

CHAPTER 3: ALTERNATIVES



Visitor enhancement project on the refuge: USFWS

- Introduction
- Formulating Alternatives
- Alternative A Current Management (No Action)
- Alternative B Enhanced Habitat Density (Service preferred Alternative)
- Alternative C Forest Management Emphasis

Introduction

This chapter describes our process for formulating alternatives, the actions that are common to all of the alternatives, the actions or alternatives we considered but did not fully develop, and the three alternatives we analyzed in detail. At the end of this chapter, table 3.1 compares how each of the alternatives addresses key issues, supports major programs, and achieves refuge goals.

Formulating Alternatives

Relating Goals, Objectives, and Strategies

The refuge goals are intentionally broad, descriptive statements of the desired future condition of refuge resources. By design, they define the targets of our management actions in terms more prescriptive than quantitative. They also articulate the principal elements of the refuge purposes and our vision statement, and provide a foundation for developing specific management objectives and strategies. All of the alternatives share the same goals.

The objectives are essentially incremental steps toward achieving a goal; they further define management targets in measurable terms. Typically, they vary among the alternatives, and provide the basis for determining strategies that are more detailed, monitoring refuge accomplishments, and evaluating our successes. “Writing Refuge Management Goals and Objectives: A Handbook” (USFWS 2004a) recommends writing “SMART” objectives that possess five properties: (1) specific; (2) measurable; (3) achievable; (4) results-oriented and (5) time-fixed.

A rationale accompanies each objective to explain its context and importance. We will use the objectives in the alternative selected for the final CCP to write the refuge step-down plans, which we describe later in this chapter.

The strategies for each objective are the specific or combined actions, tools, or techniques we may use to achieve the objective. The list of strategies in each objective represents the potential suite of actions we may implement. We will evaluate most of them further as to how, when, and where we should implement them when we write our refuge step-down plans. We will measure our successes by how well our strategies achieve our objectives and goals.

Developing Alternatives, including the “No Action” Alternative

After we identified a wide range of possible management objectives and strategies that could achieve our goals, we began the process of designing management alternatives. Simply put, management alternatives are packages of complementary objectives and strategies designed to meet refuge purposes and the Refuge System mission and goals, while responding to the issues and opportunities that arose during the planning process.

We grouped the objectives that seemed to fit together in what we loosely called “alternative themes.” For example, we considered such themes as “current management,” “passive management,” “focal species management,” and “natural processes management.” We formed those into three management alternatives, after further evaluating how the objectives would interact, their compatibility with refuge purposes, and the reality of accomplishing them within a reasonable period.

We fully analyze in this chapter three alternatives that characterize different ways of managing the refuge over the next 15 years. We believe they represent a reasonable range of alternative proposals for achieving the refuge purpose, vision and goals, and addressing the issues chapter 1 describes. Unless otherwise noted, refuge staff would implement all actions.

Alternative A satisfies the NEPA requirement of a “no action” alternative, which we define as continuing the status quo, or current management. It describes our existing management priorities and activities, and serves as a baseline for comparing and contrasting alternatives B and C. We suggest you first read chapter 2, “Description of the Affected Environment,” for detailed descriptions of current refuge resources and programs.

Many of the objectives in alternative A do not strictly follow the guidance in the Service goals and objectives handbook, because we are describing current management decisions and activities that we established prior to that guidance. Our descriptions of those activities devolve from a variety of formal and informal management decisions and planning documents. Thus, the objectives in alternative A are fewer and more subjective than are those in alternatives B or C.

Alternative B, the Service-preferred alternative, combines the actions we believe would achieve most effectively the refuge purposes, vision, goals, and respond to public issues. It emphasizes the management of specific refuge habitats to support focal species whose habitat needs benefit other species of conservation concern in the Rappahannock River Valley. In particular, we emphasize habitat for priority bird species of conservation concern in the BCR 30 plan and the VA WAP. In addition, this alternative would enhance our present visitor services programs.

Alternative C proposes less intensive management, with a philosophy of allowing natural succession to progress in existing non-forested habitats, to the extent that it does not compromise the refuge purposes and goals. Generally, refuge grasslands, old fields and shrub habitat would progress to forest. We would manage the refuge wetland habitats and our visitor services programs as in alternative B.

Actions Common to All of the Alternatives

All of the alternatives share some common actions. Some are required by law or policy, or represent actions that have undergone NEPA analysis, public review, agency review, and approval. Others may be administrative actions that do not require public review, but that we want to highlight in this public document.

All of the following actions are current practices or policies that would continue under all alternatives:

- using an adaptive management approach where appropriate,
- continuing land protection by purchasing fee title and conservation easements from willing sellers, and accepting donations, within the current, approved acquisition boundary,
- controlling invasive species,
- monitoring and abatement of diseases affecting wildlife and forest health,
- controlling pest plants and animals,
- facilitating or conducting biological research and investigations,
- completing findings of appropriate use and compatibility determinations,
- providing refuge staffing and administration,
- conducting wilderness and wild and scenic river reviews,
- monitoring and enforcing farmers home administration easements,
- allowing cooperative farming,
- allowing firewood cutting, and
- distributing refuge revenue sharing payments.

Adaptive Management

All of the alternatives will employ an adaptive management approach for improving resource management by learning from management outcomes. In 2007, Secretary of Interior Kempthorne issued Secretarial Order No. 3270 to provide guidance on policy and procedures for implementing adaptive management in departmental agencies. In response to that order, an intradepartmental working group developed a technical guidebook to assist managers and practitioners: “Adaptive Management: The U.S. Department of Interior, Technical Guide.” It defines adaptive management, the conditions under which we should consider it, the process for implementing it in a structured framework, and evaluating its effectiveness (Williams et al. 2007). You may view the technical guidebook at <http://www.doi.gov/initiatives/AdaptiveManagement/documents.html>.

The guidebook provides the following operational definition for adaptive management:

“Adaptive management is a decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a ‘trial and error’ process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social and economic goals, increase scientific knowledge, and reduces tensions among stakeholders.”

This definition gives special emphasis to the uncertainty about management impacts, iterative learning to reduce uncertainty, and improved management as a result of learning. At the refuge level, monitoring management actions and outcomes, and key resources, will be very important to implementing an adaptive management process. Our grassland, invasive species, and integrated pest management activities are examples of refuge programs or activities where an adaptive management approach may be implemented.

The refuge manager will be responsible for changing management actions and strategies if they do not produce the desired conditions. Significant changes from what we present in our final CCP may warrant additional NEPA analysis and public comment. Minor changes will not, but we will document them in our project evaluation or annual reports. Implementing an adaptive management approach supports all five goals of the refuge.



Blue goose mural: USFWS

Protecting Land

The Service is currently authorized to protect 20,000 acres in fee title and conservation easement within its existing, approved refuge boundary. By September 30, 2007, the refuge had acquired 6,352 acres in fee title and 1,359 acres in conservation easement, protecting a total of 7,711 acres. We will continue to work with willing sellers and in partnership with other agencies and organizations to achieve the 20,000-acre goal for land protection. We will continue to seek to increase the amount of land we protect through easements to balance better with the lands we acquire in fee title.

It is impossible to predict the size, type, and location of future acquisitions that may come under our management within the next 15 years. Although we are making a concerted effort to encourage more easement acquisitions, we do not know how successful we will be in this regard. If we were to assume we would acquire a number of acres, both in fee and in easement over the next 15 years similar to what we have acquired for the first 10 years of the refuge, the result would be approximately 16,000 acres in fee, and 4,000 acres under easement. Because of our current emphasis on bringing up the percentage of lands in easements, we will assume, for planning purposes, totals of 12,000 acres in fee and 8,000 acres under easement within the next 15 years. Obviously, that also assumes that the congressional appropriations for land acquisition are similar to, or higher than, those over the first 10 years since refuge establishment.

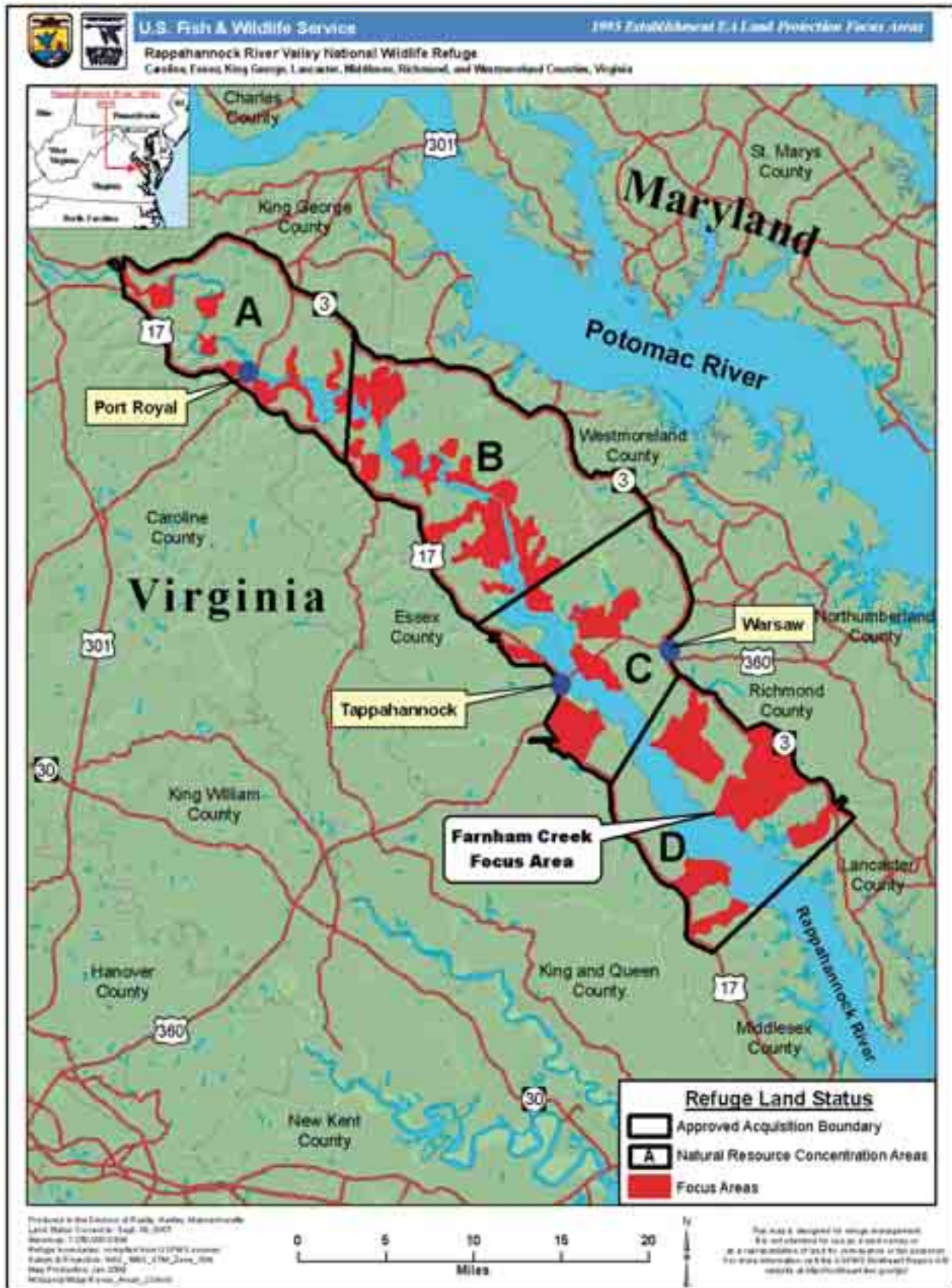
The 1995 final environmental assessment (EA) that created the refuge, and its appended land protection plan (LPP), list several criteria that we use in prioritizing land acquisitions. Those criteria, not prioritized, follow.

- Large tracts that exhibit a high degree of wildlife species diversity and habitat mix
- Tracts of critical, declining, or vulnerable habitat types (e.g., palustrine wooded wetlands and non-tidal wetlands)
- Tidal wetlands and uplands immediately adjacent
- Threatened or endangered species habitat, including habitat for the recently delisted bald eagle
- Tracts that would connect existing conservation holdings and open areas, as shown in the Rappahannock River Natural and Cultural Atlas compiled by the Chesapeake Bay Foundation and Rappahannock River Valley Association
- Corridors along tributary streams to protect fisheries, safeguard water quality, and provide opportunities for wildlife-oriented recreation for the public

We re-examined those criteria in the light of current conditions, our progress, and our experience since we first proposed to establish the refuge. We found that the original criteria remain valid, and we will continue to use them to prioritize our acquisitions. We also added two new criteria.

- Lands adjoining existing refuge tracts, to create larger blocks of protected habitat
- Large, contiguous, forested blocks (>250 acres), particularly those incorporating headwaters and drainages

In reviewing our criteria, we noticed that the narrative of our final EA (1995) lists Farnham Creek as part of Natural Resource Concentration Area D, but the set of four maps did not depict it. We corrected that oversight by including Farnham Creek, Conley Swamp, and Laton Swamp in the Farnham Creek focus area on map 3.1. We also show on map 3.1 the original natural resource concentration areas (A, B, C, and D) and their respective focus areas.



Map 3.1. 1995 Final Environmental Assessment Focus Areas, including the Farnham Creek Focus Area
Rappahannock River Valley National Wildlife Refuge

Please note that the refuge conservation easement program targets lands that contain natural resources whose importance merits their inclusion in the Refuge System, and are not simply open space easements. The goal of our easement program is to protect existing natural resources and work with the landowners to enhance those resources, including water quality buffers, while promoting the continuation of traditional uses of the land.

When we first envisioned the refuge, its proponents acknowledged that no one entity alone could achieve the desired level of land conservation. The refuge was conceived under the premise that a diverse array of partners, including landowners, non-profit conservation organizations, and government agencies, would all contribute to the same goal.

In many ways, that vision has become a reality. Private landowners have donated thousands of acres in easements, national and regional land conservation organizations engage and work together, and, with their help, the refuge has achieved more than one-third of its goal of protecting 20,000 acres of land. The refuge gained a new partner in 2006 with the approval of Fort A.P. Hill in the Army Compatible Use Buffer Program.

In December 2006, the Service entered into a memorandum of understanding with the Department of the Army, The Conservation Fund, The Nature Conservancy, the Trust for Public Land and the Virginia Outdoors Foundation. We seek to protect the lands around Fort A.P. Hill permanently for their important natural and ecological features, and to maintain the ability of the fort to continue its vital function of military training.

The conservation organizations listed above are long-standing refuge partners who have engaged in helping to conserve lands along the Rappahannock River for more than 10 years. More recently, local organizations such as the Northern Neck Land Conservancy, Middle Peninsula Land Trust, and Essex County Countryside Alliance have organized to reach out to landowners in the hope of fostering additional conservation measures, especially encouraging donations of conservation easements. Our land conservation program seeks to complement those of our national, regional and local partners.

To continue our progress toward our shared objectives in protecting land, we will employ the following, ongoing strategies.

1. Work with partners to identify willing sellers in areas of concentrations of priority natural resources.
2. Use our criteria for prioritizing land protection for lands that become available for purchase.
3. Continue to coordinate regular meetings of land protection partners to facilitate communication and cooperation.
4. Continue to seek opportunities to expand our land protection partnership.
5. Seek opportunities for alternative funding sources, such as grants.
6. Provide information to elected officials on land protection issues upon request.
7. Work with partners and landowners to encourage land conservation outside the refuge boundary.
8. Keep communities around the refuge informed about land protection issues through the distribution of outreach material and personal appearances by staff.

Managing Invasive Species

The permanent protection of land is the keystone of wildlife and habitat conservation. Land brought into the Refuge System will be available forever to support fish, wildlife and plants. We can restore, enhance, or maintain the land we purchase in fee title to provide optimal conditions for priority species targeted for conservation, such as threatened or endangered species and those whose populations are in decline. The land we protect through conservation easements will never convert to uses that would remove permanently their value for fish and wildlife.

The establishment and spread of invasive species, particularly invasive plants, is a significant problem that reaches across all habitat types. For the purposes of this discussion, we use the definition of invasive species contained in the Service Manual (620 FW 1.4E): “Invasive species are alien species whose introduction does or is likely to cause economic or environmental harm, or harm to human health. Alien species, or non-indigenous species, are species that are not native to a particular ecosystem. We are prohibited by Executive Order, law, and policy from authorizing, funding, or carrying out actions that are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere.”

In this section we discuss only alien or non-native species. In some instances, native species whose presence in a particular area interferes with our management objectives are, undesirable from a management standpoint and we address their management in a later section of this chapter.

The unchecked spread of invasive plants threatens the biological diversity, integrity and environmental health of all refuge habitats. In many cases, they have a competitive advantage over native plants and form dominant cover types, reducing the availability of native plants as food and cover for wildlife. Over the past several decades, government agencies, conservation organizations, and the public have become more acutely aware of the negative effects of invasive species. Many plans, strategies, and initiatives target the more effective management of invasive species, including “The National Strategy for Management of Invasive Species for the National Wildlife Refuge System” (2003), “Silent Invasion—A Call to Action,” by the National Wildlife Refuge Association (2002), and “Plant Invaders of Mid-Atlantic Natural Areas,” by the Service and the National Park Service (2002). The Refuge System biological discussion database and relevant workshops continually provide new information and updates on recent advances in control techniques. More sources of funding are available, both in the Service budget and through competitive grants, to conduct inventory and control programs.

We have initiated control on the following invasive plants, listed in alphabetical order by common name: autumn olive, bamboo, black locust (native to Virginia but not the coastal plain), bull and Canada thistle, common reed or *Phragmites*, English ivy, Japanese knotweed, Japanese stiltgrass, Johnsongrass, kudzu, lespedeza, mile-a-minute weed, multiflora rose, and tree-of-heaven. We have identified others for which we have insufficient resources to initiate control, including Japanese honeysuckle. We will also monitor refuge and adjacent lands and waters for the presence of invasive animal species, such as mute swans and nutria, and be prepared to respond quickly to control them if discovered.

Guidance on managing invasive species on refuges appears in the Service Manual (620 FW 1.7G). The following actions, define our general strategies on the refuge.

1. Manage invasive species to improve or stabilize biotic communities to minimize unacceptable change to ecosystem structure and function and to prevent new and expanded infestations of invasive species.
2. Conduct refuge habitat management to prevent, control, or eradicate invasive species using techniques described through an integrated pest management plan, or other similar management plan, the plans comprehensively evaluate all potential integrated management options, including defining threshold/risk levels that will initiate the implementation of proposed management actions.
3. Evaluate native habitat management activities with respect to their potential to accidentally introduce or increase the spread of invasive species and modify our habitat management operations to prevent increasing invasive species populations.
4. Refuge integrated pest management (IPM) planning addresses the abilities and limitations of potential techniques including chemical, biological, mechanical, and cultural techniques. See additional discussion on IPM below.
5. Manage invasive species on refuges under the guidance of the National Strategy for Invasive Species Management and within the context of applicable policy.

The following actions define our specific strategies for the refuge.

1. Continue the treatment of the most problematic species as funding and staffing permit.
2. Maintain early-detection/early-response readiness regarding new invasions.
3. Remove the parent sources of highly invasive species (e.g., species that are high seed producers or vigorous rhizome producers) from along the edges of management units.
4. Maintain accessibility to affected areas for control and monitoring.
5. Continue to promote research into the biological control of common reed.
6. Continue and increase efforts to involve the community in promoting awareness of invasive species issues, and seek assistance for control programs on and off the refuge.

Integrated Pest Management (IPM)

In accordance with 517 DM 1 and 7 RM 14, an integrated pest management (IPM) approach will be utilized, where practicable, to eradicate, control, or contain pest and invasive species (herein collectively referred to as pests) on the refuge. IPM involves using methods based upon effectiveness, cost, and minimal ecological disruption, which considers minimum potential effects to non-target organisms and the refuge environment. Pesticides may be used where physical, cultural, and biological methods or combinations thereof, are impractical or incapable of providing adequate control, eradication, or containment. Furthermore, pesticides would be used primarily to supplement, rather than as a substitute for, practical and effective control measures of other types. If a pesticide would be needed on the refuge, the most specific (selective) chemical available for the target species would be used unless considerations of persistence or other environmental and/or biotic hazards would preclude it. In accordance with 517 DM 1, pesticide usage would be further restricted because only pesticides registered with the US Environmental Protection Agency (USEPA) in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and as provided in regulations, orders, or permits issued by USEPA may be applied on lands and waters under refuge jurisdiction.

Environmental harm by pest species would refer to a biologically substantial decrease in environmental quality as indicated by a variety of potential factors including declines of native species' populations or communities, degraded habitat quality or long-term habitat loss, and/or altered ecological processes. Environmental harm may be a result of direct effects of pests on native species including preying and feeding on them; causing or vectoring diseases; preventing them from reproducing or killing their young; out-competing them for food, nutrients, light, nest sites or other vital resources; or hybridizing with them so frequently that within a few generations, few if any truly native individuals remain. In contrast, environmental harm can be the result of an indirect effect of pest species. For example, decreased waterfowl use may result from invasive plant infestations reducing the availability and/or abundance of native wetland plants that provide forage during the winter.

Environmental harm may also include detrimental changes in ecological processes. For example, invasions by tree of heaven can displace grasslands planted in native species, or Japanese stiltgrass can inhibit the recruitment of native tree species in forests. Environmental harm may also cause or be associated with economic losses and damage to human, plant, and animal health. For example, invasions by stand-replacing invasive species that alter entire plant and animal communities by eliminating or sharply reducing populations of native plant and animal species can also greatly increase control efforts and costs. They may also act as sources for invasion onto private property, a particular concern in this agricultural-based community.

We will refine our control program to address the most critical problems first. We may adjust our priorities to reflect regional Service priorities, the availability of new information, or a new resource.

Monitoring and Abating Wildlife and Plant Diseases

The Service has not yet published its manual chapter on Disease Prevention and Control. In the meantime, we derive guidance on this topic from the Refuge Manual and specific directives from the Director of the Fish and Wildlife Service or the Secretary of the Interior. The Refuge Manual (7 RM 17.3) lists three objectives for the prevention and control of disease.

1. Manage wildlife populations and habitats to minimize the likelihood of the contraction and contagion of disease.
2. Provide for the early detection and identification of disease mortality when it occurs.
3. Minimize the losses of wildlife from outbreaks of disease.

The Service published those objectives in 1982. Since then, in addition to diseases that cause serious mortality among wildlife, diseases transmitted through wildlife to humans have received more attention. One example is Lyme disease. In 2002, the Service published a Service Manual chapter (242 FW 5) on Lyme Disease Prevention to inform employees, volunteers, and national service workers about this disease, its prevention, and treatment.

Another serious wildlife disease that receives considerable attention worldwide is avian influenza. Of particular concern is the highly pathogenic Eurasian form (H5N1). In 2006, the Service instructed all refuges to prepare an Avian Influenza Surveillance and Contingency Plan. The plan covering all four refuges in the Eastern Virginia Rivers Refuge Complex, approved in December 2006, discusses methods for dealing with this disease.

In Virginia, chronic wasting disease (CWD) is also a concern. That disease, a progressive one of the brain and nervous system, infects deer and elk and, ultimately, causes the death of the infected animals. As of 2006, the disease had not appeared in Virginia, but had appeared in Hampshire County, West Virginia. A ban on carcass importation is in effect in Virginia. It is unlawful for any person to distribute food, minerals, carrion, or similar substances to feed or attract deer from September 1 through the first Saturday in January. The CWD management plan for the refuge complex was approved in 2008.

In addition to the diseases of wildlife, we are attentive to the diseases that affect forest health. Human activities that dramatically alter the landscape, such as development and sprawl, forest fragmentation, new road and utility construction, agriculture, introduction of non-native invasive species, and transport of disease-bearing hosts through the landscaping trade, can weaken and degrade the quality of habitats, particularly of trees and forests. Because we value highly the oak hardwood forests on the refuge, diseases that affect oaks are a special concern.

More than 80 documented insects and diseases affect oak trees in the United States. The escalating international trade is likely to introduce new pests. Their impacts range from minor defoliation to rapid mortality. In some years, pests cause the loss of a major portion of the acorn crop, impeding oak regeneration. A few pests have altered or may alter eastern U.S. oak forests on a broad scale. For example, humans' inadvertently transporting masses of eggs have aided the spread of the gypsy moth, an introduced defoliator, in the last few decades.

These are the general strategies for preventing or controlling disease.

1. Continue to conduct disease surveillance in conjunction with other fieldwork.
2. Cooperate with state agencies, particularly the Virginia Department of Game and Inland Fisheries or Virginia Department of Forestry, in conducting surveillance, providing access for sampling, and following protocols in the event of an outbreak.
3. Inform volunteers and others who work in the field about the dangers of Lyme disease and measures to avoid contracting it.
4. Monitor forests and other habitats for indicators of the increased occurrence of pests or disease. For example, note changes in flowering or fruiting phenology, physical damage, decay, weakening, sudden death, particularly of canopy and source trees of major host species, and changes in wildlife use of habitats, such as the absence of breeding birds that used to appear regularly.
5. Follow the protocols in national, state, and refuge disease prevention and control plans.



Treating Phragmites, an invasive plant: USFWS

Controlling Pest Plants and Animals

At times, native plants and animals interfere with management objectives. The Refuge Manual (7 RM 14.4A) defines a pest as “Any terrestrial or aquatic plant or animal which interferes, or threatens to interfere, at an unacceptable level, with the attainment of refuge objectives or which poses a threat to human health.” That definition could include the invasive species defined above, but in this section, we describe some situations involving native species and under what conditions we will initiate control.

In controlling pests, whether invasive or native species, we use an integrated approach. The Refuge Manual (7 RM 14.4C) defines integrated pest management as “A dynamic approach to pest management which utilizes a full knowledge of a pest problem through an understanding of the ecology of the pest and ecologically related organisms and through continuous monitoring of their populations. Once an acceptable level of pest damage is determined, control programs are carefully designed using a combination of compatible techniques to limit damage to that level.”

An integrated approach uses various methods, including natural, biological, cultural, mechanical, and chemical controls. Some examples and potential remedies of pest management follow.

Problem: Deer browsing on newly planted tree seedlings, causing unacceptable levels of mortality
Potential solutions: Use tree shelters around newly planted seedlings or plant clover in advance of tree planting to provide alternative food source. Use public hunting to keep deer populations in balance.

Problem: Beaver girdling large trees adjacent to public use facilities, potentially causing injury to visitors or damaging facilities from falling trees and branches
Potential solutions: Wrap trees with hardware cloth to prevent girdling. Temporarily employ local trappers to remove individuals from the population from selected locations. Remove dead trees before they fall. Also, see discussion below about furbearers and the discussion on general strategies.

Problem: Mute swans using and increasing in protected wetland areas.
Potential solution: Work with state partners (VDGIF) on the capture and removal of mute swans. The Service goal is zero productivity for mute swan in the Northeast Region, due to that swan’s negative impact on native waterfowl and their habitats.

Problem: Undesirable invasive or pest tree species establishing themselves in areas managed as grasslands, especially along the edges of fields, causing an unacceptable change in structure or composition of the grassland.
Potential solutions: Remove seed source by cutting high seed-producing trees along the edges of the fields. Use mowing or prescribed fire to kill saplings. Combine mowing and herbicide for long-term control.

Problem: Furbearers such as raccoons are causing unacceptable levels of predation on nesting birds.
Potential solutions: We do not intend to initiate a public trapping program at this time. The Service considers trapping as a commercial activity, and therefore it must meet a higher standard of compatibility than priority public recreational uses, or other non-commercial refuge uses. However, we may employ state-licensed volunteer or commercial trappers on a case-by-case basis to help alleviate a particular problem. In this case, trapping is considered a management activity and is not subject to compatibility standards. We will also consider non-lethal methods such as constructing predator guards, or mechanically removing any structural vegetation that provides access to nests by predators.

We use the following general strategies in pest management.

1. Determine the need for site-specific control based on the potential to affect our management objectives for a given area. We will employ an adaptive management strategy and we expect lethal control or removal of individual animals to be the exception rather than the rule. To establish general thresholds for lethal control is difficult. So we will determine our solution on a case-by-case basis. For example, in some areas, beaver activity (e.g., ponding, flooding, tree-girdling, tree-falling, etc.) enhances our management objectives for wildlife and habitats. In other areas, extensive beaver activity (e.g., tree-falling, trees dying from flooding), could begin to affect habitat significantly for migratory birds and other sensitive species. We would base our action on the extent and impact of beaver damage: how it affects sensitive resources, neighboring marshes and fields, refuge infrastructure, and accessibility. When non-lethal techniques are not feasible, or they are no longer a viable remedy, we will consider targeted trapping.
2. Employ integrated pest management techniques, including those described in the examples above, when a species is having a significant impact on an area resulting in major habitat replacement and loss of valuable canopy trees (such as oaks).
3. Monitor results to ensure that pests do not exceed acceptable levels.

Biological and Ecological Research and Investigations

The Refuge Manual and the Service Manual both contain guidance on conducting and facilitating biological and ecological research and investigations on refuges. In 1982, the Service published three objectives in the Refuge Manual for supporting research on units of the Refuge System (4 RM 6.2):

1. to promote new information and improve the basis for, and quality of, refuge and other Service management decisions;
2. to expand the body of scientific knowledge about fish and wildlife, their habitats, the use of these resources, appropriate resource management, and the environment in general; and,
3. to provide the opportunity for students and others to learn the principles of field research.

In 2006, the Service Manual provided supplemental guidance on the appropriateness of research on refuges: “We actively encourage cooperative natural and cultural research activities that address our management needs. We also encourage research related to the management of priority general public uses. Such research activities are generally appropriate. However, we must review all research activities to decide if they are appropriate or not as defined in section 1.11. Research that directly benefits refuge management has priority over other research.” (603 FW 1.10D(4))

All research conducted on the refuge must be consistent with the approved finding of appropriateness and compatibility determination for research. Research projects will also contribute to a need identified by the refuge or the Service. As we note in chapter 2, we have allowed many research projects that meet these criteria. We expect additional opportunities to arise under any of the alternatives we propose in this draft CCP. A special use permit will be issued for all research projects we allow. In addition, we will employ the following general strategies.

1. Seek qualified researchers and funding to help answer refuge-specific management questions.
2. Participate in appropriate multi-refuge studies conducted in partnership with the U.S. Geological Survey.
3. Facilitate appropriate and compatible research by providing temporary housing and equipment, if available, for persons conducting fieldwork.

Protecting Cultural Resources

As a Federal land management agency, we are responsible for locating and protecting all historic resources: specifically, archeological sites and historic structures eligible for listing or listed on the National Register of Historic Places. That applies not only to refuge land, but also to land affected by refuge activities, and includes any museum properties. Our consultation with the Virginia State Historic Preservation Officer (VA SHPO) indicates 36 archeological sites have been recorded on refuge land. Considering the topography of the area and its proximity to watercourses, additional prehistoric or historic sites likely may be located in the future. We expect their density on the refuge to be high. The archeological remains of prehistoric camps sites or villages most likely will be located along the streams, where early inhabitants would have had ample water, shelter, and good opportunities for fishing and hunting.

Under all the alternatives, we will evaluate the potential for our management activities to impact archeological and historical resources as required, and will consult with the VA SHPO. We will be especially thorough in areas along the river, where the probability of locating a site is higher. We will ensure compliance with Section 106 of the National Historic Preservation Act, regardless of the alternative implemented. That compliance may require any or all of the following: a State Historic Preservation Records survey, literature survey, or field survey.

We will also continue to maintain, to the standards of Federal historic preservation, the two structures eligible for inclusion on the National Register of Historic Places: the Wilna plantation house and the detached kitchen. The substantial repair of the exterior fabric on the plantation house recently was completed, and we will continue with plans to repair its interior, as well as the detached kitchen house.

Wildlife-Dependent Recreational Program

The National Wildlife Refuge System Improvement Act of 1997 designated six priority public uses on National Wildlife Refuges: hunting, fishing, wildlife observation, photography, environmental education, and interpretation. Per the General Guidelines for Wildlife-Dependent Recreation, Fish and Wildlife Service Manual, 605 FW 1, we will strive to meet the following criteria for a quality wildlife-dependent recreation program:

1. promotes safety of participants, other visitors, and facilities;
2. promotes compliance with applicable laws and regulations and responsible behavior;
3. minimizes or eliminates conflict with fish and wildlife population or habitat goals or objectives in an approved plan;
4. minimizes or eliminates conflicts with other compatible wildlife-dependent recreation;
5. minimizes conflicts with neighboring landowners;
6. promotes accessibility and availability to a broad spectrum of the American people;
7. promotes resource stewardship and conservation;
8. promotes public understanding and increases public appreciation of America's natural resources and our role in managing and conserving these resources;
9. provides reliable/reasonable opportunities to experience wildlife;
10. uses facilities that are accessible to people and blend into the natural setting; and,
11. uses visitor satisfaction to help to define and evaluate programs.

A community survey we conducted with assistance from USGS in 2006 indicates that all six priority uses of the Refuge System are desirable by at least 25 percent of the respondents, with stronger preferences for some activities more so than others. For example, fishing was rated as a highly desirable activity by 75 percent of those who responded to our survey. All of the priority public uses will continue to be offered to some degree on this refuge.

In recent years, the Service has recognized the importance of connecting children with nature. Scholars and health care professionals are suggesting a link between a loss of connection with the natural world and many physical and mental maladies in our nation's youth (Louv 2005). We will continue to promote the concept of connecting children with nature in all of our compatible recreational programming. Our partners, Friends, and/or other volunteers will continue to help us expand those and other priority public use programs. We will also continue to coordinate with the VDGIF on hunting and fishing programs, as well as efforts to promote the Virginia Birding and Wildlife Trail.



Youth fishing day: USFWS

Appropriateness and Compatibility Determinations

Chapter 1 describes the requirements for determinations of appropriateness and compatibility. Appendix B includes appropriateness and compatibility determinations consistent with implementing alternative B, the Service-preferred alternative. Some of these are already approved, while others are presented here in draft. Our final CCP will include all approved findings of appropriateness and compatibility determinations for the alternative selected. These activities would be evaluated based on whether or not they contribute to meeting or facilitating refuge purposes, goals, and objectives. As noted above, hunting, fishing, wildlife observation and photography, and environmental education and interpretation, when compatible, are the priority general wildlife-dependent uses of the Refuge System. According to Service Manual 605 FW 1, those uses should receive preferential consideration in refuge planning and management before the refuge manager analyzes other recreational opportunities for appropriateness and compatibility.

Activities Not Allowed

We have received requests for non-priority, non-wildlife-dependent activities that we have never allowed on this refuge. In appendix B, we formally propose that the following are not appropriate on refuge lands: use of all-terrain vehicles, bicycling off-road, camping, dog training and field trials, pets, horseback riding, jogging off-road, picnicking, the use of pursuit dogs for hunting, and swimming and sunbathing. Appendix B documents the refuge manager's justification for why they are deemed not appropriate. Other ownerships nearby or elsewhere sufficiently provide most of those activities, so the lack of refuge access does not eliminate opportunities for those activities in the Rappahannock River Valley. According to Service policy, (603 FW 1), if the refuge manager determines a use is not appropriate, it can be denied without determining its compatibility.

Activities Allowed

Some activities are already approved through an existing finding of appropriateness and a compatibility determination. These include deer hunting, research, and cooperative farming. Those approvals are included in appendix B. In addition, we are formally proposing to allow other activities consistent with alternative B. Those activities include: wildlife observation, photography,

environmental education and interpretation, recreational fishing, hunting dog retrieval, and firewood cutting. The latter two activities have an approved finding of appropriateness, but their respective compatibility determinations are included as part of this CCP. Appendix B details our proposals for all of those activities.

Refuge Staffing and Administration

Our proposals in this document do not constitute a commitment for staffing increases, or funding for operations, maintenance, or future land acquisition. Congress determines our annual budgets, which our Washington headquarters and regional offices distribute to the field stations. Chapter 2 presents our levels of staffing and operating and maintenance funds for the refuge over the last 5 years. The activities shared among the alternatives we describe below pertain to staffing, administration, and operations. Implementing them supports all our refuge goals.

Permanent Staffing and Operational Budgets

In all the alternatives, our objective is to sustain levels of annual funding and staffing that allow us to achieve refuge purposes, as interpreted by the goals, objectives, and strategies in this CCP. We achieved many of our most highly visible projects since refuge establishment through special project funds that typically have a 1- to 2-year duration. Although those funds are very important, their flexibility is limited, because we cannot use them for any other priority project that may arise. As previously mentioned, funding for land acquisition derives primarily from two sources: the Land and Water Conservation Fund, and the Migratory Bird Conservation Fund. We generally direct the funds from those sources at specific acquisitions.

In response to declines in operational funding nationwide, we developed the “Strategic Workforce Plan for the National Wildlife Refuge System in Region 5” (Phase 2; January 16, 2007) to support a new base budget approach. Its goal is a maximum of 75 percent of a refuge station budget to cover salaries and fixed costs, while the remaining 25 percent or more will be operating and maintenance funds. Our strategy is to improve the capability of each refuge manager to do the project work of the highest priority, and not to have most of a refuge budget tied up in inflexible, fixed costs. Unfortunately, in a level or declining budget environment, that also may have implications for the level of permanent staffing.

In all the alternatives, and within the guidelines of the new base budget approach, we would seek to fill our currently approved but vacant positions, which we believe are necessary to accomplish our highest priority projects. Alternatives B and C also propose additional staff to provide depth in our biological and visitor services programs. We identify our recommended priority order for new staffing in the RONS tables in appendix D. The alternatives also seek an increase in our maintenance staff, because they provide invaluable support to all program areas. Appendix C identifies the staffing requests in each alternative.

Facilities Construction and Maintenance

We acquired the first parcel of land for the refuge in 1996, but it was not until 2000 that we began to direct significant funding toward the construction, rehabilitation, or maintenance of refuge facilities. Since 2000, we have made notable progress in rehabilitating old buildings for use as the refuge headquarters, for equipment storage and as a maintenance/shop area, constructing new visitor services facilities, and improving access and security. We have also removed nearly 20 old buildings that were no longer functional or that posed safety hazards. In 2007, we replaced two old houses with modular homes for use as refuge staff quarters and other refuge uses, and began rehabilitation of a third house. We plan to begin construction on a public roads improvement project in 2009.

Under all proposed alternatives, we will continue to make incremental progress in constructing new, modest, high-quality visitor services facilities such as interpretive and informational signs and small pavilions. We will also continue to make progress toward improving access and visibility for visitors. We have identified the need for additional directional signs both on and off site. We will work with the Virginia Department of Transportation to improve directional signage off-site.

Improved signage will help raise the visibility of the refuge and the Service in the region, which, as we learned from our 2006 community survey, is an important action to pursue. We will also continue to identify and remove those structures that have no useful purpose or that pose safety hazards. If appropriate, and to advance refuge objectives, we will seek funding to replace dilapidated structures with modern facilities. We must also take care to maintain both new and rehabilitated facilities to Service standards to keep them safe, fully accessible, functional, and attractive.

Refuge Operating Hours

All of the alternatives will open the refuge for public use from official sunrise to sunset, seven days a week, to insure visitor safety and protect refuge resources. However, the refuge manager does have the authority to issue a special use permit to allow others access outside those periods. For example, we may permit access for research personnel or hunters at different times, or organized groups to conduct nocturnal activities, such as wildlife observation, and educational and interpretive programs.



Cat Point Creek: USFWS

Conducting a Wilderness Review

The Refuge System planning policy requires that we conduct a wilderness review during the CCP process. The first step is to inventory all refuge lands and waters the Service owns in fee simple. Our inventory of this refuge determined that no areas meet the eligibility criteria for a wilderness study area as defined by the Wilderness Act. Therefore, we did not analyze further the refuge's suitability for wilderness designation. See appendix E for the results of the wilderness inventory. The refuge will undergo another wilderness review in 15 years as part of the next comprehensive conservation planning process.

Conducting a Wild and Scenic Rivers Review

Service planning policy also requires that we conduct a wild and scenic rivers review during the CCP process. We inventoried the segment of the Rappahannock River that flows through the refuge, and determined that it meets the criteria for wild and scenic river eligibility, in that it is free flowing and possesses at least one “Outstanding Remarkable Value” (see appendix F). However, we are neither pursuing further study to determine suitability, nor recommending this segment of the river at this time, because of the multitude of ownerships within the boundary of the analysis area and our limited ownership. Should another state or Federal agency, or a non-governmental partner, initiate a study, we would participate in that effort.

Monitoring and Enforcing Farmers Home Administration Easements

From the late 1980s to the mid-1990s, the Farmers Home Administration (FmHA) acquired many properties in central and southwest Virginia through foreclosure sales. Under the terms of a memorandum of understanding between the FmHA and the Service, a review team consisting of their staff, our staff, and staff from the USDA Natural Resources Conservation Service and the Agricultural Stabilization and Conservation Service evaluated those properties for their conservation value. Based on those evaluations, and before reselling those properties, the FmHA placed permanent conservation easements on some of them to protect wetlands and other important wildlife habitats. The responsibility for enforcing and monitoring those easements rests with the Service, which delegated it to the manager of the closest refuge: in many cases, the Presquile refuge.

Because we now manage the Presquile refuge as a satellite of the refuge complex, the responsibility for managing eight of those easements rests now with the project leader stationed at the Rappahannock River Valley refuge. On three occasions since 2001, the project leader has acted to enforce the terms of those easements. The time required in each instance averaged about 2 to 3 workdays.

It is difficult to predict how much time and effort this responsibility will require in the future. However, under any of the alternatives presented herein, the responsibility will remain with the project leader stationed at Rappahannock River Valley Refuge for now. If we were to begin sustained and systematic monitoring of those easements, rather than only the current opportunistic enforcement, the time commitment would be substantially greater than it has been to date. We do not anticipate having the staff available to monitor on a regular basis, but it is possible and desirable to begin a modest monitoring program so that we visit each easement at least once every 5 years.

We will employ the following strategies to discharge our responsibilities in managing FmHA easements.

- 1) Respond to reports of violations or possible violations, as we learn of them. Work with landowners, utilizing partnerships where possible, to cooperatively resolve and remedy the violations. If necessary, work with the Regional Solicitor or Assistant US Attorney’s Office to ensure remediation and future compliance.
- 2) Develop a process to begin regular inventory and monitoring of FmHA easements to visit each easement once every 5 years. Work with partners and other Service offices to assist when possible.

Cooperative Farming

We will continue to use cooperative farming on an interim basis, while we work to convert former and current agricultural lands into native habitats in support of the Service policy on Biological Integrity, Diversity and Environmental Health (601 FW 3). The final environmental assessment to establish the refuge provides for the use of cooperative farming as a viable resource management opportunity in the management of the refuge. The use of cooperative farming as an interim measure will keep fields open in preparation for conversion to native plants, and will help us properly establish newly converted early successional habitats. It has been an integral component of refuge habitat restoration and management.

As of 2007, the program included 210 acres on the Tayloe tract. In lieu of paying rent for the use of refuge farm fields, the cooperator supports the accomplishment of our habitat management objectives by performing farming-related activities (discing, planting, spraying, and mowing) on farm fields as they come out of agricultural production, in support of our annual habitat management program and activities. The program will adhere to the general conditions for cooperative farming programs listed in the Refuge Manual (6 RM 4 exhibit 1). All operations on refuge cropland must conform to the best farming and soil conservation practices.

Although the cooperative farming program will stay important in our habitat program over the next few years, we plan to phase it out by 2012 (refer to appendix B, compatibility determination for cooperative farming). During that phase-out period, we will continue to evaluate the role of cooperative farming as a tool in achieving our long-term management goals. If we determine that it can provide substantial benefits that we would not attain otherwise, we may reverse our decision to phase it out in 5 years, and keep some fields in agricultural production. That decision would require a new compatibility determination and public review.

The cooperator must have prior approval of the refuge manager before applying any pesticide. The cooperator must supply the refuge manager, at least three months before farming, a label containing the common name of the pesticide, its application rate, number, and methods, and target pests. The cooperator, at the time of application, must complete a pesticide spray record furnished by the refuge. Those records provide the refuge information on trace residues and improve pest control practices.

Another activity we will evaluate over the next 5 years is the possibility of keeping a small area in agriculture to demonstrate and interpret best farming management practices that protect water quality and benefit wildlife habitat. That would promote both sustainable and conservation-oriented farming techniques, and would be included as part of our outreach and interpretation program. We believe it is important to continue to highlight the evolution of professional wildlife management principles, which now suggest that the maintenance of native plant communities offers more benefits overall to wildlife than planting annual food plots. Because that concept is relatively new, the need is compelling to share information and expertise among all interested parties. The Rappahannock River Valley, with its centuries-old traditions of agriculture, offers excellent opportunities for this kind of interpretation.

Cutting Firewood

We have determined that public firewood cutting may be advantageous to refuge management, especially in the aftermath of large storms. Experience has shown that hurricanes and other large storms often leave many downed trees across refuge roads or in other places where they impede operations and management. By offering opportunities to cut and remove firewood, we save operational funds and provide a service to the community. We may require a small fee, and specify the terms and conditions in a special use permit, depending on the circumstances of each situation. We may offer the same opportunity to refuge staff, under the same conditions and fees as those for the public. The staff privilege requires approval from the Regional Director.

Distributing Refuge Revenue Sharing Payments

As we describe in chapter 2, we pay the following counties in Virginia annual refuge revenue sharing payments based on the acreage and the appraised value of refuge lands in their jurisdiction: Caroline, Essex, King George, Richmond, and Westmoreland. Those annual payments are calculated by formula determined by, and with funds appropriated by, Congress. All of the alternatives will continue those payments in accordance with the law, commensurate with changes in the appraised market value of refuge lands, or new appropriation levels dictated by Congress. Future acquisitions may add other counties.

Actions Common to Alternatives B and C Only

Alternatives B and C have several actions or activities in common, which are not included under alternative A. These are listed below.

New Headquarters and Visitor Facility

A high priority related to refuge facilities needs would be the construction of a new headquarters and visitor contact facility. The present headquarters is located in the Wilna House, an early to mid-19th century farmhouse, which has been determined eligible for inclusion on the National Register of Historic Places. Over the past 175 years, parts of the house have been upgraded and modernized, but it retains much of its original construction material and charm. However, its builders never intended it to serve as government office space, and it does not serve that function well, particularly in terms of accessibility, accommodation of space for both visitors and staff, and utilities.

In December 2006, we evaluated potential sites for a new headquarters and visitor welcome center. The evaluation team comprised volunteers from the Core Planning Team (G. Hall (VDGIF), J. Study (FWS), and S. Lingenfelter (FWS)) and refuge staff (the manager, deputy manager, and maintenance worker). We evaluated four refuge tracts, all owned in fee title: the Hutchinson, Tayloe, Wellford, and Wilna tracts (see map 1.1 for their locations). In that evaluation, we used the following criteria (shown in alphabetical order).

1. accessibility to major road(s) (to increase public visibility, provide easier access to the visiting public, and provide easier access for staff to reach other destinations)
2. aesthetics
3. archeological concerns
4. availability of on-site recreation/interpretation opportunities
5. distance to other refuge properties, especially those requiring management
6. distance to local infrastructure (e.g., police, fire, business, other government agencies)
7. existing support facilities and space to construct new storage and maintenance facilities
8. existing utilities in place
9. long-term maintenance, for example, a long entrance road, trees that might blow down along a road, or potential for flooding
10. potential for the disturbance of surrounding habitats/wildlife
11. potential for the disturbance of adjoining or nearby landowners
12. suitability of soils for new buildings
13. other (any other criterion, including the potential for using “green” infrastructure)

We rated the potential sites issuing points according to the criteria above. The ratings we applied were +2 points (excellent), +1 points (good), 0 (neutral), -1 points (poor), or -2 points (very poor). After we averaged the numerical rankings, the Hutchinson tract (13.4 points total) was the preferred location, followed by the Tayloe (10.0 points), Wellford (9.6 points) and Wilna (3.8 points) tracts.

The Hutchinson tract location is analyzed further in chapter 4 of this draft CCP/EA. Even if this site is selected in the final decision, we are unsure when funding could be made available. If, in the interim, new significant information or opportunities become available, we would conduct another evaluation as warranted and/or we would ensure that the criteria and rankings we used in 2006 remain valid and complete. Until the funding for construction becomes available, or we acquire a more suitable building site, we will continue to use the Wilna House as our headquarters and primary office space.

The Service has developed standard designs for new refuge headquarters and visitor welcome centers. Given our projected staffing and visitation numbers, we would likely receive the smallest of the three standard designs. That design, approximately 6,845 sq ft at an estimated cost of \$4 million, accommodates a staff of 10 or fewer and visitation of 70,000 or fewer. However, in 2006, our Regional Director instructed all Service offices in the Northeast Region to evaluate the potential for co-locating offices, to reduce the current number of offices located in rented space, provide more efficient customer service, and enhance intra-Service cooperation and collaboration. He also encouraged co-locating with state fish and wildlife and other natural resource agencies. Depending on the outcome of the evaluation of offices in eastern and central Virginia, we may require substantially larger office space to accommodate staff from other Service divisions or state agencies.

Completing Refuge Step-down Plans

Service planning policy identifies 25 step-down plans that may be applicable on any given refuge. We have identified the 10 plans below as the most relevant to this planning process, and we have prioritized their completion if they are not already developed. This draft CCP presents sections of the refuge habitat management plan (HMP) that require public review; we will incorporate them into the final version of the HMP immediately after the approval of the final CCP.

The annual habitat work plan (AHWP), an inventory and monitoring plan (IMP), and an integrated pest management Plan (IPM) are also identified as high priority step-down plans to complete, regardless of the alternative selected for implementation. We describe them in more detail below. To keep them relevant, we will modify and update them as we obtain new information. The completion of these plans supports all refuge goals.

All of the alternatives incorporate by reference the following completed plans.

- Hunt Plan, completed in 2001
- Fire Management Plan, completed in 2002 with plans to update December 2008 (also see Appendix H for general fire program direction).
- Fishing Management Plan, completed in 2003
- Environmental Education Plan, completed in 2004
- Avian Influenza Plan, completed in 2007
- Hurricane Action Plan, completed in 2008 (updated annually)
- Chronic Wasting Disease Plan, completed in 2008

The alternatives schedule the completion of the following step-down management plans.

- HMP, which we will immediately begin working on following CCP approval (see discussion below, and discussion on NEPA requirements on page 2-17)
- AHWP, annually after CCP approval (see discussion below)
- Safety Plan, within 1 year of CCP approval.
- IMP, within 2 years of CCP approval (see discussion below)
- Visitor Services Plan (VSP), which would incorporate the previously approved hunt and fishing plans within 3 years of CCP approval, assuming we hire a visitor services professional
- Law Enforcement Plan, within 3 years of CCP approval
- Facilities and Sign Plan, within 3 years of CCP approval
- Integrated Pest Management Plan (IPM), within 2 years of CCP approval (see discussion below)



Gray fox: ©John Fox

Habitat Management Plan

A HMP for the refuge is the requisite first step toward achieving the objectives of goals 1–3, regardless of the alternative selected for implementation. For example, the HMP will incorporate the selected alternative’s habitat objectives developed herein, and will identify “what, which, how, and when” actions and strategies we would implement over the 15-year period to achieve those objectives. Specifically, the HMP will define management areas and treatment units, identify the type or method of treatment, establish the timing for management actions, and define how we will measure success over the next 15 years. In this CCP, the goals, objectives, and list of strategies in each objective identify how we intend to manage habitats on the refuge. We based both the CCP and HMP on current resource information, published research, and our own field experiences. We will update our methods, timing, and techniques as new, credible information becomes available. To facilitate our management, we will regularly maintain our GIS database, documenting any major changes in vegetation at least every 5 years. As appropriate, we will incorporate the actions common to all alternatives into the HMP.

Annual Habitat Work Plan and Inventory and Monitoring Plan

The AHWP and IMP for the refuge are also priorities for completion upon CCP approval. Regardless of the alternative chosen, those plans also are vital for implementing habitat management actions and measuring our success in meeting the objectives. Each year, we will generate from the HMP an AHWP that will outline specific management activities for that year. The IMP will outline the methodology to assess whether our original assumptions and proposed management actions support our habitat and species objectives. We will prioritize our inventory and monitoring needs in the IMP. The results of inventories and monitoring will provide us with more information on the status of our natural resources and allow us to make more informed management decisions.

Integrated Pest Management Plan

The refuge's IPM plan will be completed within 2 years of CCP approval. The IPM supplements both the CCP and HMP with documentation on how to manage invasive or pest species. Along with a more detailed discussion of IPM techniques, this documentation describes the selective use of pesticides for pest management on the refuge, where necessary. Throughout the life of the CCP or HMP, most proposed pesticide uses on the refuge would be evaluated for potential effects to refuge biological resources and environmental quality. These potential effects would be documented in "Chemical Profiles" in the forthcoming IPM document. Pesticide uses with appropriate and practical best management practices (BMPs) for habitat management as well as cropland/facilities maintenance would be approved for use on the refuge where there likely would be only minor, temporary, and localized effects to species and environmental quality based upon non-exceedance of threshold values in chemical profiles. However, pesticides may be used on a refuge where substantial effects to species and the environment are possible (exceed threshold values) in order to protect human health and safety (e.g., mosquito-borne disease).

Additional NEPA Analysis

For all major Federal actions, NEPA requires the site-specific analysis and disclosure of their impacts, either in an environmental assessment (EA) or in an EIS. NEPA categorically excludes other, routine activities from that requirement. Generally, those include the administrative actions listed in chapter 4.

Most of the major actions proposed in the three alternatives and fully analyzed in this draft CCP/EA are described in enough detail to comply with NEPA, and would not require additional environmental analysis. Although this list is not all-inclusive, the following projects fall into that category:

- the HMP, including its uplands and wetlands habitat management programs;
- the IMP; new visitor services infrastructure planned; development of a new headquarters and visitor contact facility;
- controlling invasive plants;
- implementing an administrative furbearer management program; and,
- changing our priority public use programs, with the exception of new hunting proposals.

The current fire management plan, white-tailed deer hunting plan, and public fishing plan have already undergone the NEPA analysis process. Those environmental documents can be requested from refuge headquarters.

Proposing to evaluate new programs for waterfowl and turkey hunting, as discussed under alternatives B and C, would require separate NEPA analysis and public involvement. Assuming that our Regional Director selects one of those alternatives for implementation, we would pursue that analysis once we have developed the details of our new hunt proposals, which we expect to complete within 5 years of CCP approval.

Alternative A. Current Management (No Action)

In addition to the actions common to all, this alternative describes our current refuge programs on 7,711 acres (6,352 in full fee title; 1,359 under conservation easement) for habitat management, fish and wildlife inventories and monitoring, administrative infrastructure and staffing, and visitor services. Although we intend this alternative to describe a “snapshot in time” of current management actions, we are including activities we have put in motion but are not in their final, desired state. For example, we have several visitor enhancement projects which are in progress at the time of this writing.

Land Protection

As we describe under the heading “Protecting Land” above, we would continue to work with willing sellers and in partnership with other agencies and organizations to achieve the 20,000-acre goal for land protection detailed in the 1995 EA and LPP. We would continue to seek to increase the amount of land we protect through easements to balance better with the lands we acquire in fee title.

Habitat Management

Our present habitat management program uses the strategy of adaptive management. That a single growing season can produce conditions so dramatically different from those of the previous year necessitates that strategy. Chapter 2 presents the refuge habitat types in table 2.4 and by tract or refuge unit on figures 5-12.

Under current management, we would continue to manage refuge fee lands intensively, for example, using prescribed fire, mowing, herbicides, and discing on up to 700 acres of grassland/old-field habitat to sustain but not increase those areas in the early stages of succession. We would allow any open lands we may acquire in fee simple to revert to shrub and forest, or replace existing fields that are less suited for grassland management, while maintaining the same quantity overall. We would monitor and treat tracts of planted or reverting mixed hardwood forest for invasive species and disease, as funding and staffing permit: approximately 2,000 acres of older mixed forest and about 1,000 acres of planted pine forest. No other active forest management would occur.

The 210 acres of existing cropland managed through a cooperative farming agreement would continue for the interim, or as long as it remains compatible with refuge purposes. We would continue to monitor tidal marshes for the presence of *Phragmites* and other invasive plants, which we would treat as funding and staffing permit. We would manage wet meadows and small impoundments, which now compose only 56 acres, to provide habitat for waterfowl and other aquatic species, at the current minimal effort required (less than 8 hours annually).

Inventories and Monitoring

Under current management, we are conducting baseline surveys and monitoring the results of selected management actions. In recent years, we have conducted breeding bird surveys, anuran call counts, secretive marsh bird surveys, winter and summer bald eagle surveys, winter and breeding grassland bird surveys, wintering waterfowl surveys, a rare species and community inventory, and habitat monitoring. We would continue that level of monitoring and inventory, modifying existing protocols, adding new ones, and dropping old ones as necessary to gain information upon which to make adaptive management decisions. As with all of our activities, the degree to which we can conduct monitoring and inventories depends on the availability of funding and staff, including the contributions of partners and volunteers.

Visitor Services

The types of visitor service programs we provide would continue, and there would be no major changes to our infrastructure. Per year, we average 3 environmental education programs and 37 interpretive and outreach programs (30 off the refuge and 7 on the refuge). Wildlife observation and photography, white-tailed deer hunting, and fishing are the most popular. We predict a slight increase in visitor numbers per year on the refuge (about 10 percent), consistent with our observations of regional recreational trends.

Due to the layout of the refuge, we offer and manage public use differently on each tract. Only the Wilna tract is open for all six priority public uses (environmental education, fishing, hunting, interpretation, photography, and wildlife observation). The Tayloe, Port Royal, and Hutchinson tracts are open by reservation for wildlife observation, photography, and interpretation. Initiatives already underway will improve visitor access at the Wilna, Hutchinson, and Laurel Grove tracts, but we would establish no new facilities or uses beyond those now available or underway. We will continue white-tailed deer hunting on multiple tracts, and would adjust it annually to meet management and visitor services objectives. Figures 13-17, presented with alternative B in this chapter, depict the existing public use infrastructure.

Refuge Administration

In this alternative, refuge staffing would remain at seven positions for the refuge complex: six stationed in Warsaw, VA, at the refuge headquarters, and one in Charles City, VA. As part of our strategic workforce plan, the position at the Charles City sub-office will assist in visitor services for the entire refuge complex, and will manage day-to-day operations at the James River, Plum Tree Island, and Presquile refuges. The staff stationed in Warsaw would continue to share visitor services responsibilities for the entire refuge complex as well.

The headquarters office would remain at the Wilna House, and we would accomplish the upgrades necessary for safety, accessibility, and utility over time as funding permits. Old barns on the Wilna tract, renovated in 2003, would continue to function as shops for maintenance, equipment repair, and storage. We would either repair other old buildings, or declare them excess property and remove them.

We would maintain our present visitor service facilities as funds and staffing permit, but would construct no new ones. We would maintain the travel trailers for interns, researchers, volunteers and temporary employees as long as we can keep the trailers safe and sanitary, and they remain economical. The state maintains the mobile home office used by the VDGIF through a memorandum of agreement, which is subject to change by either party. In the discussion that follows, we describe in detail the goals, objectives, and strategies that we would implement under alternative A.

Goal 1: Contribute to the biological diversity of the mid-Atlantic region by protecting, enhancing, and restoring the refuge's upland habitats, with an emphasis on breeding, migrating, and wintering birds.

Objective 1.1 Short-structure Grasslands/Breeding Habitat

Over the next 15 years, continue to maintain and enhance up to 350 acres of short-structure native grasses and forbs, at heights ranging between 12 and 30 inches, perimeter-to-interior ratios ranging between 0.018 and 0.023, and with a minimum patch size of 50 acres to meet the breeding season habitat requirements (May through June) of grasshopper sparrows and priority grassland-dependent birds identified in the BCR 30 plan and the VA WAP.

Strategies

Continue to:

- Use habitat management decision tools (as in Watts 2000, or Upland Habitat Decision Analysis, Mitchell and Talbott 2003, unpublished on file at refuge office) and field evaluations to determine
 - 1) which fields are best to sustain as grassland habitat,
 - 2) which non-optimal grassland fields to replace with fields of higher potential for optimal grassland, and
 - 3) which fields coming out of crop production should be evaluated for their potential for optimal grassland habitat. Important criteria in the decision tool include the proximity to other grasslands or agricultural fields, shape, size, perimeter- to-interior ratio, and soil types.
- Remove trees and linear structures, such as fences or abandoned irrigation equipment, which cause fragmentation, edge effects, or the spreading of woody plant seedlings in grasslands. Consolidate adjacent fields separated by those edge-forming features into larger units.
- Use prescribed fire as needed to remove biomass, stimulate native grass and forb growth, or reduce woody encroachment or invasive plants. The timing depends on the specific fire objective: late winter, if biomass removal is the only objective, so that cover and food would still be available during most of the winter; or, early spring or late summer-early fall, if reduction of woody encroachment is necessary.
- Mow, brush-hog, or disc, and use herbicides, on an as-needed basis outside of the breeding season. Some fields will require annual treatment where trees are problematic. Use only EPA-approved chemicals to treat invasive plants after developing an annual pesticide use proposal for each chemical, approved by the Regional Contaminants Coordinator.
- Plant native species of grasses and forbs to improve stand cover with desired structural characteristics.
- Incorporate this habitat type in landbird point count surveys, migration and winter bird counts, and anuran call counts. Update the landbird point count habitat classification to reflect changes in the vegetation community that can be linked to corresponding shifts in the avian community.



Prescribed burning to improve wildlife habitat: USFWS

Monitoring Elements

- Continue the monitoring program as funding and staffing permit. That may include:
 - point counts established in grasslands for surveys during the breeding season at this latitude (late May through June) to provide abundance, relative abundance, and density data, where appropriate, on selected fields annually;
 - periodic vegetation surveys at established points for height-density measurements, and along established transects for species composition, grass-forb ratio, litter depth and bare ground;
 - invasive plant species scouting; and,
 - habitat quality evaluation of planted and non-planted grasslands.

Rationale

The Service has the responsibility for protecting migratory birds under the Migratory Bird Treaty Act and Executive Order 13186. Providing habitats for declining grassland-dependent species on this refuge will counter habitat loss elsewhere within the mid-Atlantic, western coastal plain region. We also consider the need of birds of conservation concern on a sub-regional or statewide scale as identified in the VA WAP and BCR 30 Plan, and for which the refuge appears to contribute some responsibility, such as eastern meadowlark (VA WAP Tier IV species) and American woodcock (VA WAP Tier IV and BCR 30 species of concern). Please refer to appendix A for definitions of conservation rankings.

Birds that depend on early successional habitats such as grasslands and shrubs are one of the fastest declining bird groups because of habitat loss and changes in farming practices. Grasshopper sparrows, for example, have declined at a rate of 3.7 percent across the United States from 1966 to 1994 (Sauer, et al. 1995). Habitat loss, conversion of pasture to intensive row crops, increased frequency of mowing, and lack of fire are cited as the causes of population declines of this and other grassland-dependent species (Vickery 1996). Grasshopper sparrow abundance on the two Northern Neck Breeding Bird Survey (BBS) routes has declined in recent years with the gradual disappearance of farms, changes in farming practices, and rising development near those routes. This decline has been noted, particularly during the past 3 years, where development has dramatically increased and the abundance of grasshopper sparrows has dropped by nearly half (Ake 2006, Portlock 2006).

Due to those regional and local population declines, several national bird conservation organizations and Federal and state agencies advocate management to benefit grassland birds as detailed in such plans as the PIF Area 44 Plan, the BCR 30 plan, and the VA WAP.

We designed our management objectives to provide quality habitat for a wide variety of grassland-dependent birds throughout the year, and distinguish between those birds that prefer short-structure grasslands (objective 1.1) versus tall-structure grasslands (objective 1.2). It is also important to note that, while our objective statements focus on birds of elevated conservation concern identified in those regional and state plans, we are also consistent with their mission to “keep common birds common.”

Field size and perimeter-to-interior (or edge to interior) ratio are important criteria for determining whether a given field is potentially suitable for breeding grassland-dependent birds. If the patches are too small in size or too linear in shape, there is a greater potential for adverse edge effects, such as predation or nest parasitism, as well as woody or invasive plant encroachment. Such patches have a high perimeter-to-interior ratio, making the interior more accessible to predators. The perimeter-to-interior ratio equals the length of edge around a patch divided by the area of the patch (Helzer and Jelinski 1999; Bakker, et al 2002).

That factor may influence the probability of occurrence of some species, and is another measure related to patch shape. Block shapes with less than 1,640 feet of edge per 2.5 acres provide more habitat that is distant from edges (Watts 2000). An ideal patch would be ample enough to accommodate a buffer zone of approximately 300 feet around the edge and provide ample effective interior for the target species nesting territories. Vickery, et al. (1999) recommends conserving grassland patches of 250 acres or more to benefit more area-sensitive species. Watts, et al. (1997) determines that grassland patches of less than 25 acres are better suited for shrub-dependent birds, another suite of bird species of conservation concern.

We designed our management strategies in the short-structure grasslands primarily to meet the breeding habitat requirements of the grasshopper sparrow. We selected that species as a management focus because we felt it would represent the habitat requirements of other grassland-breeding birds of conservation concern in our area. The grasshopper sparrow is an area-sensitive species: it will not settle in areas too small, and requires grassland habitat patches at least 30 acres in size. Grasshopper sparrow breeding territories range from 2–4 acres each, but they do not nest in isolation (Vickery 1996). They were more abundant and more frequent in larger patches of mixed prairie; however, perimeter-to-interior ratio was a better predictor of area sensitivity than patch size in a Canadian study on nine grassland passerines (Davis 2004). The best perimeter-to-interior ratio for grasshopper sparrow is 0.018 or lower (Helzer and Jelinski 1999).

According to Schroeder and Askerooth (1999), grasshopper sparrows show a preference for grasslands of relatively short stature, approximately 12 inches, during the breeding season, with a patchy distribution of bare ground on which to forage, and avoid areas with extensive shrub cover (Vickery 1996). Although they prefer short-structure grasses during the breeding season, these sparrows do use taller vegetation for other purposes, and at other times of the year. Woody stems and tall forbs are used for song perches (Vickery 1996, Schroeder and Askerooth 1999, Watts, et al. 1997, Vickery and Herkert 1999, Watts 1999). In addition, we have observed adult and fledgling grasshopper sparrows using intermediate to tall-structure grasslands throughout the summer and during migration (Spencer, personal observation).

Objective 1.2 Tall-structure Grasslands/Breeding Habitat

Over the next 15 years, continue to maintain and enhance up to 350 acres of tall-structure native grasses and forbs at heights averaging 30–40 inches in fields with a perimeter-to-interior ratio between 0.018 and 0.023, and in minimum patch sizes of 50 acres, with at least one field of 200 contiguous acres in size, to meet the breeding season (May through June) habitat requirements of high priority grassland-dependent birds identified in the BCR 30 plan and the VA WAP, such as the Henslow's sparrow and northern bobwhite.

Strategies

Continue to:

Same as in alternative A, objective 1.1, plus,

- Vary the manipulations or management techniques among fields to improve the diversity of native grasses and forbs and to create a mosaic of different grassland structural types.

Monitoring Elements

- Continue the monitoring program as funding and staffing permit as indicated under objective 1.1.

Rationale

Our rationale for alternative A, objective 1.1, describes the regional and local importance of managing for large, contiguous grassland habitats to support grassland-dependent birds of conservation concern, and other native wildlife. Further, objective 1.1 focuses on our managing approximately 50 percent of the refuge's existing grasslands and old-field habitat in a short structure. Our rationale for managing the remaining 50 percent of grasslands and old-field habitat in a tall structure follows.

We designed our management objective in the refuge's tall-structure grasslands primarily to benefit the entire suite of tall-grass-breeding birds in our area, and facilitate the establishment of stable, more easily maintained grassland fields. We have planted some fields in tall-grass species such as big bluestem, Indiangrass, and common sunflower. The most recently restored tall-grass fields are now dense and lack structural diversity, but over time, selective manipulations of those fields should promote a more complex patchwork that is diverse in structure and composition, the better to mimic natural grasslands.

We identify two targeted species in the objective statement (Henslow's sparrow and northern bobwhite). These species are identified as species of concern in both the BCR 30 and VA WAP plans. Henslow's sparrow nesting has not been documented on the refuge, while northern bobwhite are common nesters on several refuge tracts. We are hoping to eventually attract nesting Henslow's sparrows by managing refuge fields to meet their preferred vegetation characteristics and patch dimensions.

Henslow's sparrows formerly were common in Virginia's Atlantic western coastal plain, but their numbers have declined precipitously throughout the 1900s. More recent records and sightings of single singing males suggest scattered sporadic breeding in the area. The nearest official records of detections of the Henslow's are at Lewisetta (Northumberland County 1993) and Dunbrooke (Essex County 1993) (Rottenborn and Brinkley 2007, in press). The Radford Armory now appears to be the only established colony, except for rumors of another near Fort Pickett (Heath VARCOM Sept. 2006 personal communication).

The habitat essential for breeding Henslow's sparrows in the coastal plain includes communities of high marsh black needlerush and saltmeadow hay, but also large patches of grassland greater than 100 acres, with high litter depth, low forb cover, and low exposure of bare ground. This sparrow prefers tall grass up to 30–31 inches tall (VA WAP, 2005). No relationship is documented between perimeter-to-interior ratio and the probability of occurrence for Henslow's sparrow.

Although to our knowledge we do not have Henslow's sparrows here, because they were extirpated from this area, they do still occur elsewhere in Virginia. We believe that, under the management we propose, the refuge could serve as suitable habitat. The patch sizes and structural dimensions of the grassland we propose, designed with Henslow's sparrow needs in mind, will serve as the benchmark standards for guiding our tall-grass habitat management. However, it is important to recognize that our management of tall-grass and old-field habitats will benefit other species as well, such as the northern bobwhite, dickcissel, field sparrow, indigo bunting, blue grosbeak, eastern kingbird, and orchard oriole.

Northern bobwhites are a high conservation priority for our area. The loss of early succession habitat, particularly nesting cover and brood range, has been identified as the most significant factor limiting quail populations (VDGIF, 2008). The habitat loss and resulting population declines have been attributed to the loss of open lands to development, the transition to "cleaner" agricultural practices, and to increased predation pressures. While we are emphasizing northern bobwhite under this tall grasslands objective, according to the BCR 30 Plan, they require patches of bare ground interspersed with standing vegetation. Within this physiographic region, bobwhites also utilize active agricultural fields, early successional old fields, lightly grazed pastures, and recent clearcuts.

We also predict our management will benefit other grassland bird generalists, such as the field sparrow and indigo bunting. Incidentally, scattered small populations of dickcissels are also showing site fidelity to several of the refuge tracts with tall grasslands and return each spring and summer. Indications of breeding include sightings of both sexes and mating attempts. This is not a species of concern identified in either the VA WAP or BCR 30, however.



LeConte's sparrow: ©John Fox

It would be very desirable if we could also establish the nesting of bobolink, another declining grassland species, on the refuge. They are known to breed in Maryland, and the Virginia Gold Book reports that bobolinks are in the northwest part of Virginia only in sporadic colonies (Rottenborn and Brinkley 2007). Breeding locations are known in Virginia's Loudoun, Fauquier, Warren, Clarke, Highland, and Augusta counties (Heath, VARCOM, 2006 personal communication).

Objective 1.3 Grasslands/Migrating and Wintering Habitat

Over the next 15 years, continue to manage the grassland habitat, identified in alternative A, objectives 1.1 and 1.2, throughout the fall migration and wintering seasons (August through February) to provide forage and cover for wintering grassland birds identified as species of concern in the BCR 30 plan and the VA WAP, such as the savannah sparrow, eastern meadowlark, horned lark, northern harrier, barn owl, and for migrating grassland birds such as bobolink. The total acres and patch sizes are less stringent during migration and winter, but will be consistent with the management actions needed to maintain the short- and tall-structure breeding grassland bird habitat described in objectives 1.1 and 1.2.

Strategies

Continue to:

- Delay burning, mowing, or other treatments until late February or early March in those grassland fields where tree encroachment is not an imminent threat to maintaining quality grassland bird breeding or wintering habitat

Monitoring Elements

Continue the monitoring program as funding and staffing permit. That may include:

- winter grassland transect surveys for species composition and relative abundance of grassland birds in select fields;
- Christmas Bird Counts and other non-standardized but repeated observations of habitat use; and,
- evaluations of habitat quality between planted and non-planted grasslands.

Rationale

Our responsibility for providing grassland bird habitat is not limited to the breeding season. The refuge acquisition boundary also lies along the western Chesapeake Bay, an important migratory bird pathway of the Atlantic flyway. Migrating grassland birds stop or winter in refuge grasslands and fallow fields. Savannah sparrows, swamp sparrows, eastern meadowlarks, horned larks, northern harriers,

and American pipits are examples of grassland bird species that increase in abundance in the winter. Bobolinks are abundant locally during spring and fall migration (Rottenborn and Brinkley, 2007) and are observed consistently during migration on refuge tracts (Spencer personal observation). Sedge wrens are an occasional visitor at the refuge during migration. Barn owls use its fields year-round.

Objective 1.4 Stable, Long-term Shrub Habitat

Over the next 15 years, continue to manage stable, long-term shrub habitat in areas where our habitat management decision tool and field evaluations recommend shrub habitat over grassland or forest management, to support breeding high-priority shrub-dependent birds of conservation concern identified in the BCR 30 plan, such as the American woodcock, northern bobwhite, and prairie warbler, as well as species of moderate conservation concern, such the eastern towhee, brown thrasher, field sparrow, and whip-poor-will. Decision criteria favoring long-term shrub habitat include the presence of moist soils, habitat patch sizes below 25 acres, or patches in a configuration or location that do not justify intensive, mechanical grassland management.

Strategies

Continue to:

- Conduct individual field evaluations on all current refuge fields, using habitat management decision tools (as in Watts 2000, or Upland Habitat Decision Analysis, Mitchell and Talbott 2003, unpublished, on file at refuge office). Complete an evaluation of individual fields on current refuge lands within 3 years, and detail those decisions and implementation plans in the refuge HMP.
- Brushhog on a four-year rotational schedule (Watts 2000), or more frequently if necessary, those areas identified suitable for long-term shrub habitat which require active management, such as manipulating field corners, edges, and pockets formed by the forest/field interface.
- Identify areas of potentially long-term shrub habitats that could be self-maintaining by virtue of their hydrology (such as low-lying fields, semi-permanent wet meadows, beaver meadows, or dry, sandy soils).
- Plant native shrub species where warranted, and as funding and staffing resources permit, to prevent tall-tree encroachment. Also, promote establishment of volunteer, native shrub species, where appropriate, through selective thinning or occasional brush-hogging.
- Evaluate cooperatively farmed acres as they come out of production to determine their suitability as stable, long-term shrub habitats and the opportunity they provide to add the total acreage of shrub habitat.
- Incorporate this habitat type in landbird point count surveys, migration and winter bird counts, and anuran call counts. Update the landbird point count habitat classification to reflect changes in the vegetation community that can be linked to corresponding shifts in the avian community.

Rationale

Shrub-dependent species are another rapidly declining bird group due to the loss of this habitat type. Shrub habitats, because they tend to be transitional in nature in the eastern U.S., have been a fast-disappearing casualty to certain forestry and agricultural practices and increased development. Shrub-dependent birds will need to rely more heavily on intentional provisions of this habitat type by land managers.

American woodcock are morphologically classified as shorebirds, but their habitat preferences during the year include both uplands and wetlands. They favor woody succession habitats on more

moist soils where worms are abundant and use the shrubby forest floor for nest sites. Here they are also well camouflaged for daytime foraging. Because of the high moisture content, these areas tend to be composed of woody vegetation in either shrubs or young tree species or both. Woodcock also need more open, short-grass habitat for singing and display territory during the breeding season. Shrublands in close proximity to short grasslands are ideal.

Prairie warblers favor early succession forests where they can glean insects, especially leaf-eating caterpillars in the treetops and hide their nests in the foliage.

Eastern towhee and brown thrasher prefer drier shrubby habitats such as is typically found along forest and field edges where the growth is more complex and offers a variety of fruits, nuts, and insects among the leaf litter.

The field sparrow, a year-round resident of the refuge and environs, favors old-field/forest edges where woody encroachment, tall forbs, vines and shrubs are well represented in an otherwise open habitat, and where it can quickly flee for cover to the adjacent forest. That scenario frequently appears in landscapes containing a mosaic of field and forest or in regenerating cutover areas. They build their nests low to the ground in young saplings or shrubs. The whip-poor-will is still somewhat common in the rural landscape within the refuge boundary compared to more developed regions of the state, but is believed to be declining at about 23 percent per year between 1980 and 2005 in Virginia (USGS Breeding Bird Survey 2007). It is essentially a woodland species, but its preferred breeding habitat is early successional forests with little or no underbrush and abundant insects.

The vegetation structure and food supplies shrub habitats provide benefit other species, such as the blue-winged warbler and willow flycatcher, which use the refuge during migration, as well as breeding yellow-breasted chats, and resident gray catbirds.

Because of reduced exposure, patch-size requirements for shrub species are much smaller than the minimum size requirements for area-sensitive grassland species. Patches less than 25 acres provide suitable habitat. Minimum patch sizes vary according to habitat quality (vegetation density), landscape and surrounding vegetation.

In addition, shrub habitat is important because many other birds rely on it at various times during the year. Shrub habitat comprises various shrub species or a diverse mix of young trees that provides an abundance of insect food for breeding birds that need to consume large amounts of protein for reproduction and feeding young. Many shrub species bear fruit in the fall, which helps boost the fat reserves for migrating or over-wintering birds. The structural density in this habitat provides cover from predators and shelter from harsh weather. Shrubby, early succession patches in close proximity to interior forest breeding territories are important for the survival of fledgling forest birds, which feed on the abundant food sources in relative safety from predators in the dense foliage.

Open fields that are less than 25 acres, and have a high edge-to-interior ratio, are not suitable for grasslands, yet are adequate for shrub-dependent species (Watts 2000). We are evaluating all fields with the hydrology, soil type, and size and configuration that would not support quality grassland habitat for their potential as long-term shrub or wet meadow habitat.

Objective 1.5 Transitional Shrub Habitat

Over the next 15 years, continue to provide interim shrub and early successional forest habitat on approximately 600 reforested acres (planted or undergoing natural succession) to support breeding high-priority shrub-dependent birds identified in the BCR 30 plan, such as American woodcock and prairie warbler, and other species described in objective 1.4. This habitat would occur in a shifting mosaic of patches across the refuge as we implement decisions to allow fields, shrub, and young forest to transition to forest.

Strategy

Continue to:

- Allow some of the existing former crop fields on the Laurel Grove, Hutchinson, Tayloe, Thomas, Wellford Fee, and Wilna tracts, which are not optimal for grassland and would serve better to enhance riparian zones or as effective forest interior, to undergo natural succession or planting in native trees. That would provide temporary shrub habitat for approximately 10–15 years, until those areas reach a young forest stage.

Rationale

We describe the important contributions of shrub habitat under the rationale for alternative A, objective 1.4 above. The 600 reforested acres we describe in this objective are in the early stages of transition to forest, and will temporarily (approximately 10–15 years) provide the same structure and diversity, and thus the same benefits for species of conservation concern, as the long-term shrub habitat.

The former open lands that have been reforested now support priority shrub-dependent species such as American woodcock and prairie warbler, as well as other shrub species such as blue-winged warbler (migration), brown thrasher, eastern towhee, field sparrow, northern bobwhite, whip-poor-will, willow flycatcher (migration), gray catbird, and yellow-breasted chat, and fledglings of two focal forest species, scarlet tanager and wood thrush. Eventually, these lands will substantially increase the forest component of the refuge for migrating or forest-dependent birds.

Objective 1.6 Forest Habitat

Over the next 15 years, continue to protect and enhance the biological integrity, diversity and environmental health of the 3,332 acres of mature upland forests composed of mesic loblolly, mixed forest, and forest bottomland habitat types in patches of at least 250 acres, to benefit breeding forest interior birds of conservation concern identified in the BCR 30 plan and the VA WAP, such as the wood thrush and scarlet tanager.

Strategies

Continue to:

- Acquire land with upland mixed forest in fee simple or conservation easement. Build upon existing tracts where possible.
- Establish threshold criteria for responding to beaver damage, as noted in “Actions Common to All Alternatives” narrative, and for disease outbreak intervention.
- Perform early detection and rapid response control of invasive plants and other undesirable species.
- Target areas characterized by small or narrow patches of disjunctive forest stands that could be consolidated to increase effective interior, and reduce edge effects. Consolidate through the reforestation of openings (by either natural succession or the planting of native species) areas that are not otherwise serving another priority habitat need.
- Create connection corridors from isolated stands, as long as this does not fragment a managed grassland field, through native plantings or natural succession.
- Incorporate forest habitat types in landbird point count surveys, migration and winter bird counts, and anuran call counts. Update the landbird point count habitat classification to track changes in forest habitat relative to bird habitat use.

Monitoring Elements

- Continue the monitoring program as funding and staffing permit. That may include:

Continue to map and scout for the presence of disease, nuisance species, invasive plants, or any other threats to forest health.

Rationale

Under alternative A, this forest habitat objective combines all forest types on the refuge because our management is consistent among all forest types; namely, no within stand manipulations are planned and our focus would continue to be on protection through land acquisition. However, it should be noted that under alternative B, goal 1, we make a further distinction in our discussion on “forest habitat” and describe three specific forest types: upland mixed forest (objective 1.7), hardwood bottomland forest (objective 1.8), and loblolly pine forest (objective 1.9). This is to allow us to distinguish the planned management activities that differ among each forest type under that alternative.

Large tracts greater than 250 acres of mature or maturing deciduous forests are in limited supply, and increasingly are becoming fragmented on a landscape scale throughout the Rappahannock River Valley. In addition to providing breeding habitat for forest-dependent birds, these forests are important stopover sites during migration, and are wintering grounds for a variety of birds. They also provide year-round habitats for a number of amphibian species and at least three state-listed reptile species: the eastern hog-nosed snake, spotted turtle, and eastern box turtle. The VA WAP lists the hog-nosed snake as a Tier IV species, and the spotted turtle and eastern box turtle as Tier III species. It is essential that we maintain and enhance the biological integrity, diversity, and environmental health of our forest tracts according to Service policy 601 FW3. To this end, we have promoted the natural forest processes of succession, regeneration, senescence and decomposition, progression toward structural and species diversity, soil maturation, and the variety of hydrological regimes that add diversity to forest composition. These factors also serve as the foundation for quality habitat for other taxonomic groups such as reptiles, amphibians, and macro-invertebrates.

The refuge includes 3,332 acres of large, forested tracts of mature and maturing mixed hardwood, mixed pine-hardwood (e.g., oaks and pines constitute at least 25 percent of the stocking [Hamel 1992]), hardwood bottomland, and loblolly and Virginia pine. Because of the history of land use, the refuge forests are highly altered stands that tend toward various mixes of natural and managed species, age classes, configurations, sizes, and health conditions. In addition to the alterations on the more upland, level forest tracts, there is substantial diversity of structure, species, and forest types due to the steep ravines and drainages that bisect the forests. We are unaware of any stands of old growth, but also we have not done a detailed forest inventory on refuge lands. Many stands established opportunistically after agricultural production ceased. Another priority in this objective is consolidating those forested areas into 250-acre or larger patches, either through management or future acquisition.

The wood thrush and scarlet tanager are two high priority species that are common breeders throughout the refuge acquisition boundary and on existing refuge lands. We have selected them as focal species for management because their requirements for patch size, shape dimensions, and landscape context, as described in the PIF Area 44 Plan, BCR 30 Plan, VA WAP, and other plans would also benefit many other forest interior bird species, and a variety of amphibians and reptiles (Rosenberg, et al. 1999 and 2003). Other species identified in the BCR 30 plan and VA WAP that would benefit from our management include the eastern wood peewee, Kentucky warbler, cerulean warbler (migrant), Louisiana waterthrush, yellow-throated vireo, and whip-poor-will (Rosenberg, et al. 1999).

Highly suitable habitat for wood thrush and scarlet tanager consists of

1. mature or maturing deciduous, or mixed forest, patches containing a mosaic of age classes and structures, with some mid-story species and some areas of early succession
2. a shape approximating a circle or square to provide a low edge-to-interior ratio;
3. contiguous patches of at least 250 acres; and,
4. a context of 70-percent forest in the surrounding 2,500 acres, or is less than half a mile from an extensive forest tract.

Goal 2: Maintain the long-term biological integrity of the riparian habitat along the Rappahannock River and its tributaries for bald eagles and other migratory birds and resident wildlife

Objective 2.1 Riparian Habitat

Over the next 15 years, continue to maintain and enhance the health and diversity of the 1,360 acres of existing riparian habitat, on Service-owned or easement tracts, to provide food, cover, nest or roost sites for bald eagles and other native, riparian-dependent wildlife.

Strategies

Continue to:

- On Service-owned lands, widen vegetated riparian buffers to 330 feet or more or connect disjunctive vegetation buffers through planting of native trees, grasses or forbs, and through natural succession. Promote a native vegetation composition and structure to facilitate ecological function and the biological needs of focal species and the diversity of taxonomic groups using this habitat type.
- Enhance habitats through planting native forest or early successional land cover, and controlling invasive plants, when staffing and funding resources allow.

Monitoring Elements

- Continue the monitoring program as funding and staffing permit. That may include:
- monitor riparian buffers on refuge easement lands and continue to work with landowners to maintain or enhance the forest's buffering functions, if necessary.

Rationale

We define riparian habitat as upland vegetation, typically forested, within a minimum of 330 feet of open water in rivers and creeks, or marsh habitat. In determining the potential for riparian habitat within the entire refuge acquisition boundary, from Port Royal to Lancaster Creek, we used aerial photos to measure the miles of shoreline associated with the river, its tributary creeks, and the edge of marsh habitat. We calculated that 443 miles of shoreline lie in the refuge acquisition boundary: the river contributes 146 miles, and the creeks and marshes 297 miles.⁴ The refuge protects 8 percent of that total in fee title or easement on 34 miles of shoreline.

In translating that shoreline distance to riparian habitat, we estimate that we protect 1,360 acres of riparian habitat, or 8 percent of the total potential riparian area within the entire refuge acquisition boundary.

Protecting the headwaters of rivers and tributary creeks is vitally important to riparian habitat protection and management, but it is often viewed as a secondary consideration, after shoreline protection. In our view, both are crucial for conserving the overall health and integrity of riparian systems. Clearly, given the amount and distribution of current refuge lands, the direct role of the refuge in protecting and conserving riparian areas is somewhat limited within its acquisition boundary. However, we will continue to serve as a resource for local landowners, and encourage their voluntary pursuit of riparian conservation measures. We will also continue to work with our conservation partners in implementing education and outreach programs.

Bald eagles are a focal species for the refuge. They use riparian habitat for many purposes throughout the year including nesting, roosting, and cover. One primary reason bald eagles are drawn to the area is the quality riparian habitat supporting nesting and roosting in close proximity to foraging habitat. Wide forests are crucial for bald eagles so that, during the heat of the day, they can roost in the relatively cooler shade of the deep forest. See objective 2.2 for additional details of our management specifically for bald eagles.

Riparian areas are also important for other resident and migratory birds. The Northern Neck and Middle Peninsula, the two landmasses that compose the terrestrial portions of the Rappahannock River Valley, lie directly in the path of birds migrating along the western side of the Chesapeake Bay. Various raptors, migratory songbirds, great blue herons, and ospreys all use riparian habitat. Augmenting the widths and lengths of riparian habitat will greatly benefit the resting, staging, and stopover needs for migrating birds, and continue to support year-round resident birds.

Wider riparian buffers also benefit other forest-dwelling species such as reptiles, amphibians and mammals. Wider buffers provide greater ecological benefits for those other wildlife, and for water quality and aquatic resources. We have established 330 feet as a minimum width for our riparian areas to maintain nesting habitat for area sensitive birds (Fischer and Fischenich 2000). Our management will emphasize actions to create the riparian zone widths that meet or exceed that distance.

Objective 2.2 Bald Eagle Roost and Nest Sites

Over the next 15 years, protect all known bald eagle roost and nest sites on refuge lands, which may vary in number and location each year, to prevent the disturbance of roosting and nesting birds, and ensure that there is no loss or degradation of vegetation supporting known sites.

Strategies

Continue to:

- Explore shoreline stabilization techniques (such as native plantings of beach grasses, or other means as deemed compatible), as funding and resources permit, to stem erosion in areas of high-energy wave action, if feasible.
- Use prescribed fire and mechanical thinning techniques to maintain a relative open understory and promote regeneration of future roost trees.
- Implement seasonal restrictions on public use to avoid any disturbing activities in roost areas.
- Incorporate this habitat type in ongoing biological surveys, such as habitat-based landbird point count surveys, winter and summer bald eagle surveys, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications in riparian zones would continue to track changes in riparian vegetation to reflect changes in bird use.
- Engage in public outreach and education and facilitate opportunities to demonstrate riparian habitat protection on the refuge.

Monitoring Elements

- Continue the monitoring program as funding and staffing permit. That may include:
- monitor changing bald eagle roost site use and make modifications or repairs as necessary to ensure favorable roosting conditions at the site.
- monitor and control invasive plants, erosion, human disturbance, and other sources of habitat degradation as staff and resources permit to protect the integrity of the roost site, nest site, and/or concentration areas on refuge lands.

Rationale

We describe the importance of riparian habitat under alternative A, objective 2.1. Actively managing this habitat type to encourage and sustain bald eagle roosting and nesting is one of our highest priorities. Currently we know of 2 roost sites and 8 nest sites on refuge lands, but this number can vary each year, as can their locations. Our annual monitoring program, in cooperation with the Center for Conservation Biology, VDGIF and other partners, helps us identify new locations.

In addition to making provisions to protect riparian zones from the upland side, the protection of riparian areas from the river or creek-side, in particular those with bald eagle roost sites, is also very important. We are observing high-energy wave action causing the erosion of some banks and the loss of beaches and bald eagle roost trees. The Wilna tract, for example, has a 5-acre bald eagle roost site dominated by 35- to 50-year-old loblolly pine and older oaks that wave action and erosion have affected. We will continue to monitor that situation and pursue restoration projects as warranted.

Goal 3: Maintain and enhance the biological diversity and environmental health of tidal and non-tidal wetlands to benefit Federal-listed species, waterfowl and other migratory birds, fish and shellfish, reptiles and amphibians.

Objective 3.1 General Wetlands Protection

Over the next 15 years, continue to protect and enhance the quality of the existing 1,270 acres of refuge wetlands for the benefit of Federal-listed species such as sensitive joint-vetch, and wintering and breeding priority bird species as identified in the BCR 30 plan and VA WAP. In emergent fresh and brackish marshes, habitat for wintering waterfowl, including American black duck, mallard and wood duck, and for such species as Coastal Plain swamp sparrow, seaside sparrow, marsh wren, king rail and least bittern are a priority management consideration. In freshwater swamps, habitat for species such as Louisiana waterthrush and prothonotary warbler, and spotted turtle are a priority. In interior marshes and feeder streams, habitat for state-listed fish species of concern such as mud sunfish, alewife, American shad, American eel, and least brook lamprey are a priority management consideration.

Strategies

Continue to:

- Enhance existing forested or early succession buffers on headwaters of streams and the uplands surrounding wetlands through natural succession or planting of native species to enhance wetland water quality.
- Engage in outreach and public education events to increase private landowner awareness and participation in wetland conservation programs.
- Implement recovery tasks for the sensitive joint-vetch as identified in the Sensitive Joint-Vetch Recovery Plan (USFWS/NE 2005)
 - Locate occurrences
 - Identify threats such as exotic invasive plant species, seed predation by corn earworm and tobacco budworm, water withdrawal, runoff, or significant changes in surrounding land use patterns
 - Where feasible, control invasive plants
- Encourage waterfront property owners and local planners in the surrounding community to implement the Chesapeake Bay Preservation Act

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permit. The following are all components of how we would measure our success with respect to our means and fundamental objectives, and the results may trigger adjustments to management strategic, or result in a re-evaluation or refinement of objectives. Examples include:
 - Invasive plants monitoring, particularly for *Phragmites*
 - Secretive marsh bird surveys
 - Midwinter waterfowl surveys
 - Priority wetland species surveys
 - Rate of beach erosion monitoring and identifying disturbance factors in sensitive areas

Rationale

One of the establishing purposes of the refuge is to protect and conserve wetlands (*Emergency Wetlands Resources Act of 1986*, 100 Stat.3582-91). Eighty percent of the breeding population of protected migratory birds in America and more than 50 percent of the total 800 species rely on wetlands (Mitsch and Gosselink 1993, citing Wharton, et al. 1982). Over 95 percent of the commercially harvested fish and shellfish species are wetland-dependent. Most freshwater fish depend on wetlands for spawning, and anadromous fish (e.g. shad, herring, sturgeon, and bass) rely on them as nurseries for young fry. Wetlands also provide essential ecosystem functions that technology has yet to rival such as flood mitigation (especially riverine wetlands), storm abatement, and nutrient and toxic material filtering and removal. Wetlands are also significant for global cycles of nitrogen, sulfur, methane and carbon dioxide (Mitch and Gosselink 1993).

The refuge acquisition boundary includes several distinct wetland habitat types.

- *Tidal freshwater emergent marsh* (also known as palustrine emergent wetlands): In these marshes, priority birds such as American black duck, wood duck, mallard, green-winged teal, common snipe, solitary sandpiper, spotted sandpiper, marsh wren, American bittern, least bittern, sora, and king rail occur. Forster's tern is also observed foraging in the associated open waters in summer.
- *Tidal freshwater swamp* (also known as tidal forested wetlands): In these swamps, priority birds such as the Louisiana waterthrush, prothonotary warbler (the only cavity-nesting warbler), worm-eating warbler, red-headed woodpecker, and wood duck occur.
- *Tidal brackish emergent marsh*: This habitat type contains more salt tolerant species than tidal fresh marshes. In these habitat areas, priority bird species such as American black duck, seaside sparrow, coastal plain swamp sparrow, marsh wren, northern pintail, and, as a rarer migrant or second breeder, sedge wren, occur.
- *Non-tidal riparian forested wetlands* (along the lowland margins and also known as hardwood bottomlands): In these habitat areas, high priority bird species such as Louisiana waterthrush, worm-eating warbler, cerulean warbler and Swainson's warbler (in the adjacent laurel thickets), and Kentucky warbler occur. Purple martin also may nest in snags in these areas, and several great blue heron rookeries and bald eagle and osprey nests are found along the riverine interface of these wetlands.
- *Wet meadows, ponds, and vernal pools*: These often are created by beaver activity in the upper reaches of the feeder creeks and drainages. In these habitat areas, priority species such as common yellowthroat, swamp sparrow (winter), willow flycatcher and sedge wren (migration) occur. Those areas are also important breeding grounds for amphibians. Fish may also be present. Depending on the expanse and depth of the water, green heron, pied-billed grebe, and teal may also use this wetland habitat.

Controlling and preventing the spread of invasive plants, particularly *Phragmites*, is an essential component of wetland protection and management of the Atlantic coastal states. *Phragmites* spreads rapidly and displaces native vegetation, posing a conservation threat to wetland-dependent species that evolved with the historic vegetative communities. *Phragmites* will negatively affect food and cover resources for many wildlife species and nesting substrate and spawning habitat for fish, and may raise the elevation of the marsh floor.

Currently, all refuge land that borders wetlands provides at least a 100-foot buffer in grassland or forest vegetation, but that is a very small fraction of what needs to be buffered and protected within the entire refuge acquisition boundary.

Objective 3.2 Shoreline Zone

Over the next 15 years, continue to protect and enhance refuge beaches and intertidal zones, including actions to minimize loss from erosion caused by high energy wave action, in order to benefit species such as nesting turtles, herons, and shorebirds that use this zone for foraging, roosting, or for access to adjacent riparian or marsh habitats for critical stages of their life cycles.

Strategies

Continue to:

- Stabilize eroding beaches through native plantings of beach grasses, coir logs, or other means as deemed compatible with the resources being protected, to stem erosion in areas of high-energy wave action.
- Engage in public outreach and education and facilitate opportunities to demonstrate beach habitat protection on the refuge.
- Manage public use in these areas to ensure compatibility of visitor activities, especially during sensitive times of the year for wildlife.

Rationale

Refuge lands currently include approximately 3 miles of beach or intertidal habitat mostly on the Wilna, Island Farm, Port Royal, and Styer-Bishop tracts. Tiger beetles, shorebirds, and nesting turtles either use this habitat for foraging or for gaining access to adjacent areas important to their life cycles. Erosion from tidal energy or wave action from boating is a concern, as is human disturbance from watercraft using near-shore areas. We will continue to explore and evaluate stabilization techniques to determine which is most effective and practical for refuge lands.

Goal 4: Promote enjoyment and stewardship of our Nation’s natural resources by providing quality, wildlife-dependent recreation and education opportunities on refuge lands and waters.

Objective 4.1 Deer Hunting

Over the next 15 years, continue to provide an annual deer hunt to manage the white-tailed deer population, protect habitat, and provide wildlife-dependent recreation on the Wilna, Wright, Tayloe, Hutchinson, Thomas, Port Royal, Toby’s Point, Mothershead, and Laurel Grove tracts.

Strategies

Continue to:

- Implement the annual lottery, permit-based hunt program. (See the additional details of the program in chapter 2, “Affected Environment,” “Visitor Services Resources—Priority Public Use Activities.”)
- Distribute annual special use permits to area dog owners, permitting access to retrieve trespass dogs during the deer hunt season. Continue to annually evaluate the program and make improvements when necessary.
- Obtain data from the VDGIF assessment of the health of the Northern Neck/Middle Peninsula deer populations and adjust the hunt program accordingly to assist in cooperative population management.
- Work with partners and volunteers to implement this program.

Rationale

The Improvement Act identifies hunting as priority wildlife-dependent recreation and it is an established traditional use in the local area. Executive Order #13443, issued by President Bush in August 2007, directs the Service and other land management agencies “...to manage wildlife and wildlife habitats on public lands in a manner that expands and enhances hunting opportunities, including through the use of hunting in wildlife management planning.” We have offered hunting on the refuge since 2002.

In 2002, we issued a final refuge hunt plan and environmental assessment after a 30-day period for public review and comment. The refuge hunt program first implemented in 2002 conformed to state regulations and additional refuge regulations stipulated in Title 50 of the Code of Federal Regulations. As the objectives in that hunt plan state, we intend to maintain the deer population at a level commensurate with available habitat, to maintain the health of the herd and prevent the habitat degradation that accompanies overpopulation.

We recognize hunting as a healthy, traditional outdoor pastime, deeply rooted in our American heritage. When managed responsibly, this activity can instill a unique understanding and appreciation of wildlife, their behavior, and their habitat needs, as well as their role in the surrounding environment. Additionally, deer hunting provides assistance with statewide deer population control efforts.

Using data collected by the VDGIF and their statewide population analysis, the refuge extrapolates population estimates and adjusts refuge program goals annually, as needed. General information and refuge specific hunting regulations can be seen in chapter 2, “Affected Environment,” “Refuge Visitor Services Program—Priority Wildlife-dependent Recreational Uses.” As in all refuge programs, we make special accommodations whenever possible to further facilitate accessibility, upon request.

Objective 4.2 Recreational Fishing

Over the next 15 years, continue to provide daily quality fishing opportunities at Wilna Pond on the Wilna tract.

Strategies

Continue to:

- Maintain accessible fishing pier. Pier may be closed certain dates for environmental education or deer hunting activities. We post notifications of those dates on the refuge website and on signs located at the refuge entrance and at the Wilna Pond at least 48 hours prior to its closure. However, it is possible that emergency situations may arise on the refuge resulting in closures not anticipated in advance.
- Maintain boat launch to facilitate hand-launch boat fishing access to the Wilna Pond. In an effort to provide fully accessible facilities, special use permits can be obtained from the refuge manager allowing the use of trailers to transport boats to the launch site.
- Improve and maintain Wilna tract access roads and parking areas.



Youth fishing day: USFWS

- Host the annual Kids' Fishing Day event for at least 30 youth, ages 5–15 years. The event includes a Fishing Clinic and fishing in the Wilna Pond. Partners for this event include the Friends group, Office of Fisheries Assistance, VDGIF, Boy Scouts, other youth organizations and private companies.
- Provide visitors with general information on the fishing program and refuge specific regulations through the refuge website, informational signs located at Wilna Pond, and the fishing brochure, which is available at the information sign located along the refuge entrance road and at the refuge headquarters.
- Work with the Friends group and volunteers to implement and maintain the fishing program.

Rationale

The Improvement Act identifies fishing as priority wildlife-dependent recreation. It states, "Compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System." As with hunting, we recognize fishing as a healthy, traditional outdoor past time. It, too, promotes public understanding and appreciation of natural resources and their management on all lands and waters in the Refuge System.

We have provided a recreational fishing program at the Wilna Pond on the Wilna tract since 2003. Additional details of the fishing program and refuge specific regulations can be seen in chapter 2, "Affected Environment," "Refuge Visitor Services Program—Priority Wildlife-dependent Recreational Uses." In preparing for that program, the Virginia Office of Fisheries Assistance in Gloucester, VA, conducted an assessment of the fishery resources and water quality parameters of the Wilna Pond in 2000. After a favorable assessment, we issued a "Fishing Management Plan and Environmental Assessment" following a 30-day period of public review and comment.

We will continue to provide recreational fishing opportunities at the Wilna Pond. Although no refuge fees are associated with this public fishing opportunity, we require anglers to comply with VDGIF regulations, which include obtaining a state fishing license. We have enacted additional refuge-specific regulations (see chapter 2, "Affected Environment," "Refuge Visitor Services Program—Priority Wildlife-dependent Recreational Uses") to minimize any impacts on wildlife and water quality. We make special accommodations whenever possible to facilitate accessibility further, upon request.

We will take an adaptive management approach to maintaining the fishery resources of the refuge. The 2000 assessment of the fishery and water quality at Wilna Pond allows us to measure changes over time, from which we would determine when to implement necessary changes to ensure the fishery resource remains healthy and sustainable. We will conduct future assessments in cooperation with the Office of Fisheries Assistance.

Objective 4.3 Wildlife Observation and Photography

Over the next 15 years, continue to provide opportunities for quality wildlife observation and photography daily at the Wilna tract, and by reservation at the Hutchinson, Tayloe, Port Royal, and Laurel Grove tracts. Provide public access on 9.21 miles of road and 2.40 miles of trail.

Strategies

Continue to:

- Provide daily, sunrise to sunset, access at the Wilna tract on designated roads and trails.
- Maintain 9.21 miles of public roads and 2.40 miles of trails that provide access to wildlife observation and photography opportunities.
- Provide general information on opportunity availability in the following publications and electronic media: Friends website, National Park Service Chesapeake Gateways Network website, Virginia Birding and Wildlife Trail website and guidebook, and refuge website and general brochure.
- Maintain existing benches, overlooks, and fishing pier at the Wilna tract.
- Construct and install informational signs with brochure racks at Wilna, Hutchinson, Tayloe, Port Royal, and Laurel Grove tracts.
- Improve parking areas at Wilna, Hutchinson, and Tayloe tracts.
- Complete Laurel Grove trail in cooperation with volunteers.
- Work with the Friends group and volunteers to implement and maintain wildlife observation and photography opportunities.
- Provide opportunities for expert-led bird or nature walks or observations of phonological events.

Rationale

The Improvement Act identifies wildlife observation and photography as priority wildlife-dependent recreation. They promote the understanding and appreciation of natural resources and their management on all lands and waters in the Refuge System.

Since 2003, the refuge has provided daily opportunities for wildlife observation and photography at the Wilna tract and, by reservation, at the Hutchinson, Tayloe, Port Royal, and Laurel Grove tracts. Those activities can take place on designated refuge roads, trails, piers, and overlooks (see figures 14-18).

Objective 4.4 Environmental Education

Strategies

Continue to:

- Facilitate the use of the Wilna tract outdoor classroom, for at least three visits per year, by encouraging partnerships with local educators and others with an environmental education curriculum based on refuge resources.
- Schedule education-oriented groups (e.g., school groups, Northern Neck Chapter of the Master Naturalists). Program details are in chapter 2, “Affected Environment,” “Visitor Services Resources—Priority Public Use Activities.”
- Provide staff or volunteer-led orientations to visiting groups.

- Maintain the Wilna tract as our primary outdoor classroom site. Environmental education visits receive priority use of the Wilna Pond fishing pier. We would notify visitors through the refuge website and signs posted on the refuge entrance road and at Wilna Pond.
- Utilize Wilna tract lodge as an indoor classroom. Maintain environmental education materials and supplies available for loan to visiting groups.
- Work with Friends of the Rappahannock and volunteers to maintain and implement the Environmental Education program.

Rationale

The Improvement Act identifies environmental education as a priority wildlife-dependent recreation activity. It teaches students the history and importance of conservation and ecological principles and scientific knowledge of our Nation's natural resources. Through that process, we can help develop a citizenry that has the awareness, knowledge, attitudes, skills, motivation, and commitment to work cooperatively toward the conservation of our Nation's environmental resources.

Environmental education within the refuge incorporates on-site and off-site programs and activities that address the audience's course of study, refuge purpose(s), physical attributes, ecosystem dynamics, conservation strategies, and the Refuge System mission. It promotes understanding and appreciation of natural resources and their management on all lands and waters in the Refuge System, and helps to raise awareness, understanding, and appreciation of the role of the refuge in the Chesapeake Bay watershed and its contribution to migratory bird conservation. The refuge has provided environmental education opportunities at the Wilna, Tayloe, and Hutchinson tracts for the past 5 years.

As discussed earlier in this chapter, in light of limited existing and projected refuge resources, we made a difficult decision at each refuge regarding which two of the six priority public uses would receive management emphasis. Although we determined that wildlife observation and hunting would be the priorities for this refuge, it still contains valuable resources that offer excellent environmental education opportunities without expending significant staff or funding.

Therefore, to provide those opportunities, we have established an educator-led program at the Wilna Pond. That site will serve as an outdoor classroom for teachers and other organized groups to explore the natural environments found in wetland, open water, grassland, and forested habitats on the refuge and includes access to an accessible restroom, pier, and nature trails. In 2007, we completed construction of a multi-purpose building adjacent to the site that will provide an indoor classroom space. Equipment such as microscopes, water testing equipment, nets, measuring devices, and other activity supplies is available to education groups visiting the refuge. By providing that equipment, the refuge staff hopes to encourage educator-led activities on-site. Although our Environmental Education Program encourages self-guiding visits, staff or volunteers will greet groups and provide a brief introduction. This site, with its environmental education opportunities, contributes to the Service objective of connecting children with nature.

Objective 4.5 On-site Interpretation

Over the next 15 years, continue to provide at least six informational signs at the Wilna, Hutchinson, Tayloe, Port Royal, and Laurel Grove tracts, and accommodate at least four pre-scheduled group visits annually.

Strategies

Continue to:

- Maintain three existing informational signs and brochure dispensers at Wilna and Hutchinson tracts.
- Provide staff or volunteer-led orientations to visiting groups.
- Install three additional informational signs and brochure dispensers at Tayloe, Port Royal, and Laurel Grove tracts.
- Provide interpretive talks and tours to at least four pre-scheduled groups.
- Allow partners to conduct compatible resource management programs at the refuge.
- Work with the Friends group and volunteers to maintain and implement this program.
- Provide informational brochures at existing informational signs at Wilna and Hutchinson tracts and refuge headquarters.

Rationale

The Improvement Act identifies interpretation as priority wildlife-dependent recreation. It includes activities, talks, publications, audio-visual media, signs, and exhibits that convey key messages about natural and cultural resources to visitors. It provides opportunities for visitors to make their own connections to the resource, which invites participation in resource stewardship and helps refuge visitors understand their relationships to, and impacts on, those resources.

The refuge interpretive program includes a variety of experiences that appeal to varying audiences, visitor interests, and learning styles. Quality self-guiding services as well as personal contacts enable us to reach a larger audience, be more readily available, and allow visitors to use them at their own pace, while still initiating discussion and providing answers to questions. Current efforts include on and off-site talks and tours as well as written information provided through informational signs, brochures, and websites. We use visitor and attendee feedback to evaluate the effectiveness of our program.

Objective 4.6 Off-site Interpretation

Over the next 15 years, continue to provide at least five off-site interpretive opportunities annually for civic groups, conservation organizations, and community events on a pre-scheduled basis.

Strategies

Continue to:

- Provide presentations for scheduled meetings of area civic groups and conservation organizations.
- Provide refuge-specific exhibits for scheduled fairs, festivals, and other community events utilizing interpretive displays.
- Maintain the refuge website to provide information on refuge resources, issues, wildlife, and habitat management highlighting its role in migratory bird conservation.
- Provide informational brochures to local businesses and distribution locations.

- Work with the Friends group and volunteers to implement and maintain the Interpretative program.

Rationale

Same as rationale for alternative A, objective 4.6

Goal 5: Communicate and collaborate with local communities, Federal and state agencies, and conservation organizations throughout the lower Rappahannock River watershed to promote natural resource conservation and the mission of the National Wildlife Refuge System.

Objective 5.1 Outreach to Elected Officials

Over the next 15 years, continue to inform elected officials, representing the 5 counties where current refuge tracts are located, about the refuge purposes and management activities on an annual basis, or as significant issues arise.

Strategies

Continue to:

- Make a personal appearance annually before the respective board of supervisors of each of the five counties, to present an update of refuge activities.
- Invite Federal, state, and local elected officials to attend and participate in outreach events held on the refuge.
- Invite Federal elected officials to attend guided tours of the refuge to display particular accomplishments, view outstanding natural resource areas, demonstrate management activities, and highlight challenges.
- Provide written or personal briefings for members of Congress, or their staffs, as needed or as requested, to inform them about important refuge issues.

Rationale

Gaining support from Federal, state and local elected officials is essential to meeting our goals. This can only happen when these elected officials are fully informed, and understand and appreciate the significant contribution of the refuge to the Refuge System and the quality of life and conservation of Federal trust resources in Virginia. We regularly inform elected officials about upcoming refuge events, and have hosted them on the refuge on several occasions.

Objective 5.2 Community Outreach

Over the next 15 years, continue to conduct up to 10 outreach programs or events annually, and initiate up to 10 news articles to increase community understanding and appreciation of the refuge's significance to natural resource conservation and its contribution to the Refuge System, and to garner additional support for refuge programs.

Strategies

Continue to:

- Issue news releases on significant accomplishments, to advertise special events, and to announce major management initiatives.
- Honor requests for speaking engagements by local community and civic organizations to inform members about refuge purposes and activities.
- Maintain refuge website
- Provide educational workshops on local natural resource topics and encourage citizen science projects

Rationale

We strive to develop an effective outreach program targeted at local communities and residents who may be unaware that a national wildlife refuge is nearby. It is particularly important that local residents understand, appreciate, and support the Refuge System mission and the refuge's unique contribution to that mission. Our current program consists of regular news releases, participation in community events, and regular presentations to local civic organizations.

Objective 5.3 Private Landowner Assistance/Invasive Plants

Over the next 15 years, continue to assist private landowners and other cooperators in controlling *Phragmites* on their lands.

Strategies

Continue to:

- Seek grant, matching, or in-kind funding contributions to continue our current *Phragmites* control initiative on private lands with cooperators

Rationale

The area within the refuge acquisition boundary totals over 250,000 acres. The refuge is authorized to protect up to 20,000 acres. There are many important habitats in the lower Rappahannock River Valley that will remain in private ownership, even when the refuge acquisition program is complete. The Fish and Wildlife Coordination Act of 1956 (16 U.S.C. 661) and the Fish and Wildlife Act of 1956 (16 U.S.C 742a-742j) allow Federal resources to be used on private lands. Using our expertise and resources to assist private landowners will provide more conservation value for fish and wildlife resources of concern, than if we only worked within refuge ownerships. This is particularly true with regard to invasive species control and other habitat restoration projects. Invasive species that are allowed to flourish on private lands can easily spread to refuge lands that may have been previously unaffected. Our efforts to assist private landowners are consistent with the "early detection-rapid response" approach to invasive species control advocated by the Service and its partners.

Our *Phragmites* control and education program, in conjunction with the Rappahannock *Phragmites* Action Committee, is one example of our successes in working with private landowners. We developed an outreach brochure and poster, and collaborated with more than 240 private landowners in controlling hundreds of acres of *Phragmites* along 70 miles of the Rappahannock River. We hope to continue to expand this effort over time to keep that invasive plant from increasing its territory, and to use it as a model to assist landowners in controlling other invasive plants on private lands.

In 2007, we also provided an invasive species workshop for the community, which was well attended. There is interest in expanding these workshops in other parts of the refuge area. We believe that many landowners in the vicinity of the refuge would gladly take on more responsibility in managing their lands to benefit wildlife if they had more assistance in the form of technical advice and a helping hand to get started, whether in controlling invasive species or restoring or enhancing habitat. Current staffing is insufficient to significantly expand our assistance to private landowners, but there are funding sources specifically targeted for improving wildlife habitat on private lands that could be competitively directed to the refuge to implement on-the-ground projects. We will employ innovative methods to structure a new position that draws from all available funding sources to expand our assistance to private landowners.

Objective 5.4 Intergovernmental Partnerships

Over the next 15 years, continue to maintain our collaborative relationships with Federal, state, and local governmental agencies to fulfill mutual natural resource conservation goals.

Strategies

Continue to:

- Offer office space to VDGIF through an existing memorandum of agreement, facilitating close collaboration on biological, recreational, and law enforcement programs.
- Collaborate with the Virginia Department of Conservation and Recreation on rare plant and animals, and exemplary plant community conservation, including invasive species control, through an existing Cooperative Agreement.
- Coordinate land conservation efforts with the Department of the Army at Fort A.P. Hill through an existing memorandum of understanding.

Rationale

We work closely with many agencies on special projects, sharing expertise and other resources. We would continue these partnerships, and encourage new ones, to enhance our ability to achieve goals and objectives.

Objective 5.5 Local Project Partnerships

Over the next 15 years, continue to coordinate with existing partners to help us meet our wildlife, habitat, and visitor services objectives.

Strategies

Continue to:

- Support and offer guidance to the Rappahannock Wildlife Refuge Friends organization
- With our Friends group, join other members of the Chesapeake Bay Gateways Network to highlight the natural bounty of the bay.
- Collaborate on special projects with existing partners, including the Alliance for the Chesapeake Bay, Essex County Countryside Alliance, Friends of the Rappahannock, garden clubs of the Middle Peninsula and Northern Neck, Middle Peninsula Land Trust, Northern Neck Audubon Society, Northern Neck Land Conservancy, Tidewater Resource Conservation and Development Council, Virginia Herpetological Society, Virginia Native Plant Society, Virginia Society of Ornithology, and other organizations with similar missions.
- Collaborate with educational institutions to conduct research and investigations to seek answers to important natural resource issues on the refuge and within the Refuge System and to contribute to our basic understanding of important natural resource issues.

Rationale

As in our discussion of land protection, working in partnership with others provides additional resources with which we can achieve our refuge goals and objectives. Our partners provide valuable assistance in accomplishing refuge projects in all our program areas.



Towing osprey chicks to a new platform: USFWS

Alternative B. Enhanced Habitat Diversity (Service-preferred Alternative)

In addition to actions common to all alternatives, alternative B represents an extension and progression of all areas of refuge management. Under alternative B, we would enhance and expand our grasslands management program, and would improve forest habitat conditions. We would construct a new administrative site and visitor contact facility and improve visitor infrastructure and programs.

Habitat Management

The maintenance of grasslands requires continuous management to keep that habitat from succeeding into shrub and forest stages and to control invasive species. Depending on the soil types, prior land use, and surrounding plant communities, grasslands may require annual, biennial or triennial treatments to return them to the desired conditions. We accomplish that most commonly by mowing and prescribed burning, but we sometime use herbicides, discing, and planting to increase plant diversity or to achieve desired structural characteristics.

Under this alternative, we would expand our intensive grassland/old field management up to a maximum limit of 1,200 acres. In addition to the techniques mentioned under alternative A, we may consider grazing as well. These management acres would include our existing 700 acres of grasslands, most of the 210 acres currently in cooperative farming, and an additional 200-250 acres of open land, of an appropriate size and shape, to be included in this management regime from future acquisitions. Cooperative farming as it exists today would be phased out within 5 years of approval of this CCP, unless it is determined that farming provides an added benefit to targeted wildlife species or could be a component of our interpretive outreach program describing the history of land use in the region and its affect on wildlife. Our implementing an adaptive management approach will facilitate those decisions, by allowing us to test other practices, monitor their impacts and compare them to current management, thereby providing a substantive basis for changing the farming program as results indicate.

We would monitor planted or existing mixed forest habitat types for invasive species and diseases, and treat them as funding and staffing permit. We would manage planted pine forest by pre-commercial and commercial thinning, and then leave it to mature and, eventually, convert to mixed pine and hardwoods. We would continue to monitor tidal marshes for the presence of *Phragmites* and other invasive plants, which we would treat as funding and staffing permit. If we encounter additional opportunities to restore previously drained wetlands, we may add to the present 56 acres of wet meadows for the benefit of waterfowl and other wetland-dependent species. As opposed to large, managed waterfowl impoundments, those areas are typically small, formerly drained areas that, with minimal management, can function as vernal pools for amphibians or small feeding areas for migrating and wintering birds.

Inventories and Monitoring

As with alternative A, we will continue existing monitoring and inventory efforts as long as they continue to provide useful information and we have the necessary resources to accomplish them. We will target any alterations or additions to these on-going surveys toward helping us understand better the implications of our management actions and ways to improve our efficiency and effectiveness. With the continuation and expansion of early successional habitats, we will likely continue to monitor the effects of our management techniques on targeted grassland species. We will also continue to seek ways to reduce our management costs for establishing and maintaining grasslands.

Visitor Services

Under alternative B, we would expand existing opportunities for all six priority public uses, with an emphasis on two of them: hunting and wildlife observation. Figures 13-17 present current and proposed public use opportunities under alternative B.

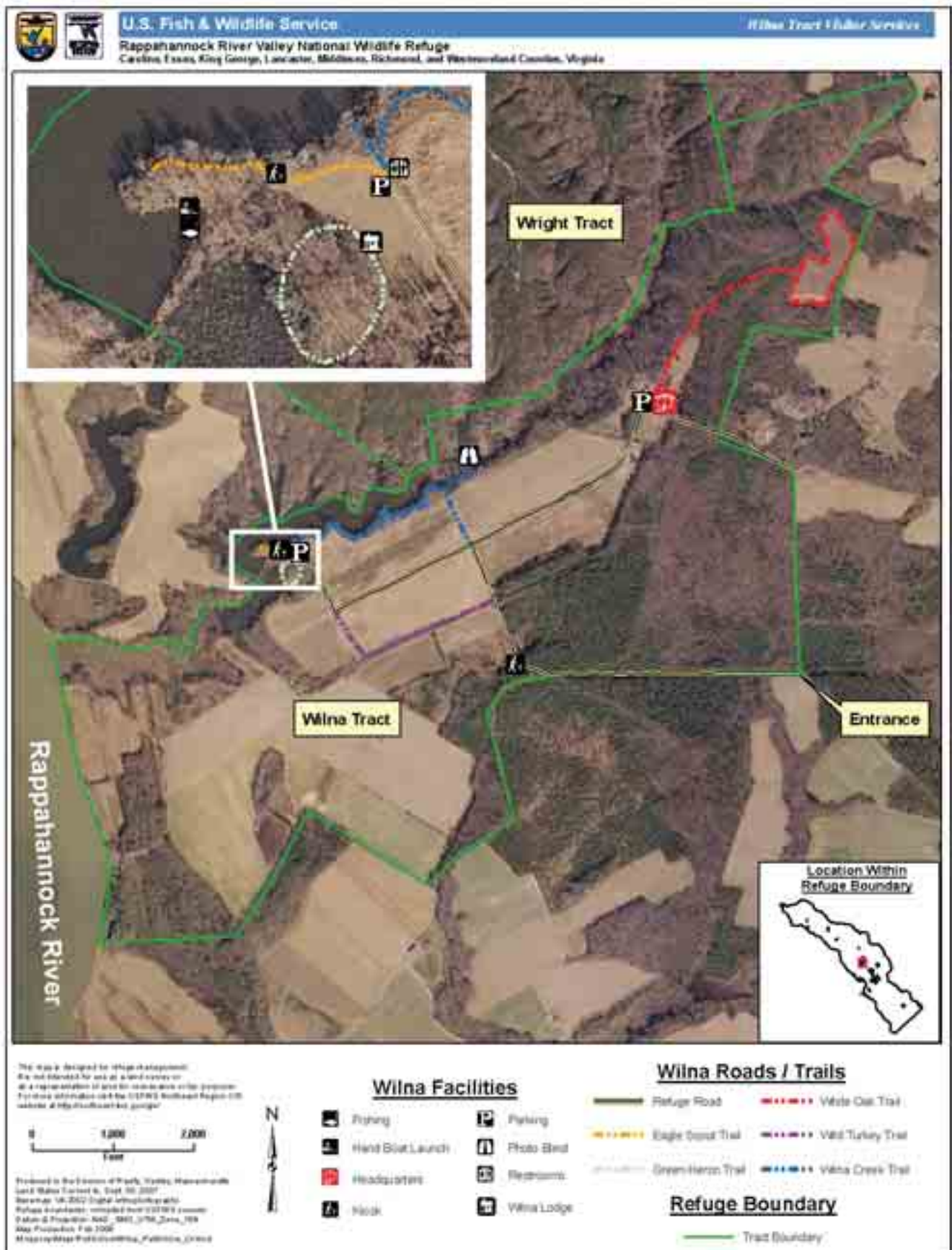
We will seek partnerships to help us achieve new and expanded programs, including new observation trails, interpretive water trails (in conjunction with the Chesapeake Gateways Network), and waterfowl and spring turkey hunting. Although we would not emphasize the other four priority uses to the same degree, we will also look for partnership opportunities to continue our modest interpretation and teacher-led environmental education programs, and provide additional access for freshwater fishing.

One of the interpretive messages that we would like to expand upon, if resources are available, is the role that farming has traditionally played in wildlife conservation over the past century, and why refuges have evolved from planting non-native crops to re-establishing native habitats as the best way to benefit fish and wildlife. It was not that long ago that the prevailing techniques for wildlife management included establishing food plots, often using annual plantings. A more recent Service policy on refuges is to focus on re-establishing native vegetation that historically occurred on the landscape where the refuge is located. This change in philosophy is still in its early stages and not yet well understood by many. Our planned interpretive message would acknowledge the important role that farming played in earlier eras of wildlife management, and discuss the rationale behind the more recent methods.

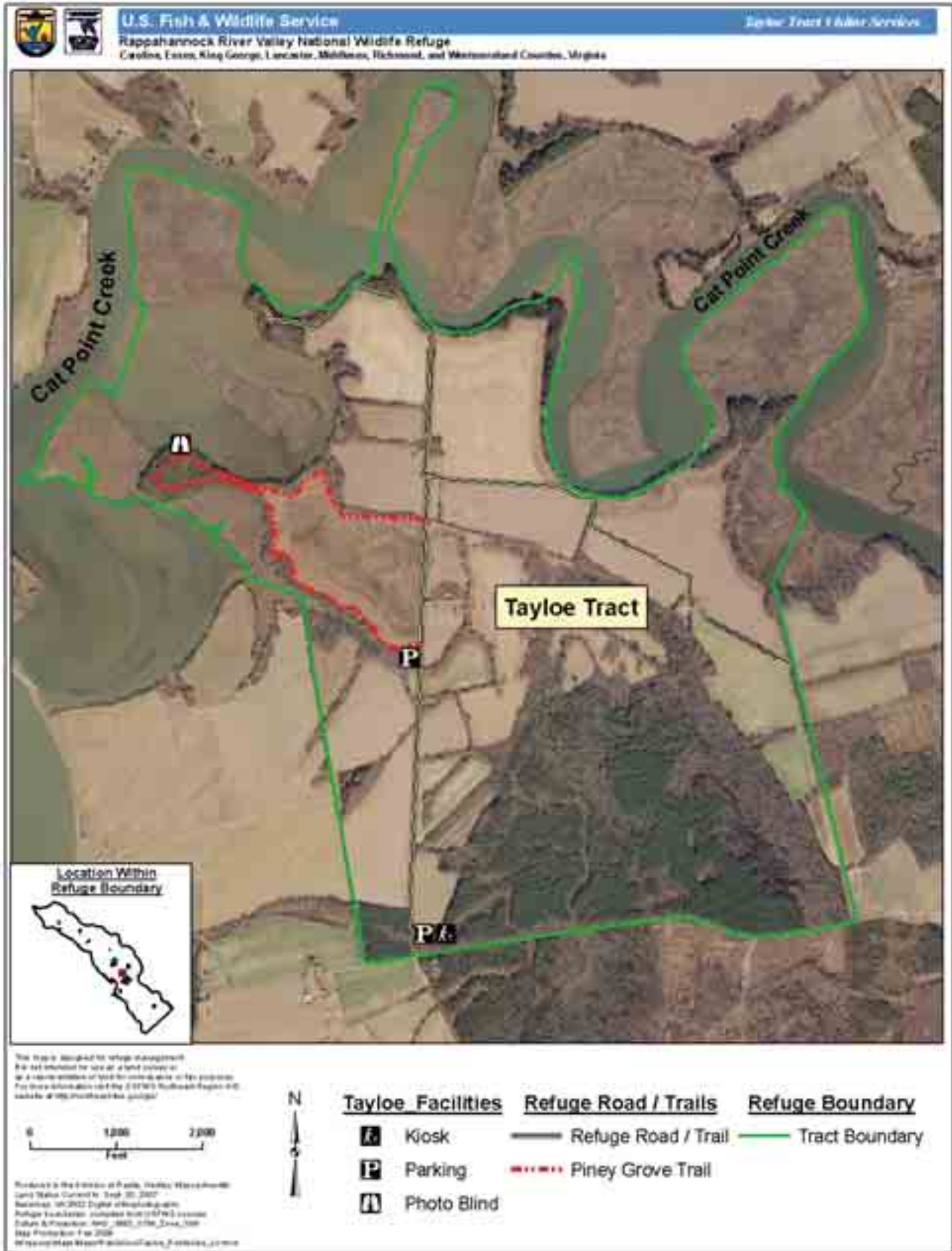
In expanding opportunities for compatible outdoor recreational opportunities, we hope to contribute to communities around the refuge, both in terms of health and well-being, and economically. We will join other agencies and organizations to promote connecting children with nature, thereby reducing “nature-deficit disorder.” A growing body of research suggests that a lack of direct involvement with the outside world may be contributing to a variety of maladies affecting children in today’s society (Louv 2005). By offering places and programs where children and their parents can observe wildlife in natural settings, and learn to appreciate hunting and fishing, we will contribute to the growing national initiative to reconnect children with nature.



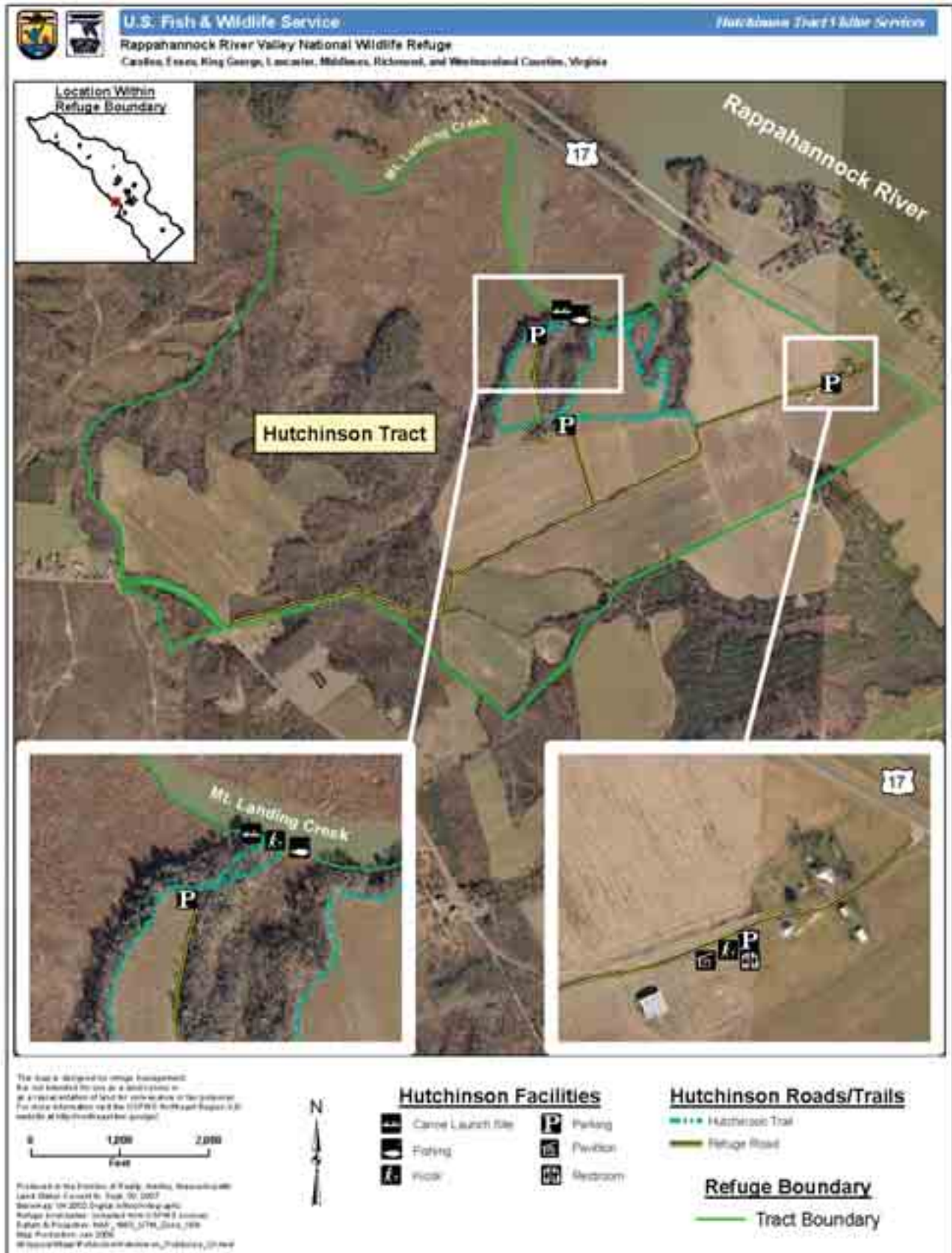
Map 3.2. Public Use on Port Royal



Map 3.3. Public Use on the Wilna



Map 3.4. Public Use on the Tayloe



Map 3.5. Public Use on the Hutchinson



Map 3.6. Public Use on the Laurel Grove
 Rappahannock River Valley National Wildlife Refuge

Research has also shown that by offering places where visitors can enjoy watching birds and other wildlife, local economies benefit. Benefits come in the form of increased sales by local businesses for food, lodging, fuel, and supplies and from associated tax revenues. We plan to offer opportunities in all five counties where the refuge manages land, and have contact sites planned in three of those counties (Caroline, Essex, and Richmond). We will work cooperatively with King George County to co-administer the Wilmot Landing site on the river at our Toby's Point tract. We will nominate the refuge tract in Westmoreland County to be included on the Virginia Birding and Wildlife Trail, and will consider expanding opportunities based on future land acquisitions.

As noted previously, we plan to de-centralize our visitor contact areas in recognition of the geographically dispersed nature of the refuge. We will take advantage of this geographic spread to attract visitors from a wide area by establishing several strategic points of contact, using informational signs or pavilions. Washington, D.C. is only about 70 miles from our Port Royal unit, which is located near the intersection of two major secondary routes of travel, U.S. routes 17 and 301. Travelers often use them to avoid gridlock on Interstate 95. Some 7,000 vehicles per day pass the Hutchinson tract on route 17 near Tappahannock, which is approximately 50 miles from Richmond. The Northern Neck of Virginia, where most of the refuge owned lands lie, is becoming an important tourist destination. The refuge includes two sites on the Virginia Birding and Wildlife Trail. Our Laurel Grove tract is conveniently located near the expanding populace of the Kilmarnock/White Stone area. Small investments in directional signage and self-service facilities at those strategic locations offer exceptional opportunities to reach many thousands of visitors and residents over the 15-year horizon of this plan.

Refuge Administration

This alternative proposes that we achieve a level of staffing that meets the minimum requirements for a refuge complex of this size and importance by adding four positions: a visitor services specialist, a biological technician, a maintenance worker, and a private lands biologist. We would base any increases in staffing on available, permanent sources of funding, and would consider them in the context of regional and refuge priorities.

We would seek to construct a new small refuge headquarters, using regional design standards, instead of using the 19th-century Wilna House. We would keep the Wilna House occupied, as the best way to ensure its continued maintenance. Our first option for maintaining the Wilna House would be to seek a partner to help in interpreting and protecting the historic aspects of that nationally significant structure while also educating visitors about the Refuge System and natural resource conservation. Of the currently owned refuge properties, the Hutchinson tract offers the best location for a new headquarters. If the refuge were selected as the site of a cross-program Service office, we would need to expand our headquarters building.

Rather than develop one large visitor center, we propose creating several smaller visitor contact and welcome areas at strategic locations, including Port Royal, Tappahannock, Farnham, and near Warsaw. We would seek partnerships to accomplish that: for example, sharing a facility, or sharing staff. That may require the construction of information signs and stations that would interpret specific refuge messages. If located on the Hutchinson tract, a new headquarters would serve a dual function as a visitor welcome area.

Over the 15-year horizon of this plan, the old barns now serving as maintenance and equipment storage facilities would be replaced with structures that are more modern. That is necessary to protect our investments in new equipment, including a tractor, backhoe, bobcat, and various attachments. As in alternative A, the use of the travel trailers by interns, researchers, volunteers and temporary employees, and the mobile home office by the VDGIF would continue. The section that follows describes in detail the goals, objectives, and strategies that we would implement in alternative B.

Goal 1: Contribute to the biological diversity of the mid-Atlantic region by protecting, enhancing, and restoring the refuge's upland habitats, with an emphasis on breeding, migrating, and wintering birds.

Objective 1.1 Short-Structure Grasslands/Breeding Habitat

Within the next 15 years, maintain and enhance up to 350 acres of short-structure native grasses and forbs, in fields with a minimum patch size of 50 acres and with perimeter-to-interior ratios ranging between 0.018 and 0.023 to meet the breeding season (May through June) habitat requirements of the grasshopper sparrow and other priority grassland-dependent birds identified in the BCR 30 plan and the VA WAP. Short-structure fields will also be defined by parameters including average vegetation heights up to 30 inches, a ratio of grasses to forbs between 2:1 and 3:1, no stand-replacing invasive species, and a patchy distribution of bare ground. Enhance grassland patches fragmented by artificial or unnecessary features through management that increases the percentage of effective interior habitat from its present levels.

Also in 15 years, achieve approximately 60-percent use by grasshopper sparrows in available short-structure grasslands on a 5-year average with a targeted density of about one pair every 4 to 8 acres. This is based on the breeding territory sizes (2–4 acres) and the average breeding density on the best refuge fields now being managed as grasslands (7.6 acres per territorial male; years 2004–2007).

Strategies

Continue to:

- Use habitat management decision tools (as in Watts 2000, or Upland Habitat Decision Analysis, Mitchell and Talbott 2003, unpublished on file at refuge office) and field evaluations to determine
 - 1) which fields are best to sustain as grassland habitat,
 - 2) which non-optimal grassland fields to replace with fields of higher potential for optimal grassland, and
 - 3) which fields coming out of crop production we should evaluate for their potential for optimal grassland habitat.

Important criteria in the decision tool include the proximity to other grasslands or agricultural fields, the shape, size, perimeter-to-interior ratio, and soils type, or the number of hours of sunlight per day a field receives. Increase the percentage of effective interior by switching sub-optimal grasslands with units of higher potential for optimal grassland, and build upon existing grasslands as opportunities become available.

- Remove trees and linear structures, such as fences and abandoned irrigation equipment, which cause fragmentation, edge effects, or spreading of woody plant seedlings in grasslands. Consolidate adjacent fields separated by these edge-forming features into larger units.
- Use prescribed fire as needed to remove biomass, stimulate native grass and forb growth, or reduce woody encroachment. Timing depends on specific fire objective: late winter, if only biomass removal is the objective so that cover and food would still be available during most of the winter; or, in early spring or late summer-early fall, if reduction of woody encroachment is necessary.
- Mow, brush-hog, disc and use herbicides as needed outside the breeding season. Some fields will require annual treatment where trees are problematic. Use only EPA-approved chemicals after developing an annual pesticide use proposal for each chemical approved by the Regional Contaminants Coordinator

- Plant native species of grasses and forbs to improve stand cover with the desired structural characteristics.
- Incorporate this habitat type in landbird point count surveys, migration and winter bird counts, and anuran call counts. Update the landbird point count habitat classification to reflect changes in the vegetation community that can be linked to corresponding shifts in the avian community.

Within 5-10 years of CCP approval:

Explore “flash” grazing as a tool for manipulating grasslands to create structural variation and set back succession in selected fields. This technique uses temporary or shorter rotation grazing. Designate fallow and unplanted fields and fields planted with warm season grasses as prospective sites for experimental grazing, well after the bird-breeding season. Evaluate the quantity of grazing (e.g. vegetation height, percent of area grazed, percent of area avoided), and vegetation response (e.g. re-growth of grazed plant, changes in vegetation composition) to determine if this strategy would meet population objectives. A grazing program would require a new compatibility determination and public review. Monitor to insure grazing does not introduce invasive species and discontinue if the costs do not outweigh the benefits.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to assess patterns of use and distribution of breeding grassland birds. The following are all components of how we would measure our success with respect to our means and fundamental objectives. Results may trigger adjustments to management strategies, or trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - To measure abundance, relative abundance, and density (where appropriate), survey during the breeding season at this latitude (late May through June) on selected fields annually throughout the life of the CCP
 - To evaluate quality of grasslands for grasshopper sparrows, conduct periodic vegetation surveys during the breeding season at bird points for height, grass-forb ratio, and bare ground. If sparrow density or percent occupancy falls, and grass height, grass-forb ratio and percent bare ground is suggestive as being the cause, then this would be a trigger point for evaluating the management regime of the grassland
 - To maintain desired quality and characteristics of grassland, annually conduct scouting for invasive plant species. We will afford zero tolerance to highly invasive or stand-replacing species. Occurrences or stands of more stable patches of invasive plants may be tolerated in the short term as long as their cumulative coverage is no more than 25 percent of a given management unit, and fundamental objectives are not compromised.

Rationale

Importance of Grassland Habitat in Both a Regional and Local Context

The Service has the responsibility for protecting migratory birds under international migratory bird treaties with Mexico and Canada. Providing habitats for declining grassland-dependent species on this refuge will counter habitat loss elsewhere within the mid-Atlantic, western coastal plain region. We also consider the needs of birds of conservation concern on a sub-regional or statewide scale as identified in the VA WAP and BCR 30 Plan, and for which the refuge appears to contribute some responsibility, such as eastern meadowlark (VA WAP Tier IV species) and American woodcock (VA WAP Tier IV and BCR 30 species of concern).

Although this region was dominated primarily by deciduous hardwood forest at the time of European settlement, openings created by Native Americans or wildfires lay scattered throughout, according to early eyewitness accounts (Watts 1999, Grumet 2000, Askins 2000). As European-influenced agriculture spread westward and the prairies disappeared, abandoned eastern farms reverted to grasslands and old meadows. The east became even more important for eastward-emigrating grassland species displaced in the west.

However, some evidence suggests that grassland-dependent birds evolved here even before that period of farm abandonment, and actually may be native to the eastern United States (Askins 2000). Regardless of the origin of eastern grassland birds, agriculture has dominated the area on a landscape-scale for generations, and grassland-dependent species have now formed an integral component of our native avifauna.

Birds depending on early successional habitats such as grassland and shrub are one of the fastest declining bird groups because of habitat loss and changes in farming practices. For example, grasshopper sparrows have declined at a rate of 3.7 percent across the United States from 1966 to 1994 (Sauer et al. 1995). The loss of habitat, the conversion of pasture to intensive row crops, the increased frequency of mowing, and the lack of fire are cited as the causes of population declines of that and other grassland-dependent species (Vickery 1996). Hence, several national bird conservation organizations and Federal and state agencies advocate management to benefit grassland birds in such plans as the PIF Area 44 Plan, the BCR 30 plan, and the VA WAP.

The lands within the refuge acquisition boundary host a variety of the grassland birds of conservation concern those plans identify. The refuge grasslands serve an important regional role for many species throughout the year. Some are year-round refuge residents, while others use the refuge only during the breeding season or winter, or during spring and fall migration.

We designed our management objectives to provide quality habitat for a wide variety of grassland-dependent birds throughout the year, and distinguish between those birds that prefer short-structure (objective 1.1) versus tall-structure grasslands (see objective 1.2). It is also important to note that, although our objective statements focus on birds of elevated conservation concern identified in regional and state plans, we are also striving through our management to “keep common birds common.”



Baltimore oriole: ©Les Brooks

Importance of Grassland Size and Structure, Especially for the Grasshopper Sparrow

Few landowners of large tracts of land can afford to devote their land solely to wildlife conservation. Since much of the land that has become available for Service acquisition consists of farms containing large crop fields, an opportunity to create large blocks of quality habitat is presented on refuge lands, particularly since those crop fields provide “open” habitat. In contrast, the conversion costs to create grasslands from older stages of succession are prohibitively expensive for many private individuals—initially \$125 or more per acre (Watts 2000).

Field size is an important criterion for determining whether a given field is potentially suitable for breeding grassland-dependent birds. If patches are too small in size or too linear in shape, there is a greater potential for adverse edge effects, such as predation or nest parasitism, as well as woody or invasive plant encroachment. Such patches have a high perimeter-to-interior ratio, making the interior more accessible to predators and invasive species, thus degrading the quality of the patch and likely diminishing the breeding success of grassland birds. The perimeter-to-interior ratio equals the length of the edge around a patch divided by the area of the patch (Helzer and Jelenski 1999; Bakker et al 2002). Block shapes with less than 1,640 feet of edge per 2.5 acres provide more habitat area that is distant from edges (Watts 2000). An ideal patch would be ample enough to accommodate a buffer zone of approximately 300 feet around the edge and provide ample effective interior for the target species’ nesting territories. Vickery et al. (1999) recommends conserving grassland patches of 250 acres or more to benefit more area-sensitive species. Watts et al. (1997) determined that grassland patches of less than 25 acres are better suited for shrub-dependent birds, another suite of bird species of conservation concern.

The grasshopper sparrow is observed frequently in the agricultural parts of the region, including within the refuge acquisition boundary. This sparrow requires grassland habitat for breeding. The extensive agricultural coverage on the landscape resembles the early succession openness of the midwestern prairies and, probably, is the main cue that attracts the sparrow to our area. Fallow fields and pastures associated with farmlands provide habitat, while the row crops nearby provide additional foraging and loafing areas. We commonly observe grasshopper sparrows loafing and foraging on insects in adjacent soybean fields.

Unfortunately, grasshopper sparrow abundance on the two Northern Neck Breeding Bird Survey (BBS) routes has declined in recent years with the gradual disappearance of open fields, changes in farming practices, and rising development near those routes. The presence of grasshopper sparrows at the Sharps BBS route has dropped by nearly half in the past 2 years (2005–2006) (Ake 2006, Portlock 2006).

The grasshopper sparrow is an area-sensitive species; it will not settle in areas too small, and requires grassland habitat patches at least 30 acres in size. The breeding territories range between 2 and 4 acres (Jones and Vickery 1999). Grasshopper sparrows were more abundant and more frequent in larger patches of mixed prairie; however, the edge-to-interior ratio was a better predictor of area sensitivity than patch size in a Canadian study on nine grassland passerines (Davis 2004). Vegetation structure was also an important predictor of grassland songbird abundance and occurrence, at least for the additional variation beyond what patch size or edge ratio would predict (Davis 2004).

According to Schroeder and Askerooth (1999), grasshopper sparrows show a preference for grasslands of relatively short-stature, approximately 12 inches, with a patchy distribution of bare ground on which to forage (Vickery 1996), and avoid areas with extensive shrub cover (Vickery 1996). Woody stems and tall forbs are used for song perches (Vickery 1996, Schroeder and Askerooth 1999, Watts et al. 1997, Vickery and Herkert 1999, Watts 1999).

On the refuge grasslands, grasshopper sparrows consistently have shown fidelity to fields of intermediate-height grasses (between knee- and waist-high) containing scattered tall shrubs and

forbs in addition to fields planted in short-stature grasses such as little bluestem, sand lovegrass, and sideoats grama (Spencer, personal observation). Those heights probably are at the upper limit of the species' tolerance; abundance and density may increase if we could maintain shorter heights. Because the habitat characteristics for breeding grasshopper sparrow territory are so restrictive, their requirements will serve as the benchmark standard to guide short-grass management on the refuge.

Some refuge fields used by grasshopper sparrows are in fallow cover types (e.g. not planted) which grow tall as the growing season progresses into late summer. The short-structure requirement appears to be only necessary during the breeding season (May through June), as these same fields continue to be used by the adults and their fledglings even as the vegetation gains height throughout the summer before migration (Spencer, personal observation). Objective 1.2 below describes our management for tall-structure grasslands.

The same habitat characteristics for grasshopper sparrow would also benefit other grassland-dependent birds (Watts 2000) such as American woodcock and eastern meadowlark.

The average density of obligate grassland breeding birds over the 3 years of a grassland-breeding bird study on the refuge (2001–2003) was 0.416 per acre (1.04/hectare) on fallow fields, and 0.70 per acre (1.75/hectare) on planted warm-season grass fields for the seven refuge fields enrolled in the study. Grasshopper sparrows composed 97.2 percent of the obligate species seen. For a quick density estimate of the entire grassland component of the refuge, one can scale those figures up to the areas of all the fields being considered (Michael C. Runge, USGS, November 2006, personal communication).

Those results and that method of estimating density should be viewed with caution, due to the newness of the fields at the time of the study and their rapidly changing characteristics, and the variability at the microsite level of different fields. In subsequent years, the vegetation in some of the planted fields became too dense and tall, especially after burning, to be attractive to grasshopper sparrows, except where recent mowing provided shorter grass. In other fields, whether planted or fallow, grasshopper sparrow abundance increased over the years as long as the vegetation was relatively short (about 1 meter).

With the addition of data on grasshopper habitat occupancy and density, we can determine if we are achieving our objectives for this species. We can use the data to refine objectives in the future and determine if our means objective (field characteristics) is correct for achieving the fundamental objective. If not, we can modify means objectives.

Objective 1.2 Tall-Structure Grasslands/Breeding Habitat

Over the next 15 years, maintain and enhance up to 350 acres of tall-structure native grasses and forbs at heights averaging 30-40 inches in fields with a perimeter-to-interior ratio between 0.018 and 0.023, and in minimum patch sizes of 50 acres, with at least one field of 200 contiguous acres in size, to meet the breeding season (May through June) habitat requirements of priority grassland-dependent birds identified in the VA WAP and BCR 30 Plan, such as Henslow's sparrow and northern bobwhite, and for dickcissel.

Tall-structure grasslands on the refuge will range in height from 30–40 inches, with bunchgrass density at about 2 to 3 bunches per square meter on average throughout the unit, will contain a grass-forb ratio between 2:1 and 3:1 on average through the unit, and will contain no stand-replacing invasive species. Each year throughout the term of this plan, provide at least one field of at least 200 contiguous acres in size. Also through management, increase the percentage of effective interior habitat from current levels in those patches fragmented by artificial or unnecessary features.

Strategies

Within 5 years of CCP approval:

In addition to the strategies of objective 1.1, the following will also apply

- Vary the management techniques (such as spot mowing to create varying heights) among fields to improve the diversity of native grasses and forbs and to create a mosaic of different grassland structural types. The need for a patchwork mosaic and more structural diversity is more critical in tall grasslands, which would otherwise become too dense.
- Mow, brush-hog, and burn on a two-year cycle or as needed to reduce woody encroachment. Some fields require annual mowing in sections where soil moisture and proximity to colonizing tree species (sweetgum, maple, tulip poplar, black locust) promotes competition with desired grasses and forbs.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to assess patterns of use and distribution of breeding grassland birds. The following are all components of how we would measure our success with respect to our means and fundamental objectives. Results may trigger adjustments to management strategies, or trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - To evaluate achievement of the fundamental objective (percent use and density of dickcissels and bobwhite quails), conduct point counts established in grasslands for surveys during the breeding season at this latitude (late May through June) to measure abundance, relative abundance, and density (where appropriate) on selected fields annually throughout the life of the CCP
 - To evaluate quality of grasslands for breeding dickcissels, northern bobwhite quail, or migrating bobolinks, conduct periodic vegetation surveys at bird points for height, density measurements (as a function of bunches per square meter and bare ground percent), and species composition or grass-forb ratio.
 - To maintain desired quality and characteristics of grassland, annually conduct scouting for invasive plant species. We will afford zero tolerance to species that are highly invasive and stand-replacing. Occurrences or stands of more stable patches of invasive plants may be tolerated in the short term as long as their cumulative coverage is no more than 25 percent of a given management unit, and fundamental objectives are not compromised.

Rationale

See our rationale for alternative B, objective 1.1, for a discussion of the regional and local importance of managing for large, contiguous grassland habitats to support grassland-dependent birds of conservation concern and other native wildlife. That objective presents our rationale for managing in a short structure approximately 50 percent of our existing grasslands and old-field habitat on the refuge. Our rationale for managing in a tall structure the remaining 50 percent of grasslands and old-field habitat follows.

Some of the refuge grasslands have been planted in tall-grass species, such as the big bluestem, Indiangrass, and common sunflower, to benefit the entire suite of breeding tall-grass birds, rather than focus on a single species, and to facilitate the establishment of stable, more easily maintained stands. The most recently restored tall-grass fields on the refuge are dense and lack structural diversity, but over time, selective manipulations of those fields should promote a more complex patchwork that is diverse in structure and composition, the better to mimic natural grasslands.

We do not have documentation that breeding Henslow's sparrows occur here, and they are thought to be extirpated from this area. However, they do still occur elsewhere in Virginia and the patch size and structural dimensions we target in our objective will serve as the benchmark standards for guiding our tall-grass management in hopes of attracting that species. We are hopeful that through active management over time, breeding Henslow's sparrows could be attracted to refuge fields that meet their preferred vegetation characteristics and patch dimensions

Henslow's sparrows historically were common in large, open fields and marshes in Virginia. They were recorded in various locations, including Arlington, Fairfax, Virginia Beach, Saxis Island and the Chesapeake Bay marshes. Their numbers declined precipitously throughout the 1900s. More recent records, and sightings of single singing males, suggest scattered, sporadic breeding in the area. The nearest official records of Henslow's sparrows are in Lewisetta (Northumberland County, 1993) and in Dumbrooke (Essex County, 1993) (Rottenborn and Brinkley 2006, in press). The Radford Armory now appears to be the only established colony, except for rumors of another population near Fort Pickett (Heath, VARCOM, Sept. 2006 personal communication).

Essential habitat for breeding Henslow's sparrows in the coastal plain includes high marsh black needlerush and saltmeadow hay communities, but also large grassland patches greater than 100 acres, with high litter depth, low forb cover, and low bare ground exposure. This sparrow prefers tall grass up to 30-31 inches (VA WAP, 2005). No relationship is documented between perimeter-to-interior ratio and the probability of occurrence for these sparrows.

Northern bobwhite are a high conservation priority for our area that we feature in this objective. They are ranked as a high priority species in the BCR 30 plan and a Tier IV species in the VA WAP. The loss of early succession habitat, particularly nesting cover and brood range, has been identified as the most significant factor limiting quail populations (VDGIF, 2008). The VA WAP states that populations of this species have demonstrated a declining trend and it may qualify for a higher tier rank in the foreseeable future. The habitat loss and resulting population declines have been attributed to the loss of open lands to development, the transition to "cleaner" agricultural practices, and to increased predation pressures. According to the BCR 30 Plan, they require patches of bare ground interspersed with standing vegetation. Within this physiographic region, bobwhites utilize active agricultural fields, grasslands and early successional old fields, lightly grazed pastures, and recent clearcuts, all with a shrubby cover.

Eventually, we also hope to attract nesting bobolinks to refuge grasslands and old fields, assuming we can provide their preferred vegetation characteristics and patch dimensions for breeding habitat. Bobolinks are already documented using refuge fields during spring and fall migration. They are known to breed in Maryland, and the Virginia Gold Book reports that bobolinks inhabit the northwest part of Virginia only in sporadic colonies. Breeding locations are known in Virginia's Loudoun, Fauquier, Warren, Clarke, Highland, and Augusta counties (Heath, VARCOM, 2006 personal communication).



Cedar waxwing: ©Les Brooks

Another species of particular interest to us is the scattered small populations of dickcissels which are showing site fidelity to several refuge tracts and return each spring and summer. Indications of breeding include sightings of both sexes and mating attempts. This is not currently a species of high concern identified in the VA WAP or BCR 30 Plan. However, until Henslow's sparrow or breeding bobolinks appear, we will use dickcissels as an interim indicator species of quality breeding and nesting habitat for those two species since their habitat requirements are similar. Our management of tall-grass and old-field habitats will also benefit generalist species of concern such as the field sparrow, indigo bunting, blue grosbeak, eastern kingbird, and orchard oriole.

Management of grasslands adjacent to vernal pools or low-lying wet areas is also essential for breeding amphibians. The section on wetlands, objective 3.1, "Wet Meadows, Ponds, and Vernal Pools," discusses that in more detail.

Objective 1.3 Grasslands/Migrating and Wintering Habitat

Within the next 15 years, manage the grassland habitat identified in alternative B, objectives 1.1 and 1.2, throughout the migration and wintering seasons (August through February) to provide forage and cover for wintering grassland birds identified as species of concern in the BCR 30 plan and the VA WAP, such as the savannah sparrow, eastern meadowlark, horned lark, northern harrier, and barn owl, and for migrating grassland birds such as the bobolink.

Total acres and patch sizes are less stringent during migration and winter, but will be consistent with management actions needed to maintain short- and tall-structure breeding grassland bird habitat described in objectives 1.1 and 1.2.

Strategies

Continue to:

- Delay mowing or other grassland maintenance management until the end of February or early March in any fields not requiring late summer or fall management to reduce tree encroachment.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to assess patterns of use and distribution of wintering grassland birds. The following are all components of how we would measure our success with respect to our means and fundamental objectives. Results may trigger adjustments to management strategies, or trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - winter grassland transect surveys for measuring composition and relative abundance of grassland birds in select fields (fundamental objective);
 - Christmas Bird Counts and other non-standardized but repeated observations to determine habitat use and distribution (fundamental objective).

In addition to helping us evaluate the refuge grassland management, winter grassland data will help us determine the statewide or regional contribution of the refuge to wintering grassland passerines.

Rationale

Our responsibility for providing grassland bird habitat is not limited to the breeding season. The refuge acquisition boundary lies in an important migratory bird pathway along the western Chesapeake Bay of the Atlantic flyway. Migrating grassland birds stop or winter in refuge grasslands and fallow fields. Savannah sparrows, swamp sparrows, eastern meadowlark, horned lark, northern

harrier, and American pipits are examples of grassland bird species that increase in abundance in the winter. Bobolinks are locally abundant during spring and fall migration (Rottenborn and Brinkley, 2006, in press) and are observed consistently during migration on refuge tracts (Sandy Spencer, personal observation). Sedge wrens are occasional visitors at the refuge during migration. Barn owls use these fields year-round.

Our management for wintering grassland birds also benefits from proximity to adjacent private croplands, versus other habitat types or land uses. The crop fields that can provide supplemental foraging areas complement the attractiveness of refuge fields for grassland birds such as horned larks, eastern meadowlarks, and American pipits.

Objective 1.4 Grasslands/New Areas

Over the next 15 years, as opportunities arise through new Service acquisitions or the phasing out of cropland management on refuge lands, increase the grassland component of refuge habitat types from its current 700 acres, to a maximum of 1,200 acres, maintaining the relative 50:50 ratio between short-structure and tall-structure grasslands, subject to the same standards of quality, the same target species, and the same seasonal considerations detailed in alternative B, grassland management objectives 1.1 to 1.3.

Strategies

Within 5 years of CCP approval:

- Evaluate all refuge crop fields to be phased out of production within 5 years of CCP approval using habitat management decision tools for determining suitability for grasslands (as in Watts 2000, or the Upland Habitat Decision Analysis, Mitchell and Talbott 2003, unpublished, on file at refuge office) and field evaluations, as described above in alternative B, objectives 1.1 and 1.2.
- As part of this evaluation, considering the potential for <150 acres of existing crop fields on the Tayloe tract to demonstrate and interpret best management farming practices that protect water quality and benefit wildlife habitat.
- Evaluate all future land acquisitions using habitat management decision analyses building upon existing grassland acres where feasible and practicable.

Rationale

We describe our rationale for managing grasslands habitat throughout the year in objectives 1.1 to 1.3 above.

We have been gradually phasing out croplands on the refuge since its peak in 2000 when we had approximately 620 acres. We would phase-out the remaining 210 acres over the next 5 years. Those acres, along with any potential future acquisitions that include farmland fields, would provide the additional sources for increasing the grassland acreage on the refuge.

We have generated some controversy with our decision to remove lands from agricultural production and convert them to native habitats on some tracts purchased in fee. There is a need to conduct additional outreach to inform local citizens and visitors about the evolution of wildlife management practices over the past several decades.

Although to plant crops and establish food plots for wildlife was once common, we now believe wildlife populations will fare better if we restore and manage the full complement of plants native to our area. One way to conduct that outreach is through informational displays that interpret the

changes in wildlife management and explain the rationale behind the shift. The ideal place to conduct that outreach would be the Tayloe tract, where farming now goes on, and where it has gone on for centuries. Using this area also to interpret conservation measures would be advantageous, in that all farmers could employ them to more effectively retain nutrients and sediments, and thereby, protect water quality and create wildlife habitat. Therefore, we might retain farming in some areas for that purpose. If so, we would prepare a new compatibility determination and seek additional public input on the design of such a program.

Regarding future land acquisition at the refuge, it is important to explain that we are not targeting croplands per se in our land protection program. We expect that most of the active cropland we would acquire in the future would be under a conservation easement. However, we could acquire some cropland as part of a larger fee title purchase to protect quality wildlife habitat

We would manage the farmlands we purchase in fee title to be grasslands or another native habitat type. We would evaluate crop fields as to their best habitat use, whether forest, shrub, or grassland, using field evaluations and the habitat management decision tool described above. The potential to acquire an additional 500 acres of cropland over the next 15 years is a reasonable estimate, but it is not definite. We based the upper limit of 1,200 acres on our best judgment of our management capability over the next 15 years; it is not an upper limit on the biological capacity of present or future refuge lands.



Summer tanager: ©Les Brooks

Objective 1.5 Stable Long-term Shrub Habitat

Within the next 15 years, manage relatively stable, long-term, native shrub habitat in blocks between 5 acres and 25 acres where our habitat management decision tool and field evaluations recommend shrub habitat over grassland or forest management, where 50 percent of their area is used during at least one season (breeding, migration, winter) by high-priority, shrub-dependent birds of conservation concern identified in the BCR 30 plan and the VA WAP, such as the American woodcock, bobwhite, and prairie warbler, and other species such as the yellow-breasted chat, worm-eating warbler, eastern towhee, brown thrasher, field sparrow, and whip-poor-will. Decision criteria favoring long-term shrub habitat include the presence of moist soils, habitat patch sizes below 25 acres, or patches in a configuration or location that do not justify intensive, mechanical grassland management.

Strategies

Continue to:

- Complete field evaluations on each refuge field within 3 years of CCP approval, using the habitat management decision tools (as in Watts 2000, or the Upland Habitat Decision Analysis, Mitchell and Talbott 2003, unpublished, on file at refuge office). Detail those decisions and implementation plans in the refuge HMP and AHWP. Evaluate lands acquired in the future within 1 year of acquisition.
- Brushhog on a four-year rotational schedule (Watts 2000), or more frequently if necessary, those areas identified suitable for long-term shrub habitat which require active management, such as manipulating field corners, edges, and pockets formed by forest/field interface.
- Identify areas of potentially stable, long-term shrub habitats that could be self-maintaining by virtue of their hydrology (such as low-lying fields, semi-permanent wet meadows, beaver meadows, or dry, sandy soils).
- Plant native shrub species where warranted, and as funding and staffing resources permit, to promote establishment of volunteer, native shrub species, and prevent tall-tree encroachment, where appropriate, through selective thinning or occasional brush-hogging.
- Evaluate cooperatively farmed acres when they come out of production for their potential as long-term, stable shrub habitats to increase acreage of shrub habitat.
- Incorporate this habitat type in landbird point count surveys, migration and winter bird counts, and anuran call counts. Update the landbird point count habitat classification to reflect changes in the vegetation community that can be linked to corresponding shifts in the avian community.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our means and fundamental objectives. The results may trigger adjustments to management strategies, such as thinning, brush-hogging, burning, planting, or selective removal to achieve structural and species diversity of native shrub species and to remove trees. Results may also trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
- Continue to incorporate this habitat type into ongoing biological surveys, such as habitat-based landbird point count surveys, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications in shrub zones would be updated to track changes in habitat relative to bird habitat use.

Rationale

Shrub-dependent species are another rapidly declining bird group due to loss of habitat. Shrub habitat comprised of various shrub species, or a diverse mix of young trees, provide an abundance of insect food for breeding birds, which need to consume large amounts of protein for reproduction and feeding young. Many shrub species also bear fruit in the fall, which helps boost the fat reserves for migrating or over-wintering birds. The structural density in this habitat type also provides cover from predators and shelter from harsh weather. Shrubby, early succession patches in close proximity to interior forest breeding territories are also important for survival of fledgling forest birds, which feed on the abundant food sources in relative safety from predators in the dense foliage.

Shrub habitat, in close proximity to grasslands, provides an alternative for many species when management actions, such as burning or mowing, temporarily remove grassland habitat. Some locations at the grassland-forest interface lend themselves particularly well to rotational shrub management where their constricted configuration, such as in tight corners or where they occur in small, interspersed pockets, make grassland maintenance difficult. These areas can be periodically set back through mechanical treatments to provide a continued source of shrub habitat. Some areas are naturally in shrub cover due to moist soils, but that is in very limited supply.

In addition to being transitional in nature, shrub habitats are quickly disappearing because of certain forestry and agricultural practices and increased development. Shrub-dependent birds will need to rely more heavily on intentional provisions of this habitat type by land managers.

American woodcock are morphologically classified as a shorebird, but their habitat preferences throughout the year range from uplands to wetlands. They favor woody succession habitats on moist soils where worms are abundant and use the shrubby forest floor for nest sites. Here, they are well camouflaged for daytime foraging. Because of high moisture content, those areas tend to be composed of woody vegetation in either shrubs or young tree species or both. Woodcock also need more open, short-grass habitat for singing and display territory during the breeding season, so shrublands in close proximity to short grasslands are ideal. Ideally, breeding habitat is early successional forest with little or no underbrush and abundant insects.

The northern bobwhite also uses the cover and food resources provided by shrub and early successional forest habitats. They have a wide range of dietary preferences. Prairie warblers favor early succession forests and shrubby habitats where they can glean insects, especially leaf-eating caterpillars in the treetops and hide their nests in the foliage. The Eastern towhee and brown thrasher prefer drier, shrubby habitats typically found along forest and field edges, where the confusion of growth is more complex and offers a variety of fruits, nuts, and insects among the leaf litter. The field sparrow, a year-round resident of the refuge and its environs, favors old-field/forest edges where woody encroachment, tall forbs, vines and shrubs are well represented in an otherwise open habitat, where it can quickly flee for cover in the adjacent forest. It builds its nests low to the ground in young saplings or shrubs. That scenario frequently appears in landscapes containing a mosaic mix of field and forest or in regenerating, cut-over areas. The whip-poor-will is still somewhat common in the rural landscape within the refuge boundary compared to more developed regions of the state, but is believed to be declining at about 23 percent per year between 1980 and 2005 elsewhere in Virginia (USGS Breeding Bird Survey 2007).

The vegetation structure and food supplies provided by shrub habitats benefit other species such as blue-winged warbler and willow flycatcher that use the refuge during migration, as well as breeding yellow-breasted chats, and resident gray catbirds.

Because of reduced exposure, patch size requirements for shrub species are much smaller than the minimum size requirements for area-sensitive grassland species. Patches less than 25 acres are adequate for shrub-dependent species (Watts 2000). Minimum patch sizes would vary according to habitat quality (vegetation density), landscape and surrounding vegetation. We are evaluating all fields with a hydrology, soil type, and size and configuration, and exposure to sunlight that would not support quality grassland habitat for its potential as long-term shrub or wet meadow habitat.

Objective 1.6 Transitional Shrub Habitat

Within the next 15 years, provide interim shrub and early successional forest habitat on 600 reforested acres, including those planted or undergoing natural succession, to support breeding, high priority shrub-dependent birds of conservation concern such as American woodcock, bobwhite, and prairie warbler, identified in the BCR 30 plan and the VA WAP. This habitat would occur in a shifting mosaic

of patches across the refuge as we implement decisions to allow fields, shrub, and young forest to transition to forest. Also, where appropriate, manage shrub habitat to increase the effective interior of any surrounding forest habitat.

Strategies

Continue to:

- Allow a selection of existing former crop fields on Laurel Grove, Hutchinson, Tayloe, Thomas, Wellford Fee, and Wilna tracts, which are not optimal for grassland and would better serve to enhance riparian zones or effective forest interior, to undergo natural succession or planting in native trees. This would provide temporary shrub habitat for 10 to 15 years until those areas reach young forest stage.

Rationale

We describe the important contributions of shrub habitats under the rationale for alternative B, objective 1.5 above. The 600 reforested acres we describe in this objective are in the early stages of transition to forest, and will temporarily (approximately 10–15 years) provide the same structure and diversity, and thus the same benefits for species of conservation concern, as the long-term shrub habitat.

The formerly open lands that have been reforested now support priority shrub-dependent species such as the American woodcock, bobwhite, and prairie warbler, as well as other shrub species such as the blue-winged warbler, brown thrasher, eastern towhee, field sparrow, northern bobwhite, whip-poor-will, willow flycatcher, gray catbird, and yellow-breasted chat. This objective also benefits two priority forest species in the VA WAP and BCR 30 plan, the scarlet tanager and wood thrush, which depend on this habitat type during their fledgling nesting stage. Eventually, these lands will substantially increase the forest component of the refuge for migrating or forest-dependent birds.

Objective 1.7 Upland Mixed Forest Habitat

Within the next 15 years, enhance the existing 1,563 acres of upland mixed forest habitat on the refuge, but also seek opportunities through future refuge acquisitions and management, to increase the amount and distribution of this forest type, and to promote its biological integrity, diversity and environmental health. Management would strive to create large contiguous forest patches of at least 250 acres, protect corridors that connect those large patches, and improve structural diversity, to benefit birds and other native wildlife of conservation concern throughout the year identified in the BCR 30 plan and VA WAP such as scarlet tanager, wood thrush, eastern hog-nosed snake, eastern ribbon snake, and eastern box turtle.

Strategies

Continue to:

- Acquire land with upland mixed forest in fee simple or conservation easement. Build upon existing tracts where possible.
- Establish threshold criteria for responding to beaver damage, as noted in “Actions Common to All Alternatives” narrative, and for disease outbreak intervention.
- Perform early detection and rapid response control of invasive, undesirable plants, pathogens, and animal species, and diseases.

Chapter 3: Alternatives

- Target areas characterized by small or narrow patches of disjunctive forest stands that we could consolidate to increase effective interior and reduce edge effects. Consolidate areas through reforestation of openings (either by natural succession or by plantings native species) that are not otherwise serving another priority habitat need.
- Create connection corridors from isolated stands, as long as this does not fragment managed grasslands, through native plantings or natural succession.
- Incorporate this habitat type in landbird point count surveys, migration and winter bird counts, and anuran call counts. Update the landbird point count habitat classification to track changes in forest habitat relative to bird habitat use.

Within 5 years of CCP approval:

- Increase the structural and species diversity in overstocked monotypical stands of tulip poplar, e.g. 1,000 trees per acre (or 10 per 20 feet×20 feet) and in patches greater than 5 acres.
 - Conduct stand inventories for potential areas needing restoration or management; incorporate prescriptions and implementation strategies in the HMP and AHWP as appropriate. Continue to map and scout for the presence of disease, nuisance species, invasive plants, or any other threats to forest health.
 - Perform early detection and rapid response control of invasive, undesirable plants, pathogens, and animal species, and diseases.
 - Use pre-commercial mechanical and selective thinning, ensuring minimal disturbance impacts (soil erosion and compaction, introduction of non-native invasive plants, and fragmentation). Thin such stands using pre-commercial mechanical or selective thinning down to a range between 150 and 200 trees per acre (depending upon basal areas, slope, exposure, and surrounding shelter).
 - Implement standard operating procedures approved by the VA SHPO to avoid damaging potential historic or archeological resources during forest management.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our means and fundamental objectives. The results may trigger adjustments to management strategies, to achieve structural and species diversity or improve forest health, or results may trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - Continue to map and scout for the presence of disease, nuisance species, invasive plants, or any other threats to forest health.
 - Continue to incorporate this habitat type into ongoing biological surveys, such as the habitat-based landbird point count surveys, winter or summer bald eagle surveys in riparian areas, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications in upland mixed forests would be updated to track changes in habitat relative to bird habitat use.



Singing dickcissel. ©Les Brooks

Rationale

On a landscape scale throughout the region and in the refuge acquisition boundary, large tracts (>250 acres) of mature or maturing deciduous and mixed forests are in limited supply, and becoming increasingly fragmented. In addition to providing important breeding habitat for forest-interior birds, the geographical orientation of these forests along the western side of the Chesapeake Bay and their proximity to tributary creeks that bisect this part of the coastal plain make them important stopover sites during migration and as wintering grounds for a wide variety of forest birds.

The same concepts and concerns for maximizing effective interior, and minimizing edge effects and edge-to-interior ratio discussed in the grasslands objectives above, also apply to forest habitats. Maintaining forests in large blocks, particularly those surrounding or containing water features and low-lying areas, increases the probability of providing and protecting breeding and over-wintering habitat for amphibians, reptiles, and invertebrates, and protecting rare plant communities over a broader spatial distribution. This strategy also serves to maintain the biological integrity, diversity, and environmental health of the refuge forests for state-listed species such as the eastern hog-nosed snake, eastern ribbon snake, and eastern box turtle.

The refuge already includes substantial acreage (3,332 acres) of large forested tracts of mature and maturing mixed hardwood, mixed pine-hardwood (where oaks and pine constitute at least 25 percent of the stocking) (Hamel 1992), hardwood bottomland, and pine (loblolly and Virginia pine). Because of past land use history, the refuge forests are highly altered; stands tend to be in various mixes of natural and managed species, age classes, configurations and sizes, and health conditions. Although we have yet to perform a detailed forest inventory on the refuge, we are not aware of any stands of old growth. We assume that many of those stands established opportunistically after agricultural production ceased. Consolidating those forested acres into 250-acre patches or larger, through either management or future acquisition, is a priority under this objective.

Another priority is to promote a diversity of forest types and age classes in those stands, and prevent encroachment by invasive non-native vegetation. Generally, our strategy would allow natural succession to proceed without intervention to the extent possible, as long as it does not jeopardize our objectives of increasing species and age class diversity and protecting forest health. Simply put, acquiring and consolidating additional upland mixed forestlands, which require minimal management, is a very effective, efficient strategy over the long term for providing significant benefits to forest-dependent species across a number of taxonomic groups. Furthermore, it is essential that we maintain and enhance the biological integrity, diversity, and environmental health of our forest tracts according to Service policy 601 FW3. To this end, we would promote the natural forest processes of succession, regeneration, senescence and decomposition, progression toward structural and species diversity, soil maturation, and the variety of hydrological regimes that add diversity to forest composition. These factors also serve as the foundation for quality habitats for other taxonomic groups such as reptiles, amphibians, and macro-invertebrates.

In overstocked, monotypic tulip poplar stands, improvements to structure and diversity would benefit breeding hardwood forest species such as wood thrush, scarlet tanager, Swainson's warbler, Kentucky warbler, black and white warbler, chimney swift, yellow-throated vireo, and whip-poor-will.

The wood thrush and scarlet tanager are two high priority bird species that are common breeders throughout the refuge acquisition boundary and on refuge-owned land. We have selected them as focal species for management because their requirements for patch size, shape or dimension, and landscape context, described in the PIF Area 44 Plan, would also benefit many other forest interior bird species, and a variety of amphibians and reptiles (Rosenberg, et al, 1999 and 2003). Our intent is not only to meet the breeding and post-fledging requirements for wood thrush and scarlet tanager, but also to benefit co-occurring species of conservation concern identified in the BCR 30 plan and VA WAP, such as the eastern wood peewee, Kentucky warbler, cerulean warbler (migrant), Louisiana waterthrush, yellow-throated vireo, and whip-poor-will (Rosenberg, et al. 1999).

Those forests would also provide year-round habitats for a number of amphibian species, and for at least four state-listed reptile species, including eastern hog-nosed snake, eastern ribbon snake, spotted turtle, and eastern box turtle. Although those are not focal species, they are state species of conservation concern, and we want to consider benefits for other taxa that use the same habitat types as our target species. We will not measure them except on an occasional, opportunistic basis.

Highly suitable habitat for these species consists of

1. mature or maturing deciduous or mixed forest patches containing a mosaic of age classes and structures, with some mid-story species and some areas of early succession
2. a shape approximating a circle or square to provide a low edge-to-interior ratio;
3. contiguous patches of greater than 250 acres, and, 4) a setting in a context of 70-percent forest in the surrounding 2,500 acres, or is less than half a mile from an extensive forest tract.

The minimum area needed to provide highly suitable habitat for these species relates inversely to the percent of forest cover within a 1.2-mile radius of the core area. For example, if a landscape (defined as an area of 2,500 acres) is 70-percent forested, the minimum patch size for highly suitable habitat would be 66 acres. If the same 2,500 acres were only 40-percent forested, the minimum patch size for highly suitable habitat would be 605 acres. In general, patches exceeding 250 acres, having a low edge-to-interior ratio, such as round or square shapes, and that would afford breeding territories that are at least 330 feet from the edge, have demonstrated lower rates of predation and nest parasitism (Rosenberg, et al. 1999 and 2003).

Another way to estimate suitability is to measure the degree of isolation of a given patch—its distance from larger tracts of contiguous forest. Patches less than 100 acres are more suitable the closer they are to larger tracts. For example, a 100-acre patch one-quarter of a mile from a large forest is 88 percent as likely to support breeding scarlet tanagers as an unfragmented forest; a similar patch half a mile away is only 70 percent as likely. Wood thrushes need about 5 acres containing a mix of understory and canopy trees per pair for a breeding territory (Rosenberg, et al. 2003). Scarlet tanagers need approximately 12 acres per breeding pair (Hamel 1992), and prefer a higher denser canopy cover composed of a variety of species of 9 inch–12 inch diameter (Rosenberg, et al. 1999).

Objective 1.8 Hardwood Bottomland Forest

Within the next 15 years, sustain the existing 453 acres of hardwood bottomland forest on the refuge, but also seek opportunities through future refuge acquisitions and management, to increase the amount and distribution of this forest type, and to promote its biological integrity, diversity and environmental health.

Management would strive to create large, contiguous patches of forest (at least 250 acres), and protect corridors that connect those large patches to benefit forest-dependent birds of conservation concern identified in the BCR 30 plan and the VA WAP, such as the Louisiana waterthrush, Swainson's warbler, prothonotary warbler, and Kentucky warbler, and to benefit herpetofauna of conservation concern identified in the VA WAP, such as the eastern ribbon snake, spotted turtle, and eastern box turtle.

Strategies

Continue to:

- Target areas characterized by small or narrow patches of disjunctive forest stands that we could consolidate to increase effective interior and reduce edge effects. Consolidate areas through reforestation of openings (either by natural succession or by plantings native species) that are not otherwise serving another priority habitat need.
- Create connection corridors from isolated stands, as long as this does not fragment managed grasslands, through native plantings or natural succession.
- Acquire land with hardwood bottomland in fee simple or conservation easement. Build upon existing tracts and protect uplands surrounding tracts, where possible, to enhance the quality and function of existing habitat areas.
- Establish threshold criteria for responding to beaver damage, as noted in "Actions Common to All Alternatives" narrative, and for disease outbreak intervention.
- Perform early detection and rapid response control of invasive plants and other undesirable species.
- Where applicable, target areas characterized by small or narrow patches of disjunctive forest stands that could be consolidated to increase effective interior and reduce edge effects. Consolidate areas through reforestation of openings (either by natural succession or by plantings of native species) that are not otherwise serving another priority habitat need.
- Incorporate this habitat type in landbird point count surveys, migration and winter bird counts, and anuran call counts. Update the landbird point count habitat classification to track changes in forest habitat relative to bird habitat use.

Within 5 years of CCP approval:

- Identify areas where natural hydrology has been interrupted or diverted and has the potential for restoration through removal of drain tiles, plugging drainage ditches, etc. Once natural hydrology has been restored, allow these areas to revert naturally to hardwood bottomland forest.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our means and fundamental objectives. The results may trigger adjustments to management strategies, to achieve structural and species diversity or improve forest health, or results may trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - Continue to map and scout for the presence of disease, nuisance species, invasive plants, or any other threats to forest health.
 - Continue to incorporate this habitat type into ongoing biological surveys, such as the habitat-based landbird point count surveys, winter or summer bald eagle surveys in riparian areas, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications in hardwood bottomland forests would be updated to track changes in habitat relative to bird habitat use.

Rationale

We describe our rationale for managing large, contiguous forests under alternative B, objective 1.7.

Hardwood bottomland is defined as a low-lying, semi-permanently flooded forest that is not directly influenced by the river. Healthy stands support a rich biodiversity of wildlife and plants native to the area. As we acquire that forest type in the future, especially in areas where it has not been managed previously, such as in streamside forests or hardwood and laurel thickets on cool ravine slopes, those areas will provide long-term, high-quality habitat for numerous priority bird species, such as the prothonotary warbler, Louisiana waterthrush, Swainson's warbler (a significant possible breeder), worm-eating warbler, red-headed woodpecker, wood duck, and rusty blackbird, and other taxa such as the spotted turtle, amphibians (salamanders, frogs, toads), invertebrates, and rare plant communities.

Objective 1.9 Loblolly Pine Forest

Within the next 15 years, on 1,771 acres of loblolly pine forest, maintain the integrity of mature stands, and enhance the structural and species diversity in any younger overstocked monotypical stands, e.g. 1000 trees per acre (or 10 per 20 feet×20 feet) and in patches greater than 5 acres, to benefit a variety of canopy-, midstory-, and understory-breeding forest-dependent birds identified in the BCR 30 plan and the VA WAP, such as northern bobwhite and chuck-will's widow.

Strategies

Within 5 years of CCP approval:

- Increase the structural and species diversity in overstocked monotypical stands of loblolly pine, e.g. 1,000 trees per acre (or 10 per 20 feet×20 feet) and in patches greater than 5 acres.
 - Conduct stand inventories for potential areas needing restoration or management; incorporate prescriptions and implementation strategies in the HMP and AHWP as appropriate. Continue to map and scout for the presence of disease, nuisance species, invasive plants, or any other threats to forest health.
 - Perform early detection and rapid response control of invasive, undesirable plants, pathogens, and animal species, and diseases.

- Use pre-commercial mechanical and selective thinning, ensuring minimal disturbance impacts (soil erosion and compaction, introduction of non-native invasive plants, and fragmentation). Thin such stands using pre-commercial mechanical or selective thinning down to a range between 150 and 200 trees per acre (depending upon basal areas, slope, exposure, and surrounding shelter).
- Implement standard operating procedures approved by the VA SHPO to avoid damaging potential historic or archeological resources during forest management.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our means and fundamental objectives. The results may trigger adjustments to management strategies, to achieve structural and species diversity or improve forest health, or results may trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - Continue to map and scout for the presence of disease, nuisance species, invasive plants, or any other threats to forest health.
 - Continue to incorporate this habitat type into ongoing biological surveys, such as the habitat-based landbird point count surveys, winter or summer bald eagle surveys in riparian areas, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications near overstocked pine or hardwood forest types would be updated to track changes in habitat relative to bird habitat use, particularly after such stands undergo improvement measures such as thinning, prescribed fire, etc.

Rationale

Forests are a significant habitat type in the refuge acquisition boundary (see the rationale for alternative B, objectives 1.7 and 1.8). Nearly all of the forest in this area has been highly altered. Short-rotation pine plantations and hardwood harvesting have been major economic activities on the eastern Virginia landscape for generations. The refuge includes a number of relict pine stands, which were either planted or are regenerating naturally from seed, and hardwood forest regenerating from previous clear-cuts. Regenerating pine often contain patches of overstocked, monotypical, or early successional growth with no understory. Except for a few species, these stands are generally poor habitats for the majority of breeding birds or migrants in this region (CCB 2002), and may pose a fire hazard in drought years.

Stands less than 5 acres in size generally would not be economically feasible for commercial thinning operations. Improvements to regenerating loblolly pine stands would benefit breeding pine forest species such as eastern screech owl, northern bobwhite, pine warbler, chuck-will's widow, and wintering brown creeper, kinglets, and pine siskin. Stand improvements would also apply to overstocked forested tracts acquired by the Service in the future.

The highly altered state of some pine stands makes type classification challenging. For example, many stands classed as pine by forestry professionals actually have sufficient stocking of hardwoods to support bird communities typical of mixed pine-hardwood stands (Hamel 1992). In addition, mixed pine-hardwood stands on the Coastal Plain bottomlands differ from the same type on higher ground in their species composition and avifauna assemblage (Hamel 1992). Pine forests on the refuge generally fall into the mixed pine-hardwood type. Stands that may appear to be "pure" loblolly on maps or from a distance, upon scrutiny shows evidence of succession toward mixed pine-hardwood containing eastern red cedar, oaks, and shrub layers. Similarly, in the dense, monotypical stands of tulip-poplar, self-thinning and succession toward mixed hardwood types is apparent (Sandy Spencer, personal observation).

The intent of this objective is to assist in the natural succession of highly altered pine and hardwood stands toward a mixed pine-hardwood, or mixed hardwood forest, typical for this region, and provide more structural diversity within each type. In particular, we would promote those stands that contain mast-bearing canopy species such as oaks, beech, hickories, and fruit-bearing sub-canopy species, such as viburnums, holly, blueberry, paw-paw, dogwood, mountain laurel.

Goal 2: Maintain the long-term biological integrity of the riparian habitat along the Rappahannock River and its tributaries for bald eagles and other migratory birds and resident wildlife

Objective 2.1 Riparian Habitat

Within the next 15 years, protect the existing 1,360 acres of riparian habitat on the refuge, and restore to native vegetation up to 200 additional acres of agricultural land within the riparian area on the Tayloe tract. Management actions would emphasize long-term benefits to species of conservation concern that utilize riparian areas identified in the BCR 30 plan and VA WAP, including nesting bald eagles and other migratory birds, amphibians, and reptiles including the state-listed spotted turtle. Riparian protection and restoration would also improve water quality to enhance habitat for fish nurseries and other aquatic life.

Strategies

Continue to:

- On Service-owned lands, widen vegetated riparian buffers to 330 feet or more, and seek opportunities to connect disjunctive vegetation buffers and connect core areas through planting of native trees, grasses or forbs, and through natural succession. Promote native vegetation composition and structure to facilitate ecological function and the biological needs of focal species and the diversity of taxonomic groups using this habitat type.
- Perform early detection and rapid response control of invasive, undesirable plants, pathogens, and animal species, and diseases.
- Acquire riparian habitat, in fee or easement, as a priority from willing sellers when opportunities arise and funding allows. In particular, seek quality riparian habitat in proximity to existing refuge lands.



Snowy day on the refuge: Carolina Vasconcelos

Within 5 years of CCP approval:

- Evaluate locations where the widths of existing riparian vegetation cover or future acquisitions can be converted to forest (first choice) or native grasses and forbs and expanded to 1,600 feet to maintain for a complete avian community and to benefit herpetofauna. At the very least, the 330 feet minimum width is important to reduce nest predation on breeding birds and provide minimal protection to water quality. Exceptions to allow narrower widths may be necessary to accommodate other land use priorities or site configuration, but will be determined on a site-specific basis.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our means and fundamental objectives. The results may trigger adjustments to management strategies, to achieve structural and species diversity or improve forest health, or results may trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - Continue to map and scout for the presence of disease, nuisance species, invasive plants, or any other threats to forest health.
 - Continue to incorporate this habitat type into ongoing biological surveys, such as the habitat-based landbird point count surveys, winter or summer bald eagle surveys in riparian areas, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications in riparian forests would be updated to track changes in habitat relative to bird habitat use.
 - Monitor riparian buffers on easement lands to locate problems such as invasive species, erosion, and continue to work with landowners to maintain or enhance the forest buffer's function. Find solutions to address problems encountered.

Rationale

We define riparian habitat as upland vegetation, typically forested, which occurs within a minimum of 330 feet of open water in rivers and creeks, or marsh habitat. In determining the potential for riparian habitat within the entire refuge acquisition boundary, from Port Royal to Lancaster Creek, we used aerial photos to measure the miles of shoreline associated with the river, its tributary creeks, and the edge of marsh habitat. We calculated that 443 miles of shoreline lie in the refuge acquisition boundary: the river contributes 146 miles, and the creeks and marshes 297 miles.⁶ The refuge protects 34 miles of shoreline, or about 8 percent of that total.

In translating that shoreline distance to riparian habitat, we estimate that currently there are 1,360 acres of riparian habitat protected by the refuge. This amounts to approximately 8 percent of the total potential riparian area within the entire refuge acquisition boundary.

Protecting the headwaters of rivers and tributary creeks is vitally important to riparian habitat protection and management, and often is viewed as a secondary consideration, after shoreline protection. In our view, both are critical to conserving the overall health and integrity of riparian systems. Clearly, given the amount and distribution of current refuge lands, the refuge's direct role in protecting and conserving riparian areas is somewhat limited within the refuge acquisition boundary. However, we will continue to serve as a resource to local landowners and encourage their voluntary pursuit of riparian conservation measures. We will also continue to work with our conservation partners in implementing education and outreach programs.

Agricultural and timbering land uses, and increasing development interests on the Rappahannock River waterfront, place a high premium on the value of limited high quality riparian habitats. Acquiring and enhancing riparian habitat will therefore be a high priority for the refuge.

Of the three eastern Virginia river tributaries of the Chesapeake Bay: the Rappahannock, York, and James rivers; the Rappahannock River has the lowest percentage (35.6 percent) of 30-meter (i.e., 100 feet) buffered shoreline (Dauer, et al. 2005). Yet, the area in the refuge acquisition boundary contains one of the most important bald eagle concentration areas in Virginia—one of the primary reasons for establishing the refuge and a focus of its management. Bald eagles are drawn to the area because of the quality riparian habitat supporting nesting and roosting sites close to foraging habitat.

They also use trees in riparian habitat as perch sites while feeding and resting. See objective 2.2 for our management proposals directed specifically at bald eagles.

The Northern Neck and Middle Peninsula, the two landmasses that comprise the terrestrial portions of the Rappahannock River Valley, lie directly in the path of migratory birds flying along the western side of the Chesapeake Bay. Augmenting the widths and lengths of riparian habitat will greatly benefit the resting, staging, and stopover needs for migrating birds. Additionally, wider buffers will benefit other forest-dwelling species. Wider buffers, provide greater ecological benefits for wildlife, water quality and aquatic resources. The results of a recent study of 73 wetlands in Canada suggested that the effects of adjacent land-use on wetland sediment and water quality could extend over comparatively large distances (Houlahan and Findlay 2004).

Some frequently recommended or required minimum buffer widths for water quality are 50 feet (Virginia Department of Forestry, Best Management Practices for Water Quality) or 100 feet (Chesapeake Bay Preservation Act). For agriculture, the Natural Resource Conservation Service sets minimum and maximum widths ranging from 30 feet for some herbaceous filter strips, up to 150 feet for forested riparian buffer strips, as part of the Conservation Reserve Program requirements.

Narrow buffer zones between wetlands and more intensive land-uses would not achieve high water quality goals (Houlahan and Findlay 2004). Semlitsch (1998, in Fischer 2000) recommended terrestrial buffers greater than 541 feet to maintain viable populations and communities of salamanders and to maintain the connection between wetlands and terrestrial habitats to preserve the biodiversity of remaining wetlands. The range of recommended widths for birds is broad. Fischer and Fischenich (2000) cite recommendations that range from 50 feet for stopover use during migration, to 330 feet to maintain nesting habitat for area sensitive species of birds, to over 1600 feet to maintain a complete avian community. Wide riparian forests are crucial for bald eagles so that during the heat of the day they can roost in the relatively cooler shade of the deep forest.

Management of easement properties may differ from owned properties to accommodate a balance between landowner's objectives and Service goals. As we negotiate new easements, we will seek to increase riparian habitat by requiring that buffers consisting of native forest or early succession cover types be established and maintained along borders of marsh or waterfront. Mutual agreement between the landowner and the Service will determine the widths and cover types, and permitted forest management activities. If the property is already in forest or a timber tract, we will require the protection of forested buffers along all marsh-front, creek-front, riverfront and major drainages. We would evaluate each new tract for the best width and cover type to ensure maximum riparian benefit yet not conflict with other goals for the property.

Objective 2.2 Bald Eagle Roost and Nest Sites

Over the next 15 years, actively manage all known bald eagle roost and nest sites on refuge lands, which may vary in number and location each year. Prevent disturbance to roosting and nesting birds, ensure no loss or degradation of vegetation supporting known sites, and provide for new and alternative roost and nest sites over the long term.

Strategies

Continue to:

- Explore stabilization techniques (such as native plantings of beach grasses, or other means as deemed compatible), as funding and resources permit, to stem erosion of bank and tree loss, in areas of high-energy wave action.

- Use prescribed fire and mechanical thinning techniques to maintain a relative open understory and promote regeneration of future roost trees.
- Incorporate this habitat type in on-going biological surveys, such as habitat-based landbird point count surveys, winter and summer bald eagle surveys, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications in riparian zones would continue to track changes in riparian vegetation to reflect changes in bird use.
- Observe time-of-year restrictions and primary zone guidelines for any potential disturbance activities in roost areas (as described in the Virginia Bald Eagle Management Guidelines (2007)), and the National Bald Eagle Guidelines (FWS 2007)); National Wildlife Federation’s “Bald Eagles in the Chesapeake: a management guide for landowners”, VDGIF Bald Eagle nest management in Virginia, Chesapeake Bay Program’s “Habitat requirements for Chesapeake Bay Living Resources—Bald Eagle”, and USFWS Habitat management guidelines for the bald eagle in the southeast region, 3rd revision).
- Engage in public outreach and education and facilitate opportunities to demonstrate riparian habitat protection on the refuge.
- Work with conservation partners to acquire high conservation-value areas within the focus areas designated in 1994 for protection of bald eagle habitat as identified in the Refuge Establishment Environmental Assessment (1995) and more recent bald eagle surveys, especially if they currently exist as quality riparian habitat or can build upon existing refuge lands.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits to measure our success with respect to our means and fundamental objectives. The results may trigger adjustments to management strategies, or trigger a re-evaluation or refinement of our objectives. Examples of monitoring or surveys that we may implement include:
 - Monitor changing bald eagle roost and nest use and make modifications or repairs as necessary to ensure the favorable roosting conditions of the site
 - Monitor and control invasive plants, erosion, human disturbance, and other sources of habitat degradation as staff and resources permit to protect the integrity of roost, nest, and concentration areas on refuge property
 - Continue to incorporate this habitat type into ongoing biological surveys, such as habitat-based landbird count surveys, winter and summer bald eagle surveys, migration and winter bird counts, and anuran call counts. Landbird point count habitat classifications in or near roosts would be updated to track changes in habitat relative to bird habitat use.

Rationale

We describe the importance of riparian habitat in objective 2.1 above. Actively managing this habitat type to encourage, sustain, and increase bald eagle roosting and nesting use is one of our highest priorities. Our 1994 EA identified land acquisition focus areas where protecting bald eagle habitat was a priority, and more recent bald eagle surveys conducted on the Rappahannock River by boat and plane have both verified these original areas and identified new ones. We will continue to seek acquisition, in fee or easement, of those lands as a priority, from willing sellers, as opportunities arise and funding is available.



Mountain laurel: USFWS

The Rappahannock River Valley is very significant to mid-Atlantic eagle population, and possibly, to the entire eastern population of bald eagles, suggesting the local population has continental importance. It also contains one of the biggest winter concentration areas in the Chesapeake Bay Recovery Area. At one time, 1500–2000 birds (estimate) migrate up from southern states, and 500–600 eagles (estimate) migrate down from northern locations to congregate in the tidal fresh reaches. About 15 percent of all eagles on East Coast pass through the Rappahannock River area; and, 5 percent of the Chesapeake Bay population nest in the Rappahannock River stretch (120 pairs) (Watts personal communication 2003).

However, due to the status of the Chesapeake Bay as both a summer and winter destination for migrants, concentration areas may support a complex mix of individuals of different ages and from different populations. Sorting out which populations are present, and in which proportions, at any given time is highly problematic. Residency times and turnover rates of birds within concentration areas is also unknown. For that reason, it is not possible to infer how many different individuals may be using particular concentration areas over an extended period (Watts, et al. in press).

In Virginia, the bald eagle breeding population has steadily increased from an estimated low of approximately 32 pairs in the late 1960s to 560 known occupied territories in 2007 (Watts and Mitchell 2007). Of that total in 2007, 143 (or approximately 26 percent) were surveyed on the Rappahannock River (Watts and Mitchell 2007). As young eagles mature to breeding age (4–5 years), more suitable nesting sites will be required to maintain positive or stable population trends.

The Chesapeake Bay is an area of convergence for post-nesting and sub-adult bald eagles from breeding populations in the Southeast and Northeast. The convergence of three geographically distinct populations (northeast, southeast, and Chesapeake Bay) suggests that the bay plays a particularly important role in the recovery of bald eagles in eastern North America. Bald eagle “concentration areas” are locations where eagles congregate in numbers much higher than what may be accounted for by local breeding pairs and their offspring and that support one to several communal roosts. Concentration areas may support a complex mix of individuals of different ages, from different populations, and varying residency times and turnover rates, making it difficult to determine the total number of individual birds for a length of time (Watts, et al. in press). Some indication of that quantity

is suggested by the periodic, one-day concentration area surveys conducted by boat on Virginia's three major concentration areas: the James River, Potomac River, and Rappahannock River. The Rappahannock River Concentration Area typically supports the highest number of wintering eagles, with a high winter count in 2005 of 395, but the 9-year average is about 200. Summer surveys began in 2006 and thus far, the high count is 174 on a single survey (Cooper, Portlock and Spencer 2005).

Waterfowl concentration areas are often correlated with fisheries concentration areas. Mid-winter eagle concentrations probably are attracted to concentrations of fish or waterfowl. The high count of eagles in 2005 may have been tied to a die-off of gizzard shad. Most fish runs are not in full swing when the eagles are at their highest densities. The eagles are probably following waterfowl; eagles from the north are known to follow waterfowl south.

Bald eagle communal roost sites have certain characteristics, for which we will manage. Most sites are close to major foraging areas, isolated from human disturbance, protected from harsh weather, surrounded by forest, and usually have a clear movement corridor between the roost and primary foraging areas. Substrates include both pines and hardwoods typically composed of mature canopy trees that possess ample lateral branches for perching and feeding. Actual roost trees tend to be large with good crown access for entry and exit (Watts, et al. in press). They tend to occur in wide (>100 feet) forested zones along creeks and rivers (Cline 1993). Nest sites in this area are predominately in pine, but other tree species are used on occasion, such as beech and sycamore (Spencer, personal observation). Although bald eagles retain some fidelity to roosting sites, these sites can also shift due to fluctuations in populations, prey base, changes in surrounding vegetation, and season. For that reason, it is desirable to provide and protect many sites at different locations to account for those potential fluctuations.

Nest trees are typically a large canopy species towering over the surrounding trees as this affords wide views and easy access for such a wide-winged bird. Typically, the nest tree is one of the largest canopy trees in a clump of trees with little or no undergrowth. The nest tree or clump is usually at the forest edge overlooking a field, marsh, or water body, and never far from feeding habitats (Watts, et al. in press, Cline 1993).

We are particularly concerned with the loss of bald eagle sites due to erosion. In addition to making provisions to protect riparian zones from the upland side, the protection of riparian areas from the river or creek-side is also very important. We are observing modest- to high-energy wave action causing calving and undercutting of some banks, and the loss of beaches and roost trees. We speculate that the erosion rate in some places may be 1–2 feet per year. An adjacent landowner claims that 50 feet of beach and marsh have eroded in the past 50 years (Meyers France, January 2007, personal communication). On the Wilna tract, for example, wave action and erosion have affected a 5-acre bald eagle roost site dominated by 35- to 50-year-old loblolly pine and older oaks. We will monitor that situation, and conduct restoration projects as warranted. Raptors, migratory songbirds, great blue herons, and ospreys also use that forested habitat.

We will continue to increase our outreach to boaters and other river users, who are engaged in activities near bald eagle nest or roost sites, in an effort to explain our restrictions in public use and access. Other outreach activities will include programs and field visits to demonstrate our riparian habitat protection and enhancement on the refuge.

Goal 3: Maintain and enhance the biological diversity and environmental health of tidal and non-tidal wetlands to benefit Federal-listed species, waterfowl and other migratory birds, fish and shellfish, reptiles and amphibians

Objective 3.1 General Wetlands Protection

Within the next 15 years, protect and enhance the present 1,270 acres of refuge wetlands and seek opportunities to create large-block wetlands (>50 acres) within the refuge boundary as opportunities arise to benefit highest priority species identified in the BCR 30 Plan and VA WAP, such as the bald eagle, sensitive joint-vetch (a Federal-listed plant) and wintering waterfowl such as the black duck. In emergent fresh and brackish marshes, such species as Coastal Plain swamp sparrow, seaside sparrow, marsh wren, king rail, and least bittern would be priorities for management. In tidal freshwater swamps, Louisiana waterthrush and prothonotary warbler would be priorities. In interior marshes and feeder streams, our priorities would include the mud sunfish, alewife, American shad, American eel, and Atlantic sturgeon.

Strategies

Continue to:

- Enhance existing forested or early successional vegetated buffers on headwaters of streams and the uplands surrounding wetlands through natural succession or planting of native species to enhance water quality. If the areas of new acquisition lack a minimum 100-foot minimum buffer around wetlands, establish buffers of sufficient width and vegetative cover as a priority to accomplish resource protection goals (case-by-case determination).
- Engage in outreach and public education to increase private landowner awareness and participation in wetland conservation programs.
- Implement the recovery tasks in the Sensitive Joint-Vetch Recovery Plan (USFWS/NE 2005).
 - Survey to locate occurrences.
 - Protect known populations from invasive plants and other threats.
 - Identify threats such as exotic invasive plant species, seed predation by corn ear worm and tobacco budworm, water withdrawal, runoff, or significant changes in surrounding land use patterns.
 - Employ adaptive management where feasible (such as controlling invasive species).
 - Encourage waterfront property owners and local planners in the surrounding community to implement the Chesapeake Bay Preservation Act.
- Target wetlands identified in the 1994 focus areas for Service acquisition or partner protection. In particular, prioritize the protection of large wetlands and wetland complexes within the established acquisition boundary of the refuge. Also, protect uplands adjacent to valuable wetlands, and build upon existing tracts of protected wetland or the headlands of creek drainages.
- Eradicate stand-replacing invasive species to the extent possible, incompatible uses, erosion of critical habitats (where feasible), and runoff from adjacent uplands.
- Identify potential sources of turbidity and minimize those originating from refuge lands.

Within 5 years of CCP approval:

- Facilitate partnerships for researching, conducting inventories, and monitoring the refuge that would improve our understanding of its contribution to and responsibility for VA WAP and BCR 30 plan priority wetland birds that BBS or landbird point counts inadequately detect. For example, information would be highly desirable on the prothonotary warbler, Louisiana waterthrush, and secretive marsh species such as least bittern and king rail. In particular, work with partners to develop and implement a habitat-based, targeted monitoring program for forested wetland species to quantify their relative abundance and density.
- Evaluate small creeks to see if fish passage is restricted. In particular, look at places where fabricated dams that are no longer operational are excluding fish passage. Work with partners to remedy fish passage restrictions where practical.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits. The following are all components of how we would measure our success with respect to our means and fundamental objectives, and the results may trigger adjustments to our management strategies, or trigger a reevaluation or revision to our objectives. Examples of monitoring or surveys may include:
 - Scouting for invasive plants, particularly *Phragmites*, to prevent the loss of quality habitat
 - Secretive marshbird surveys and mid-winter waterfowl surveys to evaluate their patterns of habitat use and potential areas for habitat protection or enhancement projects
 - Surveys for forested wetland priority species such as the prothonotary warbler, to evaluate threats to breeding habitat.
 - Monitor the intertidal zone and shoreline erosion rate of critical habitats for marsh birds, bald eagles, or sensitive joint-vetch to evaluate the potential for abatement
 - Monitor wildlife disturbance in sensitive areas

Rationale

One of the establishing purposes of the refuge is to protect and conserve wetlands (Emergency Wetlands Resources Act of 1986, 100 Stat.3582-91). Eighty percent of America's breeding population and more than 50 percent of its 800 species of protected migratory birds rely on wetlands (Mitsch and Gosselink 1993, citing Wharton, et al. 1982). Over 95 percent of the commercially harvested fish and shellfish species are wetland-dependent. Most freshwater fish depend on wetlands for spawning, and anadromous fish rely on them as nurseries for young fry. Wetlands also provide essential ecosystem functions that technology has yet to rival such as flood mitigation (especially riverine wetlands), storm abatement and filtering and removing nutrients and toxic material. Wetlands also are significant for global cycles of nitrogen, sulfur, methane and carbon dioxide (Mitch and Gosselink 1993).

The Rappahannock River is an important estuarine tributary of the Chesapeake Bay and, conversely, the bay is intrinsic to the character of the tidal Rappahannock River. What tributaries contribute to the bay in terms of sediment loads, nutrients, and other pollutants, will come back to haunt them in time. Indeed, they are doing so now. Dead zones, caused by toxically low levels of oxygen from high levels of nutrients, are spreading upriver (Dauer, et al. 2005). The grass shrimp, which needs clean water and is an important fish food, once was abundant in beds of submerged aquatic vegetation (SAV) around Hoskins Creek (Williams 1993), but the Rappahannock River's SAV beds have all but disappeared because of high sediment loads, and with them went a variety of crustaceans and mollusks that thrived

there. All vegetation zones along the river—upland buffers, riverine and estuarine wetlands, beach vegetation, and SAV beds—provide an indispensable ecological function by filtering out those loads to deliver cleaner water to the river and bay.

The several distinct types of wetland habitat on the refuge include

- *Tidal freshwater emergent marsh* (also known as palustrine emergent wetlands);
- *Tidal freshwater swamp* (also known as tidal forested wetlands, dominated by trees or shrubs);
- *Tidal brackish emergent marsh* (contains more salt tolerant species than tidal fresh marshes);
- *Riparian forested wetlands* (along the lowland margins and also known as hardwood bottomlands) which receive only occasional flooding from the river but may annually flood from rains and sheetflow from uplands;
- *Wet meadows, ponds, and vernal pools* (created by beaver activity occur in the upper reaches of the feeder creeks and drainages. Wet meadows created by surface flow also are scattered throughout lower terraces on the uplands in depressions in poorly drained soils).

The freshwater tidal marshes are composed of emergent vegetation such as wild rice, cattail, big cordgrass, pickerel-weed and arrow arum, and have salinity levels below 0.5 parts per thousand. They host priority birds such as the American black duck, wood duck, mallard, green-winged teal, common snipe, solitary sandpiper, spotted sandpiper, marsh wren, American bittern, least bittern, sora, and king rail. In addition, Forster's tern forages in the associated open waters in summer. Those areas contain most of the important nursery and spawning habitat for several important fish species that, in turn, provide an important food source for herons, eagles, ospreys and fish-eating waterfowl.

The freshwater, tidally influenced forested wetlands or swamps within the refuge acquisition boundary are dominated by green ash, maple, river birch, and sycamore in the canopy, with an occasional occurrence of bald cypress. The vegetation in those wetlands can withstand long periods of saturation of the root zone during the growing season. They support such priority bird species as the Louisiana waterthrush, prothonotary warbler, worm-eating warbler, red-headed woodpecker, and wood duck. Cerulean warblers and Swainson's warblers may use those forested wetlands even more than has been documented. That potential deserves further study.

The forested wetland swamps in upper Cat Point Creek also support a large colony of purple martins, which may be nesting there. Several great blue heron rookeries, bald eagle nest and roost sites, and numerous osprey nests also lie along the interface of those wetlands with riparian habitat. We discuss habitat for those species in more detail in goal 2. Many species of passerines also use those forested wetlands as stopover habitat during migration.

Tidal brackish marsh (part of the estuarine emergent wetland type) varies by soil type, salinity, elevation and geographic location. It forms along tidal tributaries in the transition zone between outer salt marshes and tidal fresh marshes, and often is dominated by big cordgrass. The low marsh is inundated diurnally, and supports grasses and rushes, while the high marsh experiences inundation only irregularly during storms or spring tides and, therefore, often supports scattered shrubs in addition to grasses and rushes. The Island Farm Marsh tract, opposite the Tappahannock, is characteristic of that type and, depending on salinity levels in any year, sometimes supports vegetation such as *Spartina patens* associated more frequently with salt marshes. Some priority species found in the boundary area's brackish marshes are the American black duck, seaside sparrow, coastal plain swamp sparrow, marsh wren, northern pintail, and a rarer migrant or second breeder, sedge wren.



Restoring forest habitat by planting trees: USFWS

Riparian forests (non-tidal) have shorter periods of flooding and support forest species that are similar to those in upland hardwood forests. For that reason, we discuss the objectives, rationale, and strategies for this community type separately in goal 2.

Controlling and preventing the spread of invasive plants, particularly common reed or *Phragmites*, is an essential component of wetland protection and management in the Atlantic coastal states. It spreads rapidly, displaces native vegetation and, over time, raises the height of the marsh floor, altering the hydrology of the marsh. That poses a conservation threat to wetland-dependent fish and wildlife species that evolved with the historic vegetative communities that provide food, nest substrate, spawning habitat, or cover at different times in their annual life cycles.

All refuge lands that border wetlands or open water now have at least 100-foot buffers in grassland or forest vegetation, but that is a very small fraction of what needs to be buffered and protected within the entire refuge acquisition boundary.

The Rappahannock River marshes and their associated open water habitats are vitally important for fish resources, wintering and migrating ducks and geese, invertebrates, migrating monarch butterflies, breeding and wintering amphibians and reptiles, and river otters, and are used by a substantial assemblage of Federal- and state-listed birds of conservation concern. Protecting wetlands is fundamental in preserving the food web of the Rappahannock River Valley.

Size is an important criterion in protecting and managing wetlands. Watts, et al. (1992) found that marsh area was a good indicator of species richness in all breeding marsh birds studied. Marsh-dependent birds declined in frequency in marshes between 12 and 25 acres. Large marshes also were rare in the western shore of the Chesapeake Bay study area. Large expanses of freshwater tidal marshes also are in limited supply on the Rappahannock River, and deserve protection. The Virginia DCR has identified extensive freshwater tidal marsh as a significant plant community type (Belden 2002). The brackish and fresh-brackish marshes on the Rappahannock River support colonies of breeding and wintering marsh wrens, a species of high priority in the BCR 30 plan. Because marsh wrens are pseudo-colonial nesters that will not nest in isolation, they require marshes large enough to accommodate multiple male breeding territories (Kale 1965; Picman, et al. 1988; Spencer 2000). Marsh wrens breed and winter on the Rappahannock River (Spencer, personal observation).

Protecting large blocks (>50 acres) of all types of wetland habitat in the refuge will improve the success of nesting, foraging, and cover opportunities for emergent-wetland-dependent species, such as the American black duck, seaside sparrow, marsh wren, coastal plain swamp sparrow, mallard, northern pintail, wood duck, least bittern, king rail, sora, common snipe, and green-winged teal, and for forested swamp species such as the prothonotary warbler, Louisiana waterthrush, red-headed woodpecker, and bald eagle, all identified in the BCR 30 plan and the VA WAP.

Sensitive joint-vetch is an annual legume that appears sporadically in freshwater tidal marsh habitat and prefers disturbed edges. The Service has an obligation to benefit that Federal-listed species. Therefore, our playing an active role in tidal marsh conservation is important. Probably most important is to benefit that species by continuing to control *Phragmites*. Spraying *Phragmites* next to sensitive joint-vetch requires extreme caution, typically using hand equipment.

Objective 3.2 Tidal Brackish and Fresh Marsh

Within the next 15 years, protect and manage quality wintering waterfowl habitat in areas known to support wintering waterfowl concentrations as detected from aerial surveys or where there is potential, particularly in larger marsh complexes of >50 acres.

Strategies

Continue to:

- Establish or widen existing forested or early successional vegetated buffers on headwaters of streams and the uplands surrounding wetlands through natural succession or planting of native species to enhance wetland water quality. If 330-foot minimum buffers around wetlands are lacking in new acquisition areas, establish buffers of sufficient widths and vegetative cover as a priority to accomplish resource protection goals (case-by-case determination).
- Acquire or protect through easements larger tracts of tidal marshland (>50 acres) as funding and opportunity permits.

Rationale

Quality wintering waterfowl habitat includes a combination of good foraging and secure resting areas in proximity to each other. Marshes containing a combination of high- and low-marsh vegetation and submerged aquatic vegetation (SAV) interspersed by numerous sheltered pools of varying depths, characterize ideal habitat for dabblers and fish resources for divers. In chapter 2, we describe where the SAV beds are located on the Rappahannock River and what surveys we are undertaking to monitor them.

Objective 3.3 Wet Meadows and Vernal Pool Habitat

Over the next 15 years, enhance wet meadow and vernal pool habitats to benefit breeding, foraging, and over-wintering wildlife of conservation concern identified in the VA WAP, such as spotted turtle, ribbon snake, and other native reptiles and amphibians.

Strategy

Continue to:

- Manage existing restored refuge wetlands by manipulating water levels to maximize value to breeding amphibians and other wetland-dependent species.

- Manage vegetation through plantings or other techniques, where feasible or needed, to meet the state recommendation of 300-foot to 1,000-foot vegetated buffers around vernal pools or wetlands.
- Protect known vernal pools from drift and runoff from applications of herbicides.

Within 5-10 years of CCP approval:

- Identify areas where removing agricultural drain tiles and plugging ditches can restore the natural hydrology. Within 5 years of CCP approval, develop restoration plans and timelines for implementation.
- Explore protecting vernal pools on private lands by conservation easement, particularly for forested tracts. Work with landowners to include language in the conservation agreements to establish buffers at least 300 feet, and up to 1,000 feet if possible, around vernal pools in forests, remove agricultural drain tiles, and plug ditches to restore natural hydrology.
- In early spring identify and map areas of concentration of amphibians and vernal pools to ensure their conservation and protection.
- Develop partnerships with Northeast Partners in Amphibians and Reptiles Conservation (PARC, soon to publish habitat management guidelines) and the state herpetologists on protecting and managing vernal pools and general measures to protect amphibians.

Rationale

Vernal pools are small bodies of standing water that form in the spring from meltwater and are often dry by mid-summer or may even be dry before the end of the spring growing season. Many vernal pools are found in depressions in agricultural areas, but also may be found in woodlots. Wetland vegetation may become established, but usually is dominated by annuals. Wet meadows usually look much like a fallow field except that water-loving grasses and sedges dominate them. They will contain nearly 100 percent vegetative cover with very little or no open water. Surface water is temporary or seasonal and only present during the growing season in the spring. Wet meadows often form a transition zone between aquatic communities and uplands with soils that are often saturated and mucky.

Quality terrestrial habitat in close proximity to vernal pools, ponds, and wet meadows, where no barriers such as roads exist, is also crucial for breeding, foraging, and over-wintering amphibians such as salamanders and frogs with limited overland range distances. Persistence of amphibian populations at breeding ponds also depends upon the amount and proximity of suitable terrestrial habitats (Blossey and Maerz, unpublished; but see Guerry and Hunter 2002; Pope, et al. 2000). Wood frogs may need up to 300 feet to accommodate their post-breeding movements (Baldwin, et al. 2006), salamanders may need over 500 feet to accommodate the dispersal movements of some species (Semlitsch 1998) and up to 2,600 feet may be required to accommodate migration distances of newts (Johnston 2003).

Several species such as spotted turtle are in rapid decline. After grasslands, vernal pools are the most rapidly declining habitats in the area, with few to no regulations to protect them. Vernal pools must be one-tenth of an acre in size before any regulations apply; and there is no mitigation required unless the pool is half an acre in size (J.D. Kleopfer, personal communication, 2006). Wet meadows, moist soil units, temporary vernal pools, beaver wetlands, and Coastal Plain ponds in the refuge acquisition boundary have variable hydroperiods and species composition depending on landscape context, soils, and surrounding vegetation and thus are not easily classified. Structurally, they may have some emergent vegetation, grasslands and other early successional vegetation, and even trees.

The characteristic vegetation for vernal pools on the refuge is composed of sedges such as woolgrass, rushes, and shrub species such as wax myrtle, groundsel tree, and black willow. Those areas support bird species such as the common yellowthroat, swamp sparrow (winter), willow flycatcher and sedge wren (migration) and are important breeding grounds for amphibians. Fish may also be present. Depending on the expanse and depth of the water, the green heron, pied-billed grebe, and teal may use these wetlands.

Complexes of wet-meadows and vernal pools near grasslands and forests provide suitable year-round habitat for breeding, foraging, and over-wintering amphibians and certain reptiles. The practice of ditching and draining agricultural fields is widespread in this area. Those practices redirect precipitation sheetflow toward existing outlets such as creeks and ponds. The hydrology of many agricultural fields on the refuge was modified in that fashion. This is beneficial to units currently managed as grasslands, but perhaps, at a cost to terrestrial habitat for amphibians, as it resulted in removal of vernal pools and wet meadows that formed in and around the fields.

Invertebrate prey in terrestrial habitats is greater than in areas immediately around the pond perimeter, and after breeding, amphibians depend on these terrestrial habitats for foraging prior to overwintering (Lamoureux, et al. 2002; Pope, et al. 2000). The provision of vernal pools and wet meadows should be viewed as a necessary complementary component of the refuge grassland and forest management program.

Management and control of non-native invasive plants will also benefit management for amphibians, as these plants can cause significant reductions in invertebrate abundance (Blossey 1999), potentially degrading the value as amphibian foraging sites. Blossey and Maerz (2002, unpublished) found that green frogs failed to gain weight or mass in habitats invaded by Japanese knotweed, compared to those inhabiting non-invaded fields.

Objective 3.4 Shoreline Zone

Within 5 years of CCP approval, begin a program to prevent or substantially reduce the further erosion or disturbance of beaches and marsh edges or fringes which contain protected populations, such as the Federal-listed sensitive joint-vetch, bald eagle roosts, and to benefit species such as nesting turtles, herons, and shorebirds that use this zone for foraging or for access to adjacent riparian or marsh habitats for critical stages of their life cycles.

Strategies

Continue to:

- Plant native aquatic grasses on gradually sloping beaches with species that are appropriate for brackish or fresh zones in this region, such as wigeon grass (*Ruppia maritima*), wild celery (*Valesneria spiralis*), three-squares, and black needlerush (*Romeria americanus*), and explore other stabilization techniques deemed compatible.
- Protect joint-vetch populations as described in the strategies for objective 3.1.
- Engage in public outreach and education to explain the sensitive nature of these transitional habitats and the importance of reducing human disturbance.
- Manage public use in these areas to ensure compatibility of visitor's activities, especially during sensitive times of the year for wildlife.

Within 5 years of CCP approval:

- Set markers to identify current baseline for a measure of erosion rate near known or suspected sites of high erosion rates (6 inches to 1 foot per year) in marshes near populations of species of conservation concern.
- After observation for 1 year, identify priority areas in need of abatement measures.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits. The following are all components of how we would measure our success with respect to our means and fundamental objectives, and the results may trigger adjustments to our management strategies, or trigger a reevaluation or revision to our objectives. Examples of monitoring or surveys may include:
 - Monitoring and treating invasive plants, particularly *Phragmites*, to prevent unacceptable levels of loss of quality habitat. If the patch sizes of *Phragmites* attain a solid stand (regardless of size) that reasonably can be sprayed or, if it threatens a rare community, initiate appropriate control measures to decrease *Phragmites* to a tolerable level. We may leave untreated any patches that are static or inaccessible by any currently available means until we determine a feasible solution or efficacious method.
 - Secretive marsh bird surveys to evaluate habitat use patterns and potential areas for enhancement projects for focal species. We would use the valuations to identify areas for protection from disturbance (waterfowl), or to develop a decision tool to evaluate potential sites for the creation or improvement of marshbird habitat. Monitoring data may be used to evaluate the effectiveness of these decisions, and then to make better decisions in the future at other sites.
 - Mid-winter waterfowl surveys conducted by the state will help keep refuge staff apprised of patterns of use and distribution throughout marshes in the project area. That information is useful for monitoring declines and increases in state-listed or BCR-listed species, for targeting areas for potential easement or protection. Conduct additional aerial waterfowl surveys, if funding is available, in 5-year intervals.
 - Surveys of priority forested wetland species such as prothonotary warbler. Trends in abundance data would be used to trigger assessments of habitat quality for breeding and potential sources of threats to habitat quality.
 - Surveys of anurans (frogs or toads), to monitor overall diversity and indications of habitat changes that affect local populations or to evaluate for further vernal pool protection or management.
 - Monitoring intertidal zone and shoreline erosion rate of critical habitats for marshbirds, bald eagle roots, or sensitive joint-vetch to evaluate the potential for abatement.
 - Monitor disturbance factors for wildlife in sensitive areas.



The banks of the Rappahannock River: USFWS

Rationale

Managing erosion along the edges of a dynamic tidal river presents a great challenge. Beach and marsh erosion is a dynamic natural process of any river system. Depending on the directional orientation of the wide stretches of the lower Rappahannock River, different beaches are subject to pummeling by storms and long-lasting winds at different times, resulting in sand deposition and beach accretion in some places, sand loss and calving of marsh peat or bank at others. Problems tend to be greatest where sediments are unconsolidated, fetch⁷ is greater than 1 mile, upland areas generate significant runoff or have saturated soils, and adjacent shorelines are hardened with protective structures (MD DNR 2000).

Only in a few locations would it make sense to interfere with this natural process. Increasing shoreline development, revetments, bulkheads (hard shorelines), and removal of vegetation for scenic vistas, creates a greater burden for erosion control and maintaining ecological functions on the Rappahannock River's remaining fringe marshes. In some places, we may need to intervene to stem erosion along emergent fringe marshes and beachfronts of other wetland types containing populations of protected or listed species such as the Federal-listed sensitive joint-vetch. The creation of "living shorelines"—planting native aquatic grasses or other vegetation—may partially resolve erosion on gently sloped beaches and shoreline. Cutbank areas with steep drop-offs do not lend themselves to that type of restoration, and may require structures or hybrid solutions. Establishing native vegetation is also a strategy to prevent the establishment of non-native species (Smart, Dick, and Doyle 1998).

Goal 4: Promote enjoyment and stewardship of our Nation's natural resources by providing quality, wildlife-dependent recreation and education opportunities on refuge lands and waters.

Objective 4.1 Deer Hunting

Continue to provide a quality annual deer hunt to manage the white-tailed deer population, protect habitat, and provide a priority, wildlife-dependent recreational opportunity on the Wilna, Wright, Tayloe, Hutchinson, Thomas, Port Royal, Toby's Point, Mothershead, and Laurel Grove tracts. Within 15 years of CCP approval, evaluate other existing refuge tracts where hunting is not currently allowed, as well as any new tracts acquired, for new deer hunting opportunities. Where we determine a deer hunt is appropriate, compatible, and can be supported with available resources, we would increase available hunt acres.

Strategies

Continue to:

- Implement the annual lottery, permit-based hunt program. (See additional program details in "Visitor Services Resources—Priority Public Uses" in chapter 2.)
- Distribute annual special use permits to area dog owners, permitting access to retrieve trespass dogs during the deer hunt season. Continue to annually evaluate the program and make improvements when necessary.
- Obtain data from the VDGIF assessment of the health of the Northern Neck/Middle Peninsula deer populations and adjust the hunt program accordingly to assist in cooperative population management.
- Work with the Friends group, volunteers, and other partners to implement this program.

Within 5 years of CCP approval:

- Work with the VDGIF to improve the reporting system to better facilitate evaluation of the refuge program.
- Evaluate the program through staff observation and hunter contacts.
- Create and maintain access roads or parking areas as needed.
- Coordinate with state and other partners to develop host programs that encourage new user groups, e.g., Becoming an Outdoors Woman, youth hunts.

Rationale

As in alternative A, we recognize hunting as a healthy, traditional outdoor pastime, deeply rooted in our American heritage. President Bush recognized this tradition in implementing Executive Order #13443, issued in August 2007, directing the Service and other land management agencies “...to manage wildlife and wildlife habitats on public lands in a manner that expands and enhances hunting opportunities, including through the use of hunting in wildlife management planning.”

In addition, deer hunting aids statewide efforts to control deer populations and complements habitat management on the refuge.

Using data collected by the VDGIF and their statewide population analysis, the refuge extrapolates population estimates and adjusts refuge program goals annually, if needed. As in all refuge programs, we make special accommodations upon request, whenever possible, to further facilitate accessibility. The following are the guiding principles of our hunting program, according to new Service policy (605 FW 2).

1. Manage wildlife populations consistent with Refuge System-specific management plans approved after 1997 and, to the extent practicable, state fish and wildlife conservation plans.
2. Promote visitor understanding of and increase visitor appreciation for America’s natural resources.
3. Provide opportunities for quality recreational and educational experiences.
4. Encourage participation in this tradition.
5. Minimize conflicts with visitors participating in other compatible, wildlife-dependent recreation.

In 2002, we issued a final “Refuge Hunt Plan” and environmental assessment after a 30-day period of public review and comment. The refuge hunt program conforms to state regulations and additional refuge regulations stipulated in Title 50 of the Code of Federal Regulations. Given our stated hunt program objectives, we intend to maintain the deer population at a level commensurate with available habitat, to maintain the health of the herd and prevent the habitat degradation that accompanies overpopulation.

Due to the unpredictable nature of the land acquisition program, we do not know where additional huntable acres will be located, but we intend to open new tracts to deer hunting where we determine it an appropriate and compatible use. Otherwise, the rationale is the same as alternative A.

Our highest priorities over the next 15 years would be to continue to develop a quality hunting opportunity for deer, and to evaluate hunting opportunities for waterfowl (see objective 4.2) and wild turkey (see objective 4.3). However, over the next 15 years, and assuming resources and support are available and we have made progress on evaluating the waterfowl and turkey hunts, a secondary

priority would be to evaluate opportunities for small game hunting, such as for rabbit and squirrels. Existing refuge tracts provide good habitat for these species and we would expect to acquire additional quality habitat in the future. We would continue to coordinate with VDGIF in evaluating any proposed new hunting and fishing programs.

Objective 4.2 Waterfowl Hunting

Within 5 years of CCP approval, evaluate providing a quality public waterfowl hunt program, in partnership with the VDGIF, on refuge tracts such as the Tayloe, Island Farm, and Toby's Point tracts. Expand this opportunity to other existing refuge tracts and newly acquired tracts where determined appropriate and compatible.

Strategies

Within 5 years of CCP approval:

- Evaluate the potential to open the refuge to waterfowl hunting, prepare necessary National Environmental Policy Act (NEPA) documents and management plan, gain state concurrence, ensure compatibility, and consult with the public during the process.
- If the evaluation finds that waterfowl hunting is an appropriate and compatible use of the refuge:
 - Develop a waterfowl hunt program that ensures high quality resting and feeding habitat are maintained and protected.
 - Work with the VDGIF to determine hunt blind locations where quality waterfowl hunting opportunities exist.
 - Work with the VDGIF to install and maintain stakes to designate waterfowl hunting blinds.
 - Within the VDGIF state seasons, determine refuge hunt dates with a focus on minimizing conflicts between hunting, habitat management, and other wildlife-dependent recreational activities.
 - Work with the VDGIF annually to evaluate the status and trend of the waterfowl population and adjust the program according to state regulations and the Federal framework.
 - Create the necessary infrastructure to support the program, including working with off-refuge partners.
 - Collaborate with the VDGIF on waterfowl hunting outreach and enforcement.
 - Work with partners such as Ducks Unlimited to provide youth waterfowl hunting opportunities on the refuge, and youth conservation (Greenwing) events.

Rationale

As in alternative A, the Improvement Act identifies hunting as priority wildlife-dependent recreation. The act states, "compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System." Furthermore, hunting is an established, traditional use in the local area. We may offer waterfowl hunting on the refuge under this alternative if determined appropriate and compatible for the refuge; however, we would strive to distribute this use in a way that ensures the continued use of refuge habitats by other visitors with minimal disturbance.

The marshlands along the Rappahannock River are important feeding and resting areas for wintering waterfowl and other water-dependent birds. Most of these marshes are privately owned, however, and many have several types of recreation occurring in or around them, such as fishing, crabbing, and waterfowl hunting during the waterfowl-hunting season. Since its establishment, the Service has not exercised its riparian rights to regulate waterfowl hunting on any of the marshes under its ownership. Consequently, licensed hunting blinds have been set in several locations on the edge of, or within, the navigable waterways of some refuge marshes. That is the case, for example, on the Tayloe and Island Farm tracts. Those blinds are legally established; however, neither the frequency of their use by hunters nor the cumulative impacts on the local wintering waterfowl population using those marshes have been assessed.

Hunting around the refuge could have a significant adverse effect on waterfowl populations using the refuge. A study conducted at the Back Bay National Wildlife Refuge showed that mallard subjected to hunting pressure might have developed a conditioned frequent flight response to humans during the hunting season (Laskowski, et al. 1993). That behavior may be detrimental because additional flight can increase hunting mortality and energy expenditure. Waterfowl in poor condition from frequent flights that burn critical body fat experience higher natural mortality rates (Haramis, et al. 1986, Hepp, et al. 1986). Bartelt (1987) found that human disturbance of family groups of Canada geese resulted in their increased hunting mortality. Poor body condition and low lipid reserves (body fat) during winter and the spring migration can affect the reproductive success of waterfowl (Ankney and MacInnes 1978, Raveling 1979, Krapu 1981).

Developing a refuge waterfowl hunting program would give us the opportunity to offer public waterfowl hunting opportunities and lessen the potential for negative impacts on the life cycles of migratory birds by better regulating the disturbance of wintering waterfowl on refuge lands, and providing safe resting and feeding areas throughout the winter. We would do that primarily through the location of blind sites, and by managing the timing, season, and numbers of hunters.

We intend to work with the VDGIF to coordinate a program using numbered stakes to designate the locations of the hunt blinds. That would require additional coordination to insure compliance with state regulations on blinds. Alternatively, we could exercise our riparian rights and erect permanent, stationary shore blinds. With the assistance of the VDGIF, the refuge would allow hunting in accordance with state seasons. We may cease hunting in certain areas after December 15 to afford additional protection to nesting bald eagles.

The tracts identified as potential quality waterfowl hunting sites include the Tayloe, Island Farm, and Toby's Point. Those tracts total approximately 1000 acres of wetland/marsh habitat along the Cat Point Creek and Rappahannock River. Due to the unpredictable nature of the land acquisition program, we do not know where we would locate additional hunting opportunities, but we would evaluate new tracts for waterfowl hunting where we determined it an appropriate and compatible use. The hunting principles for this objective are the same as those in alternative B, objective 4.2.

Objective 4.3 Wild Turkey Hunting

Within 5 years of CCP approval, evaluate establishing a quality wild turkey hunting program on refuge tracts such as the Tayloe and Toby's Point tracts, in cooperation with the VDGIF. Expand that opportunity to other refuge tracts and newly acquired tracts where we determine it appropriate and compatible.

Strategies

Within 5 years of CCP approval:

- Evaluate the potential to open the refuge to turkey hunting, prepare necessary NEPA documents and management plan, gain state concurrence, ensure compatibility, and consult with the public during the process.
- If the evaluation finds that turkey hunting is an appropriate and compatible use for the refuge:
 - We would then work with the VDGIF to evaluate the state and regional turkey population and trends, adjusting the refuge hunt program accordingly.
 - Establish a turkey hunt program in conjunction with the state hunting seasons in spring or fall, with a focus on minimizing conflicts between hunting, habitat management, migratory bird nesting, and other wildlife-dependent recreation activities.
 - Work with partners such as the National Wild Turkey Federation to provide youth hunting opportunities and youth conservation (JAKES) events on the refuge.

Rationale

We recognize wild turkey hunting as a traditional outdoor pastime. When managed responsibly, it can instill a unique appreciation of wildlife, their behavior, and their habitat needs. If our analysis determines that turkey hunting is appropriate and compatible for the refuge, we would pursue developing this opportunity.

We now identify the Tayloe and Toby's Point tracts as potential sites for quality wild turkey hunting. They consist of mature and early successional forest habitats. Through further evaluation, if we determine to pursue this hunt, we would plan to define hunt areas, and conduct a permitted hunt, holding a lottery to determine successful permittees. We may charge an application fee to offset the cost of conducting the hunt. We would ask the VDGIF and the National Wild Turkey Federation to assist in implementing the turkey hunt during the state hunting seasons. State and refuge law enforcement officers would check hunt tracts to ensure compliance with state and refuge regulations. Due to the unpredictable nature of the land acquisition program, we do not know where additional hunt opportunities may be located, but our intent is to evaluate new tracts for wild turkey hunting where it is determined to be appropriate and compatible.

The hunting principles identified under the rationale for alternative B, objective 4.2 are the same for this objective.

Objective 4.4 Recreational Fishing

Within 5 years of CCP approval, provide daily, quality fishing opportunities at Wilna Pond on the Wilna tract, and formally establish three new fishing opportunities and daily fishing access at the Hutchinson, Laurel Grove, and Toby's Point tracts.

Strategies

Continue to:

- Provide daily fishing access at the Wilna Pond. Fishing may be conducted by boat, shoreline, or pier access.

- Maintain accessible fishing pier at Wilna Pond. The pier is closed during environmental education or deer hunting activities. We would post notifications of those dates on the refuge website and on signs at the refuge entrance and at Wilna Pond at least 48 hours before closing the pier. However, it is possible that emergency situations may arise on the refuge resulting in closures not anticipated in advance.
- Maintain parking and boat launch at Wilna Pond to facilitate hand-launch boat fishing access to the Wilna Pond. To accommodate more accessible boat launching, small trailers would be permitted. Posts would be installed to prevent large trailers, which could damage the unimproved launch site, from getting too close to the shoreline. Boats, canoes, and kayaks would still need to be hand-launched but the use of trailers would allow safer access for those unable to secure their watercraft on or in a vehicle.
- Conduct annual Kids' Fishing Day event at Wilna Pond for at least 30 youth, ages 5–15 years. Event includes a Fishing Clinic and hands-on fishing in the Wilna Pond. Partners for this event include the Friends, Office of Fisheries Assistance, VDGIF, Boy Scouts, other youth organizations and private companies.
- Provide visitors with general information on the fishing program and refuge specific regulations through the refuge website, information signs located at Wilna Pond, and the fishing brochure, which is available at the information sign along the refuge entrance road and at the refuge headquarters.
- Work with the Friends Group, volunteers, and other partners to implement and maintain the fishing program.

Within 5 years of CCP approval:

- Improve and maintain access roads and parking areas at Wilna, Hutchinson, and Laurel Grove tracts.
- Formally allow bank fishing on refuge lands at Toby's Point within 100 feet upstream of the King George County's Wilmont Landing boat launch and pier; provide informational signs and brochures containing refuge-specific and state fishing regulations to facilitate this use, in cooperation with the county.
- Work with the Friends group and volunteers to replace the fishing pier at the Hutchinson tract.
- Provide designated shoreline and hand-launch boat fishing access at the Laurel Grove tract, pending results of the baseline report.
- Close sites periodically if necessary to minimize conflicts with visitors participating in other compatible wildlife-dependent recreational activities and other habitat management activities. Post notification of those dates on the refuge website and on signs located at the refuge entrance and tract parking areas at least 48 hours prior to its closure.
- Install fishing regulation information at Hutchinson and Laurel Grove tract parking areas.
- Provide visitors with general information on the fishing program and refuge specific regulations through the refuge website, informational signs located at Wilna Pond, and the fishing brochure. Make the fishing brochure available at the information sign located along the refuge entrance road and at the refuge headquarters.
- Revise the fishing brochure and refuge website to include site-specific information for the Hutchinson, Toby's Point, and Laurel Grove tracts.

- Work with the Friends group and volunteers to implement and maintain the fishing program.
- Publish a version of the revised fishing brochure in Spanish.

Rationale

As in alternative A, the Improvement Act identifies fishing as priority wildlife-dependent recreation. The act states, “Compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System.” Fishing promotes public understanding and appreciation of natural resources and their management on all lands and waters in the Refuge System. A free fishing program has been in place on the Wilna tract since 2003.

The Wilna Pond fish community is a self-sustaining population. Refuge-specific regulations are in effect to ensure its health (i.e., largemouth bass catch and release only).

We are not considering stocking fish in refuge ponds. Generally, refuge management focuses on supporting self-sustaining habitats and native or naturalized species populations.

The Improvement Act stipulates, “In administering the System, the Secretary shall...ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans....” One of several Service policies that devolves from that act is in the Service Manual (601 FW 3), “Biological Integrity, Diversity, and Environmental Health.”

Part 3.14(f) of that policy states, “We do not introduce species on a refuge outside of their historic range or introduce a species if we determine they were naturally extirpated, unless such introductions are essential for the survival of the species and prescribed in an endangered species recovery plan, or is essential for the control of an invasive species and prescribed in an integrated pest management plan.”

Based on new policy in 605 FW3 and 4, we strive to follow these guiding principles for the refuge fishing program.

1. Effectively maintain healthy and diverse fish communities and aquatic ecosystems by scientific management techniques.
2. Promote visitor understanding of, and increase visitor appreciation for, America’s natural resources.
3. Provide opportunities for quality recreational and educational experiences consistent with criteria describing quality as defined in chapter 1.
4. Encourage participation in this tradition.
5. Minimize conflicts with visitors participating in other compatible, wildlife-dependent activities.

Under this alternative, we would continue to provide accessible fishing opportunities, as described under alternative A, with the addition of one new fishing pier and supporting facilities (road access, parking areas) to provide designated shoreline recreational fishing access, at the Laurel Grove and Hutchinson tracts, respectively.

In addition, on the Toby’s Point tract, we would formally allow fishing in an area that anglers have used for many years. Access to that site is provided by the adjacent Wilmont Landing boat launch area and pier, which are owned and maintained by King George County. Essentially, we believe there is little to low impact associated with anglers’ bank fishing from refuge lands, within 100 feet upstream, or north, of the pier. We would work in cooperation with county officials to provide informational signs and brochures containing refuge-specific and state fishing regulations to facilitate this use.

The Hutchinson tract, located in Essex County, would provide access to fishing in the Mount Landing Creek, while the Laurel Grove tract would provide fishing access in an 11-acre freshwater pond. We would remove an existing, dilapidated pier at the Hutchinson tract, and build a new pier, with volunteer and grant assistance. At Laurel Grove, shoreline areas would be designated by signage and maintained, correcting any erosion resulting from foot traffic when necessary. In order to maintain overall fish population health, site specific fishing regulations would be set according to the results from the Laurel Grove Pond survey conducted by the Office of Fisheries Assistance, and all state fishing and boating regulations would apply.

Objective 4.5 Wildlife Observation and Photography

Within 5 years of CCP approval, enhance the current wildlife observation and photography program, and create new, quality, self-guiding opportunities by: opening up four additional tracts to daily access (Hutchinson, Tayloe, Laurel Grove, and Port Royal tracts); creating one additional trail (Hutchinson tract); and, constructing two additional photography blinds (Wilna and Port Royal tracts). Expand this opportunity to newly acquired tracts where determined appropriate and compatible.

Strategies

Continue to



Great blue heron: Randy Lennon/USFWS

- Maintain 9.21 miles of public access roads and 2.40 miles of trails that provide access to wildlife observation and photography opportunities.
- Maintain existing benches, overlooks, and pier at the Wilna tract.
- Improve parking areas at Wilna, Hutchinson, and Tayloe tracts.
- Provide daily, sunrise to sunset, access at the Wilna tract on designated roads and trails.
- Provide general information on opportunity availability on the following publications and electronic media: the Friends website, National Park Service Chesapeake Gateways Network website, Virginia Birding and Wildlife Trail website and guidebook, and refuge website and general brochure.
- Complete the trail on Laurel Grove tract in cooperation with volunteers.
- Maintain informational kiosks at Wilna and Tayloe tracts.
- Construct and install informational kiosks with site maps and brochure racks at Hutchinson, Port Royal, and Laurel Grove tracts.
- Coordinate with state partners, the Friends group, Northern Neck Audubon Society, volunteers, and other partners to assist with maintenance of trails and photo blinds and implementation, monitoring, and evaluation of this program.
- Provide opportunities for expert-led bird or nature walks

Within 5 years of CCP approval:

- Change “Reservation only” to “Open daily,” on signs, websites, and refuge brochures for tracts to be open to daily use.
- Maintain roads and parking areas to provide year-round access to affected tracts.
- Construct and install photography blind on the Wilna Creek Trail in cooperation with the Northern Neck Audubon Society.
- Construct and install a wildlife observation footpath and a photography blind on the Port Royal tract.
- Provide wildlife observation and photography opportunities on newly acquired lands, provided those opportunities would be compatible with refuge natural resources priorities. Our highest priority would be to provide opportunities on those lands that offer a unique refuge experience or provide access to different geographic or habitat areas within the acquisition boundary with minimal impact on wildlife use, habitat management and other wildlife-dependent recreation activities.

Rationale

As in alternative A, the Improvement Act identifies wildlife observation and photography as priority wildlife-dependent recreation. We believe these programs promote public understanding and appreciation of natural resources and their management on all lands and waters in the Refuge System. Pursuant to the policies in 605 FW 4 and 5, we follow these guiding principles for wildlife observation and photography opportunities at the refuge.

1. Provide safe, enjoyable, and accessible wildlife viewing and photography opportunities and facilities.
2. Promote visitor understanding of, and increase visitor appreciation for, America’s natural resources.
3. Focus on providing quality recreational and educational opportunities, rather than quantity, consistent with Service criteria describing quality found in 605 FW 1 Part 1.10.
4. Minimize conflicts with visitors participating in other compatible, wildlife-dependent recreation.

These opportunities have been provided daily at the Wilna tract, and by reservation at the Hutchinson, Tayloe, Port Royal, and Laurel Grove tracts since 2003. Existing opportunities are available on designated refuge roads, trails, piers, and overlooks as shown on informational signs, refuge brochures, and the refuge website. This alternative expands on alternative A by enhancing infrastructure and site accessibility to increase these opportunities. Reservation-only sites would be open daily. Additional trails would be created on the Laurel Grove and Hutchinson tracts. Those and existing trails would be supplemented with photography blinds. We would plan the location of the trails and blinds to provide visitors with quality viewing opportunities and emphasize minimizing disturbance to wildlife or sensitive plant communities and habitat management activities. Refuge trails and roads would remain open year-round, sunrise to sunset, except as otherwise permitted under a special use or hunt permit. Access to trails is by foot travel.

Due to the unpredictable nature of the land acquisition program, we do not know where additional wildlife observation and photography opportunities would be located, but our intent is to open new tracts to these activities where it is determined to be appropriate and compatible.

Objective 4.6 Environmental Education

Within 10 years of CCP approval, facilitate educator-led environmental education programs on the refuge, to at least five visits per year, by encouraging partnerships with local teachers and others with an environmental education curriculum based on refuge resources.

Strategies

Continue to:

- Facilitate educator-led environmental education programs for public schools, private schools, home-schooled students, scout troops, and other organized education-oriented groups (Master Naturalists). Program details can be seen in chapter 2, “Affected Environment,” “Refuge Visitor Services Program—Priority Wildlife-dependent Recreational Uses.”
- Provide staff or volunteer-led orientations to visiting groups.
- Maintain the Wilna tract outdoor classroom site. Environmental education visits receive priority use of the Wilna Pond fishing pier. Notification is provided to visitors through the refuge website and signs posted on the refuge entrance road and at Wilna Pond.
- Utilize Wilna tract lodge as an indoor classroom. Maintain environmental education materials and supplies available for loan to visiting groups.
- Work with the Friends group and volunteers to maintain and implement the Environmental Education program.
- Seek cooperative partnership with VDGIF Environmental Education coordinator.

Over the next 10 years:

- Work with partners to provide annual educator workshops to familiarize educators with the refuge and its role in migratory bird conservation.
- Expand involvement in Master Naturalists training to the Middle Peninsula Chapter.
- Work with partners and the Friends group to provide outreach to area schools, scouts, and conservation organizations.
- Support partnership grant writing to facilitate partner-led environmental education programs on the refuge.
- Identify and formalize partnerships with other conservation agencies and organizations.

Rationale

In addition to the rationale provided under alternative A, objective 4.4, the Service is promoting the importance of connecting people, in particular children, with nature. Two Service initiatives: Connecting People with Nature and No Child Left Inside are currently in the early stages of being implemented on the refuge. Scholars and health care professionals are suggesting a link between a loss of connection with the natural world and many physical and mental maladies in our nation’s youth (Louv 2005). We look to our partners, Friends, and/or other volunteers to help us expand our environmental education programs to connect children with nature, and to develop and assist with other priority public uses.

Objective 4.7 On-site Interpretation

Within 10 years of CCP approval, provide up to six informational signs and six pre-scheduled group visits annually at the Wilna, Hutchinson, Tayloe, Port Royal, and Laurel Grove tracts. Expand this opportunity to newly acquired tracts where determined appropriate and compatible. These opportunities are also discussed in goal 5.

Strategies

Continue to:

- Maintain three existing informational signs and brochure dispensers at Wilna and Hutchinson tracts.
- Allow and encourage partners to conduct compatible, resource management programs at the refuge.
- Provide staff or volunteer-led interpretive talks and tours; up to six pre-scheduled groups/year.
- Provide informational brochures at existing signs at Wilna and Hutchinson tracts and refuge headquarters.
- Work with state partners, the Friends group, volunteers, and other partners to maintain and implement interpretive programs.
- Install three additional informational signs and brochure dispensers at Tayloe, Port Royal, and Laurel Grove tracts.

Within 5 years:

- Develop interpretive panels for the Tayloe tract to explain (a) the role that farming has traditionally played in wildlife conservation over the past century, and (b) the rationale that supports why refuges have evolved from planting non-native crops to re-establishing native habitats as the best way to benefit fish and wildlife.
- Support efforts of the Friends group to obtain grants and create a canoe interpretive trail and brochure for the Hutchinson tract, Mount Landing Creek.
- In cooperation with the Refuge Friends group, rehabilitate Mount Landing Creek access pier at Hutchinson tract to provide canoe access to the creek.
- Over the next 15 years:
 - Construct and install interpretive signs along trails and other interpretive opportunity sites on newly acquired properties, where appropriate and compatible.

Rationale

The Improvement Act identifies wildlife interpretation as priority wildlife-dependent recreation. New FWS policy in 605 FW 7 defines interpretive programs as management tools to accomplish the following.

1. Provide opportunities for visitors to become interested in, learn about, and understand natural and cultural resource management and our fish and wildlife conservation history.
2. Help visitors understand their role within the natural world.

3. Communicate rules and regulations to visitors, thereby promoting understanding and compliance to solve or prevent potential management problems.
4. Help us make management decisions and build visitor support by providing insight into management practices.
5. Help visitors enjoy quality wildlife experiences on the refuge.

Further, the new policy provides these guiding principles for interpretive programs.

1. Relate what is being displayed or described to something within the personality or experience of the visitor...provide meaningful context.
2. Reveal key themes and concepts to visitors based on information.
3. Inspire and develop curiosity.
4. Relate enough of the story to introduce concepts and ideas and pique visitor interest, discussion, and investigation so that visitors will develop their own conclusions.
5. Organize activities around theme statements.

We strive to follow those principles, which will serve to enhance visitors' understanding of the area's significant resources, as well as the important role the refuge plays in their conservation.

We would install additional interpretive signage on several refuge tracts as well as newly acquired tracts. Due to the unpredictable nature of the land acquisition program, we do not know where additional interpretive opportunities would be located, but our intent is to provide these opportunities on new tracts where it is determined to be appropriate and compatible.



Protecting planted trees: USFWS

Objective 4.8 Off-site Interpretation

Within 15 years of CCP approval, provide up to 10 off-site interpretive opportunities annually for civic groups, conservation organizations, and community events on a pre-scheduled basis.

Strategies

Continue to:

- Provide presentations for scheduled meetings of area civic groups and conservation organizations.
- Provide refuge specific exhibits for scheduled fairs, festivals, and other community events utilizing interpretive displays.
- Maintain the refuge website to provide information on refuge resources, issues, wildlife, and habitat management highlighting its role in migratory bird conservation.
- Provide informational brochures to local businesses and distribution locations.
- Work with state partners, Friends, volunteers, and other partners to implement and maintain the Interpretation program.

Rationale

Same as in alternative B, objective 4.7

Goal 5: Communicate and collaborate with local communities, Federal and state agencies, and conservation organizations throughout the lower Rappahannock River watershed to promote natural resource conservation and the mission of the National Wildlife Refuge System.

Objective 5.1 Elected Official Outreach

Within 3 years of CCP approval, inform elected officials representing all 7 counties included within the refuge boundary about the refuge purposes, the mission of the Refuge System, recreational and educational opportunities on the refuge, important management activities, and opportunities for collaboration.

Strategies

Continue to:

- Make a personal appearance annually, before the respective board of supervisors of each of the 7 counties to present an update of refuge activities.
- Invite Federal, state, and local elected officials to attend and participate in outreach events on the refuge.
- Invite Federal, state, and local elected officials to attend guided tours of the refuge to display particular accomplishments, view outstanding natural resource areas, demonstrate management activities, and highlight challenges.
- Provide written or personal briefings for members of Congress or their staffs, as needed or as requested, to inform them about important refuge issues

Rationale

It is important that elected officials at all levels of government, as representatives of all American citizens, be informed about the nationally significant contributions of refuge lands toward wildlife conservation and wildlife-dependent recreation. This is true of both potentially controversial issues and the routine achievements toward accomplishing our objectives. If elected leaders are well informed, they can pass on accurate information to constituents who make inquiries. The support of elected officials is integral for the continued funding and delivery of other resources necessary to achieve the goals and objectives of this plan.

Objective 5.2 Community Outreach

Within 5 years of CCP approval, increase community outreach by conducting up to 15 outreach programs or events each year,⁸ and initiate regular news articles throughout the year to increase community understanding and appreciation of the refuge's significance to natural resource conservation, its contribution to the Refuge System, and to garner additional support for refuge programs.

Strategies

Continue to:

- Issue news releases on significant accomplishments, to advertise special events, and to announce major management initiatives.
- Honor requests for speaking engagements by local community and civic organizations to inform members about refuge purposes and activities.
- Maintain the refuge website to national standards.
- Provide educational workshops on local natural resource topics and encourage citizen science projects.

Rationale

The Rappahannock River Valley is still a relatively new refuge. From the results of a community survey issued in 2006, it appears that many people living in proximity to the refuge are unfamiliar with the refuge mission and purposes. It is important, if we are to be a valued part of the communities we serve, that we communicate often with local citizens. News articles and personal appearances inform our neighbors about what we are doing and why, which we hope will lead to increased understanding, appreciation, and support of our programs. Feedback we receive from these outreach efforts allows us to understand better the issues that are important in our communities, and how our management may affect them.

Objective 5.3 Private Landowner Assistance

Within 5 years of CCP approval, establish a greater role assisting landowners who seek to maintain and improve wildlife habitat on private lands within and adjacent to the refuge boundary.

Strategies

Continue to:

- Seek additional funding to continue our current *Phragmites* control and other invasive plant initiatives on private land.

Within 5 years of CCP approval:

- Expand our technical assistance capability to assist private landowners on invasive species identification and control, wetland protection, and habitat restoration and management.
- Seek permanent salary and operational funding to establish a position for a private lands biologist to be stationed at the refuge to accomplish this objective. Potential funding sources include grants, contributed funds, the Partners for Fish and Wildlife Program, and USDA cost sharing programs. We may consider filling this position with a temporary or term position only if we cannot secure permanent funding.

Rationale

As a public land management agency, it is very important to us that we are viewed as responsible, helpful and conscientious neighbors. Assisting private landowners makes good business sense as it raises our visibility as an agency and strengthens support for the missions of the Service and the Refuge System. Working to restore degraded habitats throughout the river valley on other ownerships contributes to the conservation of resources the refuge was established to protect. Providing greater habitat connectivity would benefit most mobile species of conservation concern because they would be less prone to extirpation and have flexibility to move should site specific impacts become too great.

The area within the refuge acquisition boundary totals over 250,000 acres. The refuge is authorized to protect up to 20,000 acres. There are many important habitats in the lower Rappahannock River Valley that will remain in private ownership, even when the refuge acquisition program is complete. The Fish and Wildlife Coordination Act of 1956 (16 U.S.C. 661) and the Fish and Wildlife Act of 1956 (16 U.S.C 742a-742j) allow Federal resources to be used on private lands. Using our expertise and resources to assist private landowners will provide more conservation value for fish and wildlife resources of concern, than if we only worked within refuge ownerships. This is particularly true with regard to invasive species control and other habitat restoration projects. Invasive species that are allowed to flourish on private lands can easily spread to refuge lands that may have been previously unaffected. Our efforts to assist private landowners are consistent with the “early detection-rapid response” approach to invasive species control advocated by the Service and its partners.

Our *Phragmites* control and education program, in conjunction with the Rappahannock *Phragmites* Action Committee, is one example of our successes in working with private landowners. We developed an outreach brochure and poster, and collaborated with more than 240 private landowners in controlling hundreds of acres of *Phragmites* along 70 miles of the Rappahannock River. We hope to continue to expand this effort over time to keep that invasive plant from increasing its territory, and to use it as a model to assist landowners in controlling other invasive plants on private lands.

In 2007, we also provided an invasive species workshop for the community, which was well attended. There is interest in expanding these workshops in other parts of the refuge area. We believe that many landowners in the vicinity of the refuge would gladly take on more responsibility in managing their lands to benefit wildlife if they had more assistance in the form of technical advice and a helping hand to get started, whether in controlling invasive species or restoring or enhancing habitat. Current staffing is insufficient to significantly expand our assistance to private landowners, but there are funding sources specifically targeted for improving wildlife habitat on private lands that could be competitively directed to the refuge to implement on-the-ground projects. We will employ innovative methods to structure a new position that draws from all available funding sources to expand our assistance to private landowners.

Objective 5.4 Intergovernmental Partnerships

Within the next 15 years, enhance our existing, and seek additional, collaborative relationships with Federal, state, and local government agencies to fulfill mutual natural resource conservation goals.

Strategies

Continue to:

- Offer office space to the VDGIF through an existing memorandum of agreement, facilitating close collaboration on biological, recreational, and law enforcement programs.
- Collaborate with the Virginia Department of Conservation and Recreation on rare plant and animal, and exemplary plant community conservation, including invasive species control, through an existing cooperative agreement.
- Coordinate land conservation efforts with the U.S. Department of the Army at Fort A.P. Hill through an existing memorandum of understanding.

Within 10 years of CCP approval:

- Coordinate a forum of government agencies operating in the lower Rappahannock River watershed who have natural resource conservation goals to share information and examine opportunities to advance future collaboration and cooperation.

Rationale

There are many other government agencies with offices or installations in the area that have a share in the responsibility to conserve natural resources. Among them are the U.S. Department of the Army at Fort A.P. Hill, National Park Service, Natural Resources Conservation Service, VDGIF, Virginia Department of Conservation and Recreation, planning district commissions, soil and water conservation district commissions, the Tidewater Resource Conservation and Development Council, and others. We work closely with many of those agencies on special projects, sharing expertise and other resources to achieve mutual objectives.

We could achieve an even greater return for the environment if we worked together on a strategic basis. That would involve establishing a forum to share long-term plans such as our CCP, the VA WAP, master plans, and other strategic documents to examine overlapping goals and determine methods to work together toward meeting shared objectives.

Objective 5.5 Local Project Partnerships

Within the next 15 years, enhance our existing partnerships, and seek additional ones, to help us meet our wildlife, habitat, and visitor services objectives.

Strategies

Continue to:

- Support and offer guidance to the Rappahannock Wildlife Refuge Friends organization.
- Expand our efforts, with the help of our Friends Group, as a member of the Chesapeake Bay Gateways Network to highlight the natural bounty of the Chesapeake Bay by applying for Gateways grants and collaborating with other Gateways Network members.
- Collaborate on special projects with existing partners, including the Alliance for the Chesapeake Bay, Friends of the Rappahannock, garden clubs of the Middle Peninsula and Northern Neck, Master Naturalists Program, Northern Neck Audubon Society, Tidewater Resource Conservation and Development Council, Virginia Herpetological Society, Virginia Native Plant Society, Virginia Society of Ornithology, and other organizations with similar missions.
- Collaborate with educational institutions to conduct research and investigations to seek answers to important natural resource issues on the refuge and within the Refuge System and to contribute our basic understanding of important natural resource issues worldwide.

Rationale

In addition to land conservation partners, we are fortunate to receive support from a variety of other entities. A Refuge Friends group organized in 2004 is growing in stature and effectiveness. We have benefited from many local and statewide organizations whose conservation missions overlap those of the refuge. We look to our recent admission into the Chesapeake Gateways Network to pave the way for more collaboration and grant opportunities. We also have a strong volunteer program, without whose help we would not have completed many of the visitor service facilities we now have.

We must nurture those many partnerships as we seek to expand our role in conservation, education, and recreation in area around the refuge. We also have benefited from targeted research conducted by colleges and universities, among them Virginia Commonwealth University and the College of William and Mary. Research often can answer complex questions on refuge management issues and add to the wealth of scientific knowledge upon which decisions on current and future resource issues will be based.



Island Farm tract: USFWS

Alternative C. Forest Management Emphasis

In addition to actions common to all alternatives, this alternative resembles alternative B concerning refuge administration and visitor services. It differs significantly; however, from alternatives A and C in its habitat management and inventory programs for areas now in grasslands and old fields, croplands, and planted, overstocked stands of pine.

Habitat Management

In alternative C, we would allow all current 700 acres grasslands to revert to shrub and forest, supplementing that process when necessary with plantings to achieve desired results. We would phase out cooperative farming and allow those lands to revert to forest or plant them with trees and shrubs to achieve a more desirable composition of plant species. We would continue to manage existing forest lands, particularly overstocked stands, through mechanical thinning and prescribed burning.

As in the other alternatives, we would monitor the planted or existing mixed forest habitat types and tidal marshes for invasive species, and treat them as our funding and staffing permit. We would not seek to restore previously drained wetlands that required active management (moist soil units), but may still continue to plug ditches or use other, less intensive techniques that do not necessitate long-term management.

We would redirect some of the staff time saved in less intensive management to other priority tasks, including more in-depth assessments of habitat quality of forest, shrublands, and wetlands, more monitoring and evaluation of habitats and fish and wildlife populations, and more work on controlling invasive species.

Inventories and Monitoring

Same as alternative B, with the exception of monitoring and inventories specifically aimed at early successional habitat management. As we phase out that type of habitat, we would eliminate those inventories.

In the section that follows, we describe in detail the goals, objectives, and strategies we would implement under alternative C.

Goal 1: Contribute to the biological diversity of the mid-Atlantic region by protecting, enhancing, and restoring the refuge's upland habitats, with an emphasis on breeding, migrating, and wintering birds.

Objective 1.1 Transitional Shrub-Early Successional Forest Habitat

Over the next 15 years, allow natural succession to proceed on the 700 acres of managed grasslands and old fields, resulting in a progression to shrub and eventually to forest, to provide high-quality early successional forest habitat to benefit birds of conservation concern identified in the BCR 30 plan and the VA WAP, such as the American woodcock and prairie warbler.

Other species that would benefit include yellow-breasted chat, worm-eating warbler, eastern towhee and migrating species such as blue-winged warbler, magnolia warbler, and yellow warbler. In addition, continue to provide this transitional habitat on the 600 reforested acres that were planted or undergoing natural succession. The shrub stage in this habitat complex would occur in a shifting mosaic of patches across the refuge as we implement decisions to allow the transition of fields, shrub, and young forest to mature forest.

Strategies

- Cease brush-hogging, mowing, and prescribed fire activities where used to set back succession or manage grasslands, and permit woody encroachment of shrubs and trees.
- Allow all cropland or old-field habitats acquired in the future to succeed naturally to shrub and then forest habitat.
- Supplement the succession process with planting native trees when and where resources are available.
- Evaluate grassland fields for their potential to self-maintain as a stable shrub habitat using the protocol in the habitat management decision tool and field evaluations (as in Watts 2000, or Upland Habitat Decision Analysis, Mitchell and Talbott 2003, unpublished on file at the refuge office). Consider xeric soil areas, which would support a heath community, or hydric soil areas, which would support the Coastal Plain pond shore or wet meadow community type. We would not plant those fields with trees, but we might thin them selectively to promote volunteer, native shrubs.
- Jump-start the timeline of natural succession to forest with supplemental native plantings, as funding and resource opportunities permit. We would exclude from tree planting the tracts that we determine best suited for optimal, stable shrub habitat.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits. The following are all components of how we would measure our success with respect to our means and fundamental objectives, and the results may trigger adjustments to our management strategies, or trigger a reevaluation or revision to our objectives. Examples of monitoring or surveys may include:
 - Continue to incorporate this habitat type into ongoing biological surveys, such as habitat-based landbird point count surveys, migration and winter bird counts, and anuran call counts. Landbird point count habitat classification in transitional shrub and early successional forest would be updated to track changes in forest habitat relative to bird habitat use.
 - Continue to map and scout for the presence of disease, nuisance species, invasive plants, or any other threats to forest health.

Rationale

We designed alternative C to be a less intensive management scenario. Grassland management is labor-intensive; it requires considerable investments of resources in time, equipment, planning, maintenance, monitoring, manipulation, invasive plant control, and, if it involves restoration by planting, can be very expensive.

This area of Virginia has contributed to a threatened population of grassland-dependent birds, and that has been our management priority to date. However, it is also true that the refuge lands have the potential to make an important contribution to shrub-dependent species and, eventually, to forest birds, by allowing refuge grasslands to undergo natural succession to shrub habitat and, eventually, to forest. The availability of shrub habitat and large, contiguous forested tracts are fast becoming of limited supply in the region.

Forests have dominated the eastern United States in varying degrees of openness or denseness, depending upon which geological period one uses as a reference. To manage over the long term

toward forest habitats would be consistent with the natural tendency of this area to revert to trees. In addition to the priority shrub-dependent species named above, during the interim period of conversion, these former grasslands and old fields would provide habitat for other species such as blue-winged warbler, brown thrasher, eastern towhee, field sparrow, northern bobwhite, whip-poor-will, willow flycatcher, gray catbird, and yellow-breasted chat. Eventually, allowing natural succession on both grasslands and shrub habitats would substantially increase habitat for breeding, wintering, and migrating forest-dependent birds.

Objective 1.2 Stable, Long-term Shrub Habitat

Within the next 15 years, manage stable, long-term shrub habitat in areas where our habitat management decision tool and field evaluations recommend shrub habitat over grassland or forest management, to support breeding shrub-dependent birds of conservation concern identified in the BCR 30 plan and the VA WAP, such as the American woodcock and prairie warbler. The decision criteria favoring long-term shrub habitat include the presence of moist soils, habitat patch sizes below 25 acres, or patches in a configuration or location that do not justify intensive, mechanical grassland management.

Strategies

- Complete individual field evaluations on all current refuge fields within 3 years of CCP approval, using the habitat management decision tool. Document those decisions and implementation plans in the refuge HMP.
- Brush-hog periodically those areas identified for long-term shrub habitat that can be readily accessed by equipment, to prevent the encroachment of tall trees. Conduct that active management as funding and staffing allows.
- Identify areas of potentially long-term shrub habitats that could be self-maintaining by virtue of their hydrology (such as low-lying fields, semi-permanent wet meadows, beaver meadows, or dry, sandy soils).
- Plant native shrub species as funding and staffing resources permit, and promote establishment of volunteer, native shrub species to prevent tall-tree encroachment.
- Evaluate cooperatively farmed acres as they come out of production, and all newly acquired tracts, for their potential as permanent, stable shrub habitats to increase acreage of this habitat type.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits. The following are all components of how we would measure our success with respect to our means and fundamental objectives, and the results may trigger adjustments to our management strategies, or trigger a reevaluation or revision to our objectives. Examples of monitoring or surveys may include:
 - Continue to incorporate this habitat type into ongoing biological surveys, such as habitat-based landbird point count surveys, migration and winter bird counts, and anuran call counts. Landbird point count habitat classification in more stable shrub habitat would be updated to track changes in shrub habitat relative to bird habitat use.
 - Continue to map and scout for the presence of disease, nuisance species, invasive plants, or any other threats to shrubland health.

Rationale

Same as alternative A, objective 1.4.

Objective 1.3 Forest Habitat

Within the next 15 years, protect and enhance the biological integrity, diversity and environmental health of 3,332 acres of mature upland forest composed of mesic loblolly, mixed forest, and forest bottomland hardwood types, in at least 250-acre contiguous patches, to benefit breeding forest interior birds of conservation concern identified in the BCR 30 plan and the VA WAP, such as the wood thrush and scarlet tanager. Also, seek opportunities through future refuge acquisitions, to increase the amount, distribution and diversity of forest habitat on refuge lands.

Strategies

- Allow any areas not optimal for long-term shrub cover to undergo natural succession to forest. When funding and staff resources permit, plant native tree species to accelerate that process where the disturbance or compaction of soil is affecting tree growth.
- Target small or narrow patches of disjunctive forest stands that we could consolidate to increase their effective interior and reduce edge effects. Consolidate forest patches through reforestation of openings, by either natural succession or planting native species.
- Create connection corridors from isolated stands through native plantings or natural succession.

Monitoring Elements

- Conduct appropriate monitoring and survey programs as funding and staffing permits. The following are all components of how we would measure our success with respect to our means and fundamental objectives, and the results may trigger adjustments to our management strategies, or trigger a reevaluation or revision to our objectives. Examples of monitoring or surveys may include:
 - Continue to incorporate this habitat type into ongoing biological surveys, such as habitat-based landbird point count surveys, winter and summer bald eagle surveys in riparian areas, migration and winter bird counts, and anuran call counts. Landbird point count habitat classification in mature, upland forests would be updated to track changes in forest habitat relative to bird habitat use.
 - Continue to map and scout for the presence of disease, nuisance species, invasive plants, or any other threats to forest health.

Rationale

We describe the benefits of maintaining large forested tracts in the rationale for alternative A, objective 1.6. Over the long term, acres of forest habitat would dramatically increase under alternative C, since the 700 acres of refuge grasslands and old-field habitat, and the 600 reforested acres would transition naturally to forest. That is in keeping with the design of alternative C, which reduces intensive habitat management. Compared to other refuge habitat types, maintaining grasslands requires considerable amounts of funding, staff time, and equipment. Allowing grasslands to transition to shrub, and then forest habitat, requires minimal effort. It would also result in large blocks of contiguous forest, which are becoming locally scarce, particularly as more developed land uses spread throughout the refuge acquisition boundary.

Goal 2: Maintain the long-term biological integrity of the riparian habitat along the Rappahannock River and its tributaries for bald eagles and other migratory birds and resident wildlife.

Same as in alternative B, goal 2, objectives 2.1 and 2.2

Goal 3: Maintain and enhance the biological diversity and environmental health of tidal and non-tidal wetlands to benefit Federal-listed species, waterfowl and other migratory birds, fish and shellfish, reptiles and amphibians.

Same as alternative B, goal 3, objectives 3.1 to 3.4

Goal 4: Promote enjoyment and stewardship of our Nation's natural resources by providing quality, wildlife-dependent recreation and education opportunities on refuge lands and waters.

Same as alternative B, goal 4, objectives 4.1 to 4.8

Goal 5: Communicate and collaborate with local communities, Federal and state agencies, and conservation organizations throughout the lower Rappahannock River watershed to promote natural resource conservation and the mission of the National Wildlife Refuge System.

Same as in alternative B, goal 5, objectives 5.1 to 5.5

Table 3.1 Comparison of Alternatives

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
<p>Short-structure Grasslands/ Breeding Habitat</p>	<p>Continue to maintain and enhance up to 350 acres in patches >50 acres.</p> <p>Remove trees and other woody vegetation, fence lines, abandoned irrigation equipment, or other features causing edge effects or fragmentation.</p> <p>Management from May through June would focus on benefiting breeding grasshopper sparrow and other BCR 30 and VA WAP priority species.</p> <p>Use prescribed fire, Service-approved herbicides (glyphosate-based, imazypir-based) or mechanical treatments as management tools.</p> <p>Plant native grass and forb species to improve stand cover with desired structural characteristics.</p> <p>Continue monitoring program, including annual breeding bird surveys, periodic vegetation composition surveys, and habitat quality evaluations.</p> <p>Continue identifying threats such as invasive plants, and conducting outreach with nearby property owners and local officials. Continue to work with Friends group and volunteers to implement outreach program.</p>	<p><i>In addition to alternative A objective and strategies:</i></p> <p>Include strategies to increase the percentage of effective interior grassland habitat by switching from management of sub-optimal grassland fields to focusing on fields of high potential, and also building upon existing quality grasslands through management or acquisition as opportunities arise.</p> <p>Explore the feasibility and effectiveness of grazing as an additional management technique to maintain grassland habitat.</p> <p>Expand outreach and technical assistance to private landowners and local officials to increase the effectiveness of programs such as invasive species control and habitat restoration.</p>	<p>Allow natural succession to proceed on the 350 acres currently in short-structure grasslands. Over the next 15 years, these acres would provide transitional shrub or early successional forest habitat.</p> <p>Management would benefit such high priority BCR 30 species as American woodcock and prairie warbler.</p> <p>Continue identifying threats such as invasives, and conducting outreach with nearby property owners and local planners. Continue working with Friends group and volunteers to implement this program.</p>
<p>Goal 1. Contribute to the biological diversity of the mid-Atlantic region by protecting, enhancing, and restoring the refuge upland habitats, with an emphasis on breeding, migrating, and wintering birds.</p> <p><i>Responds to Issues: What is an appropriate and manageable amount and distribution of grasslands to manage on the refuge? What is the future of our cropland farming program? How can we improve the diversity, integrity and health of our forests?</i></p>			

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
Tall-structure Grasslands/ Breeding Habitat	<p>Continue to maintain and enhance up to 350 acres in patches >50 acres, with at least one field at 200 acres.</p> <p>Remove trees and other woody vegetation, fence lines, abandoned irrigation equipment, or other features causing edge effects or fragmentation.</p> <p>Management from May through June would focus on benefiting breeding Henslow's sparrow, northern bobwhite and other BCR 30 and VA WAP priority species.</p> <p>Same management techniques and monitoring programs as short-stature grasslands. Vary management techniques among fields to improve diversity of native grasses and forbs.</p>	<p><i>In addition to alternative A objective and strategies:</i></p> <p>Include strategies to increase the percentage of effective interior by switching sub-optimal grassland fields with fields of high potential, and build upon existing quality grasslands as opportunities arise. Strategies would also include varying the timing and techniques of treatments to increase structural and species composition diversity among this grassland type.</p> <p>Explore the feasibility and effectiveness of grazing as an additional management technique to maintain grassland habitat.</p>	<p>Allow natural succession to proceed on the 350 acres currently in tall-structure grasslands.</p> <p>Similar to short-structure grasslands, management would contribute to transitional shrub or early successional forest habitat over the next 15 years, and benefit American woodcock and prairie warbler.</p> <p>Continue identifying threats such as invasive plants, and conducting outreach and providing technical assistance to nearby property owners and local officials.</p> <p>Continue to work with Friends group and volunteers to implement the outreach and assistance program.</p>

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
Grasslands/ Migrating and Wintering Habitat	<p>Continue to enhance the 700 acres of grasslands (combined short-structure and tall-structure acres) to benefit migrating and wintering grassland birds.</p> <p>Management from August through February would focus on providing forage and cover for wintering savannah sparrow, eastern meadowlark, horned lark, northern harrier, barn owl, and other BCR 30 and VA WAP priority species using this habitat during winter. Migrating birds of conservation priority, such as bobolink, would also be a target of management.</p> <p>Delay burning, mowing, or other treatments until late February/early March in those grasslands where tree encroachment is not an imminent threat to maintaining quality grasslands habitat.</p> <p>Continue monitoring program; including winter grassland transect surveys and Christmas Bird Counts, and habitat quality evaluations.</p> <p>Continue identifying threats such as invasive plants, and conducting outreach to nearby property owners and local officials. Continue to work with Friends group and volunteers to implement this program.</p>	Same as alternative A	<p>Allow natural succession to proceed, thereby transitioning grasslands to shrublands and forest. However, continue conducting outreach and providing assistance to nearby property owners and local officials to minimize invasive plant infestations.</p> <p>Continue to work with Friends group and volunteers to implement this outreach and assistance program</p>

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
Grasslands/ New Areas	Not applicable to current management.	<p>Over the next 15 years, as opportunities arise with new Service acquisitions, increase grassland habitat on the refuge up to a maximum of 1,200 acres total; an upper limit based on management capability. Maintain the relative 50:50 ratio between short- and tall-structure grasslands. Management of individual fields would follow respective objectives and strategies identified above for grasslands under alternative B.</p> <p>Current cropland farming, on approximately 210 acres, would be phased out over the next 5 years, and those acres would also be evaluated for transitioning to grasslands habitat as a priority. If there is not potential for quality grasslands, they would be allowed to naturally succeed, or be planted, to either permanent shrubland or forest.</p> <p>Objectives and strategies for grassland establishment, management and maintenance as described in alternative A would also apply to new grassland fields.</p>	<p>Any newly acquired grasslands would be allowed to naturally succeed to either permanent shrubland or forest and would be monitored for threats such as invasive plants. We would continue to conduct outreach and provide technical assistance to nearby property owners and local officials to minimize invasive plant infestations.</p> <p>Continue to work with Friends group and volunteers to implement the outreach and assistance program.</p>

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
<p>Long-term Shrub Habitat</p>	<p>Complete evaluation of all fields within 3 years using habitat management decision tool, and through site visits, to determine which grassland fields are best suited for transitioning to long-term shrub habitat. Generally moving towards shrublands would be in those fields comprised of moist soils, <25 acres, and located or configured such that intensive grassland management is not efficient.</p> <p>Management would focus on providing breeding habitat for American woodcock, bobwhite, prairie warbler, and other priority BCR 30 and VA WAP shrub-dependent species.</p> <p>Maintain primarily by mowing; enhance, where warranted, by planting native shrubs.</p> <p>Continue monitoring program, including landbird surveys, winter bird counts, and anuran call counts.</p>	<p>Same as alternative A.</p>	<p>Complete evaluation of all fields within 3 years using habitat management decision tool, and through site visits, to determine which fields are naturally sustaining shrub habitat (e.g. shrubland is the climax vegetation); otherwise, allow natural succession to proceed to forest, or plant to native trees as warranted.</p>

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
<p>Transitional Shrub Habitat</p>	<p>Continue to provide transitional shrub habitat on 600 reforested acres (e.g. planted or undergoing natural succession). Habitat patches would occur as a shifting mosaic across refuge as we implement decisions to allow individual fields, shrub, and early successional forest patches to transition to forest.</p> <p>Focal species are the same as those listed under long-term shrub habitat. Management would be less intensive and less frequent than that used to maintain permanent shrub habitat.</p> <p>Continue identifying threats such as invasive plants, and conducting outreach with nearby property owners and local officials. Continue to work with Friends group and volunteers to implement this program.</p>	<p>Same as alternative A.</p>	<p>Same as alternative A, except may accelerate natural succession through tree plantings or other vegetation manipulations. All fields would transition to shrub or forest, including current cropland farming areas and any fields acquired in the future.</p>

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
Upland Mixed Forest	<p>Continue to protect and enhance the biological integrity of up to 3,332 acres of mature upland forest, in patches >250 acres.</p> <p>Management would focus on providing breeding habitat for wood thrush and scarlet tanager, and other priority BCR 30 and VA WAP forest interior species.</p> <p>Maintain habitat by treating invasive plants, consolidating or connecting isolated or disjunctive patches through reforestation or allowing natural succession to occur.</p> <p>Continue identifying threats such as invasive plants, and conducting outreach with nearby property owners and local officials. Continue to work with Friends group and volunteers to implement the outreach program.</p>	<p><i>In addition to alternative A objective and strategies:</i></p> <p>Continue to protect and enhance the existing 1,563 acres of upland mixed forest similar to alternative A, but also seek opportunities through future refuge acquisitions and management to increase the amount and distribution of this forest type and to promote its biological integrity, diversity and environmental health.</p> <p>This includes reducing the amount of fragmentation, control of invasive plants, and protecting corridors or connections between large patches.</p> <p>Minimum patch size and priority focal species of concern targeted for management are the same as under alternative A. In addition, state species of concern such as eastern hog-nosed snake, eastern ribbon snake, and eastern box turtle would be a management focus.</p>	<p>Maintain approximately 3,332 acres of mature upland forest to benefit such high priority BCR 30 species as wood thrush and scarlet tanager.</p> <p>Promote contiguous forest habitat patches of at least 250 acres, connecting isolated or disjunctive stands.</p> <p>Seek opportunities through future acquisitions to increase the amount, distribution, contiguity, and diversity of upland forest habitats.</p> <p>Continue identifying threats such as invasive plants, and conducting outreach and technical assistance to nearby property owners and local officials.</p> <p>Continue to work with Friends group and volunteers to implement the outreach and assistance program.</p>

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
Hardwood Bottomland Forest	Included as part of "Upland Mixed Forest" objective.	<p>Continue to protect and enhance the existing 453 acres of hardwood bottomland forest, in patches >250 acres, but also seek opportunities through future refuge acquisitions and management to increase the amount and distribution of this forest type, and promote its biological integrity, diversity and environmental health. This includes reducing the amount of fragmentation, controlling invasive plants, and protecting corridors or connections between large patches.</p> <p>Management would focus on benefiting species such as Louisiana waterthrush, and Swainson's, Kentucky and prothonotary warblers, and other priority BCR 30 and VA WAP forest-dependent species, such as spotted turtle and certain amphibians.</p> <p>Strategies would include identifying areas where natural hydrology has been interrupted or diverted, and implementing restoration activities such as removing drain tiles, plugging drainage ditches, etc. Other strategies are similar to those identified under "Upland Mixed Forest."</p>	Included as part of "Upland Mixed Forest" objective.
Forested Habitat/ Overstocked	Acres are included as part of "Upland Mixed Forest" objective. No current management is occurring.	<p>Increase structural and species diversity in overstocked tulip poplar and loblolly pine stands greater than 5 acres by conducting stand improvements such as pre-commercial mechanical and selective thinning.</p> <p>Management in tulip poplar stands would focus on benefiting a variety of canopy-, midstory-, and understory-breeding forest-dependent birds identified in the VA WAP and BCR 30 Plan.</p>	<p>Included as part of "Upland Mixed Forest" objective</p> <p>Increase structural and species diversity in overstocked tulip poplar and loblolly pine stands greater than 5 acres by conducting stand improvements such as pre-commercial mechanical and selective thinning.</p>

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
<p>Goal 2. Maintain the biological integrity of the riparian habitats along the Rappahannock River and its tributaries for bald eagles and other migratory birds and resident wildlife.</p> <p><i>Responds to Issue: How can we improve the diversity, integrity, and health of our riparian areas for priority species of concern, such as bald eagles? Where are additional land protection and/or management and restoration appropriate?</i></p>			
Riparian Habitat	<p>Continue to maintain and enhance the 1,360 acres of existing riparian habitat to provide food, cover, nest and roost sites for bald eagles and other native riparian-dependent species.</p>	<p><i>In addition to alternative A objective and strategies:</i></p> <p>Focus management strategies on benefiting native amphibians and reptiles including the state-listed spotted turtle, and protecting water quality for fish nurseries and other aquatic life. Through management, ensure that riparian habitat on existing refuge lands, and those on lands acquired in the future, meet or exceed a 330-foot minimum width.</p> <p>This habitat type would be a priority to acquire for the refuge when opportunities arise from willing sellers.</p>	Same as alternative B
Riparian Habitat (Continued)	<p>Create vegetated riparian buffers of ≥330 feet, comprised of native vegetation, by treating invasive plants, consolidating or connecting isolated or disjunctive patches through reforestation or allowing natural succession to occur.</p> <p>Monitor riparian buffers on easement lands and work with landowners to promote healthy riparian areas.</p> <p>Continue to incorporate this habitat type in ongoing landbird surveys. Landbird point count habitat classifications in riparian zones would continue to track changes in riparian vegetation to reflect changes in bird use.</p>		

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
Bald Eagle Roost and Nest Sites	<p>Protect all known bald eagle nest and roost sites by preventing disturbance during sensitive times of the year and promoting healthy riparian systems.</p> <p>Explore shoreline stabilization techniques to stem erosion that threatens nest and roost trees.</p> <p>Use prescribed fire, herbicides, and mechanical treatments to maintain a relative open understory and promote future roost and nest trees.</p> <p>Monitor eagle use, changes in habitat quality, human disturbance, and other threats as allowed by available resources.</p> <p>Engage in public outreach and education to demonstrate riparian habitat protection on the refuge.</p> <p>Continue bald eagle river surveys and nest monitoring program, partnering with other agencies and organizations.</p>	<p><i>In addition to alternative A objective and strategies:</i></p> <p>Implement the time-of-year restrictions and protection zone guidelines for any potential disturbance activities in roost areas (reference: Draft Nat'l Bald Eagle Guidelines, 2007; NWF "Bald Eagles in the Chesapeake: a management guide for landowners", and CBF "Habitat requirements for Chesapeake Bay living resources-bald eagle.")</p> <p>Nest and roost sites would be a priority to acquire for the refuge, or by conservation partners, when opportunities arise from willing sellers. Work with conservation partners to pursue protection of the bald eagles focus areas identified in the refuge establishment EA (1994), or identified from more recent bald eagle surveys.</p>	Same as alternative B

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
<p>Goal 3. Maintain and enhance the biological diversity and environmental health of tidal and non-tidal wetlands to benefit Federal-listed species, waterfowl and other migratory birds, fish and shellfish, reptiles, and amphibians.</p> <p><i>Responds to Issues: How can we improve the diversity, integrity, and health of our wetlands for priority species of concern? Where are additional land protection and/or management and restoration appropriate?</i></p>			
<p>General Wetlands Protection</p>	<p>Continue to protect and enhance the quality of the existing 1,270 acres of wetlands to benefit Federal-listed species such as bald eagle and sensitive joint vetch, and wintering and breeding marsh, swamp, and stream species identified in BCR 30 and the VA WAP, including fish.</p> <p>Establish or widen existing forested buffers on stream headwaters through native plantings or allowing natural succession to occur. Protect all wetlands with >100 foot vegetated buffer.</p> <p>Implement recovery plan tasks for the sensitive joint vetch including surveying, mapping, monitoring, identifying threats, and conducting outreach with waterfront property owners and local planners.</p> <p>Continue to conduct invasive plants and beach erosion monitoring.</p> <p>Continue surveys of secretive marsh birds, midwinter waterfowl and priority wetland species.</p>	<p><i>In addition to alternative A objective and strategies:</i></p> <p>Seek opportunities through future refuge acquisitions and management to increase the amount, distribution, and diversity of wetland types, and reduce the amount of fragmentation by striving to create contiguous blocks of protected wetlands >50 acres.</p> <p>Management would focus on benefiting Federal-listed species such as bald eagle and sensitive joint-vetch, and enhancing habitat for wintering waterfowl, such as black duck. Many other species of concern would also benefit, including anadromous fish such as alewife, American shad, American eel, and Atlantic sturgeon.</p> <p>Wetlands identified in the refuge establishment EA (1994) as focus areas for Service acquisition, or partner protection, would be a priority to acquire from willing sellers. Work with conservation partners to pursue protection.</p> <p>Facilitate research and other partnerships to accomplish monitoring and inventory needs.</p> <p>Evaluate impediments to catadromous fish passage to determine if there are opportunities for improvements.</p>	<p>Same as alternative B</p>

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
Tidal Brackish and Fresh Marsh	Incorporated into general wetlands protection.	Manage and protect quality tidal brackish and fresh marsh to benefit wintering waterfowl habitat in areas known to support wintering waterfowl concentrations as detected by aerial surveys or where there is potential, particularly in large marsh complexes >50 acres. Implement management strategies identified for general wetlands, including protection of new areas through fee or easement acquisition by the Service or conservation partners from willing sellers.	Same as alternative B
Wet Meadows and Vernal Pool Habitat	Incorporated into general wetlands protection.	Enhance wet meadow and vernal pool habitat to benefit breeding, foraging, and over-wintering wildlife of conservation concern identified in the VA WAP. Implement management strategies identified for general wetlands, including protection of new areas through fee or easement acquisition by the Service or conservation partners from willing sellers. One change, however, is to increase buffer protection to the state recommended minimum width of 300 feet, and increase to 1000 feet when possible. Identify areas where natural hydrology has been interrupted or diverted, and implement restoration activities such as removing drain tiles, plugging drainage ditches, etc. Manage existing restored refuge wetlands by manipulating water levels to maximize value to breeding amphibians and other wetland dependent species. Identify and map early spring concentration areas of amphibians and vernal pools to help facilitate protection.	Same as alternative B

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
Shoreline Zone	<p>Continue to protect and enhance the 3 miles of refuge intertidal zone, including beaches. Implement strategies to minimize erosion.</p> <p>Management would benefit species that use this zone for foraging or access to adjacent riparian or marsh habitats for critical stages of their life cycle, such as nesting turtles, herons, and shorebirds.</p> <p>Stabilize eroding beaches through native plantings of beach grass, coir logs, or other compatible means.</p> <p>Manage public use in these areas during sensitive times of the year to minimize disturbance to wildlife.</p> <p>Engage in public outreach and education to demonstrate beach habitat protection on the refuge.</p>	<p><i>In addition to alternative A objective and strategies:</i></p> <p>Increase active protection of intertidal zone to substantially reduce erosion and protect fringe marshes containing the Federal-listed sensitive joint vetch.</p> <p>New strategies would include setting markers to establish a baseline for measuring erosion rates in highly prone or sensitive areas. After 1 year of observation, design and implement an abatement plan for priority, threatened areas.</p> <p>Implement sensitive joint vetch recovery tasks as identified under “General Wetlands Protection” objective.</p>	Same as alternative B
<p>Goal 4. Promote enjoyment and stewardship of our Nation’s natural resources by providing quality, wildlife-dependent recreation and education opportunities on refuge lands and waters.</p>			
<p><i>Responds to Issues: Which wildlife-dependent programs can be expanded or improved to meet community interests? Do our facilities meet program needs? How do we manage individual programs to ensure resources are protected, and also minimize conflicts among users?</i></p>			
Deer Hunting	<p>Continue to provide an annual deer hunt on Wilna, Wright, Tayloe, Hutchinson, Thomas, Point Royal, Toby’s Point, Mothershead, and Laurel Grove tracts.</p> <p>Hunt is implemented as an annual lottery, permit-based program.</p> <p>Partners in implementing the program include Friends Group, volunteers, VDGF.</p> <p>Continue to maintain infrastructure, such as parking and access roads, to facilitate this opportunity.</p>	<p><i>In addition to alternative A objective and strategies:</i></p> <p>Evaluate the other refuge tracts and any newly acquired tracts for hunt opportunities to increase huntable acres where appropriate and compatible.</p> <p>Work with VDGF to improve reporting system and better facilitate an evaluation of the refuge program.</p>	Same as alternative B

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
Waterfowl Hunting	No program.	<p>Within 5 years of CCP approval, assuming an evaluation determines waterfowl hunting on the refuge could be both appropriate and compatible, provide a quality waterfowl program in partnership with VDGIF. Refuge tracts such as Tayloe, Island Farm, and Toby's Point are best candidates for initiating program. Additional NEPA compliance, planning, compatibility, and public input are prerequisites.</p> <p>Expand opportunity to other existing refuge tracts and any newly acquired tracts once program has been determined successful, and where it is determined appropriate and compatible.</p> <p>Work with VDGIF to identify temporary blind locations, install and maintain stakes, annually evaluate the program and waterfowl populations, and outreach and enforcement.</p>	Same as alternative B

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
Wild Turkey Hunting	No program.	<p>Within 5 years of CCP approval, assuming an evaluation determines wild turkey hunting on the refuge could be both appropriate and compatible, provide a quality wild turkey hunt program in partnership with VDGIF. Refuge tracts such as Tayloe and Toby's Point are best candidates for initiating program. Program would be implemented to ensure compatibility with our objectives to protect nesting birds of conservation concern. Additional NEPA compliance, planning, compatibility, and public input are prerequisites.</p> <p>Expand opportunity to other existing refuge tracts and any newly acquired tracts if program has been determined successful, and where it is determined appropriate and compatible.</p> <p>Work with VDGIF to annually evaluate the program and turkey populations, and to conduct outreach and enforcement.</p> <p>Work with the National Wild Turkey Federation to provide a youth hunt on the refuge.</p>	Same as alternative B

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
Recreational Fishing	<p>Continue to provide a daily, quality fishing opportunity at Wilna Pond on the Wilna tract. Access is by boat, shoreline, or accessible pier. No lead tackle is allowed in the pond.</p> <p>Maintain boat launch, roads, parking area, and accessible fishing pier, providing visitor access to Wilna Pond.</p> <p>Continue annual Kids' Fishing Day event. Implement this and other fishing programs with support from Friends Group, volunteers, and VDGIF.</p> <p>Continue outreach and education of fishing regulations through refuge website, posted information signs at Wilna Pond, and through fishing brochure.</p> <p>Continue to work with Friends group and volunteers to implement program.</p>	<p><i>In addition to alternative A objective and strategies:</i></p> <p>Within 5 years of CCP approval establish new fishing opportunities and daily fishing access at Hutchinson, Laurel Grove, and Toby's Point tracts.</p> <p>Work with Office of Fisheries Assistance to evaluate fishing opportunity and program guidelines at Laurel Grove tract. If implemented, a program would require designating shoreline access and hand boat launch points.</p> <p>Work with Friends group and volunteers to replace fishing pier at Hutchinson tract.</p> <p>Update outreach and education materials, including adding signage, and creating a Spanish version of the fishing brochure.</p>	Same as alternative B

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
<p>Wildlife Observation and Photography</p>	<p>Continue to provide quality observation and photography opportunities daily on Wilna tract, and by reservation on the Hutchinson, Tayloe, Port Royal, and Laurel Grove tracts.</p> <p>Maintain 2.4 miles of trails and 9.21 miles of open road access to facilitate these activities. Complete Laurel Grove trail.</p> <p>Maintain existing benches, fishing pier, and overlook at Wilna Pond.</p> <p>Improve parking at Tayloe, Wilna, and Hutchinson and improve signage and access to information at these and the Port Royal and Laurel Grove tracts.</p> <p>Continue to provide general information on opportunity availability via various websites, guidebooks, and general refuge brochure.</p> <p>Continue to work with Friends group and volunteers to implement this program.</p>	<p><i>In addition to alternative A objective and strategies:</i></p> <p>Within 5 years of CCP approval, expand program by creating new, quality, self-guided opportunities. These include opening up 4 additional tracts to daily access (i.e. Hutchinson, Tayloe, Laurel Grove and Port Royal tracts); creating one additional trail at the Hutchinson tract; and, construction of 2 photography blinds (e.g. Wilna tract and other to be determined).</p> <p>Construct informational kiosks at Wilna, Tayloe, Hutchinson, Port Royal, and Laurel Grove tracts. Maintain roads and parking at newly opened tracts.</p> <p>Expand opportunities to newly acquired tracts where they are determined appropriate and compatible.</p>	<p>Same as alternative B</p>

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
Environmental Education	<p>Continue to facilitate the use of Wilna tract as an outdoor classroom for at least 3 visits/year.</p> <p>Support educator-led programs by maintaining the facility, materials and supplies, and providing a refuge orientation led by either refuge staff or volunteers.</p> <p>Work with Friends group and volunteers to implement program.</p>	<p><i>In addition to alternative A objective and strategies:</i></p> <p>Facilitate an increase in educator-led programs to at least 5 visits/year.</p> <p>Expand partnerships, and formalize relationships, with environmental education agencies such as Virginia Department of Conservation and Recreation, the Virginia Master Naturalist Program, the Virginia Department of Game and Inland Fisheries, and USDA Extension Service, as well as local educators and others with an established curriculum based on refuge resources.</p> <p>Support grant writing by others to fund programs.</p> <p>Encourage partner-led educator workshops to familiarize educators with the refuge and its role in migratory bird conservation.</p>	Same as alternative B

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
On-site Interpretation	<p>Continue to provide 6 informational signs at key refuge access points, and conduct at least 4 pre-scheduled interpretive talks or tours annually, on Wilna, Hutchinson, Tayloe, Port Royal, and Laurel Grove tracts.</p> <p>Continue to work with Friends Group and volunteers to help conduct interpretive programs and maintain facilities and materials.</p>	<p><i>In addition to alternative A objective and strategies:</i></p> <p>Increase interpretive programs to at least 6/year using Friends group and volunteers to help implement.</p> <p>Develop interpretive panels at Tayloe tract to explain the role that farming has traditionally played in wildlife conservation over the past century</p> <p>Work with Friends group to rehabilitate existing canoe access pier at Hutchinson tract. Also, support their efforts to seek outside funding for an interpretive canoe trail and brochure for this tract.</p> <p>Improve interpretation on all trails, and update outreach and education materials.</p> <p>Expand opportunities to newly acquired tracts where they are determined appropriate and compatible.</p> <p><i>In addition to alternative A objective and strategies:</i></p> <p>Increase programs to up to 10/year, reaching out to civic groups, conservation organizations, and community events.</p>	Same as alternative B
Off-site Interpretation	<p>Continue to conduct at least 5 off-site interpretive opportunities annually for civic groups, conservation organizations, and community events.</p> <p>Continue to work with Friends Group and volunteers to help conduct interpretive programs and maintain facilities and develop and distribute informational materials.</p> <p>Maintain refuge website.</p>	<p><i>In addition to alternative A objective and strategies:</i></p> <p>Increase programs to up to 10/year, reaching out to civic groups, conservation organizations, and community events.</p>	Same as alternative B

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
<p>Goal 5. Communicate and collaborate with local communities, Federal and state agencies, and conservation organizations throughout the lower Rappahannock River watershed to promote natural resource conservation and the mission of the National Wildlife Refuge System.</p> <p><i>Responds to Issues: How do we raise visibility of the Service, the Refuge System, and Rappahannock River Refuge in the local community? How do we increase community and elected official support for the refuge? How can we expand and enhance partnerships to help achieve refuge and regional conservation goals and objectives? What is our role in working with private landowners interested in land and habitat conservation?</i></p>			
<p>Elected Official Outreach</p>	<p>Continue to inform elected officials representing the 5 counties the current refuge lies within on an annual basis, or as significant issues arise.</p> <p>Make a personal appearance before respective board of supervisors to present an update on refuge activities.</p> <p>Continue to invite Federal, state, and local elected officials to participate in refuge events and attend guided tours that highlight important refuge resources or demonstrate important management activities.</p> <p>Contact members of Congress on a regular basis, either through personal visits or written briefings.</p>	<p>In addition to alternative A objective and strategies:</p> <p>Increase outreach to include elected officials in all 7 counties within the refuge acquisition boundary.</p>	<p>Same as alternative B</p>
<p>Community Outreach</p>	<p>Continue to conduct outreach in conjunction with interpretive programs under Goal 4.</p> <p>Continue to issue news releases on significant accomplishments, to advertise special events, and to announce major initiatives. Also, continue to maintain the website.</p>	<p>In addition at alternative A objective and strategies:</p> <p>Increase outreach in conjunction with interpretive programs under Goal 4.</p>	<p>Same as alternative B</p>

Refuge Resource or Program	Alternative A Current Management	Alternative B Service-preferred alternative	Alternative C Forest Emphasis
Private Landowner Assistance	<p>Continue to assist private landowners and other cooperators in controlling Phragmites on their lands.</p> <p>Assistance includes on-the-ground support, as well as seeking grants and other funding sources.</p>	<p>In addition to alternative A objective and strategies:</p> <p>Expand technical assistance capability to assist landowners on invasive species identification and control, wetlands protection, and habitat restoration and management.</p> <p>Seek funding to establish a private lands coordinator position to be stationed at the refuge to accomplish objective. Potential funding sources include grants, contributed funds, the Partners for Fish and Wildlife Program, and/or USDA cost-sharing programs.</p>	Same as alternative B
Inter-governmental Partnerships	<p>Continue to maintain the collaborative relationship with Federal, state, and local governmental agencies to meet natural resource mandates and objectives.</p> <p>Examples include providing office space for VDGIF, implementing the coop agreement with VDCR for invasive species control, and the MOU with Fort A.P. Hill for conserving lands of high wildlife value.</p>	<p>In addition to alternative A objective and strategies:</p> <p>Enhance our existing collaborative relationships, and seek additional ones, to increase likelihood of meeting resource mandates and objectives.</p> <p>Within 10 years, coordinate a forum of government agencies operating in the lower Rappahannock River watershed that have a natural resource conservation mandate, to share information and examine opportunities to advance future collaboration and cooperation.</p>	Same as alternative B