsh cordgrass make up the first order of the food chain. Intermediate levels of the aquatic food chain include a number of zooplankton species, and benthic species dominated by annelid worms, mollusks and crustaceans. Submerged aquatic vegetation around Fisherman Island is limited to a few small patches on the northern end.

Many of the aquatic shellfish resources in the area are used for commercial purposes. Hard clam beds have been planted by commercial aquaculturists throughout suitable habitat along the southern peninsula. Much of the area between Skidmore and Smith Island is leased by watermen from the State of Virginia for clam beds. Many of the bayside creeks also have planted clam beds, wherever the depth is appropriate (Mitchell 2001). Blue crabs are commercially harvested offshore using crab traps. Many crab pots are concentrated on the north end of Fisherman Island. However, it is likely that crab pots occupy most of the creeks on the bayside of the eastern shore. Oyster grounds are currently being restored by the Virginia Institute of Marine Science, just north of Fisherman Island Refuge.

Finfish of primary importance that use the surrounding waters for spawning, nursery, or feeding areas include black drum, red drum, bluefish, winter flounder, summer flounder, menhaden, spot, Atlantic croaker, grey trout, mullet, spotted seatrout and stripped bass or rockfish. The species caught by recreational and commercial fisheries vary seasonally. Peak fishing periods are April through October, with a rockfish season in December.

Socio-Economic Factors

The eastern shore of Virginia lies on the southern tip of the Delmarva Peninsula, south of the eastern shore counties of Maryland and the State of Delaware. The eastern shore of Virginia is made up of two counties — Accomack and Northampton. This section will mainly focus on Northampton County, since that is where the Eastern Shore of Virginia and Fisherman Island Refuges are located. However, information on Accomack County will be provided for comparison's sake.

Northampton County is 35 miles long and includes about 230,000 acres. In general, the County is not a destination point for most people, but rather a stop along their route north or south. This is largely because the Chesapeake Bay separates Northampton from the Hampton Roads area of Virginia, a major metropolitan area with over a million residents. Although the Chesapeake Bay Bridge-Tunnel (Bridge-Tunnel) connects Northampton County to mainland Virginia, the $20 round trip toll to cross the Bridge-Tunnel has in the past prevented many people from visiting the eastern shore. The Bridge-Tunnel Authority, however, recently instituted a commuter toll of $14 round trip in a 24-hour period. This reduction in toll price for some commuters has had major impacts on the eastern shore of Virginia's growth. Many new housing developments have been built in recent years. New hotels, restaurants and shopping areas are expected in the next few years. A developer is constructing an up-scale golf course community in Cape Charles, located about 10 miles north of the refuge. This community will include up to 3,000 homes and townhouses, a boat marina, a hotel and speciality shops. The first of two golf courses was completed in 2001.

Population and Employment on the Eastern Shore of Virginia

According to the 2000 Census, the Commonwealth of Virginia's population is around 7.1 million, reflecting more than a 14 percent increase over the last 10 years (U.S. Census Bureau 2000). Northampton County, in contrast, had only a 0.2 percent population increase over the last 10 years, bringing its 2000 population to 13,093. One report says Northampton County's population has suffered because agricultural practices have become less labor intensive and more mechanized (Wilbur Smith Associates 1999). Also, several major seafood processing facilities have closed or relocated outside Northampton County. Northampton County's primary industry is agriculture (Adams et al., 1999). Northampton and Accomack County together produce 70 to 75 percent of Virginia's vegetable crops.

While the eastern shore is one of the poorest areas in the Commonwealth of Virginia, its economy boasts a broad range of industries and retains competitive advantage in key traditional and emerging industries (The Louis Berger Group 2000). Few residents commute outside the region for employment. Unemployment is currently at low levels, but given the mix of local industries, employment is highly seasonal and skewed toward professionals with lower rates of pay.

The total number of full, part-time and proprietorship employment positions grew slightly in both Accomack and Northampton counties from 1990-98 (The Louis Berger Group 2000). Northampton County showed a 3.6 percent gain during that period while Accomack had an increase of less than 1 percent. Overall, the number of jobs on the eastern shore remained relatively steady throughout the last decade, with a slight increase in jobs over the last two years. In contrast, Virginia saw a 15 percent increase in jobs from 1990 to 2000.

Despite the steady number of jobs on the eastern shore over the last 10 years, the area has shown a steady decline in its labor force. Improved economic conditions towards the end of the last decade put the 2000 labor force at just below 1990 levels. A shrinking labor force is common to rural areas with fixed levels of employment opportunities and an outflow of working-age young people searching for a broader range of opportunities (The Louis Berger Group 2000). Furthermore, an influx of retirement-age people has kept the population fixed but has not contributed to the labor pool. A decline in the labor force and a slight increase in the number of jobs has contributed to low unemployment rates.

The service and retail/wholesale businesses were the biggest employers in Northampton County throughout the 1990s. The government and agriculture sectors also added jobs during this period, offsetting a 50 percent decline in the County's manufacturing sector, which employed 400 people in 1998.

Weekly earnings on the eastern shore vary widely by profession and sector of the economy. The government sector posted the highest average weekly earnings at $540 a week (The Louis Berger Group 2000).

In 1999, Northampton County had a per capita personal income (PCPI) of $20,233 (Bureau of Economic Analysis 2000). PCPI is calculated as the total personal income of the residents of an area divided by the population of the area. This figure is often used as an indicator of the quality of consumer markets and of the economic well-being of the residents of an area. Northampton's

PCPI ranked 72nd out of 105 counties and independent cities in Virginia. This ranking is 68 percent of the state PCPI average ($29,794), and 71 percent of the national average ($28,546). Northampton's 1999 PCPI reflected an increase of 3.5 percent from 1998. In contrast, the state average increased by 5.0 percent in 1999, and the national change increased by 4.5 percent (Bureau of Economic Analysis 2000).

Refuge Contributions to the Local Economy

Fisherman Island.
USFWS photo

One way the refuge contributes to the economy of Northampton County is by protecting wildlife habitat , or "open space," in perpetuity. A "Cost of Community Services Study (COCS)" for Northampton County, Virginia (Adams et al., 1999) documents the benefits of open space. COCS is a case study analysis of the net fiscal impacts of different land uses. It provides a snapshot in time of costs versus revenues based on current land use. These studies are based on real budgets for a specific community. The analysis shows which services private residents receive in return for the taxes they pay to their local community. These studies have shown open space costs towns less than residential or commercial development. This is because residential, and to a lesser extent, commercial development requires certain services such as schools, utilities, and emergency services. Although residential and commercial development increases an area's tax base, expenses incurred by the area for increased services outweigh the taxes generated from residential and commercial uses.

The refuge directly contributes to the local economy through "Refuge Revenue Sharing" payments. The Federal government does not pay property tax on refuge lands, but instead makes annual payments to respective counties based on a maximum of 0.75 percent of the fair market value of refuge lands, as determined by an appraisal every five years. The actual amount distributed each year varies and is based on Congressional appropriations. The amount distributed also changes as new lands are acquired. Table 3-4 depicts the amounts contributed to Northampton County between 1995 and 1999.

The refuge also contributes to the local economy by generating tourism dollars. Tourism is the largest industry in Virginia. Preliminary domestic traveler spending in 1999 for Virginia is estimated at $12.36 billion. Traveler spending represents direct spending by all travelers including meals, lodging, public transportation, auto transportation, shopping, admissions and entertainment. In 1997, Virginia was ranked 10th in the nation for domestic traveler spending. Combined visitation to 150 of

Table 3-4. *Refuge Revenue Sharing payments from Eastern Shore of Virginia and Fisherman Island Refuges to Northampton County.*

	Number of Acres		Total Paid to Northampton County	
	Eastern Shore of Virginia Refuge	Fisherman Island Refuge	Eastern Shore of Virginia Refuge	Fisherman Island Refuge
1996	725	1,000	$16,388	$9,364
1997	745	1,000	$16,745	$9,427
1998	745	1,825	$10,538	$16,808
1999	745	1,850	$9,403	$15,650
2000	745	1,950	$8,249	$13,728

Virginia's attractions, parks, and travel centers, however, was down 0.1 percent through December 2000. Attractions were down 2.4 percent statewide, but State/National park visitation was up 2.2 percent (Virginia Tourism Corporation 2001). Although National Wildlife Refuges are not included in the State/National park category, these figures illustrate a growing popularity in nature-based tourism.

Traveler spending in Northampton County in 1999 was estimated at $48.4 million; for Accomack County, just north of Northampton County, traveler spending was almost double, at $98.1 million. In the County, there are approximately seven hotels and approximately a dozen restaurants. Recent tourism initiatives, however, have included the promotion of bed-and-breakfast accommodations throughout the eastern shore, especially in Cape Charles. There is also an effort underway to create a cruise ship port-of-call in Cape Charles.

Public Use

Access

U.S. Route 13 and the Chesapeake Bay Bridge-Tunnel connect the eastern shore of Virginia to the major metropolitan areas of the east coast (see Table 3-5.) . Route 13 is a four-lane divided highway and a major north-south corridor on the Delmarva Peninsula for truck traffic. The Bridge-Tunnel is 17 miles long. Crossing over and under open waters where the Chesapeake Bay meets the Atlantic Ocean, the Bridge-Tunnel provides a direct link between southeastern Virginia and the Delmarva Peninsula, and cuts 95 miles from the journey between Virginia Beach and points north of Wilmington, Delaware. The crossing consists of a series of low-level trestles interrupted by two approximately one-mile-long tunnels. Construction of the original bridge began in September 1960 and the bridge opened for traffic in April 1964

Table 3-5. *Major metropolitan cities near the Eastern Shore of Virginia Refuge, and the driving distance between the cities and the refuge (Eastern Shore of Virginia Economic Development Commission 2000).*

City	Miles
Norfolk, VA	35
Richmond, VA	125
Baltimore, MD	140
Washington, D.C.	150
Philadelphia, PA	165
Raleigh, NC	225
New York, NY	290

(Eastern Shore of Virginia Economic Development Commission 2001). The toll to cross the bridge is $10 each way, with a $14 round-trip commuter fee levied in March 2002.

The Eastern Shore Railroad has more than 90 miles of track serving Accomack and Northampton Counties, and a 26-mile car float operation to cross the Chesapeake Bay from Cape Charles to Little Creek (Eastern Shore of Virginia Economic Development Commission 2001). Two carfloats of 18 and 25 car capacity are used over the water route. Commodities currently handled by the

Family at overlook.
USFWS photo

railroad include coal, stone, cement, grain, propane gas, paper, chemicals, fertilizer, food stuffs and brick.

Commercial air service is available from Norfolk International Airport, which offers service from several commercial airlines and air freight carriers. Accomack County Airport is located at the Accomack Airport Industrial Park near the geographic center of the eastern shore of Virginia. The general aviation airport has a 5,000-foot concrete runway capable of accommodating most jet and prop aircraft.

Refuge Visits

Visitation at the Eastern Shore of Virginia Refuge has increased dramatically since 1996. One of the reasons for this is because part-way through 1996, the refuge installed a traffic counter that helped refuge staff obtain a more accurate account of visitation. Before the traffic counter was installed, visitor numbers were largely underestimated (Kenyon 2001) (see Table 3-6). Another reason for the increase in visitation since 1996 is because the refuge finished construction of its Visitor Center in that year. The Eastern Shore of Virginia Refuge is one of only about half a dozen refuges in Region 5 that has a building dedicated for the sole purpose of visitors (Region 5 has about 40 staffed refuges). Signs on Route 13 directing drivers to the refuge's Visitor Center have increased the visibility of the refuge, as well as the refuge's visitation.

Table 3-6. *Visitors to the Eastern Shore of Virginia Refuge.*

	1999	1998	1997	1996	1995
Refuge Visits	190,911	173,151	150,107	91,540	45,000
Visitor Center Visits	30,758	29,160	28,463	21,000[1]	N/A[2]

[1] Due to construction, the Visitor Center was only open June through December 1996.
[2] The Visitor Center was closed in 1995 for construction.

In general, the refuge is not a destination point for most people, but rather a stop along the way to somewhere else (Kenyon 2000). Many visitors to the Washington, D.C. area stop at the refuge on their way north or south. Some visitors are so called "snowbirds," or retirees who visit the refuge on their migration north for the summer or south for the winter. Visitors come to

the refuge for birdwatching, environmental education, trail walking, photography and access to the boat ramp. Other visitors include military history buffs and groups of people who use the refuge's conference space. Most visits last 20 to 30 minutes. Visitor patterns, however, are expected to change with increased development in the area (Kenyon 2000). Currently, there is little tourism support in the area, but the construction of additional hotels, restaurants and shopping centers could quickly change that. The refuge schedules educational programs for local school children throughout the year. Approximately 1,200 schoolchildren visited the Eastern Shore of Virginia Refuge in the 2000 school year.

Hunting

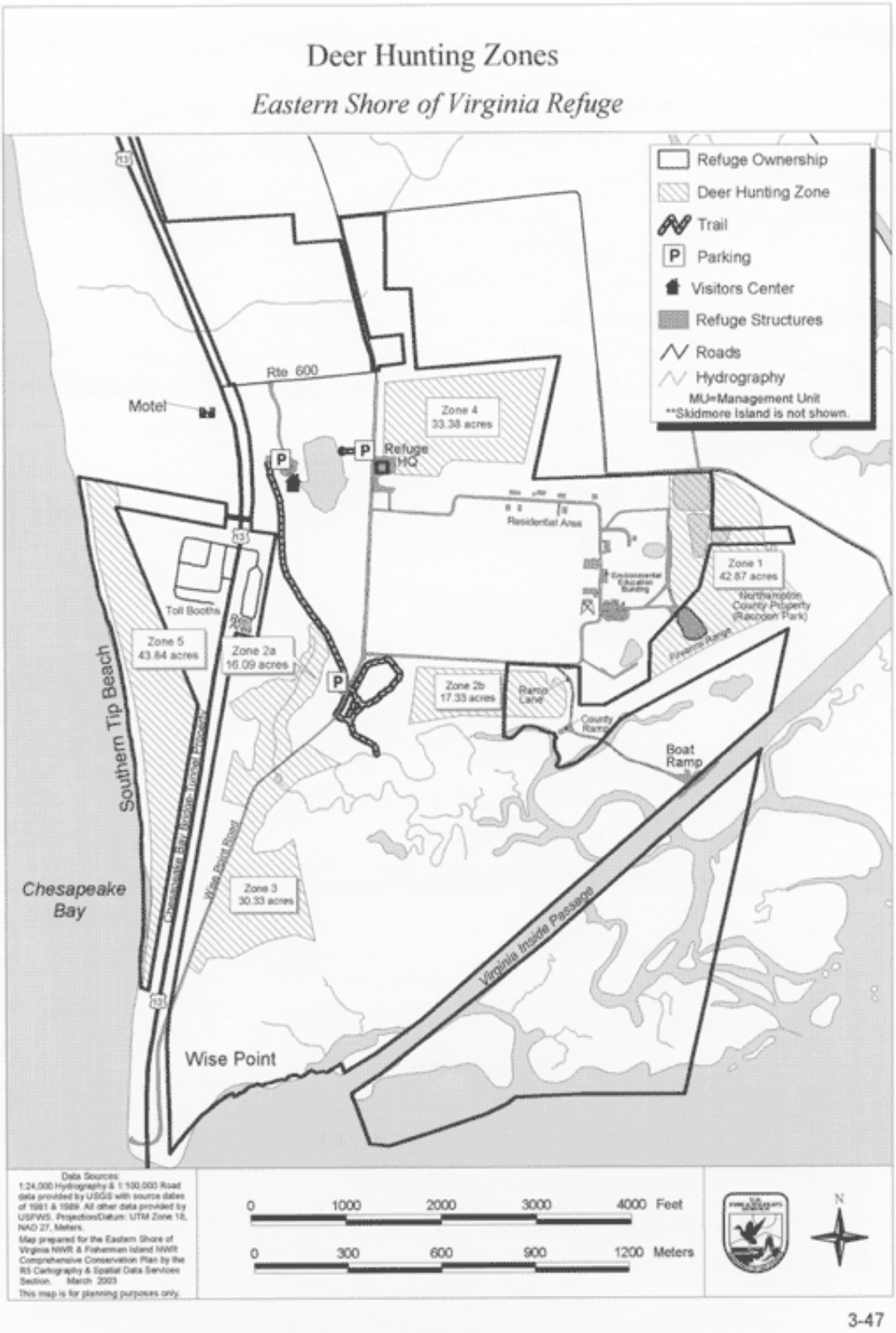
The Eastern Shore of Virginia Refuge implemented a hunt program in 1993 as a means of keeping white-tailed deer populations in balance with refuge habitat, while also providing public outdoor recreation benefits (USFWS 1993b). Approximately 200 acres are divided into five hunt zones that can accommodate a maximum of 23 hunters per day (see Map 3-2). The archery season is currently 12 days long with hunting from Monday through Saturday for two consecutive weeks. The hunt generally starts during the last week in October and ends in early November. Refuge trails and access through the refuge remain open during the archery hunt. The shotgun season is seven days long with hunting on Wednesdays and Saturdays in November and December. Refuge trails are closed during hunt days and access through the refuge is by Special Use Permit only.

Table 3-7. *Statistics on the number of hunters at the Eastern Shore of Virginia Refuge, their success rates and the number of deer taken.*

	Archery			**Shotgun**			**Total**		
	1999	*2000*	*2001*	*1999*	*2000*	*2001*	*1999*	*2000*	*2001*
#Hunters	63	49	50	91	62	67	154	111	117
% Successful	26	37	44	10	19	22	18	27	32
Hunter Hours	930	1137	1134	805	795	817	1735	1932	1951
Deer Taken	17	18	22	9	12	15	26	30	37
Hours Per Deer	54.7	63.2	51.6	90	66.3	54.5	66.7	64.4	52.7

There is no hunting on Fisherman Island Refuge.

Map 3-2


Deer Hunting Zones
Eastern Shore of Virginia Refuge
Refuge Ownership
Deer Hunting Zone
Trail
Parking
Visitors Center
Refuge Structures
Roads
Hydrography
MU=Management Unit
**Skidmore Island is not shown.
Rte 600
Motel
Zone 4
33.38 acres
Refuge HQ
Residential Area
Zone 1
42.87 acres
Northampton County Property (Raccoon Park)
Toll Booths
Zone 5
43.84 acres
Zone 2a
16.09 acres
Zone 2b
17.33 acres
Ramp Lane
County Ramp
Boat Ramp
Southern Tip Beach
Chesapeake Bay Inside Inlet Protection
Wise Point Road
Zone 3
30.33 acres
Chesapeake Bay
Virginia Inside Passage
Wise Point
Data Sources:
1:24,000 Hydrography & 1:100,000 Road data provided by USGS with source dates of 1981 & 1999. All other data provided by USFWS. Projection/Datum: UTM Zone 18, NAD 27, Meters.
Map prepared for the Eastern Shore of Virginia NWR & Fishermen Island NWR Comprehensive Conservation Plan by the R5 Cartography & Spatial Data Services Section. March 2003
This map is for planning purposes only.
0 1000 2000 3000 4000 Feet
0 300 600 900 1200 Meters
N

3-47

View from Bunker Overlook.
Matthew Akel

Fishing

There are no fishing opportunities on either refuge. However, we traditionally allowed access through the refuge to the former Wise Point Corporation property for recreational and commercial watermen. Since the refuge has taken over ownership of that property, access for recreational anglers has been temporarily halted until improvements are made to the boat ramp and the parking lot area. Since commercial watermen depend on access to the boat ramp for their livelihood, the refuge has continued to allow access for that group while boat ramp improvements are underway. There are about 21 commercial watermen currently using the boat ramp. Commercial watermen are charged $35 annually for a Special Use Permit (SUP), which supports up to four transferrable subpermits.

Wildlife Observation and Photography

The Eastern Shore of Virginia Refuge has a 1.5-mile trail system with two observation platforms, interpretive signs and a kiosk. The trail starts at the Visitor Center with the Butterfly Trail, and links to an interpretive trail that loops through mixed hardwoods, past an old graveyard and up to the top of a World War II bunker which offers a panoramic view of refuge marshes, barrier islands, bays, inlets and the Atlantic Ocean (See Map 2-2). The trails are open for walking only. The refuge also has an environmental education building, a conference building and a photography blind that overlooks a freshwater pond. The refuge is open a half-hour before sunrise until half-hour after sunset. Visitors are prohibited from some activities including metal detecting, picknicking, and collecting plants, animals or artifacts.

There is an observation window in the Visitor Center overlooking a freshwater pond. The Visitor Center has binoculars and a spotting scpe available for visitor use to observe wildlife. Behind the Visitor Center is a butterfly garden which provides opportunities to view and photograph butterflies.

Fisherman Island Refuge is open to the public for guided tours from October 15 through March 30. The island is closed the remainder of the year to protect colonial nesting birds from disturbance. Occasionally tours are given at other times of the year (i.e., International Migratory Bird Day). Visitors to Fisherman Island Refuge observe neotropical birds in the fall and many different species of waterfowl in the winter.

Visitor Center exhibits.
USFWS photo

Environmental Education and Interpretation

The largest attraction for interpretation on the Eastern Shore of Virginia Refuge is the Visitor Center. The Visitor Center offers exhibits and short videos on the important habitats of the area and wildlife management activities that occur on the refuges. It also offers an auditorium where wildlife videos are shown.

Most of the elementary school children in Northampton County (approximately a thousand students) receive annually one to two hours of education on conservation and migratory bird issues. Educational activities follow the State "Standards of Learning." We also educate about a thousand children from other schools, summer camps and other clubs and organization.

Visitors to Fisherman Island Refuge learn about the important role the island plays in wildlife protection and how it was important for harbor defense during both World Wars.

Public Use Opportunities Off-Refuge

Three miles north of the refuge is Kiptopeke State Park. The 540-acre park is on the Chesapeake Bay and offers camping, swimming, boating, fishing, biking, hiking, picnicking and interpretive programs.

About 10 miles north of the refuge is Cherrystone Campground, a family camping and recreational vehicle resort. Cherrystone is also on the Chesapeake Bay. The resort is about 300 acres and offers cottages, camping cabins, on-site trailer rentals and tent rentals. Visitors can swim, fish, boat, kayak, shop and golf.

Approximately 70 miles north is Chincoteague National Wildlife Refuge, Assateague Island National Seashore, the Virginia Space Flight Center (one of only three commercial rocket launch facilities in the United States), small towns filled with historic homes, and hundreds of miles of waterfront on the Chesapeake Bay and Atlantic Ocean.

Cultural Resources

A variety of federal laws require that the U.S. Fish and Wildlife Service (Service) identify and preserve important historic structures, archaeological sites, and artifacts. Appendix B contains a summary of the most commonly applicable historic preservation laws for refuge management. The National Environmental Policy Act (NEPA) mandates consideration of cultural resources in planning federal actions. The National Wildlife Refuge System Improvement Act calls for identification of the archaeological and cultural values of each refuge in the Comprehensive Conservation Plan (CCPs).

Federal agencies are also required by the National Historic Preservation Act to locate and protect historic resources (archaeological sites and historic structures eligible for or listed in the National Register of Historic Places, and museum property) on their land or on land affected by their activities. In addition, agencies are required to establish a program for these activities and carry out their preservation activities in consultation with State Historic Preservation Offices. In Region 5, the Service's Regional Historic Preservation Officer oversees compliance with these laws and consults with the State Historic Preservation Offices in 15 states. In Virginia, this is the Virginia Department of Historic Resources.

According to the National Historic Preservation Act, site preservation depends on the National Register of Historic Places (known as the National Register) eligibility, a measure of the site or structure's quality or importance. Federal agencies are also charged with locating, evaluating and nominating sites on their land to the National Register. The Service maintains an inventory of discovered archaeological sites and historic structures in the Regional Office, with copies of the site files at each refuge.

In addition, the Service complies with the Archaeological Resource Protection Act, which requires protection of archaeological sites from vandalism and looting, and permits for site excavation. The Regional Historic Preservation Officer manages these activities.

The Service also owns and cares for museum property. Archaeological collections, art, zoological and botanical collections, historical photographs, and historic objects are our most common types of museum property. Each refuge

maintains an inventory of museum property. Museum property care on refuges is guided by the Museum Property Coordinator in the Region 5 Regional Office, and helps the Service comply with the Native American Grave Protection and Repatriation Act, as well as Federal regulations guiding curation of Federal archaeological collections. The program ensures that Service collections will continue to be available to people for learning and research.

Eastern Shore of Virginia National Wildlife Refuge

Preservation of cultural resources depends on their eligibility for listing on the National Register of Historic Places. Eastern Shore of Virginia Refuge has had a professional archaeological survey completed to understand the eligibility of its known sites. The Virginia Department of Historic Resources has been consulted with reference to this work and site and structure eligibility. In addition, the refuge has maps of land forms likely to need survey in the future, should ground disturbance be necessary.

The end result of this work has proven the refuge has one National Register eligible farmstead. In addition, there are structural remains of Fort John Custis, part of the Chesapeake Bay Harbor Defenses, which may be eligible for the National Register. Nine other known sites, including two cemeteries, have been evaluated for eligibility for the National Register. None of these sites are eligible. A full listing of the refuge's cultural resource sites and structures, along with descriptions, appears in Appendix H.

Fisherman Island National Wildlife Refuge

Previous Archaeological Work

Because Fisherman Island consists of modern (post 1820) deposits, the Virginia Department of Historic Resources concurred in 1992 with Espey, Huston and Associates that no archaeological survey was justified on the island unless archival sources suggested historic use of the area. Therefore, the firm's study of the Parallel Crossing Proposal did not include work on Fisherman Island. In 1975, however, a team of museum and military professionals examined structural remains of Fort John Custis on Fisherman Island (Virant 1975). In 1994, Matthew L. Adams and Christopher K. Wiles also visited Fisherman Island and reported on the condition of the Fort John Custis structures (Adams 1994). No archaeological or professional architectural survey has been conducted on Fisherman Island.

Known cultural resources on Fishermans Island consist of four structures remaining from Chesapeake Bay Harbor Defenses for World War II - gun emplacements and the activities related to their support. In addition, one standing cabin may be related to shell fishing on the island. Sites of cabins from the late 19th and early 20th century may exist as well. No cultural resources on Fishermans Island have as yet been evaluated for National Register eligibility.

Chapter 4

Aerial view of Fisherman Island Refuge.
USFWS photo

Environmental Consequences

- Introduction
- Staffing and Budget
- Physical Environment
- Biological Resources
- Socio-Economic Factors
- Cultural Resources
- Cumulative Impacts

Introduction

This chapter predicts the impacts of implementing the management strategies proposed under each of the four alternatives in Chapter 2. Where detailed information is available, we present a scientific and analytic comparison among alternatives. In the absence of detailed information, we make comparisons based on professional judgement and experience. We predict impacts for all alternatives, including Alternative A (Current Management), the baseline for comparing the other alternatives. Within our 15-year planning time frame, we identify direct and indirect impacts. Beyond the 15-year time frame, we give a more speculative description of direct, indirect, and cumulative impacts.

We generally describe impacts on a relatively fine geographic scale, for example, within the confines of land we currently own. We ask the reader to keep in mind this is a very small area: On Eastern Shore of Virginia Refuge, we own 1,120 acres; on Fisherman Island Refuge, we own 1,850 acres. Because of the small geographic scale, we may have overstated both positive and negative impacts within their larger geographic context.

We analyze impacts on a broader geographic scale when talking about our proposed land acquisition program. Much of this analysis, however, is speculative since we do not yet own the land, we cannot always say exactly what we will do with the land once we own it, and we do not always have information regarding the wildlife and habitats that thrive on this land.

We have arranged this chapter's discussion according to impact topics. Those impact topics generally follow the Affected Environment topics from Chapter 3. The impact topics discussed in this chapter are Staffing and Budgets, Physical Resources, Biological Resources, Socio-Economic Factors, Public Use and Cultural Resources. Under each impact topic, we predict and analyze the impacts each alternative would have on that particular topic. We generally analyze actions in the same order they appear in the Alternatives Matrix. We also offer a summary of the cumulative impacts each alternative would have on the impact topic. A matrix at the end of this chapter summarizes the consequences of each alternative.

Staffing and Budgets

Alternative A

Refuge budgets are generally broken into two funding sources - Operations and Maintenance. Operations cover expenses such as salaries, awards, utilities, and the Refuge Operating Needs System (RONS). Maintenance generally covers all large maintenance expenses. Both the Operations and Maintenance accounts include discretionary funds that are used for unforeseen events.

In Alternative A (Current Management Alternative), we maintain the existing approved staff positions of nine permanent, full-time positions and a funding target of $581,000, which includes both Operations and Maintenance funding. We continue to fund the current number of seasonal interns with bookstore profits and donations.

Discretionary funding for Operations decreased by more than 60 percent in FY 2001. In addition, no new RONS projects were funded. Discretionary funding for Maintenance increased from $20,000 to $23,000 in FY 2001. Generally, at least one Maintenance Management System (MMS) project is funded each year with project costs fluctuating between $6,000 and $55,000. Appendix G lists the current backlog of MMS and RONS projects for both Refuges.

Alternative B

Compared to Alternative A, Alternative B, or the Proposed Action, would result in sizeable increases in funding over the next 15 years. The current total of nine permanent, full-time (PFT) and no seasonal staff would increase to 18 PFT and three seasonal staff members. The FY 2003 budget proposal for Operations and Maintenance that would cover all proposed CCP projects in the next 15 years would result in a $2.47 million increase from Alternative A. This increase would cover all new permanent and seasonal salaried positions, and 20 new biological and public use projects. Many of these new positions and projects were included in the Refuge RONS table in previous fiscal years, but they have never been approved for funding. The $2.47 million increase assumes a 100 percent funding scenario.

The increase includes three new positions that will be added to manage the newly acquired 376-acre Wise Point Corporation property. The three positions account for more than $560,000 of

the total increase from Alternative A. Another $629,000-$715,000 would go towards improving the boat ramp, public parking area, and roadside vehicle pull-outs at the former Wise Point property.

Alternative C

Similar to Alternative B, Alternative C would result in substantial increases in refuge funding over the next 15 years. Proposed projects would remain generally the same as Alternative B with the managerial emphasis shifting from forest/shrub to grassland dominant along with the interpretative and education programs.

Alternative D

Compared to Alternative B, Alternative D would result in eight fewer projects and one less new permanent staff member. The RONS funding request for all new projects and staff, in this Alternative, would decrease from $2.47 to $1.51 million. Funding needs for MMS, however, would increase substantially because of a proposal under Goal 6 to remove several artificial structures.

Summary

Alternatives B and C would result in a $2.47 million budget increase from Alternative A. Most of that increase would be tied to RONS projects. Alternative D would result in a $1.51 million budget increase, however we would request more money for maintenance because of proposals to remove artificial structures in this Alternative. The minimal staffing and budget proposal in Alternative A would prohibit the Refuge from meeting the stated goals in the CCP. Staffing and budget proposals in Alternatives B and C best meet the vision and all six goals of the refuge. Alternative D's staffing and budget proposal best fulfills Goal 6, which is to "enhance and restore the quality of the soils, waters and other abiotic components of the refuge and landscape."

Physical Environment

Air Quality

Alternative A

The most common way refuge operations can impact air quality is through the prescribed fire program. Prescribed fire directly impacts air quality in three principal ways: decreased visibility, increased particulates, and increased pollutants. We do not propose any prescribed burns in Alternative A.

As stated in Chapter 3, the eastern shore of Virginia currently has attainment status for air quality as required by the Federal Clean Air Act of 1970. This means the area does not exceed the level of acceptable pollutants as set by the Federal government in the Clean Air Act. Increased traffic volume is one factor that could cause the area to exceed acceptable pollutant levels. Any visitor increase in Alternative A would not be enough to increase traffic volumes to the point where it would affect air quality.

By banning personal watercrafts (PWCs) from the Wise Point boat ramp in all alternatives, we would contribute to maintaining a healthy level of air quality. According to data collected by the U.S. Environmental Protection Agency (EPA), PWCs have twice the hourly usage rate of other water vessels, double the load factor (rpm, pay load, etc.) and significantly more horsepower than a typical two-stroke outboard. For these reasons, PWCs emit eight times more pollution than equivalent motorboats. The PWC industry counters that the EPA data include older, less efficient PWCs and almost all 1998 models meet new hydrocarbon and oxides of nitrogen emission standards. Still, it will be many years before the older models are replaced. Air pollution, however, is only a small part of our reasons for banning PWC's from launching from the boat ramp.

Alternative B

In Alternative B, we propose to use prescribed burning as a management tool to encourage a productive understory and kill pine seedlings on approximately 35 acres in the Wise Point area. Burning would kill loblolly seedlings, remove accumulated needles and allow other species, such as hardwoods and vines, to establish themselves in the understory (Brown and Smith, 2000). Burning also causes decomposition of material, which makes nitrogen available. We would only burn occasionally, in the winter, and

when stands need rejuvenation. We would burn low-intensity ground fires in small areas at different intervals.

We would also establish experimental 10x10 meter burn plots to test the effectiveness of prescribed fire on invasive plant species in shrub/scrub habitat. To be effective, burning would be used in combination with herbicides. There are about 150 acres of shrub/scrub habitat, but we would not burn all 150 acres at once.

Forest habitat.
KAB

We would use prescribed burns to keep grassland (60 acres) and shrub habitats (150 acres) in desirable successional stages, especially after cutting down loblolly pine. Fire adds nutrients to the soil and promotes germination of desirable species. We would burn sections of these sites, not all 210 acres at once.

On Fisherman Island, prescribed burning may be used to control phragmites. We are in the process of accurately mapping the existing amount of phragmites on Fisherman Island. Currently, there are approximately 100 acres of phragmites on Fisherman Island Refuge. Fire would be used in accordance with a Service-approved herbicide in order to remove the vegetation killed by herbicide. Burning itself would not reduce growth unless the roots burn; however, burning in conjunction with chemical control has been found effective (Tu et al., 2001).

Burning is often less expensive than herbicides. Burns would only be conducted after an approved Service Fire Management Plan has been written specifically for the refuge with the assistance of a fire ecologist. Burning would only occur under safe conditions that evaluate wind conditions and direction, existing fuel conditions, relative humidity, and the creation of fire breaks. Under the correct conditions, prevailing winds would transport smoke and particulates east, away from Route 13 and other public areas. Burning would be performed by personnel with approved fire training. Adjacent land owners would be notified prior to burning.

The refuge has consulted with a regional fire ecologist and a prescribed burn specialist. These and other experts have concluded the adverse effects of burning on the refuges would be minor and temporary.

Alternative C

In Alternative C, we would burn to maintain shrub habitat in the cut areas on Wise Point (approximately 10 acres) and in MU 6A (5 acres). The benefits to wildlife from maintaining shrub habitat are discussed in Alternative B. The additional burning used in

this Alternative could increase the quality of the shrub habitat. Increased plant species and structural diversity could provide a wider variety of foods and cover for migrating, wintering and nesting birds. As in Alternative B, we would also maintain grassland by burning.

Any burning in Alternative C would have a minor and temporary effect on air quality.

Alternative D

In Alternative D, we propose the use of small, experimental plots to test the effectiveness of burning to control invasive species. This is similar to Alternatives B and C. No other burning is proposed for Alternative D.

Summary

None of the alternatives would have a major impact on air quality. Alternative A would have the least impact, followed by Alternative D. Alternatives B and C would have the greatest impact on air quality, but the impact would still be minor and temporary. All alternatives would comply with the Clean Air Act.

Climate

None of the alternatives would measurably impact the climatic conditions on the eastern shore of Virginia. All of the alternatives would impact the microclimatic conditions within the refuge acquisition areas and the immediate surroundings because vegetated, undeveloped lands moderate local temperatures, whereas developed lands trap heat.

Geology, Topography and Soils

None of the alternatives would substantially impact the local geology, topography or soils. All the alternatives would protect, in perpetuity, soil formation processes on lands the refuge acquires. Some disturbances to surface soils and topography would occur at locations selected for visitor facilities, such as the Environmental Education study area proposed in Alternative B. The vast majority of disturbance would occur in Alternative D, where we propose to remove several buildings. This would be a one-time disturbance, and in the long run it would be a positive benefit because the areas where buildings would be removed would be restored to wildlife habitat.

In Alternative B, we propose the use of discing to control invasive plant species and to maintain grassland. Discing disturbs the soil and could encourage invasive growth since many invasive species thrive on soil disturbance. Therefore, we would use discing cautiously. Also in Alternative B, we propose using a hydroaxe to control the spread of phragmites in a clear-cut pine stand. However, hydroaxing can result in soil compaction, creating depressions that hold water and encourage the hydrophilic phragmites to spread even more. If this occurs, we would spray phragmites with an approved herbicide.

Hydrology

Each alternative would protect the natural hydrology of the affected areas. Alternative A would provide the least protection for hydrology since it proposes to acquire only an additional 310 acres. Alternatives B and C would provide an equal amount of protection for hydrology because in both alternatives we would acquire 6,030 acres of wildlife habitat. We would protect habitat using a combination of tools including acquisition, conservation easements, and partnering with other land conservation organizations. Protected lands contribute to clean surface water because vegetation filters contaminants from rain water that runs into lakes, ponds, marshes and estuaries. Protecting land would also prevent development, which can dramatically affect surface water as rainwater runs off pavement, collecting contaminants along the way. Conservation land also protects groundwater recharge areas which is important since rainwater is the only means of groundwater recharge on the eastern shore of Virginia. The wetlands protected in all the alternatives would maintain natural catchments to hold and absorb surface waters, thereby minimizing flooding.

By banning PWCs from launching from the Wise Point boat ramp, we would help to maintain water quality in and around the lower peninsula. Nearly all PWCs currently in use are powered by two-stroke engines, which do not completely burn the mixture of oil and gasoline delivered to the combustion chamber. We do not propose banning PWCs for water quality issues alone. However, small incremental impacts can accumulate and lead to larger impacts.

Improvements to the boat ramp in Alternatives B, C and D would affect the hydrology in the area of the boat ramp. Alternative A would have the least impact, since we would not improve the boat ramp. In all other alternatives, we would install culverts under Ramp Road to improve water exchange and minimize road damage. Installing culverts would alter the hydrology of the pond

Otter tracks.
USFWS photo

adjacent to Ramp Lane. The area where the pond lies used to be salt marsh. When Ramp Lane was created, it bisected the salt marsh and created an impoundment (the pond), altering the normal hydrology. Installing culverts may restore the natural hydrology of the pond to salt marsh by lowering the water level and improving tidal exchange. A more saline environment would discourage the proliferation of phragmites, an invasive species. Instead, more salt marsh plants would begin to appear, providing better wildlife habitat.

In Alternatives B, C and D, installing the boat ramp, posts and docks would require some dredging, which would cause some temporary turbidity in the water. We would remove the 10-12 docks that are in the boat ramp area now. This would also cause some temporary disturbance to the Virginia Inside Passage. There would be less disturbance in Alternative D, since we would install a one-lane boat ramp, whereas in Alternatives B and C, we would install a two-lane boat ramp. The least disturbance would be in Alternative A, where we would make no improvements to the boat ramp.

In Alternatives B, C and D, we would grade the entrance road and the parking lot and lay down gravel. Grading could cause fill to erode into the water. This could cause more turbidity in the water, thus impacting vegetation.

Contaminants

Alternative A

In Alternative A, we identified sites of possible contamination on the refuge by interviewing former military personnel and refuge staff. We followed Service protocol on conducting contaminants surveys on existing refuge lands and lands to be acquired. We removed underground storage tanks and inspected above-ground tanks. Following this protocol ensures that we are providing the healthiest environment possible to the wildlife that use the refuge. We also are working with Northampton County to relocate the firearms range. Relocating the range would reduce the potential for lead contamination on the refuge, thus providing a more healthy environment for wildlife.

Alternative B

In Alternative B, we would take a more aggressive approach to remediating contaminants on the refuge than in Alternative A. We would conduct thorough sampling for heavy metals and organochlorine in areas where we suspect such contaminants

exist. We would also conduct tests to evaluate the risk of these contaminants to the plants and wildlife on the refuge. We would use that information to determine how to remediate contaminants on the refuge to offer a healthier environmental for the flora and fauna there.

We would conduct sampling beyond the firearms range berm to evaluate ecological risk to biotic elements. As discussed above, this sampling would help us determine the impact of lead and other contaminants from the firearms range to plants and wildlife near the refuge. Results would be used to determine appropriate remediation. We would also implement engineering mechanisms to control surface runoff and leachate from the berm, and we would implement current practices for firearms range management such as periodic removal of contaminated soils. These strategies would help reduce lead and other contaminants in and around the firearms range, thus reducing the effects of those contaminants to the plant and wildlife on the refuge. As in Alternative A, we would work with Northampton County in trying to relocate the firearms range.

Alternative C

Same as Alternative B.

Alternative D

Same as Alternative B.

Summary

Goal 6 states that we will enhance and restore the quality of the abiotic components of the refuge and the landscape. One way we can do this is by determining the effects of contaminants on the refuge to plants and wildlife, and taking action to clean up those contaminants. Alternative A does the least to address the contaminants issue on the refuge, whereas Alternatives B, C and D all address the contaminants issue at the same level, and therefore best achieve Goal 6.

Saw-whet owl.
Franchesca Saeny

Biological Resources

Threatened and Endangered Species

Alternative A

In Alternative A, the Current Management Alternative, our methods of monitoring beach nesting birds alert us to the presence of potential nesting piping plovers. If nesting occurs, we follow piping plover recovery plan recommendations. By restricting research vehicles to hard-packed sand within the intertidal zone, we assist in piping plover nest protection as nests would be located in and above the wrackline.

We protect Northeastern beach tiger beetle foraging and larval burrowing habitat on the southern tip beach of the Eastern Shore of Virginia Refuge from human disturbance by closing the beach to public use.

In all alternatives, we would conduct a flora survey at Fisherman Island, which would help identify and protect endangered plant species.

Alternative B

In Alternative B, the Proposed Action, we would implement weekly piping plover surveys to determine plover use during migration, nesting and wintering periods. These surveys would encourage staff to be more vigilant for nesting plovers that would require immediate protection from predators or other threats.

In the Proposed Action, the Northeastern beach tiger beetle would benefit from additional monitoring of both larvae and adults. Surveying the adult and larvae population would help us confirm whether there is a viable breeding population. Monitoring would enable us to detect temporal population trends (i.e. increases or die-offs) and assist with making management decisions. Working with the Sunset Beach Resort to educate their guests about the importance of the beetle would further reduce human disturbance (i.e., compaction of larval burrows and interruption/alteration of foraging behavior).

Also in Alternative B, we would protect 6,030 acres of land, some of which supports species of concern at both the Federal and State levels, including the Bald Eagle (Elliotts Creek) and Northeastern beach tiger beetle (Chesapeake Bay beaches).

Alternative C

Same as Alternative B with the exception of possibly opening the southern tip beach to surf fishing if adult and larval tiger beetle surveys show a stable and healthy population. This could have a negative impact on tiger beetle populations. However, tiger beetles can likely withstand a moderate amount of human intrusion in the form of foot traffic (Knisley 2001). Specifically, Knisley reports tiger beetles can probably withstand about 50 people walking on the beach per day. He also said some tiger beetles have actually been reintroduced to areas where surf fishing is already allowed, and populations there have been shown to thrive.

Fennel.
Charles Philip

Alternative D

Same as Alternative B.

Summary

Alternative A would provide the least protection for potential nesting piping plovers, since we would not survey for plovers on a regular basis, and therefore could overlook nesting pairs. Alternatives B, C and D all propose surveying for plovers during different times of the year so we will be able to protect any nesting pairs, and determine which areas of Fisherman Island, if any, plovers use during migration and winter. Alternatives B and D provide the most protection to the Northeastern beach tiger beetle population on the southern tip beach. In those Alternatives, we continue to keep the beach closed to public use and monitor the beetle population to determine breeding status. In Alternative A, we continue to close the beach to public use but we do not conduct any monitoring, and in Alternative C, we conduct monitoring but open the beach to public use. Public use on the beach may or may not negatively impact the beetle population. Alternatives B and C have the potential to protect even more tiger beetles, and possibly other Federal listed species, by acquiring an additional 6,030 acres. Since Alternative B would provide the most protection to the Northeastern beach tiger beetle, and since it would protect 6,030 acres of land, it would best achieve the stated mission of the U.S. Fish and Wildlife Service (Service), which says the Service will protect national resources, including endangered species. Under the Refuge Recreation Act (16 U.S.C. 460k-460k-4) one of the purposes for establishing the Eastern Shore of Virginia Refuge was for the conservation of endangered or threatened species. Therefore, Alternative B would also best meet this purpose.

Plants

Alternative A

In the Current Management alternative, browse lines, numerous deer trails and the resultant plant community are evidence of the impacts to vegetation on the Eastern Shore of Virginia Refuge due to an over abundance of white-tailed deer. Studies have shown that an increase in deer density can have a detrimental effect on vegetation. The refuge's deer hunt helps to reduce the deer herd, subsequently promoting herbaceous and woody plant regeneration.

In Alternative A we increase grassland habitat by planting warm season grasses on MU 10 and 13. We maintain grasslands by mowing large blocks and raptor strips on a rotational basis. This results in reduced shrub/scrub succession. By hydroaxing non-native shrubs, we reduce invasive plants; however, the effect is only temporary. Part of the refuge is maintained in early successional habitat (shrub/scrub) by hydroaxing small trees and/or allowing natural succession.

We planted hardwoods on MU 13 several years ago, but most of the trees did not survive, probably because the plants purchased were bare root stock and they were planted during an unseasonable time of year.

By limiting public use on Fisherman Island we prevent trampling of sensitive vegetation. We provide seasonal guided tours which restrict the public to the road and prevents entry onto vegetated areas. By spraying phragmites with herbicide in the saltmarsh, we reduce the spread of invasive plant species and facilitate the establishment of native plants.

In Alternative A, we would acquire 310 acres within our current acquisition boundary, which was approved in 1984. Acquiring additional lands within the refuge boundary would increase the acreage of saltmarsh habitat on the refuge. We have further increased the amount of protected habitat through easements and acquisitions by working with partners.

Vegetation was originally disturbed to create the 1.5-mile long, 8-foot-wide trail leading from the Visitors Center to the loop trail around the bunker. Since the creation of that trail, however, only a small amount of vegetation is disturbed. Refuge staff have not observed disturbance to vegetation by visitors walking off trail.

Alternative B

Compared to Alternative A, we would increase the amount of hardwood habitat in Alternative B by about 27 acres. We would plant hardwoods in MU 6B to add to the largest contiguous block of hardwood forest on the refuge. This would increase the mast producing habitat as well as deer foraging habitat. Coordinating with the Chesapeake Bay Bridge-Tunnel Authority (Bridge-Tunnel Authority) to plant hardwoods behind their administration building would increase the size of the hardwood habitat block on the bayside of the refuge and it would convert a portion of the Bridge-Tunnel Authority's lawn to hardwood habitat.

We would provide a more productive understory in Alternative B as compared to Alternative A at Wise Point by thinning loblolly pine. Thinning pines on Wise Point would allow additional sunlight to penetrate the forested canopy which would allow native shrub species (i.e., *Myrica* spp.) to reestablish. This, in turn, would increase vegetation diversity providing additional forage and cover habitat. However, this action could expose remaining pine trees to wind throw and non-native phragmites could become more widespread (it is currently present in small openings). To mitigate phragmites invasion, we would use a chain saw to remove trees. Using a chainsaw would cause less soil disturbance than heavy equipment. We would also spray phragmites with an approved herbicide if it begins to encroach on the pine understory. The loblolly pines in this area are old and the salt marsh intrusion is weakening the forest. This may make thinning impractical. Monitoring fruit production in these openings would help us determine when and/or how much to thin to create as much fruit-producing understory as possible. Monitoring deer browse effects on this understory would help determine the deer impacts to vegetation and would help evaluate the success of our hunt program.

Mowing.
UNK

In the pine stands at Wise Point, we would implement a light winter burn to kill pine seedlings. Light to moderate winter burning kills loblolly seedlings that measure less than 1.5 meters tall, and less than five centimeters in diameter. Burning removes downed needles and allows other species, such as hardwoods and vines, to establish themselves in the understory, thus creating more vegetative diversity (Brown and Smith, 2000). Fire would also rejuvenate desirable vegetation, such as *Myrica* spp., due to its resprouting ability. Myrica is flammable and resprouts vigorously after burning. We would only burn occasionally when stands need rejuvenation. Nitrogen may become available after burning from decomposition of burned material.

We also would use fire as a tool for controlling invasive plant species in hardwood understory habitat. In combination with spraying herbicides, fire can reduce and control Japanese honeysuckle and phragmites. Burning may top-kill the honeysuckle, but the honeysuckle could vigorously resprout. The rhizomes of phragmites are not affected by fire, and fire often promotes growth, although sometimes drought can cause rhizome damage. To be effective, prescribed burns would be used in combination with herbicide spraying. Using this process, we would kill non-target native species, especially with burning. Therefore, spraying would be more focused on solid blocks of invasives. Fire would remove the dead layer of vegetation that could prevent native species from germinating. We would burn with extreme caution when burning phragmites, as spot fires can occur up to 100 feet from burning phragmites (Tu et al., 2001). Burns would be conducted with trained Service fire personnel under approved fire conditions (i.e., wind, humidity). Prescribed burns would be most effective after a late summer glyphosphate application followed by a winter burn.
We would also use prescribed burns to keep grass and shrub habitats in desirable successional stages. Fire can add nutrients to the soil, promote germination of desirable species and assist in invasive plant species control. Additionally, it can be less expensive than using herbicides or mowing.

In Alternative B we would use experimental plots to determine the best methods (i.e., mow, spray, and burn) by which to control invasive species in shrub and grassland habitat. Test plots located in MUs 5, 6, and 7 would help determine effective methods. We would monitor the effects of the treatments to determine which methods would work best on a widespread scale. Because most everything would be killed, eradicating invasives in shrub/scrub habitat would create early successional habitat. We may use discing for fennel if above techniques do not work. As mentioned in the section on soils, discing disturbs the soil and could encourage invasive growth because these species typically thrive on disturbance of the soil; therefore, discing would be used as a last resort in severely disturbed areas. Mowing may be used to reduce the vigor of the plant, but this can also cause the plant to shoot and therefore could increase the density of the plant. Therefore, mowing could be used in conjunction with spraying. We would mow repeatedly during the growing season and then spray the shoots with herbicide in the fall. Cutting and treating autumn olive in MU 6A would reduce this exotic, invasive species. Most likely, autumn olive would be replaced by black cherry, sassafras, dogwood, red maple, and other native shrubs and small trees.

Clearcutting seven acres of loblolly pine on Wise Point to convert mature pines to shrub habitat would eliminate canopy cover and allow light to penetrate the ground, thus creating shrub thickets. If possible, we would use a chainsaw to reduce phragmites invasion. If this is too labor intensive, we would use a hydroaxe instead. Using a hydroaxe would result in soil compaction, creating depressions that hold water and encourage the hydrophilic phragmites to spread even more. If this happened, we would spray phragmites with an approved herbicide. Working with the Bridge-Tunnel Authority to manage pines in the Wise Point area adjacent to the refuge would help improve the quality and quantity of this newly created shrub habitat.

In MUs 4, 5, 6, 7, and 10, we would only need to remove small, sporadic pockets of loblolly pines. This could be done in a timely and efficient manner with a chainsaw. If any of the units grew to a high-density, monotypic pine stand, we would use a hydroaxe which would mulch the pines. We would remove the stumps in all units. We would use prescribed fire to maintain shrub habitat. As shrub stands age, light burns can reduce and rejuvenate vegetation in a patchy fashion. Fire can create more vegetative diversity than mowing to set back succession (Krementz and Jackson, 1999). We would continue to monitor all management units for the invasion of loblolly pines and invasives, and we would control these species as necessary.

Wise Point boat ramp.
R. Wilson

By allowing natural shrub succession in MUs 9, 10 and 11, we would convert grassland to shrub/scrub habitat. Cutting fields in large rotational blocks would create age diversity in vegetation. In Alternative B, we would continue to manage for grasslands in MUs 1 and 13, as in Alternative A. We would, however, convert approximately 48 acres of existing grasslands to either shrub (43 acres) or hardwoods (five acres). In Alternative A, we manage grasslands by mowing; in Alternative B, we would use a combination of mowing, burning and discing. Burning and discing can result in different species composition. Because discing can encourage invasive plant species growth, we would use it with discretion. A regional grassland study is currently investigating grassland management techniques such as burning and mowing. Some research indicates that burning suppresses non-native cool season grasses and favors native warm season grasses which are more beneficial to wildlife in this area. Burning also would reduce the accumulated litter resulting from previous seasons' mowing. Burning is most effective if done in early spring (March), on a two- to six-year rotational basis, with only a percentage of grassland habitat burned in each management unit at one time. This technique would provide a diversity of grassland habitats and leave some undisturbed grassland habitat available for nesting.

Mowing would help keep non-target woody species and weeds such as mustard and horseweed out of grassland habitat between prescribed burns. Discing can assist in maintaining a variety of grassland densities such as short sparse grassland and tall dense grassland.

In Alternative B, we would encourage researchers on Fisherman Island Refuge to walk to their study site to avoid stepping on vegetation. Educating the public, enforcing closures and restricting public tours to within a quarter of a mile of where the road reaches the beach would also protect beach and dune vegetation. We would also conduct deer browse surveys on Fisherman Island Refuge to determine if there are impacts of deer degradation on the vegetation there.

In Alternative B, we would open a walking trail along the Wise Point Road. Since this is already a road, we would not need to disturb vegetation by creating this new trail. We would, however, disturb vegetation to create a 200-foot boardwalk with a platform overlook onto salt marsh. The platform would measure about 16 feet x 19 feet and would include an interpretive panel. Construction of the boardwalk may require the disturbance of a small amount of salt marsh. If so, we would restore an equal amount of salt marsh elsewhere on the refuge. Also in Alternative B, we propose to build an environmental study area with trail. Development of the trail would impact vegetation including soil compaction which ultimately reduces vegetation composition and structure.

Installation of a culvert(s) under Ramp Lane would alter the hydrology of the impoundment. This impoundment was historically a tidally-influenced salt marsh, which was impounded by creation of the road that essentially cut the marsh off from cyclic tides. Installing a culvert(s) would improve the hydrology and assist in reverting this area to salt marsh. With the daily flushing of salt water, the invasive phragmites that rings the impoundment would also be adversely impacted, and spartina and other salt marsh vegetation would return. However, because of siltation and other changes that have occurred since this area was impounded, it would not immediately be the same quality marsh it once was.

Adding pull-offs to Ramp Lane to enhance driving safety would require some filling of salt marsh and cutting of vegetation along the upland areas of the road. Although engineering specifications have not been completed it is estimated that approximately one-third of an acre of wetlands would be filled and one-half acre of uplands would be cleared for pull-offs. About one-half acre of

uplands would be cleared for a satellite parking area.

Grading and graveling the entrance road and parking lot would cause some siltation in adjacent waters. This would cause water turbidity affecting wetland vegetation, benthic organisms and fisheries.

An electric gate would be installed which would require trenching to run electricity to the gate and installation of a magnetic plate under the road surface.

In the proposed alternative we would work with State partners to modify the refuge's hunt program to increase the deer harvest. We would also expand deer hunting on Eastern Shore of Virginia Refuge by opening a portion of the former Wise Point property to hunting. Modifications to the deer hunt program would prevent continuous ongoing habitat degradation. Habitats subject to deer damage include forest understory and shrub habitat that migratory songbirds depend on for food resources. Curbing the deer population would enable the forest understory to grow and produce more food and cover for neotropical migrants. Baseline monitoring of the effects of deer browsing in shrub, understory, and forested habitats prior to any modifications would be conducted to compare the results of taking more deer from the refuge.

Some wildlife disturbance and trampling of vegetation would occur from deer hunters walking around in their zones.

Opening Fisherman Island Refuge to a deer hunt in Alternative B would reduce the serious habitat degradation often caused by heavy browsing on forest understory and shrubs. Heavily-browsed vegetation leaves less food and cover habitat for migratory birds, a trust resource which the refuge is charged with protecting. The hunt would cause some trampling of unstable dunes and vegetation. Damage to vegetation and within these unstable soils and dunes would likely incur when hunters are tracking wounded deer. Another concern is the potential introduction of invasive plants from hunters walking on the island with boots that may be harboring seeds from invasive plants found on the Eastern Shore of Virginia Refuge or other areas of the State.

Our land acquisition proposal in Alternative B would add 6,030 acres to the approved acquisition boundary, compared to Alternative A, which adds 310 acres. All of the 6,030 acres proposed for acquisition in Alternative B are located on the southern 10 km of the Delmarva Peninsula. The 6,030 acres

mostly consists of agricultural land, forested land, tidal marsh and open water.

Woodcock.
USFWS photo

We would provide between three and six new trails if we acquired all 6,030 acres within the proposed acquisition area. To create trails, we would likely need to disturb vegetation by cutting down trees or clearing shrubs and grassland. To mitigate disturbance to vegetation, we would try to locate trails in already disturbed areas. Also, we would take into consideration vegetation and drainage patterns when designing trails.

We would allow deer and small game hunting on lands to be acquired provided there would be minimal disturbance to neotropical migratory species. Deer and small game hunting would fall within the parameters of the State hunting seasons. By offering deer hunting opportunities we would curtail deer browse on lands to be acquired, therefore increasing vegetation diversity. We would also allow waterfowl hunting on marsh blocks we acquire that are 200 acres or larger. Most waterfowl hunting would take place on the seaside of the Delmarva Peninsula. If hunters are allowed to get out of their boats and walk on the marsh, this could result in some trampling of vegetation. However, we would only open refuge lands to waterfowl hunting after December 1, when most vegetation is dormant, so impacts by hunters would be minimal.

Alternative C

Impacts to vegetation in Alternative C are similar to those in Alternative B. The major difference between the alternatives is the amount of acreage in different habitat types.

There are 17 fewer acres of hardwood habitat and 90 fewer acres of shrub/scrub habitat in Alternative C as compared to Alternative B. Therefore, Alternative C would not provide as many benefits for forest- and shrub/scrub-dependent species as would Alternative B.

As in Alternative B, we would eradicate and control invasive species in the shrub/scrub habitat. This is the same action as in Alternative B. This would have all the same benefits of eradicating invasives in Alternative B.

We would clearcut loblolly on Wise Point as in Alternative B. However, in Alternative C, we would cut up to 24 acres whereas in Alternative B, we only cut 9.5 acres. Pines in the Wise Point area are already showing signs of senescence and low vigor due to age, salt water intrusion and wind effects. Although this action

could increase negative aspects of phragmites invasion, we would only cut in small test areas to determine phragmites and other vegetative response before cutting on a large scale. As in Alternative B, we would monitor and react (by spraying herbicides or mowing) to any phragmites invasion as a result of our actions. Pines on the west side of Wise Point Road would not be cut; therefore, some pine habitat would remain and the remaining pines would provide a buffer and screen from Route 13 traffic. We would leave dead, standing snags because of the benefits they provide, as mentioned in Alternative B.

We would remove scattered loblolly pines from shrub habitat as in Alternative B, but less acreage would be impacted because there would be less shrub acreage in Alternative C. We would remove and spray autumn olive, as we do in Alternative B.

In Alternative C, we would convert almost the same amount of shrub/scrub habitat to hardwood habitat as we would in Alternative B (36.5 acres compared to 38.5 acres).
In Alternative C, as in Alternative B, we would monitor for deer impacts, monitor for fruit production, cut shrub/scrub habitat in 14-acre rotational blocks, and work with the Bridge-Tunnel Authority to manage pines at Wise Point. The same consequences that applied to these actions in Alternative B would apply to Alternative C.

There would be about 130 acres more of grassland habitat in Alternative C than in Alternative B. In Alternative C, we would maintain MUs 1, 2, 4-7, 13 and 14 in grassland, whereas in Alternative B, we would only maintain MUs 1 and 13 in grassland. We would maintain grassland habitat in Alternative C using the same methods as in Alternative B (mow, disc, burn). Any management done to promote grasslands would occur in a minimum size of 14-acre blocks. We would remove loblolly pines and some of the shrubs along the southern edge of Route 600 to make grasslands appear contiguous and reduce fragmentation. We would leave small clumps of existing shrubs which would not reduce grassland habitat quality (Sample and Mossman, 1997). As in Alternative B, we would eradicate invasives.

Under Alternative C, there would be more impact to vegetation from opening the Wise Point Road to public use because we would extend the trail off the road and through forest and salt marsh habitat to the beach. We predict the trail extension would be less than half of a mile. Building the trail could cause some one-time disturbance to salt marsh, and it may cause permanent disturbance to forested habitat if we cut down trees for the trail. In Alternative C, we would not open Fisherman Island Refuge to

deer hunting. This would eliminate hunters trampling vegetation. Also, we would not open Wise Point to waterfowl hunting.

By opening the southern tip beach to surf fishing in Alternative C, we could negatively impact dune vegetation if anglers do not stay on the beach.

In Alternative C, we propose a scaled-down version of boat ramp improvements from Alternative B. There would be less impact on vegetation than in Alternative B, as the parking lot would be smaller.

Our land acquisition proposal in Alternative C would add an additional 6,030 acres to the approved acquisition boundary, the same as Alternative B. In Alternative C, however, we would restore all agricultural land to grassland habitat.

We would provide the same number of trails on lands proposed for acquisition, and the same impacts apply in Alternative C as they do in Alternative B. We would also provide the same hunting opportunities for deer, small game and waterfowl.

Alternative D

This alternative is characterized by a major increase in forested habitat relative to the other two upland community types (grasslands and upland shrub). This is the most significant difference between it and the other three alternatives. While the community structure (i.e., species) will depend on the outcome of the detailed study, most stands will probably be an oak-dominated mixed deciduous-pine forest. The total forest acreage may approach 400 acres if all upland areas not now in woodlands (i.e., management units, the railroad right-of-way, and the residence areas) are converted (depending on the outcome of the initial investigation of historic vegetation). Since it will ultimately be difficult or impossible to determine the relative species compositions of the historic forest, most areas not currently wooded (i.e., the management fields) would be allowed to succeed naturally through grass/forb and shrub communities into mature woodlands. We may modify the final distribution and species composition based on the investigation of historic vegetation, but for the most part we would let the areas succeed on their own and tell us what species belong there. Primary active management in these areas would be intensive control of invasives, particularly honeysuckle, fennel, and kudzu. Secondly, there would be a concerted effort to maintain the deer population as low as possible.

Pokeweed.
USFWS photo

Areas already wooded would be treated differently. The 35 acres of mature loblolly pine west of Route 13 would be left intact. It currently appears healthy with a diverse understory, and attempts to manipulate it may open it up to invasive species. The senescent stands of pine east of Route 13 along Wise Point Road will be thinned or cut heavily. As in Alternative C, the southernmost 25.4 acres would be converted to coastal shrub (myrtle), while the northern area up to MU 2 and MU 4 (about 35 acres) would be thinned and planted to oaks and other hardwoods to promote a mixed deciduous-pine community. The existing mixed oak/pine and mixed pine/oak communities around the headquarters and north of MU 5 and MU 6B would be left intact, though species composition may be modified if the initial investigation suggests it. Sections of MU 13 have already been planted to mixed hardwoods, and the remainder of MU 13 and MU 14 to mixed warm-season grasses. These would also be allowed to succeed naturally from this point on, with the expectation they will mature into hardwood-dominated forest.

Other than the removal of deer, there would be no active understory management within these forests. This differs from Alternative B, but not from Alternative C. Instead, the primary forest management other than reforestation and deer control would be the creation of forest openings. Though the rotation times and distribution of these openings would be developed further after completion of the detailed investigation, they would be timed to assure availability of some mix of grasslands and upland shrub at all times throughout the refuge, to benefit those migrants dependent on these communities. Total acreages of the grassland and shrub communities would still be less than in other alternatives, however. Monitoring rates of succession in newly created openings would provide data to suggest the best size, distribution, and timing of new openings. We would experiment with different applications of fire and mechanical removal of trees (e.g., chain-saws, hydroaxe) in creating openings. We do not anticipate use of herbicides for clearing, since we would want to promote succession and eventual regrowth of the forest. Herbicides, though counter to the concept of environmental health, would be used as necessary in the early stages of reforestation to control invasives where there is no effective alternative. They would also be used as necessary to control future invasives in wooded habitats where fire and mechanical treatment are unsuccessful.

This alternative recognizes a distinction between upland and coastal shrub communities not recognized in the other alternatives. Coastal shrub (primarily *Myrica* spp.) is dealt with separately from upland shrub. Many of the latter consist of

Honeysuckle.
Charles Philip

shrubs like groundsel and beautyberry mixed with black cherry, sassafras and black locust which have been cut to keep them low and shrubby. Coastal shrub is a distinct community and managed separately in Alternative D. It is primarily wax myrtle and bayberry (*Myrica* spp.) with occasional black cherry and sassafras and is found in lower, more saline areas. Initially, as the various management fields are allowed to succeed, areas of such upland shrub would be extensive on the refuge, possibly approaching 300 acres for several years. Eventually, however, as woodlands mature, upland shrub communities would occur in this alternative only as a result of the creation of forest openings. Such openings would be created to simulate natural openings in the forest canopy that would have historically occurred through fire and storm damage. Once openings have been created, they would be allowed to succeed naturally through grassland and shrub stages, which would not be maintained. At that time, upland shrub communities would become more transient and less available as food sources for migrant birds. The total acreage of upland shrub would vary depending on the total forest openings existing at any one time, and the stages of succession of each. The optimum acreage to keep available in forest openings would be determined upon completion of detailed investigation of historic habitat types. In the long term, once forests are mature, the total acreage of all openings which would foster upland shrub would be less than the total shrub acreages in Alternatives A (146 acres), B (190 acres) or C (96 acres). The average acreage kept in forest openings would be determined by experimentation and monitoring.

Because upland shrub would not be maintained, coastal shrub (*Myrica* spp.) thus becomes critical under this alternative as a food and cover source for migrants dependent on low shrub communities, since it would be the most abundant shrub cover. Coastal shrub is not managed under the other alternatives, but generally left intact in all of them. Alternative D, as in Alternative C, would convert 25.4 acres of senescent pine at the south end of Wise Point to wax myrtle, thus producing a total acreage of about 45 acres on the existing Eastern Shore of Virginia Refuge under Alternatives C and D, versus only about 20 acres under Alternatives A and B. Coastal shrub on Fisherman Island would remain the same under all alternatives.

Grassland, like upland shrub, would be created in this alternative only as a result of the creation of forest openings. Such openings would be created on a rotational basis to simulate the effects of storms or fire, and grasslands will occur as newly created openings succeed through that stage into shrub and then on to become mature forest. Like upland shrub, the grassland

community would thus be more transient and less available as a food source for migrants dependent on grasslands for food and cover. Like upland shrub, the total acreage of grasslands would vary depending on the total forest openings existing at any one time, and the stages of succession of each. The optimum acreage to keep in grassland would be determined on completion of the detailed investigation of historic habitat types. In any case, the total acreage of all grassland would be less than that in Alternatives A (125 acres), B (77 acres) or C (212 acres).

Since many of the management units would be allowed to succeed naturally, much current effort expended maintaining management fields would cease under Alternative D. Control of invasives (primarily honeysuckle, fennel, and kudzu; secondarily autumn olive, Russian olive, wisteria, and phragmites) would become the primary management effort for several years. It would be critical to control these species to allow native species to succeed fully to mature communities. This poses unique problems for Alternative D, however, since burning and mowing, two preferred treatments for invasives, would also set back succession, a primary aim of this alternative. While counter to the concept of environmental health, highly targeted herbicide treatment on specific stands of invasives may prove the most efficient means of control. As in the other alternatives, we would develop test plots to experiment with different combinations of methods, seeking that which most effectively controls invasives while allowing succession to move forward.

As in Alternative B, we would work with the Bridge-Tunnel Authority to manage pines at Wise Point.

Sharpie in hand.
USFWS photo

Regarding impacts to coastal and dune communities under Goal 2, everything else is the same as in Alternatives B and C except for disturbance to marsh community due to boat ramp improvements. In Alternative D we would be providing 25 parking spots compared to 35 in Alternative C and 75 in Alternative B. In addition, we would restore up to one acre of wetlands in this alternative when the water regime is restored in the area of these closed parking spaces.

In Alternative D, we would seek to protect through conservation easement or direct purchase any of the four target habitat types within the proposed 6,030-acre expansion area. These habitat types include deciduous-conifer, maritime pine savanna, coastal shrub and beach dune.

This alternative also promotes removal of numerous artificial structures and roadbeds. These actions are not called for in the

other alternatives. Removing the roadbeds, restoring natural drainage and restoring soil depth and condition over these sites would promote natural vegetative growth. This revegetation would have development of different vegetative structure and resulting edge affect. Eliminating unnecessary fencelines would also help control new invasive problems. Replacement of the culvert along the boat ramp road would restore tidal flushing to more closely approximate the historical tidal exchange in this area and would restore up to five acres of tidal wetlands.

Summary

Alternative B offers the most opportunity for providing forage and cover habitat for neotropical and temperate migrant birds, and therefore best achieves Goal 1. In Alternative B we would add 27 acres of hardwood forest habitat on existing refuge lands and we would increase fruit production in the understory and in shrub habitat. These management practices are necessary to create optimum fruit and insect abundance for birds throughout the migration and winter seasons. Alternative B also best fulfills the purposes of the refuge and the Vision Statement, both of which state the refuge is charged with protecting migratory birds by providing them with a place to rest and refuel before continuing the rigorous journey to their wintering grounds. Although Alternative D would provide more forested habitat than Alternative B, there would be no active understory management in Alternative D other than the deer hunt on Eastern Shore of Virginia Refuge. Also, Alternative D does not include any management strategies for upland shrub habitat, a type of habitat many neotropical migrants depend on, in addition to hardwood habitat. Furthermore, in Alternative B, we would expand the proposed acquisition area by 6,030 acres. We would convert agricultural land to hardwood forest/shrub habitat, adding more forage and cover habitat to the refuge. There is no specified land acquisition plan for Alternative D. In Alternative A we would only acquire 310 acres. We would acquire 6,030 acres in Alternative C, but all agricultural land would be restored to grassland instead of hardwood forest/shrub habitat. While grassland habitat is beneficial to grassland temperate migrants, it does not provide forage and cover habitat to forest and shrub-dependent neotropical and temperate migrants.

Alternative D would best achieve Goal 2 because it recognizes a distinction between upland and coastal shrub communities not recognized in the other alternatives. Alternative D also addresses the importance of wax myrtle to the coastal vegetative community.

Also under this Alternative, we would compile information to further guide management of the salt marsh, beach and interdunal communities. Alternative B would partially achieve Goal 2 because it proposes a deer hunt on Fisherman Island. The deer hunt could reduce deer browse on important marsh, beach and interdunal vegetation, thus helping to maintain the health of these habitat types.

Certain management strategies in all alternatives help to achieve Goal 3. Alternative D would best restore a healthy hardwood habitat, Alternative B an understory habitat and Alternative C a grassland habitat. However, Alternative B comes closest to addressing at least two of the habitats mentioned in Goal 3 - hardwood and understory. These habitats are most important to neotropical and temperate migrants. Both the Vision Statement and the purposes of the refuge direct the refuge to manage specifically for migratory species.

Wildlife

Alternative A

We plant warm season grasses to benefit migrant, wintering and breeding grassland birds (i.e., raptors, woodcock, quail) and small mammals. These grasses provide food (seeds) and cover. The structure of these grasses allows movement for foraging and running to escape predators while also providing nesting habitat. We maintain these grasslands by mowing. We also mow strips through the grass and shrub habitats to help raptors target prey.

We maintain shrub habitat in MUs 5, 6, and 7 (66.5 acres) to provide food (e.g., fruit and insects) and cover for a variety of migrant, breeding, and wintering birds. Some species also benefit from the shrub structure itself (e.g., American woodcock). The trade-off is less habitat for grassland and forest birds.

We monitor avian and mammalian predation of beach nesting birds on Fisherman Island as a proactive approach towards preventing predation and destruction of entire colonies and sensitive shorebird nests and chicks.

The 1.5-mile trail on the Eastern Shore of Virginia Refuge that runs from the Visitor Center to the Winslow Bunker overlook has little impact on wildlife. Most of the trail runs through an open field. Visitors may flush some grassland birds while using the trails, but there are other large parcels of grassland on the refuge where avian species are more likely to be found. The loop trail

Terrapin.
USFWS photo

that leads to the bunker overlook runs through some forested habitat, but the trail is less than half of a mile.

By limiting public access to Fisherman Island Refuge, we reduce human disturbance during both migration and breeding seasons. This is especially critical to sensitive colonial and beach nesting birds. Human use can lead to indirect mortality by flushing birds off nests, thus exposing eggs and chicks to weather and predation. Humans can also directly impact avian mortality through stepping on eggs and chicks or causing nest abandonment by adults. Efforts to limit human disturbance on Fisherman Island Refuge indirectly lead to increased productivity for royal terns, brown pelicans, American oystercatchers, and other beach nesting birds.

Our current hunt program is designed to manage deer abundance while also providing recreational opportunities. Controlled deer hunting helps keep the deer population within the carrying capacity of the habitat. It also enables the forest understory to grow and produce more food and cover for neotropical migrants, small mammals, reptiles and invertebrates. The deer population also benefits from a hunt because there is less competition for food.

Acquiring additional lands within our current acquisition boundary provides more habitat for wildlife for all aspects of their life cycle. In Alternative A, we propose to acquire 310 more acres.

In all alternatives, we ban PWCs from launching from the Wise Point boat ramp. PWCs have a shallow draft, which gives them the ability to penetrate areas that are not available to conventional motorized watercraft. This access has the potential to adversely impact wildlife and aquatic vegetation in these shallow areas. Wildlife impacts noted among avian and marine mammal populations may include interruption of normal activity and alarm or flight; avoidance and displacement, loss of habitat use, decreased reproductive success, interference with movement, direct mortality, interference with courtship, alteration of behavior, change in community structure and nest abandonment. Other potential impacts on the environment include elevated noise levels. Such disturbances could occur throughout the newly-acquired Wise Point property, which consists of extensive coastal salt marsh. It provides high value migration, wintering and breeding habitat for black ducks, gadwall, Canada geese, mallards and blue-winged teal. It also provides migration and wintering habitat for a diversity of other waterfowl species including Atlantic brant, greater snow geese, American widgeon, green-winged teal, goldeneye, bufflehead, mergansers, and seaducks.

The area also supports large numbers of colonial nesting waterbirds. By not allowing PWCs to launch from the Wise Point boat ramp, we hope to decrease PWC use in the Wise Point area.

In all the alternatives, we remove the communication tower once the lease expires in 2007. Communications towers have been found to cause substantial bird fatalities, especially among some 350 species of night-migrating birds (Manville 1999). The Service has estimated 4-5 million birds are killed annually by towers (Manville 1999). Since the refuge's primary goal is to provide resting and feeding grounds for migratory birds, the communications tower violates the spirit and the intent of the Migratory Bird Treaty Act and refuge goals. The Service has guidance on the siting, construction, operation and decommissioning of communications towers to reduce the number of bird kills. The guidance suggests siting towers away from major migratory bird routes and away from refuges or wetlands. The guidance also suggests building towers no higher than 199 feet. The present tower violates these guidelines. In addition, the tower violates Northampton County's tower ordinance. Finally, the tower is located adjacent to the refuge maintenance area and these buildings are within the fall zone of the tower. The tower was constructed in the 1950's and does not meet current design standards for minimizing the zone affected by a potential tower collapse. Removal of the tower would benefit wildlife and migratory bird habitat by making habitat available for restoration, and removing the "footprint" of the tower. Shrub habitat for migratory birds would be restored subsequent to the tower removal. Also, the security lighting for the remaining on ground facility would be down-shielded to minimize disturbance to wildlife and migratory birds.

Alternative B

In Alternative B, we would increase the amount of deciduous forest habitat by about 27 acres, compared to Alternative A. This would provide structure, food and cover for migratory and nesting forest birds. Invertebrates on buds, twigs and bark would provide food for birds, as would soft fruit producing trees (i.e., cherry, hackberry). Research has shown that some birds will switch from primarily insectivorous to frugivorous diets during fall migration (Parrish 1997) to quickly increase body weight and energy for the migration to wintering areas. Many species throughout the fall migration on the lower Delmarva Peninsula are associated with deciduous forest habitats including the American redstart, black-and-white warbler, red-eyed vireo, yellow-billed cuckoo, and eastern wood peewee (Mabey et al., 1993). Migratory bats such as the eastern red bat, silver-haired

bat, and evening bat also use deciduous forests for roosting and would benefit from increased hardwood habitat. Once trees reach maturity, acorns would provide a food resource for deer, squirrels, turkey, and other small mammals.

Planting hardwood forests in MU 6A would increase the size of the existing block of forest north of that unit by 7 percent. This would improve the integrity of forested habitat for area sensitive breeding birds and reduce the amount of edge which favors the brood parasite brown-headed cowbird as well as blue jays and other nest predators (Rosenberg et al., 1999). We would also improve migratory habitat for forest birds with any increase in forested habitat regardless of size (Watts 2000). Through working with the Bridge-Tunnel Authority to plant hardwoods on their property, we would have the same impacts as described above for planting hardwoods on the refuge – it would increase the block of forest on the bayside of the refuge and provide more habitat for species who rely on deciduous forest habitat.
One negative impact of increasing deciduous forest habitat is that deer would feed on hardwood tree seedlings. To mitigate this impact, we would construct exclosure areas around tree seedlings to protect them from deer browsing.

Compared to Alternative A, we would provide more understory and therefore more food and cover resources at Wise Point in the Proposed Action through thinning of loblolly pine. Cut trees would be left on the ground to provide microhabitats for invertebrates and to return nutrients to the soil. Habitats for reptiles such as snakes would improve with more sunlight in the understory. Reducing the amount of contiguous pine habitat could have a negative impact on species nesting and feeding in pines (e.g., pine warbler, owls, ruby-crowned kinglet, brown-headed nuthatch). However, there is an abundance of loblolly pine habitat on the eastern shore of Virginia; thus, populations of these species should not be adversely impacted by our actions. In addition, we would only be thinning a total of a quarter of an acre of habitat, which would not have an impact on these species.

Monitoring for fruit production would help us maximize understory fruit production. Monitoring for deer browse using exclosures would not take away significant forage habitat for deer because we would exclude small areas and it would help us determine if our deer management strategies are working.

Burning loblolly pine stands at Wise Point would result in improved understory habitat conditions similar to the effects of thinning stated above. Direct impacts to wildlife are usually small with relatively few vertebrates being killed directly by the fire;

Reese Lukei with peregrine falcon.
USFWS photo

most impacts are usually indirect from the effects to habitat (Smith 2000). Burning would not be conducted during nesting season or peak fall migration period. Therefore, direct impacts to birds would be minimal as adult birds present during burning should be able to leave the area. Impacts to birds the following nesting season could occur due to temporary habitat degradation. We would mitigate this impact through light burning in patches which would prevent temporary loss of habitat in large areas, and through subsequent habitat improvement. Patchiness of burn combined with high reproductive ability of small mammals would allow populations to rebound quickly.

Burned areas quickly provide good raptor feeding sites as small mammals and insects become more visible (Smith 2000). Other birds are also attracted to insects and seeds which are more visible. Impacts to herpetofauna and insects would be minor during a winter burn. Deer would benefit from the regrowth after burn; therefore, a successful deer management plan should be a prerequisite before conducting a burn.

We would provide more shrub (43 acres) in Alternative B compared to Alternative A by converting several management units currently in grassland to shrub. Managing for invasive species in MUs 5, 6, and 7 would help to improve habitat diversity for breeding shrub-obligate species such as the prairie warbler, gray catbird, brown thrasher, white-eyed vireo, and common yellowthroat. Shrub-dependent migrants passing through the refuge include the American woodcock, yellow-rumped warbler and merlin. Shrub thickets (shrub/sapling mix) are used during breeding and migration and would benefit such species as orchard orioles, red-eyed vireos, American redstarts and hooded warblers. Shrub habitat would benefit mammals such as rabbits, raccoons, opossum, and fox. Open shrub habitats would also benefit bats and swallows by providing open areas in which to hunt insects. One way we would maintain shrub habitat is by burning. This would increase the quality of the shrub habitat. Increased plant species and structural diversity could provide a wider variety of foods and cover for migrating, wintering, and nesting birds.

Hydroaxing pines in MUs 4, 5, 6, 7, and 10 would cause some temporary disruption to birds and mammals. We would use a chainsaw instead of a hydroaxe whenever feasible to mitigate this disruption. Hydroaxing would be conducted outside of the avian nesting season to minimize disruption. We would leave some pines to provide winter and roosting cover for birds and mammals.

Cutting and treating autumn olive with herbicide in MU 6A would have a short-term detrimental effect by decreasing food and cover resources for migratory birds. To mitigate this effect, we would remove the autumn olive gradually and allow succession of native fruiting shrubs (i.e., *Myrica* sp., *Cornus* sp., *Prunus* sp.). Monitoring the effects of deer browse in shrub habitat would have the same effects on wildlife as monitoring in hardwood habitats. Monitoring for fruit production would help provide optimal food resources for birds in upland shrub. Cutting fields in rotational blocks would maintain a diversity of shrub stages ranging from open grassy scattered shrub to shrub thicket. Thus, we would provide habitats for a diversity of early- to mid-successional species. This would allow us to continually maintain fruiting shrub habitat and structure. Migratory birds may not be as selective in terms of varying successional habitat as breeding birds. We would use a bushhog to maintain fields in different stages which may cause disturbance to wildlife. To mitigate this disturbance, we would cut fields outside of nesting and migrating season (winter to early spring). Also, because we would cut in rotational blocks, we would only cut relatively small areas (about 25 acres) annually, also minimizing the disturbance. Developing an agreement with the Bridge-Tunnel Authority to manage pines on their property would have the same benefits of managing pines in the Wise Point area (see above).

Under Alternative B, some management units would be converted from grassland to shrub/scrub habitat. Consequently, there would be 48 fewer acres of grassland habitat compared to Alternative A. The grassland habitat we would lose, however, is not true grassland but rather a mix of grass and scattered shrub. We would not lose any warm season grasslands by conversion, and we would focus on improving the quality of the remaining grasslands on the refuge. Our techniques for managing grasslands (i.e., burning and mowing) would temporarily affect wildlife populations in the specific fields being managed. By improving our grasslands, however, we would benefit grassland obligate birds such as the eastern meadowlark, northern bobwhite quail, northern harrier and grasshopper sparrow during the winter, breeding and migrating seasons. Our grasslands would also benefit small mammals occurring in grassland habitat such as the meadow vole, meadow jumping mouse, marsh rice rat, and least shrew.

Using prescribed fire to manage grassland would likely have the most impact on birds using grassland sites. To mitigate this impact, we would conduct burning outside the nesting season and outside peak grassland bird migration/wintering periods. We predict avian response to fire would vary according to species, but

in general, grassland birds are adapted to habitat changes brought about by fire (Smith 2000).

Potential predator issues on Fisherman Island Refuge are threats of mammalian and avian predation on the colonial nesting bird colonies. Evidence of mammalian predation on Fisherman Island Refuge appears limited and significantly lower than on other barrier islands in Virginia (Truitt 2000). Red fox and coyote are the greatest perceived mammalian threat because these animals could eliminate an entire bird colony in one day, or cause abandonment. Therefore, in addition to monitoring human and mammalian predator disturbance, we would implement a zero tolerance policy for red fox and coyote on Fisherman Island. Either a gun-certified member of the refuge staff would shoot these predators, or we would hire someone from another agency to do so. We may also use padded leg-hold traps for eliminating mammalian predators such as fox and coyote, but also raccoons and opossum. This could result in incidental take of non-target animals. To reduce the impact of incidental takes, we would use live traps instead and euthanize the target mammals after they are caught.

Recent observations by biologists have recommended we take gull control measures on Fisherman Island Refuge. However, we would not undertake gull control measures until there is evidence that tern, pelican or other colonial nesting or beach nesting bird numbers are declining because of predation, competition or displacement by gulls. We would control gull populations through Integrated Pest Management (IPM). This approach assesses and implements the use of nonlethal predator control methods, such as harassment, before implementing lethal methods. Harassing gulls could result in harassment and disturbance to other avian species. If non-lethal methods do not work, we would use lethal methods to limit reproduction either by destroying nests/eggs or addling eggs. Destroying eggs can be ineffective because it causes adult birds to leave the nest and lay another clutch of eggs. Another option is oiling eggs with corn oil, which suffocates the chicks. Egg oiling would require about two or three days of staff time. This can be an effective method because adults cannot see that the eggs are destroyed so they continue to incubate the eggs instead of laying new eggs. It takes a few years to see a decrease in population from destroying or addling eggs.

We may also kill adults either by shooting or by trapping and euthanizing offending individuals. If there are only a small number of gulls preying on beach nesting birds, we may use shotguns or rifles to kill those birds. Also, shooting can cause adverse behavioral responses from other species. To mitigate

noise from the shotgun, we may use a rifle with a silencer. Any taking of migratory birds, including gulls, requires a permit from the Service's Migratory Bird office. It also requires consultation with the State of Virginia and with the U.S. Department of Agriculture, Wildlife Services. Destroying nests, addling eggs, and shooting adults all constitute a taking.

We propose to eliminate the feral cat population on Eastern Shore of Virginia under all alternatives. Feral cats prey on birds and small mammals. If left unchecked, feral cat populations can expand enormously. To protect the native species on the refuge from cat predation, staff would trap live animals and transfer them to a shelter for adoption. Live traps could result in incidental take of other animals, but we would simply release any non-target species.

We would offer more protection for colonial nesting birds and beach nesting birds on Fisherman Island Refuge by restricting public tours to the entrance road and within a quarter of a mile where the road reaches the beach. In both alternatives, we limit public use during the nesting season (March 15-September 30).

In Alternative B, we would conduct regular avian surveys on Fisherman Island Refuge, thus enabling us to take a proactive approach towards protecting plovers and alleviating predation problems. The acceptable threshold of gull (herring, great black-backed) nests on Fisherman Island has not been determined. Thorough observation and monitoring during the nesting season would be necessary to determine what impacts gulls are having on beach nesting bird productivity. That information would also help us develop a predator management plan and a monitoring plan.

Farming.
Lou Hinds

In Alternative B, we would design and construct an environmental education study area with a half-mile trail, a pavilion, and a boardwalk leading to a platform overlooking a pond. We predict impacts from the renovation of the environmental education building would be minimal because we are not constructing a new building. Most of the renovations to the building would be on the inside. The only new construction would be the trail and the pavilion located along the trail. Any construction in this area would cause minimal disturbance because it is already a disturbed area. The site of the proposed trail is also in a disturbed area, except for a portion of the trail that would run through a small amount of forest habitat (50-100 feet). Adding a trail would require mowing a strip of land and possibly laying down gravel in some areas. The pond measures about one acre and is shallow. In dry years, there is no standing water. The pond has occasional water bird use. More birds use the pond to the north, which

Tiger swallowtail.
USFWS photo

would not be disturbed by the new trail. To limit wildlife disturbance, the new trail would only be used for scheduled outdoor educational activities. This would add up to about twice daily during the spring, weekly during the summer and less in the fall and winter. The area would be monitored throughout the year and if necessary trail use would be restricted during certain times to minimize disturbance to wildlife.

Also in Alternative B, we would open a portion of the Wise Point Road to wildlife observation and photography. Allowing public use on this road may cause disturbance to neotropical avian species. Some research suggests human intrusion in wildlife habitats, such as walking on trails, can cause disturbance to wildlife. One example is a study (Gutzwiller et. al., 1997) that showed human intrusion influences avian singing behavior in some species. During breeding season, the seasonal timing of male song affects the timing of territory establishments, male attraction, pair formation, egg laying, and transmission of information about breeding songs to young (Gutzwiller et. al., 1997). Therefore, if human intrusion affects singing, it could ultimately affect reproduction and survival of some species. Another study (Riffell et. al., 1996) suggests that when repeated human intrusion recurs over an extended period of time, impacts on avian reproductive fitness have the potential to accumulate temporally at the individual, population and community levels. However, the Wise Point Road, in some areas, is 50-100 yards from Route 13, and so is already in a disturbed area. Also, the refuge's main role in the life cycle of avian species is not during breeding but rather during migration. To minimize wildlife disturbance during the migration period, we would limit access to the Wise Point Trail by offering only guided tours during the fall migration of neotropical and temperate migrants. This would help minimize disturbance to birds who are feeding and resting during their migration south to wintering habitat. All other times of the year, the trail would be open to visitors during normal refuge hours.

In Alternative B, we would also create a three-mile bike trail along an old railroad right-of-way which we own. The bike trail would measure about eight feet wide; our right-of-way is a total of 66 feet wide. The trail would run north from the refuge, parallel to Route 13, with about 100-150 feet buffering the trail from the road. The east side of the trail would border agricultural land. Given the proximity of the trail to a major highway and to agricultural fields, it is not valuable wildlife habitat. The configuration of the land as a long, thin corridor also makes it less valuable for habitat. Therefore, disturbance to wildlife would be minimal.

In order to manage for fewer deer on Eastern Shore of Virginia Refuge, we propose in Alternative B to work with the State to modify our hunt program in a way that we can further reduce the deer herd. We would also expand the hunt on the refuge to include portions of the newly acquired Wise Point property. There has been a decline over the past eight years in the number of deer taken during hunting on the refuge. In 1993, the first year of the hunt, 62 deer were taken. In 2000, only 18 were taken. It is possible more deer were taken in 1993 because that was the first time the refuge was open to hunting. Furthermore, the location of the refuge promotes easy ingress of deer, causing a continual replacement of harvested animals. Controlled deer hunting helps keep the deer population within the carrying capacity of the habitat.

Shotgun noise from hunting could cause some wildlife disturbance.

Initiating a deer hunt on Fisherman Island Refuge achieves the biological objective of reducing the density of the white-tailed deer population. High densities of white-tailed deer can cause serious habitat degradation by heavy browsing on forest understory and shrubs. This would have a positive impact on avian and mammalian species who depend on forested habitats or other types of vegetation on which deer browse. The hunt program would be conducted in accordance with State hunt regulations. It would be reviewed annually to ensure deer management goals are achieved. Hunt season dates and bag limits would be adjusted as needed to achieve reduction of the resident breeding population of white-tailed deer. Hunters would be allowed to take antlerless deer only, therefore achieving the objectives of reducing the population.

Opening Fisherman Island to an archery management deer hunt could increase the predator population. For instance, if hunters field dressed deer on the island the entrails could attract predators and provide food to improve the health of these predators so that they could better survive the winter months. This is considered a potentially serious problem, as most other barrier islands along the Virginia coastline are plagued with avian predator issues. Because of this potential problem, no field dressing would be allowed on Fisherman Island Refuge.

In Alternative B, we would open a portion of the Wise Point property to waterfowl hunting. We do not anticipate much of an impact on waterfowl populations in this area for several reasons. For one, not many waterfowl use the inland marsh of the Wise Point area (Costanzo 2001). Also, most of the marsh area on the

eastern shore of Virginia is owned by the State and is already open to migratory bird hunting. Although we may see an initial rush of hunters who are curious about the area, interest in hunting on the property would probably wane after the first couple years. Furthermore, the property would only accommodate five to 10 hunters. Our waterfowl hunt season dates and bag limits would fall within the parameters of the State's waterfowl season. The hunt would be administered to limit disturbance to other wildlife and to limit conflicts with other recreational users, such as kayakers. Shotgun noise from game and waterfowl hunting would cause some wildlife disturbance.

Alternative B proposes to improve the boat ramp area for commercial and recreational watermen. Once improvements are complete and the area is reopened to recreational boaters there would be increased ramp usage and increased boat traffic in the surrounding waters. This increase will cause wildlife disturbance and will have an impact on water quality (both from turbidity and increased oil and gas). The Wise Point ramp would also give boaters easy access to a number of sensitive barrier islands and saltwater marshes. The barrier islands have large numbers of beach nesting (e.g., American oystercatcher) and colonial nesting (e.g., royal tern) birds that would be adversely impacted by noise, human presence, pets and litter). The concern is that nesting pairs and whole colonies could be lost if human disturbance is not controlled. Additionally, there is a concern that gulls (nesting and otherwise) could increase in number with increased human presence because of litter (food, old bait and fish remains after cleaning) which could cause increased predation on the colonial and beach nesting birds and eggs. It is during the warm nesting season that the largest number of boaters are likely to be using the ramp and have an interest in accessing nearby beaches for strolling, shell collecting, picnics and rest breaks.

Marsh birds (e.g., black ducks, tri-colored herons, snowy egrets) would also be adversely impacted by boaters navigating the marshes. These impacts would include human presence, engine noise and boat wakes.

Improvements to the boat ramp would cause some onetime disturbances to biological resources. Dredging and pier/mooring post removal may bring some previously submerged contaminants (e.g., oil, DDT) to the surface.

Finally, the Eastern Shore of Virginia Refuge would experience an increase in traffic within its boundaries which would cause wildlife disturbance and may also increase litter and vandalism.

In Alternative B, we would acquire 6,030 acres, compared to 310 in Alternative A. Included in that 6,030 acres would be agricultural land that we would convert to hardwood forest and shrub habitat. This habitat would provide benefits for forest- and shrub-dependent species. Removing farmland from production would also reduce pesticide and herbicide use, possibly providing additional benefits to wildlife.

We would provide between three and six new trails if we acquired all identified 6,030 acres within the lower 10 kilometers of the Delmarva Peninsula. There would be at least one but no more than two trails in each of the three parts of the acquisition area: the bayside coastline, the southern tip, and the seaside. At least one trail on the bayside would have beach access, provided such access would not harm or harass Northeastern beach tiger beetles. Trails on the southern tip and on the seaside would be located wherever they would pose the least amount of disturbance to migratory species. The creation of trails could cause some disturbance to wildlife. To minimize this disturbance, we would attempt to construct trails outside of the spring and fall migration seasons.

We would allow deer and small game hunting on lands to be acquired provided there would be minimal disturbance to neotropical migratory bird species. Deer and small game hunting would fall within the parameters of the State hunting seasons. Allowing deer hunting on lands proposed for acquisition would improve the health of the deer population because it would help prevent overpopulation. We would also allow waterfowl hunting on marsh blocks we acquire that are 200 acres or larger. We would administer the hunt so as to minimize disturbance to fall migrating birds. Hunt seasons and bag limits would fall within State parameters.

Harrier in hand.
USFWS photo

Remediating heavy metals and pesticides, and controlling leachate from the firearms range would enhance the quality of the environment for all species, as would being prepared for a hazardous material spill in the Chesapeake Bay or on Route 13, adjacent to refuge property.

In Alternative B, we would consider relocating the switching station, which is currently situated next to the communications tower. This would make more habitat available for wildlife, and would eliminate disturbance from security lights. Continued operation at the site would require shielding of security lights. Even relocating the switching station to the perimeter of the refuge would assist in the operation of the site and enhance the security of refuge headquarters.

Alternative C

The impact of hardwood management is the same as in Alternative B except acreage is 17 acres less than in Alternative B. Thus, benefits to wildlife described in Alternative B from hardwood habitat, such as food for birds and small mammals, would decrease.

In Alternative C, we would provide 90 acres less of shrub habitat as compared to Alternative B. Benefits described for shrub habitat in Alternative B, such as food and cover habitat for shrub-obligate birds and mammals, would decrease. As in Alternative B, we would eradicate and control invasive species in shrub.

We would cut more loblolly pine on Wise Point than we would in Alternative B. The positive impacts to wildlife would be the same as in Alternative B, but the negative impacts to species using pine habitats would increase under this Alternative. However, the relatively small amounts of pine that would be cut compared to the abundance of loblolly pine occurring on the eastern shore would likely mitigate these negative impacts, as long as the habitat conditions are similar. As in Alternative B, we would monitor and react to any phragmites that may result from clearcutting. We would also leave existing snags to benefit invertebrates and to aid in returning nutrients to the soil.

Royal tern colony.
USFWS photo

We would remove scattered loblolly pines from shrub/scrub habitat. This action would have the same impacts to wildlife as in Alternative B, but less acreage would be impacted since fewer management units would be maintained as shrub/scrub (only 6A and 10 in Alt C).

In Alternative C, we would manage for more grassland habitat (207 acres) than in the other alternatives (125 acres in Alternative A and 77 acres in Alternative B). We would remove shrubs and saplings in MUs 5-7 and plant native warm season grasses. Therefore, under this Alternative, we would be able to provide more habitat for nesting grassland dependent birds which require large grassland areas. However, we would also lose important shrub/forest migrant habitat, which would decrease benefits for birds that depend on those habitat types.

Maintaining grasslands through mowing, discing, and burning would have the same impacts to wildlife as Alternative B. However, management activities would only occur in areas with a minimum size of 14 acres. We would leave an area of this size untreated every season so that there would be grasslands available to grassland obligates during migration. We would

remove loblolly pines and some of the shrubs along Route 600 to make grasslands appear contiguous and reduce fragmentation (Sample and Mossman, 1997). This technique would attract grassland temperate birds. We would leave small clumps of existing shrubs which would not reduce grassland habitat quality. These shrub clumps would provide escape cover from predators for some birds and small mammals.

We would not manage understory habitat in Alternative C. Due to less deer management and no thinning, migratory birds dependent on understory impact would be negatively impacted. Areas that would have been thinned in Alternative B would be clearcut in Alternative C.

By opening the southern tip beach to surf fishing, we could negatively impact the tiger beetle. However, we would only open the beach if adult and larval tiger beetle surveys show a stable and healthy population. Furthermore, observations by a species specialist have shown that tiger beetles can withstand a moderate amount of human intrusion, as previously discussed (Knisley 2001).

In Alternative C, we would maintain the same deer hunt program on Eastern Shore of Virginia Refuge as in Alternative B. We would not open Fisherman Island to deer hunting because it is a potential public safety hazard. Route 13 is a busy, four-lane highway and hunters would have to pull on and off that road to access the hunting area. Also, there is little parking for hunters, and refuge staff may have to shuttle hunters to and from the island. This would take an inordinate amount of staff time.

Also in Alternative C, we would not open Wise Point to waterfowl hunting, thus offering less disturbance to wildlife that use the Wise Point marsh area.

Opening up the Wise Point Road and building a trail extension to the beach could have a significant impact on wildlife. The negative effects of human intrusion mentioned in Alternative B would be more pronounced in Alternative C because we would be cutting through undisturbed habitat. The Wise Point road already has a hard surface and is in close proximity to Route 13, so there is already a certain level of disturbance there. But the new trail that would cut to the southeast would run through one of the largest blocks of forested habitat on the refuge. This could result in displacement of bird species and interruptions in feeding and resting. To mitigate this impact, we would limit use of this trail during the migration period.

Our land acquisition proposal in Alternative C would add 6,030 acres more of habitat to the approved acquisition boundary compared to Alternative A, which would add 310 acres. Within that 6,030 acres, about 3,315 acres of agricultural land would be converted to grassland habitat.

As in Alternative B, we would provide between three and six new trails if we acquired all 6,030 acres within the lower 10 km of the Delmarva Peninsula. Trails on the southern tip and on the seaside coastline would be located wherever they would pose the least amount of disturbance to grassland temperate migrants. As in Alternative B, we would allow deer, small game and waterfowl hunting. All the same impacts from Alternative B would apply in Alternative C as well.

Remediating heavy metals and pesticides, and controlling leachate from the firearms range would enhance the quality of the environment for all species, as would being prepared for a hazardous material spill in the Chesapeake Bay or on Route 13.

As in Alternative A, we would only remove the communications tower, and not the switching station.

Alternative D

In this alternative, we would work with State partners to modify the refuge's hunt program to maintain a low deer population. As the management units and areas currently maintained as shrub are allowed to succeed into mature forest, the browse available for deer would increase. The deer population will spike upwards due to ingress, better nutrition and higher natality. This suggests that even with maximum pressure we would be unable to eliminate damage to understory and other habitats by deer. Working with the State we would attempt to increase the overall harvest as well as the percentage of does taken. If monitoring suggests continued understory damage in spite of an increased harvest, we may work with the State to implement controlled removal of deer as nuisance animals using refuge staff or contract hunters. The consequences to wildlife under Alternative D are identical to those for Alternative A except that the greater acreage of woodlands (300-400 acres) under the present alternative magnifies the benefits to forest-dependent species, as it magnifies the negative affects on shrub and grassland-dependent species. Since there would be significantly reduced grassland and shrub acreages under Alternative D, many of the benefits to wildlife cited under Alternative C would be reduced or lost.

Regarding other impacts to the fauna of the coastal and dune communities under Goal 2, everything is essentially the same as in Alternatives B and C. We would continue to maintain the same restrictions on access, protect colonial nesting and beach nesting birds from disturbance on Fisherman Island through closures and other types of controlled access, and through public education.

Removal of structures like the old water tower and air control tower would eliminate potential shelters for predators.

Boat mooring spaces for commercial watermen would be the same as in Alternative C, thus the impacts would be the same.

There would be less wildlife disturbance from public use activities in Alternative D than in Alternatives B and C, and the same amount of disturbance as there is in Alternative A. We do not propose any new public uses on existing refuge lands for Alternative D than we have for Alternative A.

We predict there would be less disturbance to wildlife in Alternative D from the boat ramp because the ramp would not get as much use, since the parking lot and ramp would be smaller.

The same stipulations to fishing and hunting on lands to be acquired apply in Alternative D as they do in Alternatives B and C.

Summary

As stated in the previous summary of plants, Alternative B would best achieve Goal 1 by providing forest and shrub habitat to neotropical and temperate migrants. This type of habitat would most benefit the largest number of migratory avian species. Alternative C, which focuses mostly on grassland habitat, would only benefit temperate migrants that depend on that type of habitat, and Alternative D, which focuses mostly on hardwood forest habitat, would negatively impact neotropical migrants that depend on early successional habitat. Therefore, Alternative B would have the most positive impact on the largest variety of avian species. Alternative B would also improve the quality of the existing grassland habitat on the refuge for breeding grassland-obligate birds.

As stated in the Threatened and Endangered Species section, Alternatives B, C and D would provide the most protection to piping plovers because those alternatives propose to increase monitoring efforts. Those alternatives also provide the most

protection for other beach nesting birds (i.e., American oystercatcher) as well as colonial nesting birds (i.e., terns), because the refuge would conduct surveys of all target species and would monitor for predators. Alternative C would provide the least protection to the Northeastern beach tiger beetle because we would open the southern tip beach to public use.

Alternative C would most threaten forage and cover habitat on the refuge for neotropical migrants because it proposes to extend the Wise Point Trail to the beach by the Bridge-Tunnel. This trail extension would cut through important habitat.

All alternatives would benefit neotropical migratory birds by proposing to remove the communications tower. This would eliminate the possibility of bird strikes from the tower. Alternatives B and D also propose to remove the switching station next to the communications tower. This would provide a minor additional benefit to wildlife by making more habitat available and eliminating security lights.

Alternative B would best achieve Goal 3, and the purposes of the refuge, because it proposes to acquire 6,030 acres. Alternative C would add the same amount of acreage to the proposed acquisition boundary, but much of the agricultural land acquired in Alternative C would be converted to grassland habitat. As stated above, grassland habitat only benefits a small percentage of the migratory birds that use the Delmarva Peninsula. In contrast, we would convert agricultural land to forest and shrub habitat in Alternative B, providing benefit to most all neotropical migrants and even to some temperate migrants that do not use grassland habitat.

Alternative B proposes to open Fisherman Island Refuge to an archery deer management hunt, which would help reduce deer browse on Fisherman Island, therefore providing more food and cover habitat for wildlife, including birds and small mammals.

Socio-Economic Factors

Alternative A

The refuge most benefits the local economy by preserving land as wildlife habitat, or potential wildlife habitat. This habitat can also be considered open space. A study conducted by American Farmland Trust for Northampton County (Adams et. al., 1999) proved the economic benefits of preserving land as open space versus developing it for residential or commercial use. The study shows that for every dollar of revenue generated by residential development for Northampton County, $1.13 worth of public services are required from the County. These public services include schools, utilities, and emergency services. For every dollar of revenue generated by commercial and industrial development for the County, 97 cents worth of public services are required from the County. The least expensive type of land use is farms and open lands, which only required 23 cents worth of public services for every dollar of revenue it generates for the County. In other words, farms and open lands requires less than one quarter of the money that it generated, creating a surplus of revenues for the County. The findings of this study help County residents understand the demands for services in relation to tax revenue generated.

The refuge also directly contributes to the local economy through the refuge Revenue Sharing Program. Through this program, the federal government makes annual payments to localities based on lands it owns in those localities. Those payments are similar to payments made by other agencies in lieu of property taxes. For 745 acres that make up the Eastern Shore of Virginia Refuge and 1,950 acres that make up Fisherman Island Refuge, the Service paid almost $22,000 to Northampton County in 1999. In Alternative A, we would acquire 310 more acres which lie within the current acquisition boundary. Average payments over the last three years to Northampton County for lands on the peninsula are $16.28 per acres. Based on that figure, we would pay the County an additional $5,047 annually in Refuge Revenue Sharing money if we acquired the 310 acres within our boundary.

Our land acquisition program, which preserves wildlife habitat on the eastern shore of Virginia, also contributes to preserving the rural lifestyle. By recently acquiring the Wise Point Corporation land, we would help to preserve the commercial and recreational fishing culture that has existed at the Wise Point boat ramp for decades.

The Visitor Center also provides a great benefit to the local economy. Because of its location at the southern tip of the peninsula, it serves as an information center and a gateway for visitors traveling from the south. We have on display at the Visitor Center a map with the major points of interest in Northampton and Accomack counties, which make up the eastern shore of Virginia. The Visitor Center also offers a wide variety of brochures on local points of interest.

Wildlife-dependent recreational activities at the refuges spin off economic benefits that have not been specifically quantified. The fall migration of neotropical birds on the lower peninsula is the subject of an ongoing annual birding festival that generates income for numerous hotels, restaurants and other tourist facilities. The Service, in its publication "Banking on Nature" (USFWS 1997b) estimated that, on average, "non-consumptive" recreational visitors to National Wildlife Refuges in the northeast spent $20 per person per day in neighboring communities. Using these numbers, the 35,000 people visiting the Visitor Center annually spend $700,000 a year in neighboring communities. That figure does not necessarily include the 115,000 visitors who use the Refuge trails and the Wise Point Corporation boat ramp.

Refuge employee Jerry Loomis helps build a birdhouse at the Birding Festival.
Charles Philip

The refuge also contributes to the local economy by helping to promote wildlife-dependent recreational opportunities off-refuge, such as local hunting and fishing events. We also participate in many activities that contribute to the protection of sensitive habitats and generally help influence continued conservation on the eastern shore. These activities include participating in organizations such as the Southern Tip Partners and the Coastal Virginia Wildlife Observatory.

We provide many social benefits that cannot be measured by economics. By educating approximately 25,000 visitors annually, we increase the visibility of the National Wildlife Refuge System. Education also raises awareness of the need for wildlife conservation and stewardship in local communities.

Refuge funding goes directly towards covering bus and driver expenses so all the elementary students in Northampton County can visit the refuge and participate in educational programs. Additional money is spent in the local community by interns and Workampers who stay on the refuge for two to six months at a time. These long-term visitors - between seven and 11 per year - shop in local grocery stores and frequent other local stores. When friends and family visit, they frequent local restaurants and shops.

Aerial view of Virginia coast.
USFWS photo

When the boat ramp was under Wise Point Corporation ownership, the refuge issued Special Use permits (SUP) to commercial watermen who wanted access to the Wise Point boat ramp outside refuge hours. The SUP cost $35.00 annually. For commercial watermen, an SUP would support up to three transferrable subpermits. The Wise Point Corporation charged commercial watermen $1,200 annually to use the boat ramp; recreational users were charged $100 annually.

Under Alternative A, the refuge would manage the boat ramp similar to the Wise Point Corporation. Compared to the other alternatives, commercial users who dock their boats would pay $300 less under this Alternative, but commercial users who do not use the docks would pay $600 more. Recreational users would pay about $20 less annually under this Alternative. Commercial users who wanted 24-hour access would apply for an SUP.

Minimal improvements would be made to the boat ramp, the commercial docks and Ramp Lane. Decrepit docks and a dangerous boat ramp could result in personal injury, leaving the Service open to a liability lawsuit. The narrow, winding Ramp Lane leading to the boat ramp is barely wide enough for two vehicles to pass each other, and accidents are likely to occur. Parking would occur on a first-come, first-serve basis.

Closing Fisherman Island Refuge to public use from March 15 to September 30 has a negligible effect on the local economy of Northampton County. Most of the visitors who participate in guided tours of Fisherman Island Refuge do not stay overnight at local hotels. Visitors may eat at local restaurants before or after visiting the refuge, so restaurants could stand to gain more profit if tours of Fisherman Island Refuge were held all year round.

By managing the scheduling and maintenance of the County-owned range, we save the County staff time and money. Refuge staff spends about 30 hours annually maintaining the firearms range. We estimate the cost of labor and materials for maintaining the range at approximately $900 annually. The total staff time needed for coordinating use of the range adds up to about 30 hours annually, costing about $600 annually. Despite these costs, it is our preference to manage the range so we can assure that the scheduling of use does not conflict with educational programs at the refuge. In Alternative A, we continue to work with Northampton County and with other partners to relocate the firearms range to a more appropriate location. In the meantime, we continue to maintain and manage the firearms range.

There are both positive and negative social impacts anticipated for the removal of the communications tower on the Eastern Shore of Virginia Refuge, a strategy common to all alternatives. Refuge visitors interested in wildlife observation and photography will appreciate the more picturesque views and photo opportunities without the large communication tower distraction. Also, environmental education program participants using the nearby building will enjoy a more pristine, wildlife-oriented experience.

A negative impact from the tower removal is that the tower would no longer serve as a navigational beacon for small watercraft in and around the southern tip waters. However, there are two newly-constructed towers nearby, one approximate 1.5 miles north of the refuge and the other approximately four miles north of the refuge.

Positive impact to refuge facilities such as the maintenance shops and storage buildings are that they will no longer be damaged by paint spill incurred during periodic repainting of the tower. Additionally, the buildings will no longer be in the fall zone.

It is anticipated that there will be little negative economic impact to the lessee, Verizon Virginia, Inc., due to ample prior notice given to the company that the lease will not be renewed at the end of the contract in 2007. Two newly-constructed communication towers within five miles of the refuge provide opportunities for co-location of the communication equipment. Although there will be a cost to relocate, this is seen as a one-time cost.

Alternative B

In Alternative B, the Proposed Action, we would protect more land than in Alternative A. According to AFT's Cost of Community Services study, this would provide greater benefit to Northampton County by preserving more land as wildlife habitat or open space. If the land is not permanently protected, it would most likely be converted to residential or commercial use, and would cost the County more in services fees.

In the Proposed Action, we would protect an additional 6,030 acres, within the southern 10 kilometers of the Delmarva Peninsula. Fee acquisition would be the most appropriate method for acquiring these lands since it offers greater management flexibility and greater potential for habitat restoration, public use, and educational programs. Based on the 1999 Refuge Revenue Sharing Appraisal and recent sales information, we estimate the cost would be $21 million for fee acquisition of the entire 6,030 acres, with annual Refuge Revenue Sharing payments to

Northampton County at $155,320. We would not, however, acquire all of the acreage within the proposed 6,030-acre expansion area because some landowners may not be interested in selling, funds will not always be available when lands are for sale, and some lands will be developed over time.

We would also protect some of these lands through conservation easements and cooperative agreements. Conservation easements can cost at least three-quarters of the full land value. We would consider easements where they meet Service objectives and can be structured to achieve the habitat management objectives in the plan. The Service does not pay Refuge Revenue Sharing for easements.

The 6,030 acres consists of 3,315 acres of agricultural land, 1,810 acres of forested land, 725 acres of tidal marsh and 120 acres of open water. The agricultural land is split among at least 25 large farms which range in size from 50-200 acres. Figures from 1997 show there are about 150 farms total in Northampton County (The Louis Berger Group 2000). In the last 20 years, the number of farms in both Accomack and Northampton counties has declined more sharply than the acreage in farming, indicating a consolidation of farms and a trend toward larger farms. In 1978, there were 236 farms in Northampton County.

Between 1982 and 1987, there was a significant drop in acreage dedicated to agricultural in both Accomack and Northampton counties (The Louis Berger Group 2000). In Northampton, the acreage went from 62,000 in 1982 to 50,500 in 1987. In both counties, however, acreage in farming has been steadily increasing since 1987. As of 1997, there were 56,435 acres in agricultural use in Northampton County. In 1997, both counties accounted for 6 percent of the State's total farm earnings. That figure increased to 8 percent in 1998 (The Louis Berger Group 2000).

Purchasing farmland would have some adverse economic impacts on Northampton County. As of 1999, 407 out of 6,559 jobs in Northampton County were classified as farm employment (Bureau of Economic Analysis 2001). In other words, farm employment made up 6.2 percent of the jobs in Northampton County. However, figures show the number of farm employees fell significantly from 1970 to 1990 (The Louis Berger Group 2000). In Northampton County, employment declined 67 percent. Farm employment remained steady throughout the 1990s.

Nonfarm earnings are significantly greater than earnings generated from farms in both Accomack and Northampton counties as well as for the State of Virginia as a whole.

Maintenance worker Bob Carpenter checks a wood duck box.
USFWS photo

By taking farmland out of production, we not only cut down on the jobs and earnings in the agricultural industries, but also in industries associate with agriculture such as feed stores and suppliers of petroleum, fertilizer, lime, and other agriculture-related chemicals.

The above figures, however, show a trend in the reduction of small farms on the Eastern Shore of Virginia. With a commuter fee being implemented on the Bridge-Tunnel, the rate of farmland disappearance from Northampton County could rapidly increase. If we would not buy the lands proposed for acquisition in Alternative B, some of those same lands would be bought by developers and converted to residential or commercial use. There are important advantages to the Service owning this land. We have an interest in maintaining the rural character of Northampton County by maintaining this land as wildlife habitat instead of developing it. Also, under our ownership, the land would be under a public, not a private proprietor. This means we would provide wildlife-dependent recreational opportunities on these lands, when it would not conflict with our "wildlife first" mandate. If these lands were to fall into private ownership, access to the public would most likely be denied.

Since the Service buys land only from willing sellers, the impact from buying farmland would be spread out over time. This would give Northampton County time to further diversify its economy so people who were employed by farms could find other work.

Less farmland in Northampton County would also mean less fertilizer and chemical application for crops. This could help improve water quality in Northampton County, and could cut down on risks of exposure to chemicals for residents who live on or near farmland.

Some of the habitat management work in Alternative B would require more manual labor than refuge staff can handle. For example, to create shrub/scrub habitat, we would clear loblolly pines from about 10 acres on the refuge. This is a large project that will likely have to be contracted. Contracting out some habitat management work would provide an economic benefit to the local community.

Creating an "Adopt a Garden" program would help promote community stewardship by encouraging volunteers to

Children with ghost crab.
USFWS photo

demonstrate the importance of native nectar producing plants. Local people who volunteer for this program would take ownership of this type of work and encourage their neighbors to do the same. Working with local businesses and partners to promote native nectar producing plants would help promote their business and would foster an appreciation for the importance of native nectar producing plants.

In Alternative B, we would provide more opportunities for public use than in Alternative A, thus providing greater economic spin-off in the community. We would expand hunting, open the Wise Point Trail, create a bike path along Route 13, increase the amount of interpretive and educational programs, and design and construct an environmental education area. Adding more opportunities for wildlife-dependent recreational use would bring more people to the refuge, though it is difficult to quantify how many more people. As noted in Chapter 3 (Affected Environment), the eastern shore of Virginia is not a destination for visitors, but rather a stop north along the way to the Delmarva Peninsula or south to mainland Virginia. However, we would attract more out-of-town visitors by aggressively disseminating information about increased opportunities for wildlife dependent recreational uses on the refuge. We would attempt to increase visitation by revising our refuge brochure and Web site. These promotional items, as well as word-of-mouth, would entice more people to stop at Eastern Shore of Virginia Refuge and therefore to spend more money at local businesses. Also, the increase in wildlife-dependent recreational opportunities would offer a better quality of life for local residents.

Many of the public use projects in Alternative B would generate money for local engineering and construction companies. The largest project would be the improvements to the Wise Point boat ramp. These and some other projects are too big for refuge staff to take on, and they would have to be contracted out to local businesses. We would also help to generate money for the local economy by working with partners to develop local tourism "packages" that highlight the natural resources of the local area.

Increased visitor use would also provide many social benefits, more than in Alternative A. By increasing the amount of educational and interpretive programming we offer at the refuge, we would have the opportunity to reach more adults and school children with our message about the importance of wildlife conservation and stewardship. We would raise the level of awareness about the refuge not only in the local community, but also with our Congressional constituents. Also in Alternative B, we would reach out to a more diverse group of visitors by offering

an annual Spanish-taught environmental program and an Elderhostel program. Efforts to encourage responsible nature-based tourism would draw more people to the area and would encourage a conservation ethic. It would also help provide job opportunities while conserving a good quality of life (i.e. healthy wildlife populations, clean air and water, less traffic and stress, more open space, and lack of suburban sprawl).

The recent purchase of the Wise Point Corporation property added to the refuge's public facilities an additional .19 miles of gravel road, approximately 36,000 square feet of parking area, and a boat ramp. In Alternative B we would keep the Wise Point boat ramp open to commercial and recreational fishermen. This would provide large social and economic benefit to commercial and recreational fishermen. Some commercial watermen depend on the boat ramp for their livelihood. Many of them have thousands of dollars invested in clam beds that are conveniently accessible by the Wise Point boat ramp, the only public boat ramp on the southern tip of the Delmarva Peninsula that provides deep water access to the Atlantic Ocean. We would upgrade and improve the parking lot, boat ramp, and entrance road, making the area more safe and user friendly. We would remove unsafe docks currently used by commercial watermen and replace them with a safer dock.

The boat ramp is likely to get more use now that it is under public ownership. Reserving 12 parking spaces for permitted commercial watermen would ensure this group of users would have access to the boat ramp, even during busy seasons. We would phase out overnight docking privileges as current, permitted commercial users retire or terminate commercial fishing from the site. This may cause some economic and logistical hardships to commercial users who use large, untrailerable fishing boats to conduct their business. However, now that the ramp is under public ownership, it is unfair to offer docking to some users and not others. Since we cannot offer docking to all users, we must phase it out.

Commercial users who paid a commercial rate under Wise Point ownership would be allowed to pass on 24-hour access and reserved parking privileges to one named heir, thus helping to ease the hardship of phasing out these privileges. New commercial watermen would not have these privileges. Without 24-hour access, commercial users would be limited in when they can harvest fish, thus causing possible economic hardships on their business. Without reserved parking, commercial users may be bumped by recreational users during busy fishing seasons, such as the summer.

We would also minimize the impact of boat ramp improvement on commercial watermen by allowing the watermen to use the ramp as much as possible during construction.

All commercial watermen paid the Wise Point Corporation $1,200 to use at the boat ramp. We estimate we would charge $1,500 for an annual permit for commercial watermen who dock their boats at Wise Point, and $600 for those who do not dock their boats. New commercial users would be charged $400 annually, however they would not receive special privileges (i.e., 24-hour access, docking, reserved parking). This would save most commercial users $600-$800 annually, compared to Alternative A. These charges would be implemented when improvements to the boat ramp are completed. We would charge $120 annually for recreational annual passes and $10 for a recreational day use pass. Under this scenario, recreational users would pay $20 more annually than under Alternative A. Keeping the boat ramp open for recreational fishermen would facilitate a popular pastime on the eastern shore of Virginia – fishing. Fishing is part of the culture on the eastern shore, whether people do it for their livelihood or for fun.

Increased recreational boating use would bring additional monies to the County through purchase of fuel, lodging, meals, etc.

Currently, the refuge only recuperates about 40 percent of the costs of conducting a deer hunt on the Eastern Shore of Virginia Refuge. Under Alternative B, we would double the cost of a hunt permit fee, raising the fee from $15 to $30. This would further help us defray the cost of the current and proposed public hunting opportunities on both refuges.

We would also provide opportunities for waterfowl hunting on a portion of the newly-acquired Wise Point property. We would open lands to be acquired to big game and small game hunting where those activities would not harm or harass migratory birds. All these activities help preserve the cultural heritage of the eastern shore of Virginia, where people have hunted and fished for generations.

The Service would work with the U.S. EPA (EPA), the U.S. Army Corps of Engineers (Corps) and the Commonwealth of Virginia, Department of Environmental Quality (DEQ) regarding contaminants on the refuge, which has been designated a Formerly Used Defense Site (FUDS). FUDS is an EPA designation for former defense sites. A site's priority rank on the FUDS list determines whether funds are available for investigation, evaluation and remediation of contaminants, if

needed. The Commonwealth of Virginia has recently increased staffing for the Virginia DEQ FUDS program and, therefore, may be able to fund and conduct additional sampling on areas of concern identified in the EPA's 1998 Modified Site Investigation Narrative Report.

In October 2000, the EPA declared all of Northampton County and Cape Charles a Brownfields Area. This designation also leverages funds for environmental remediation and redevelopment, as appropriate.

We would not renew the lease for the communications tower. We do not anticipate much economic impact to Verizon Virginia, Inc., who would be responsible for dismantling these structures.

Alternative C

In Alternative C, we would expand the acquisition boundary to protect 6,030 more acres of land than in Alternative A. Therefore, Alternative C would positively benefit the local economy more than Alternative A, as the County would save money according to the Cost of Community Services study. Also, Northampton County would receive more money in Refuge Revenue Sharing payments.

As in Alternative B, we would contract out some of the habitat management work, such as removing hedgerows, shrubs and saplings. Contracting out some of this work would provide an economic benefit to the local economy.

As in Alternative B, we would raise the level of awareness of the refuge and its importance to wildlife and their habitats by engaging in more outreach activities with local businesses, the public and Congressional representatives.

In Alternative C we would not open Wise Point to waterfowl hunting and we would not open Fisherman Island to deer hunting. This may result in less economic spin-off benefits than Alternative B. We would open all land to be acquired to waterfowl hunting and big and small game hunting according to the stipulations laid out in Alternative B. In Alternative C, we would provide the same types of educational and interpretive programs as we provide in Alternatives B.

Larger public use projects, such as upgrading the boat ramp, would generate money for local or regional engineering and construction companies. Increased visitor services would provide

the same social benefits as described in Alternative B. As in Alternatives A and B, we would offer only guided tours of Fisherman Island Refuge outside the nesting season.

As in Alternative B, we would keep the boat ramp open to recreational and commercial users in Alternative C. However, we would scale down the improvements to allow for a two-lane boat ramp. We would provide 35 parking spaces, as opposed to 50 in Alternative B, and designate only seven for commercial watermen. While commercial watermen would still be able to use the parking spaces for the general public, they may be excluded if those spaces become occupied. The boat ramp would get less use if the parking lot is smaller.

We would implement the same strategies for contaminants in Alternative C as we would in Alternative B. Therefore, the impacts for these strategies would be the same as in Alternative B.

Alternative D

There are no definitive acreage numbers for land acquisition in Alternative D, so it is difficult to say what the impacts to the local economy would be. Any agricultural land we would acquire would be converted to one of the four target habitat types (deciduous-coniferous, maritime pine savanna, coastal shrub and beach dune habitats). Therefore, the same impacts of taking agricultural land out of production that apply in Alternatives B and C would apply in Alternative D.

As in Alternatives B and C, we would contract out much of the habitat management work, which would give business to local proprietors.

We would provide about the same level of wildlife-dependent recreational opportunities in Alternative D as we provide in Alternative A. We would not open the Wise Point Road to a walking trail, we would not build an environmental education study area, and we would not expand hunting opportunities. We would, however, open all land to be acquired to waterfowl hunting and big and small game hunting according to the stipulations laid out in Alternative B. In Alternative D, we would provide the same types of educational and interpretive programs as we provide in Alternatives B and C. We also engage in the same types of outreach activities to raise the level of awareness of the refuge within the local community.

As in Alternatives B and C, we would keep the boat ramp open. However, we would scale down the improvements even further from Alternative C by constructing a 25-space parking lot. We

would reserve five parking spaces for commercial fisherman. We would remove the old docks and replace them with mooring space for up to seven commercial watermen. These scaled-down improvements would cause more hardship on commercial watermen, and would provide less opportunity for fishing.

We would implement the same strategies for contaminants in Alternative D as we would in Alternative B, so the same impacts apply. We would remove several structures and other unnatural features from the refuge in Alternative D.

Kemps ridley release.
Matthew Akel

Summary

Alternatives B and C would most benefit the local economy of Northampton County according to the Cost of Community Services study and the Refuge Revenue Sharing program because under those Alternatives, we propose to acquire 6,030 acres. However, since Alternatives B and C would also take more farmland out of production than Alternative A, they would have a larger negative impact on agriculture and agricultural-related earnings.

Alternative B would provide the most economic spin-off benefits to the local community because it proposes the most wildlife-dependent recreational opportunities. Therefore, Alternative B also best achieves Goals 4 and 5 .

Alternatives B, C and D all achieve the Vision Statement because they encourage partnering with the local community to promote the area as a regional tourist destination that contributes to the local economy and the quality of life on the eastern shore of Virginia.

Public Use

Refuge Visits

Alternative A

As stated in Chapter 3, in the Socio-Economic Environment section, visitation at the Eastern Shore of Virginia Refuge has increased dramatically since 1996.

Because Eastern Shore of Virginia and Fisherman Island Refuges are not destination points for most people, visitation numbers largely depend on factors outside our control. One major factor that will influence the number of visitors we receive will be the Chesapeake Bay Bridge-Tunnel toll. Originally, two-axle, four-tire vehicles paid $10 to cross the bridge one way. This $20 round trip toll staved off development on the eastern shore, since it was cost-prohibitive for people to commute from their jobs on the other side of the bridge. However, a new 24-hour round trip toll implemented on March 1, 2002, allows two-axle, four-tire vehicles to pay $10 for the original crossing and $4 for any return crossing within 24 hours. This reduces the round-trip toll to $14. A reduced toll may encourage more people to travel to the eastern shore and visit the refuge. The biggest impact, however, will be from people who decide to build and buy homes on the eastern shore of Virginia because commuting across the bridge every day for work will not be as large of a financial strain. These people will regularly visit the refuge to walk the trails or birdwatch. Other outside factors that influence visitation numbers are additional tourism opportunities on the eastern shores of Virginia and Maryland. If additional opportunities arise, more people would visit to the eastern shores of Virginia and Maryland, probably visiting the refuge along their way.

Alternative B

Alternative B provides more recreational opportunities than Alternative A. This may increase visitation as visitors who discover the refuge the first time and do not have time to walk the Wise Point Trail, for example, may make a point of returning. Also, we propose in Alternative B to construct a three-mile gravel, interpretive bicycle trail along Route 13. The new trail could greatly increase refuge foot traffic.

With the new environmental education study area and programs, more children would be exposed to the refuge, and may return with their families. We would also implement more outreach

activities compared to Alternative A, which would raise awareness of the refuge for the local community and for visitors, another effort that may increase visitation.

Alternative C

Alternative C proposes a similar amount of increased public use and outreach activities as Alternative B, so any increases in visitation would be about the same.

Alternative D

Alternative D proposes about the same amount of public use as Alternative A, so the impacts would be equal.

Summary

Visitation at Eastern Shore of Virginia and Fisherman Island Refuges is affected by several factors, most of which are beyond our control, such as the lowered Bridge-Tunnel toll, and the establishment of other tourism destinations. Visitation may increase, however, if we offer more wildlife-dependent recreational opportunities. The more opportunities there are, the more likely the public will visit the refuge to take advantage of those opportunities. Alternative B offers the most opportunity for wildlife-dependent recreational opportunities, and therefore best achieves Goal 4. Visitation is most likely to increase under Alternative B.

Hunting

Alternative A

The Eastern Shore of Virginia Refuge implemented a hunt program in 1993 as a means of keeping white-tailed deer populations in balance with refuge habitat, while also providing public outdoor recreation benefits. The season is 12 days long, accommodates up to 23 hunters and includes both an archery and shotgun hunt. Refuge trails and access remain open during the archery hunt but closed during the shotgun hunt except by special use permit.

There is no hunting on Fisherman Island Refuge.

Alternative B

In Alternative B, we proposed to expand hunting on both refuges. We would open a portion of the newly-acquired Wise Point

property to deer hunting to expand opportunities on Eastern Shore of Virginia Refuge. We would also open that refuge to waterfowl hunting.

We would also open Fisherman Island to an archery deer management hunt. Providing a hunt on Fisherman Island poses some safety risks. Since Route 13 runs through Fisherman Island Refuge, some deer could be flushed out onto Route 13, causing deer collisions with vehicles. Also, much of the refuge is marsh habitat, which would make it difficult to walk through. There is only a limited amount of upland area in which to provide hunt zones on Fisherman Island, which means we would not be able to accommodate many hunters.

Also in Alternative B, we would open newly acquired lands to big and small game hunting provided those activities would not harm or harass neotropical and temperate migrants. Deer and small game hunting would fall within the parameters of the State hunting seasons.

We would also allow waterfowl hunting on any marsh blocks we acquire that are 200 acres or larger. Our waterfowl hunt season would fall within the parameters of the State waterfowl season. Many residents on the eastern shore already hunt waterfowl on these areas, whether they are public or private property. Keeping these areas open would allow that tradition to continue.

Hunting could cause conflicts with other wildlife-dependent recreational uses such as wildlife observation and photography. Opening land to public use can often result in litter, vandalism, and other illegal activities on refuge lands.

Alternative C

We would offer the same deer hunt program on Eastern Shore of Virginia Refuge in Alternative C as we would in Alternative B. In Alternative C, we would not open Fisherman Island Refuge to a deer hunt and we would not open Wise Point to waterfowl hunting.

Alternative D

Same as Alternative A.

Summary

Alternative B offers the most opportunity for hunting on the Eastern Shore of Virginia and Fisherman Island Refuges, and therefore best achieves Goal 4. In Alternative B, we would

expand the current hunt program on Eastern Shore of Virginia Refuge, we would open Fisherman Island Refuge to deer hunting and we would open Wise Point to waterfowl hunting.

Watermen at work.
USFWS photo

Alternatives B, C and D both offer the same level of hunting opportunities on lands to be acquired.

Fishing

Alternative A

There are no fishing opportunities on either refuge. However, we would continue to allow access to the Wise Point boat ramp for commercial watermen and recreational anglers. Under this Alternative, an unspecified number of commercial watermen could apply for a Special Use Permit to access the refuge outside normal hours of operation. Docking and 24-hour access would not be phased out. While this would benefit some commercial watermen, it would provide special rights to a certain group of people. These kinds of special rights are not appropriate on lands owned by public agencies, where all people should have equal rights. This Alternative would provide the lowest quality of access since no improvements would be made to the boat ramp, docks, parking area or entrance road.

Alternative B

In Alternative B, we would keep the Wise Point boat ramp open to commercial fishermen and recreational anglers. We would improve the boat ramp area by installing a two-lane boat ramp, upgrading the parking area to allow for 75 vehicles, and widening Ramp Lane. We would reserve 12 parking spaces for current permitted commercial watermen. We would also provide more infrastructure facilities such as restrooms and lighting. These improvements would provide a more quality fishing experience for those who use the boat ramp. However, we would eventually phase out docking, 24-hour access and reserved parking for commercial watermen, thus making it more difficult for this user group to conduct their business. The purpose for phasing out these privileges is to give all users fair and equal access to the boat ramp.

On other lands to be acquired, we would allow fishing on Chesapeake Bayside lands provided fishing would not harm or harass tiger beetle populations.

Alternative C

We propose in Alternative C to open the southern tip beach to surf fishing, making this the only Alternative in which we would directly provide fishing on one of the refuges. Same as Alternative B, except we would scale down improvements to the boat ramp area capping parking at 50 vehicles and reserving seven spaces for commercial watermen. As in Alternative B, we would build a new dock for commercial watermen. The smaller parking lot would limit the number of commercial and recreational users moreso in Alternative C than in Alternative B.

Alternative D

Same as Alternative C except we would scale down improvements to the boat ramp even more by improving the parking lot to only 25 parking spaces. We would set aside five parking spaces for commercial watermen. Instead of building a separate dock for commercial watermen, we would provide mooring posts, which would be less convenient for some commercial watermen. The smaller parking lot would further decrease the number of recreational anglers.

Summary

Because of improvements made to the boat ramp area in Alternative B, this Alternative would provide the most opportunity for access to fishing off-refuge, and therefore best achieves Goal 4. Alternative C, however, is the only Alternative that provides fishing opportunities on-refuge. Although Alternative A would provide more access for commercial watermen in the long-term, it would provide less public access than Alternative B. The Improvement Act specifically directs us to expand wildlife-dependent recreational opportunities for the public in general, not for a particular private group. In Alternatives C and D, we would scale down the size of the parking lot, allowing for fewer users.

Wildlife Interpretation and Education, and Wildlife Observation and Photography

Alternative A

Visitors Center.
USFWS photo

On the Eastern Shore of Virginia Refuge, the Visitor Center continues to be the main attraction for environmental education and interpretation. There is also a 1.5-mile trail system with two observation platforms, interpretive signs and a kiosk. The refuge also has an environmental education building, a conference building and a photography blind overlooking a freshwater pond.

Fisherman Island Refuge is open to the public from October 15 through March 30, when the refuge offers weekly guided tours to the public, and occasionally other tours upon request. Visitors to the Refuge observe neotropical birds in the fall and many different species of waterfowl in the winter, among other birds. In Alternative A, there would be no changes in wildlife interpretation and education or wildlife observation and photography.

In all alternatives, we would ban PWCs from launching from the Wise Point boat ramp. PWC use has a significant potential to conflict with other visitor's enjoyment of refuge values. A traditional motorized watercraft traverses through an area and, within a few minutes, is out of the area. PWC use typically consists of riders who traverse the same area over and over again. Because they tend to stay in one area for longer periods of time, the noise from PWCs is constant. Noise problems are compounded by PWC operating characteristics. The jet drive may emerge from the water when a PWC goes over a wave or wake resulting in changes in loudness and pitch which complainants cite as more disturbing than constant sounds. The erratic changes in engine pitch, the pulsation of sound produced by jumping wakes, and frequent changes in speed, in addition to the volume of sound, create a noise that is perceived as both irritating and an intrusion upon the refuge experience. By banning PWCs from the boat ramp, we hope to ensure a quality wildlife experience on the refuge.

PWC use is a relatively new recreational activity. Refuge staff is unaware of any PWCs that currently launch from the boat ramp. However, a report in August 27, 1997 Journal of the American Medical Association stated that from 1990 to 1995, there was a threefold increase in the number of PWCs in operation from approximately 241,000 to an estimated 760,000. We would like to state our policy on PWC use on the refuge now before the increase of use becomes an issue.

Alternative B

In Alternative B, we would provide several more opportunities for wildlife interpretation and education, observation and photography. Most of these expanded opportunities would focus on neotropical and temperate migratory species. To expand wildlife interpretation, we would revise refuge brochures and Web site, update interpretive displays to focus on neotropical and temperate migratory species, conduct weekly interpretation programs during certain times of the year and install a camera at an active osprey nesting platform.

To enhance environmental education, we would remodel the environmental education building and develop a trail behind the building for educational programs. The new trail would provide access to observing at least three habitat types necessary for migratory species - a freshwater pond, marsh, upland and grassland habitats. We would also build a pavilion along the trail for an outdoor meeting area, which would improve outdoor educational opportunities for school children.

To improve wildlife observation and photography, we would open the Wise Point Road to provide more opportunities for observing neotropical and temperate migratory species. We would also provide two additional butterfly gardens, compared to one garden in Alternative A. This would increase wildlife observation and photography for butterfly species.

The proposed three-mile bike trail along Route 13 would include interpretive panels, therefore increasing opportunities for environmental interpretation focusing on migratory bird habitat management and conservation.

Also in Alternative B, we would increase opportunities for educating teachers and non-traditional audiences, such as the growing Hispanic population on the eastern shore of Virginia. These efforts would build a stronger base of support for the refuge and the System, and would heighten awareness of the importance of the refuge to neotropical and temperate migrants.

We would open lands to be acquired for wildlife interpretation and education, and wildlife observation and photography provided those activities do not harm, harass or disturb neotropical migratory species. If and when we acquire parcels adjacent to Kiptopeke State Park, we would work with the Park to establish a trail and other connections to give visitors a larger area in which to engage in wildlife-dependent recreational uses.

Alternative C

In Alternative C, we would provide many of the same educational and interpretive opportunities as in Alternative B, but materials would focus on neotropical and grassland temperate migrants. We would provide an osprey camera and two interpretive pullouts along Hallett Circle. We would renovate the Environmental Education building, but we would not build a trail or a pavilion.

Opportunities for wildlife observation and photography would be the same as in Alternative B except we would add an extension onto the Wise Point Trail so that visitors could walk through forested and marsh habitat to the beach on the southern tip of the refuge. This would slightly expand observation opportunities on the refuge.

We would provide opportunities for wildlife interpretation and education, observation and photography on lands to be acquired according to the same stipulations as in Alternative B.

Alternative D

Alternative D would provide many of the same educational and interpretive opportunities as in Alternatives B and C, but materials would focus on historic vegetative communities. We would not build an environmental study area in Alternative D.

Wildlife observation and photography opportunities would be the same as in Alternative B except we would not open the Wise Point road.

We would provide opportunities for wildlife interpretation and education, observation and photography on lands to be acquired according to the same stipulations in Alternatives B and C.

Summary

Alternative B would provide the most opportunity for environmental education and interpretation with the construction of a new trail and a pavilion behind the environmental education building. However, Alternative C would provide the most opportunity for wildlife observation and photography by extending the Wise Point Road trail down to the beach. Alternative A would provide the least amount of opportunity for wildlife interpretation and education, observation and photography. Alternative D would provide more opportunities than Alternative A, but less than Alternatives B and C.

Cultural Resources

Some of the activities incorporated in the four management alternatives have potential to affect cultural resources at Eastern Shore of Virginia. Cultural resources at the refuges are protected from Service management activities through the refuge's coordination with the Regional Historic Preservation Office during project planning, archaeological and historic architectural survey for as yet undiscovered archaeological sites and historic structures, and avoiding identified sites and structures during activities. Most of the management activities in the alternatives can be relocated to avoid sites, or adapted to avoid altering structures.

Common to all alternatives, however, is the proposal to demolish, move or adapt as yet unevaluated structures on Skidmore Island. Should the structures be National Register eligible, the Service would consult with the Virginia Department of Historic Resources and develop a management strategy for the structures that compensate for any adverse consequences.

Another proposal common to all alternatives is evaluation of the remaining Fort John Custis structures for National Register eligibility. The work done to evaluate the structures would provide information for interpretation of the structures in the future, in addition to helping make management decisions about the firing range.

Alternative A

Alternative A, continuing the current management strategy, has the potential to disturb as yet undiscovered archaeological sites. Cutting trees at Wise Point might involve removal with skidders, construction of skid roads, and grading of log landings and staging areas. All of the potential impacts can be avoided or mitigated by coordinating planning with review by the Regional Historic Preservation Officer. Some projects, especially the Wise Point tree cutting, may require contracted archaeological survey, which would add to the expense of the activity. No actual adverse effects to archaeological sites are anticipated. The refuge will avoid any sites found by redesigning the activity.

All alternatives might include relocating the firing range, a structure related to Fort John Custis and potentially eligible for the National Register of Historic Places. Should a relocation site for the firearms range be found, plans for maintenance or removal of the old firearms range would be coordinated with review by the

Regional Historic Preservation Officer. The existing firearms range is a Fort John Custis feature, and may be eligible for the National Register. The structures remaining on the refuge from the Fort would be evaluated for National Register eligibility as part of all the proposed alternatives.

Cultural resources staff time and funds for contracted surveys may be needed, depending on how the strategies in Alternative A are implemented.

Alternative B

Alternative B, which promotes habitat for forest and shrub dependent neotropical and temperate migrants, includes cutting some trees and planting 27 acres of hardwoods. Cutting trees would have the same consequences as in Alternative A. Planting hardwoods might involve ground-disturbing preparation, such as the use of a root rake. Achieving Goal 1 calls for preparing a habitat management plan to determine appropriate hardwood management techniques. This plan will specify what techniques would be used to plant trees, and would be reviewed by the Regional Historic Preservation Officer for potential to disturb archaeological sites. Alternative B also includes construction of about four miles of trail, two parking lots and a boat ramp, which may require archaeological survey. Fewer acres of cutting and trail building means Alternative A would require less archaeological survey than Alternative B and would be less expensive. While neither alternative is expected to affect cultural resources, Alternative A would likely require less expense and cultural resource staff involvement.

Alternative C

Alternative C, which proposes to create habitat for grassland temperate species and neotropical migrants, would not have adverse consequences for cultural resources. This Alternative contains only two proposed acres of planting. However, this Alternative also proposes 44 acres of shrub removal which might call for an archaeological survey, depending on how the work is done. In addition, the proposal includes a smaller parking lot for the boat ramp than Alternative B. Alternative C contains actions which would require review and coordination with the Regional Historic Preservation Officer, but which would not have negative consequences to cultural resources. In addition, this Alternative includes more interpretation of the Winslow Battery of Fort John Custis at Eastern Shore of Virginia Refuge, a positive consequence. This Alternative might be as expensive as

Alternative A to survey for cultural resources, and might require contracted surveys.

Alternative D

Alternative D would have consequences for Fort John Custis, one of the unevaluated historic structure complexes on the refuge. Alternative D proposes removing all remains of structures. This alternative includes planting, though there would be no trail building and we would construct a smaller boat ramp and parking lot than in either Alternative B or C. We would not cut any trees in this Alternative. Planting might require archaeological survey, depending on the method used to prepare the ground. In addition, we might need to negotiate a formal agreement with the SHPO in order to mitigate the negative consequences of tearing down the structures. Mitigation might consist of documenting the structures before removal, if they prove to be eligible for the National Register.

Cumulative Impacts

Cumulative Impacts are those impacts on the physical, biological and human environment resulting from the incremental impact of the proposed actions when added to other past, present and reasonably foreseeable future actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

The cumulative impacts assessment below includes other agencies' or organizations' actions if they are interrelated and influence the same environment. Thus, this analysis considers the interaction of activities at Eastern Shore of Virginia and Fisherman Island Refuges with other actions occurring over a larger spatial and temporal frame of reference. Potential cumulative impacts for the proposed alternatives are described below.

Physical Environment

Air Quality

None of the proposed alternatives would have a significant cumulative adverse impact on air quality on the eastern shore of Virginia. Some minor and temporary adverse impacts would be expected from prescribed burns in Alternatives B, C and D. However, prescribed burns would only occur under stipulations detailed in a Prescribed Burn Plan, to be completed in 2004. These stipulations are specifically designed to minimize impacts on air quality.

Geology, Topography, Soils, Hydrology

The greatest past, present and foreseeable future impact on these resources of the eastern shore of Virginia is from increased residential development. Development along the Chesapeake Bay side of the southern Delmarva Peninsula has already progressed, since waterfront property is extremely desirable to most people looking to build new or second homes. This development has caused extensive beach erosion, as vegetation is cleared and houses are built as close as possible to the shoreline.

The refuge does not have much control over the cumulative negative impacts that result from local residential development. However, one way the refuge can contribute to mitigating those impacts is by acquiring land that is suitable for wildlife habitat. All the alternatives propose to acquire more land than what the

refuge currently owns. Under Alternative A, we would acquire 310 acres of land for wildlife habitat, the least amount of land proposed for acquisition of all the alternatives. Under Alternatives B and C, we would acquire 6,030 acres of land, in addition to the 310 acres acquired in Alternative A. There are no specific acreages for land acquisition strategies in Alternative D.

The refuge also helps mitigate impacts from residential development by working with partners to protect important habitat types from development. Currently, the refuge is a member of the Southern Tip Partners, a group of public and private organizations who work together to prioritize land acquisition strategies on the eastern shore of Virginia. Alternatives B, C and D further propose to partner with local realtors to monitor the availability of high priority lands, help obtain grants for land protection, coordinate with partners to develop a training course on conservation easements, and encourage and support the development of a local land trust.

Contaminants

Alternatives B, C and D propose thoroughly testing for contaminants on the Eastern Shore of Virginia Refuge. With those tests completed, we would be able to establish a baseline for the abiotic components of the refuge. We would then use that baseline to determine whether proposed clean up efforts are effective. Proposed clean up efforts include designing and implementing engineering mechanisms to control surface runoff and leachate from the firearms range, and implementing current practices for firearms range management, such as periodic removal of contaminated soils. Although these efforts may seem minor as compared to other possible contamination clean up methods, they could prove to have a major beneficial effect on the abiotic components of the refuge over a longer period of time. If these methods result in cleaner soil and water, they could also benefit the wildlife that use those abiotic components.

Biological Resources

All alternatives intend to maintain or improve biological resources on the refuge and on the southern tip of the Delmarva Peninsula by protecting threatened and endangered species, enhancing important habitats and providing food and cover resources for wildlife.

The Chesapeake Bay region was once thought to have few of the endangered Northeastern beach tiger beetles (USFWS 1994a). However, surveys conducted from 1989 through 1992 show the

species was found at 55 sites in Virginia. This includes 16 sites of over 500 adults, 10 sites with 100-500 adults and many additional sites with fewer than 100 adults. Despite this data, the Recovery Plan maintains that tiger beetle populations are not secure. Few sites are protected and many are threatened by human impact such as habitat alteration and recreational activities. The monitoring and other strategies we propose in Alternatives B, C and D would enable us to better protect the population of tiger beetles on the Eastern Shore of Virginia Refuge. With the increased development along the eastern shores of Maryland and Virginia, especially along the Chesapeake Bay, it would become more important to protect current and potential tiger beetle habitat.

Alternative B emphasizes the importance of forested lands for neotropical and temperate migratory species. Repeated accounts of population declines for many neotropical migratory songbird species have sparked widespread concern that has given way to national and international conservation initiatives (Mabey et. al., 1993). The Neotropical Migratory Songbird Coastal Corridor Study (Mabey et. al., 1993) determined, among other things, that neotropical migrants are most abundant closest to coastlines, and that higher densities occur along the Chesapeake Bay side of the Delmarva Peninsula than along the seaside. The study also concludes that forest habitat has greater species abundance and richness than scrub habitat, though some individual scrub communities have relatively high values. These types of habitat provide the best food and cover resources for migratory species.

Since much of the eastern shore of Virginia is farmland, the acreage that remains in forest and scrub/shrub habitat becomes even more important for migratory species. We propose in Alternative B to encourage more forest and scrub/shrub habitat on current refuge lands. We also propose to convert the agricultural land within the proposed acquisition boundary to forested and scrub/shrub habitat. These actions would increase the amount of forested and scrub/shrub habitat on the southern tip of the Delmarva Peninsula, thus benefitting the migratory birds that depend on that area as a migratory stopover point.

Alternative C emphasizes the importance of grassland habitat for certain species of temperate grassland migrants, as well as for some species of neotropical migrants. The North American Breeding Bird Survey suggests that grassland and open habitat species are experiencing dramatic annual population declines, especially in eastern North America (Sauer et al., 2000). The availability of grassland habitat within the mid-Atlantic Coastal Plain has declined dramatically throughout the 20th century due to

suppression of natural disturbance and loss of agricultural land to development. The *Partner's in Flight: Mid-Atlantic Coastal Plain Bird Conservation Plan* (USFWS 1999b) has identified 16 open habitat-dependent species of concern; all but one of those species migrate through the refuge. Alternative C proposes to increase the amount of grassland acreage on the refuge. In addition, we would convert agricultural land to grassland habitat instead of forested or shrub/scrub habitat. These proposed strategies would increase the amount of available grassland habitat on the eastern seaboard, and would therefore benefit grassland temperate migrants in this area as well.

Alternative D would also provide vital habitat for neotropical migratory species, as it proposes to let most of the refuge and the lands proposed for acquisition to revert back to forested habitat. This Alternative would largely benefit only those neotropical migrants that benefit from forested habitat, as there would be little shrub/scrub or grassland habitat.

Socio-Economic Factors

Social and Economic Factors

We expect none of the alternatives to have any major adverse cumulative impact on the economy of the eastern shore of Virginia. Although federal land acquisition reduces property tax revenue, affected counties are compensated with refuge Revenues Sharing payments, and also should realize a reduction in cost of community services. In Alternatives B and C, we propose to acquire and convert about 3,315 acres of agricultural land to either forest and shrub/scrub habitat or grassland habitat. A reduction of farmland could reduce jobs and earnings in the agricultural industries and also in industries associated with agriculture such as feed stores and suppliers of petroleum, fertilizer, lime, and other agriculture-related chemicals. However, we predict that loss of farmland has already become a trend on the eastern shore of Virginia as more and more land is being developed for residential and commercial use. Although we would contribute to taking farmland out of production, we would at least maintain the rural character of the area by protecting land as wildlife habitat, instead of developing it.

Many actions in all the alternatives intend to increase visitation to the refuge and other local nature-based attractions, therefore offering beneficial impacts by bringing in revenue to local communities through increased tourism.

Public Use

Alternatives B, C and D would cumulatively increase priority, wildlife-dependent recreation on the eastern shore of Virginia. This would supplement recreational opportunities offered by other local public and private organizations. However, the refuges would provide an experience unique from other parks and open spaces because they provide natural settings with unmatched wildlife observation experiences.

Cultural Resources

We expect none of the alternatives to have any adverse cumulative impacts on cultural resources on the southern tip of the Delmarva Peninsula. As stated in the alternatives, we would consult with the State Historic Preservation Office before destroying or moving any buildings on either refuge. Alternative C proposes to increase interpretive efforts for cultural resources, which would result in a beneficial impact.

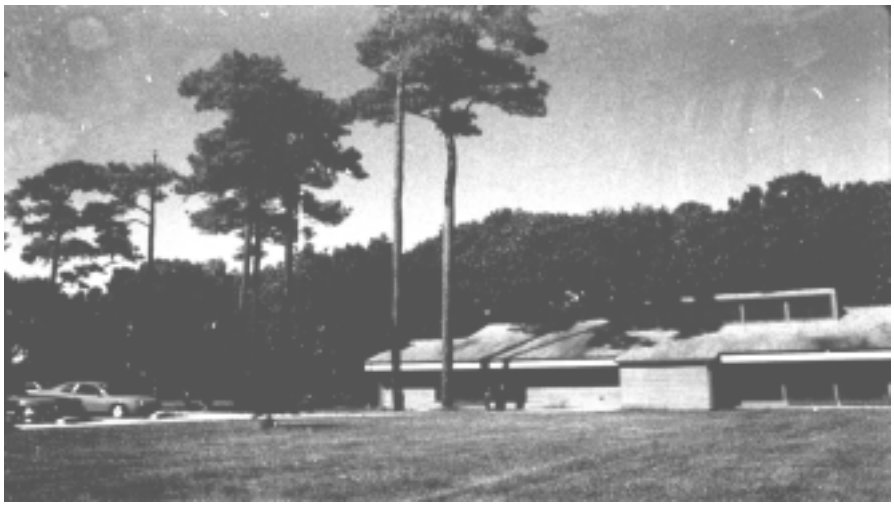
Table 4-1. A summary of environmental consequences for Eastern Shore of Virginia (ESV) and Fisherman Island (FSH) National Wildlife Refuges (NWRs).

	Alternative A, *Current Management*	**Alternative B,** *Proposed Action*	**Alternative C,** *Current Management*	**Alternative D,** *Current Management*
Staffing and Budgets	Permanent, full-time positions (PFTs): 9 Year 1 project costs: $2.4m , assuming all RONS projects are funded Recurring project costs: $666,000	PFTs: 18 Seasonal staff: 3 Year 1 project costs: $213,000 increase from Alternative A Recurring project costs: $88,000 increase from Alternative A	Same as Alternative B	Same as Alternative B
Physical Environment *Air Quality*	Positive impact by banning PWCs from launching from the Wise Point boat ramp in all alternatives	Minor and temporary negative impact from prescribed burning on up to 400 acres annually	Same as Alternative B	Same as Alternative B
Climate, Geology, Topograpy, Soils and Hydrology	Positive impact from protecting up to 310 additional acres Positive impact by banning PWCs from launching from the Wise Point boat ramp in all alternatives	Positive impact from protecting up to 6,030 additional acres Minor negative impacts to soil from construction of EE study area and discing to control invasive species Temporary water turbidity due to boat ramp area improvements	Same as Alternative B	Same as Alternative B, plus additional soil disturbance from removal of several structures
Contaminants	Neutral impact: continue to work with partners to find an alternative, off-refuge site for the firearms range	Positive impact by implementing modern practices for firearms range management (i.e., controlling surface runoff and leachate from the berm and removing contaminated soils) while searching for an alternative site	Same as Alternative B	Same as Alternative B

	Alternative A, *Current Management*	Alternative B, *Proposed Action*	Alternative C	Alternative D
Biological Resources *Threatened and endangered species*	Positive impact from closing southern tip beach on ESV NWR to protect Northeastern beach tiger beetle	Increased positive impact from Alternative A by surveying tiger beetles and working to curb trespassing on southern tip beach	Potential negative impact to tiger beetles by opening southern tip beach to surf fishing	Same as Alternative B
Plants	Neutral impact: maintain vegetative diversity by providing a mix of grassland, shrub/scrub and forested habitat	Increase mast production by planting trees on 27 acres Increase vegetative diversity and improve understory habitat by controlling invasive species Negative impact on salt marsh from boat ramp area improvements and new trail construction	Increase mast production by planting trees on 10 acres Increase vegetative diversity and improve understory habitat by controlling invasive species Increased negative impact from Alternative B as new trail would extend through salt marsh and forested habitat	Negative impact on habitat diversity by allowing succession to forested habitat on most all refuge lands Increase and improve coastal shrub community
Wildlife	Neutral impact: provide a diversity of habitat types to benefit a variety of migratory, breeding and wintering species	Positive impact on early successional-dependent species but negative impact on grassland-dependent species by converting 58 acres of grassland to shrub/scrub habitat Indirect benefit to beach nesting birds by monitoring for predators	Positive impact on grassland-dependent species but negative impact on early successional-dependent species by converting 58 acres of grassland to shrub/scrub habitat Indirect benefit to beach nesting birds by monitoring for predators	Positive impact on forest-dependent species but negative impact on shrub/scrub- and grassland-dependent species by allowing succession to forested habitat on most all refuge lands Indirect benefit to beach nesting birds by monitoring for predators

	Alternative A, *Current Management*	Alternative B, *Proposed Action*	Alternative C	Alternative D
Socio-Economic Factors	Loss of annual property tax revenue from acquisition of up to 310 acres $5,000 annual increase in Refuge Revenue Sharing Payments	Loss of annual property tax revenue from acquisition of up to 6,030 acres $125,000 annual increase in Refuge Revenue Sharing Payments	Same as Alternative B	Same as Alternative B
Public Use *Hunting and Fishing*	Negative impact by not improving the boat ramp area, which could pose a safety hazard for commercial and recreational users due to a narrow entrance road and decrepit docks	Positive impact by expanding deer hunting on ESV NWR, opening the refuge to waterfowl hunting and improving the boat ramp area Positive impact by opening FSH NWR to deer hunting	Positive impact by expanding deer hunting on ESV NWR, opening the southern tip beach to surf fishing and improving the boat ramp area	Same as Alternative A
Wildlife observation, photograpy, environmental education and interpretation	Neutral impact: these activities would continue as they have in the past	Positive impact by constructing a 3-mile bike path and a new .6-mile trail on ESV NWR Positive impact by constructing a new environmental education center on ESV NWR with a .5-mile trail and expanding interpretive programs	Positive impact by constructing a 3-mile bike path and a new 1-mile trail on ESV NWR Positive impact by constructing a new environmental education center on ESV NWR with a .5-mile trail and expanding interpretive programs	Positive impact by expanding interpretive programs
Cultural Resources	Positive impact by evaluating structures on Skidmore Island and other structures on ESV NWR before demolition or removal	In addition to benefits in Alternative A, ground disturbing projects would be reviewed by the Regional Historic Preservation Officer for potential disturbance	In addition to benefits in Alternatives A and B, increase the visibility of cultural resources on ESV NWR by providing an interpretive program on the Winslow Bunker	Same as Alternative B

Chapter 5



Refuge Headquarters.
Charles Philip

Consultation and Coordination with Others

- Introduction
- Public Use Summary
- List of Preparers

Introduction

The purpose of this chapter is to summarize public outreach that occurred during development of this document, including open houses, public meetings, and planning update mailings. In addition, we have summarized consultation and coordination with partners.

Public Involvement Summary

In August 1999, we held a series of open houses and public meetings at Virginia Beach, Cape Charles and Melfa, Virginia. At these meetings, we gathered information and ideas from local residents, adjacent landowners, and various organizations and agencies. We announced the location, dates and times for these meetings in local newspapers and through special mailings. More than 35 people total attended all the meetings.

We also distributed in August 1999 a planning newsletter to our mailing list of about 1,000 people. The newsletter was also made available at Refuge Headquarters, open houses and public meetings. The newsletter contained a workbook insert that included questions to help collect the public's ideas, concerns and suggestions on important issues associated with managing Eastern Shore of Virginia and Fisherman Island Refuges. We asked for input on issues and possible action options, the things people valued most about the refuges, their vision for the future of the refuges and whether our recreational facilities meet the peoples' needs. More than 80 workbooks were completed and returned with responses to the questions. A second newsletter, distributed in November 1999, highlighted responses to the questions we asked in the first newsletter.

In November 1999, we held a three-day Experts' Workshop at the Eastern Shore of Virginia Refuge. More than 30 biological experts from Federal, State, private and academic organizations were invited to the workshop. We asked experts to give a 10-15 minute presentation on a topic that pertains to the Eastern Shore of Virginia Refuge. The goals of the workshop were to record the most complete information on the status of refuge habitat and species, to rank and prioritize these habitats and species, to discuss the best manner in which to optimize habitat for diversity and species health and numbers, and to identify important habitats off-refuge that may play a role in how to best achieve our goals. Following are some of the recommendations that developed from this workshop:

- Land acquisition and vegetated buffers can be used to protect water quality.
- Warm season grasses provide a variety of benefits, including good stem density and ground cover for birds, high biomass yields and drought tolerant.
- Eastern Shore of Virginia Refuge needs to manage its deer and predator populations.
- Conduct inventory of plant species, shorebirds on Fisherman

Island, and conduct a herpetology inventory.
- Both refuges provide important migration, staging and wintering habitat for waterfowl.
- The refuge should manage habitats for wooded and sub-canopy growth. The loblolly pines are not that special to migratory birds and could be selectively cut to open up area.
- Habitats should be managed as natural communities. Specific natural communities to protect and enhance include salt marsh, subtidal habitats, unvegetated mudflats, seagrass and oyster reefs, understory forest areas, pine savannah, shrub habitat along other marsh, forest, grassland borders, and large patches of grasslands.
- The refuge should educate landowners on the need to protect the resources of the eastern shore of Virginia.
- The Visitor Center is the cornerstone of public use at the refuge. However, there is a need for an additional trail system with better signs informing people where to go.

In January 2000, we held a one-day, technical workshop focused on compatible, wildlife-dependent recreational uses. Local, state and regional experts were invited to participate in the workshop. The main goal of the workshop was to gain input on issues and opportunities such as habitat management, the boat ramp, the communications tower, the firearms range, and land acquisition. Some recommendations that developed from this workshop are as follows:

- Identify and prioritize potential acquisition areas through detailed mapping; strengthen partnerships.
- The hunt program on the Eastern Shore of Virginia Refuge should be maintained in order to manage the deer population.
- Access to Fisherman Island is limited; expand tours and educational opportunities only if it can be done without impacting wildlife.
- The County and the refuge should work together in addressing deep water and night access issues.
- Eastern Shore of Virginia Refuge is not the best location for a firearms range, but the options for relocation are limited.
- University cooperative agreements should include requirements for relevant research for management.
- The refuge should establish a Friends Group.

We held an afternoon and an evening public meeting on July 30, 2002, at the Kiptopeke Elementary School in Eastville, Virginia to discuss the long-term management of the Wise Point boat ramp on the Eastern Shore of Virginia Refuge. The refuge acquired the Wise Point property, including the boat ramp, in January 2002. Since then, the refuge has implemented interim management strategies until the Comprehensive Conservation Plan (CCP) is completed. The final CCP will determine how the refuge will manage the boat ramp over the long term. The purpose of the meeting was to invite

public discussion on the management of the boat ramp. About 65 people attended the evening meeting. Input obtained from the public meetings, newsletters and workshops was used to prepare this Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA).

Finally, two meetings were held with Federal, State and County representatives to discuss the future management of the Wise Point boat ramp. The meetings were held on September 5 and October 10, 2002. Both interim and long-term management strategies were discussed. The group brainstormed on how all entities could work together for common goals on management of this site.

On January 6, 2003, an informational meeting was held with Federal, State and County representatives as well as local non-government organizations. The goal of this meeting was to inform these partners of the highlights and insights on the preferred alternative of the Draft CCP/EA so they would be able to answer questions from constituents when the draft document was released for public comment.

This Draft CCP/EA will be released for 45 days of public review and comment. During the review period, we will hold three public meetings to allow the public a chance to comment on the document. The public is also invited to write individual letters of comment and send them to: Beth Goldstein, Team Leader, U.S. Fish and Wildlife Service, 300 Westgate Center Drive, Hadley, 01035-9589, or northeastplanning@fws.gov.

List of Preparers

Members of the core planning team:

Robert Steven Adamcik
Wildlife Biologist
USFWS Washington Office

Provided input as consultant on biological elements of the plan, with emphasis on development of Alternative D.

Liz Bellantoni
National Planning Coordinator
USFWS Washington Office

Provided input regarding the formulation of goals, objectives and strategies. Also, provided guidance in interpreting the planning policy.

James Kenyon
Former Outdoor Recreation Planner
Eastern Shore of Virginia National Wildlife Refuge

Major responsibilities included developing strategies for priority public uses. Also, helped draft compatibility determinations for the various activities on the refuges.

Pamela Denmon
Wildlife Biologist
Eastern Shore of Virginia National Wildlife Refuge

Provided biological assistance for Alternatives and Environmental Consequences Chapters.

Beth Goldstein
Team Leader
USFWS, Region 5 Regional Office

Organized and facilitated meetings, coordinated all tasks related to the CCP and wrote sections of the plan.

Michael W. Mitchell
Former Assistant Refuge Manager
Eastern Shore of Virginia National Wildlife Refuge

Co-author of the CCP and primary author of Chapter 3, "Biological Resources" section.

Susan Rice
Project Leader
Eastern Shore of Virginia National Wildlife Refuge

Assisted with gathering baseline data and expert biological input to formulate alternatives.

Don Schwab
Wildlife Biologist
VA Department of Game and Inland Fisheries

Provided input on mammals, predator issues and deer management strategies for both refuges.

Phil West
Game Biologist
VA Department of Game and Inland Fisheries

Provided input on deer hunting and habitat management strategies from a State perspective.

William Zinni
Land Ascertainment Biologist
USFWS, Region 5 Regional Office

The primary author of the Land Protection Plan (LPP). Also, participated in meetings related to goals and objectives and helped write the land protection strategies and the biological section of the plan.

Other Assistance

William Archambault
Former NEPA Coordinator
USFWS, Region 5 Regional Office

Provided guidance on public use issues and NEPA compliance. Facilitated public meetings.

Nancy Biegel
Former Outdoor Recreation Planner
Eastern Shore of Virginia National Wildlife Refuge

Provided access to all photographs used in the CCP. Also, provided input on public use strategies.

Thomas Bonetti
Refuge Planner
USFWS, Region 5 Regional Office

Served as team leader for the first year-and-a-half of the planning process.

Robert Carpenter
Former Engineering Equipment Operator (retired)
Eastern Shore of Virginia National Wildlife Refuge

Provided information on maintenance needs of the refuge and on traditional land uses on the eastern shore of Virginia.

Gary Costanzo
Waterfowl Biologist
VA Department of Game and Inland Fisheries

Provided guidance for waterfowl hunting proposals on and off the refuge.

Eric Davis
Biologist
USFWS, Region 5 Virginia Field Office

Provided assistance regarding strategies for Federal listed species on or historically occurring on the refuges.

Sheila Faith
Former Outdoor Recreation Planner
Eastern Shore of Virginia National Wildlife Refuge

Provided input on public use strategies. Also, reviewed and commented on draft strategies.

Anne Hecht
Biologist, Endangered Species
USFWS, Region 5, Great Meadows National Wildlife Refuge

Assisted in providing information and guidance on background information and strategies related to piping plovers.

Shelley Hight
Archaeologist, Division of Visitor Services, Outreach and Cultural Resources
USFWS, Region 5 Regional Office

Recommended actions pertaining to cultural resources on the Refuges; wrote the cultural resources section of the plan.

Cindy Kane
Biologist, Ecological Services
USFWS, Region 5 Virginia Field Office

Recommended strategies for addressing contamination issues on the Refuge. Also, provided background information on potentially contaminated sites.

C. Barry Knisley
Department of Biology
Randolph-Macon College
Ashland, Virginia

Provided information and recommendations regarding strategies about the Federal listed Northeastern beach tiger beetle.

Hal Laskowski
Regional Zone Biologist
USFWS, Prime Hook National Wildlife Refuge

Provided guidance on general species management and research needs for the refuge.

Jerry Loomis
Electrician
Eastern Shore of Virginia National Wildlife Refuge

Provided information on the maintenance needs of the refuge.

J. Christopher Ludwig
Chief Biologist, Virginia Natural Heritage Program

Helped define the plant community of Eastern Shore of Virginia Refuge and helped formulate strategies for habitat management.

Diane Lynch
Biologist, Endangered Species
USFWS, Region 5 Regional Office

Provided information and input on strategies concerning the Northeastern beach tiger beetle.

Irene Morris
Office Assistant
Eastern Shore of Virginia National Wildlife Refuge

Assisted with various tasks to help facilitate meetings and the planning processin general.

Paul Nickerson
Regional Endangered Species Coordinator
USFWS, Region 5 Regional Office

Provided input and information on strategies concerning threatened and endangered species.

Mary Parkin
Biologist, Ecological Services
USFWS, Region 5

Assisted in providing background information and recommendations on the Federal listed Delmarva fox squirrel.

Debra Reynolds
Outdoor Recreation Planner
Silvio Conte National Fish and Wildlife Refuge

Served as assistant planner for the first year-and-a-half of the planning process.

Greg Thompson
Cartographer
USFWS, Region 5 Regional Office

Responsible for creating all maps related to the CCP and the LPP. Provided guidance on map design and detail.

Denard Spady
Editorial Board member
Citizens for a Better Eastern Shore

Provided personal accounts of the history of land use on the eastern shore of Virginia; suggested land protected strategies.

Thomas Stewart
Division Chief of Wildlife and Habitat
USFWS, Washington Office

Provided guidance on public use and biological issues related throughout the CCP process.

Karen Terwilliger
Resource Management Associates
Locustville, Virginia

Offered technical advice regarding endangered species and habitat management techniques.

Edward Vale
Student
University of Massachusetts-Amherst

Edited plan and formatted it in PageMaker. Placed pictures with text. Assisted with other tasks related to the final compilation of the plan.